

A dark blue background with a network of glowing white lines and nodes, representing a network or data flow. A central orange rectangle contains the title text.

Collaborative research for a changing climate

Learning from researchers
and stakeholders in the ARCC
programme

Report prepared for the ARCC
Coordination Network by
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This report summarises research to assist the ARCC Coordination Network in maximising learning from six projects in the ARCC programme. Through interviews and discussions with researchers and stakeholders, the project drew out key messages from the project teams' experiences and reflections on working together: what supports good collaboration; what gets in the way; how to bring together and make sense of different types of information (e.g. technical, risk based, experiential and values) and communicate complex terms such as uncertainty and risk. The findings also have wider application to other research programmes and networks, both in the built environment and infrastructure sectors and beyond.

Please note:

We acknowledge that the term 'stakeholder' is problematic for many reasons (we are, of course, all stakeholders in adapting to a changing climate). We have tried out various other terms during the project ('practitioner', 'non-academic' and 'academic' stakeholder, 'end user', 'decision-maker'). No term was even close to being perfect so, in this report, we have decided to use the term 'stakeholder' to encompass team members that have been involved in the various projects who are not part of academic institutions. There are of course still blurry areas (e.g. research consultancies) but we hope this provides some clarity given that there is a pragmatic need to make a distinction.

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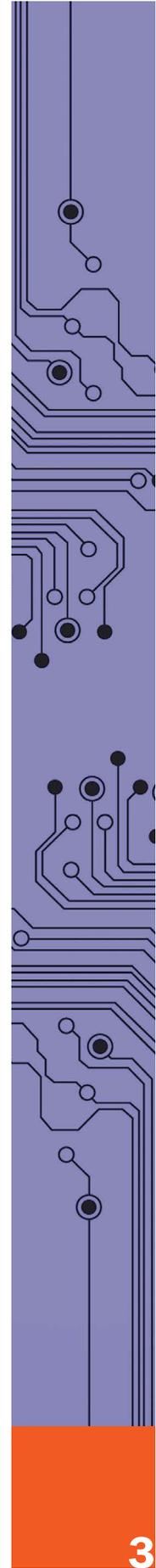
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Executive summary

The Adaptation and Resilience a Changing Climate Coordination Network (ARCC CN) was set up in 2009. Funded by the Engineering and Physical Sciences Research Council (EPSRC) and forming part of the Living with Environmental Change (LWEC) partnership, it is intended to promote collaborative work between researchers and stakeholders to enhance the overall impact of the research outputs within the built environment and infrastructure sectors. The roles of the ARCC CN are to:

- facilitate collaboration between research projects and with the broader research community;
- promote stakeholder and researcher participation;
- maximise the potential benefits of the research to all users through broadening engagement and targeted dissemination;
- facilitate the further exploration of related knowledge and knowledge gaps.

In order to contribute to wider understanding of what is required for successful and effective collaboration, the ARCC CN commissioned this review of six multidisciplinary projects (ARCADIA, ARCC-Water, BIOPICCC, DeDeRHECC, FUTURENET and SNACC) which focus on adaptation of buildings and urban environment infrastructure to a changing climate. The aims have been to capture the lessons learnt by the project teams and to help guide future collaborative efforts. The findings from the 37 interviews that were conducted with researchers and stakeholders across the six projects and with staff at the ARCC CN are relevant to other multidisciplinary and stakeholder-engaged research projects and networks, to overarching programmes such as LWEC with a broad remit across a range of subject areas, and to funding agencies with a responsibility to ensure maximum impact from funded research.

Nine themes were used to structure the discussions with interviewees and the report presents individual findings for these:

- motivations and drivers
- goals and expectations
- communication between researchers and between researchers and stakeholders
- communicating complex language and terms
- making the research relevant to end users
- deciding who to work with
- personal qualities and skills needed
- the role of the ARCC CN
- practical considerations to bear in mind.

The interviewees were generous in their time and their reflections on the successes and problems involved in building collaborative research between different academic and professional disciplines and interests and between the individual projects themselves. The ARCC CN activity sits within and contributes to a wider context of such programmes of research. With that in mind, the review also took account of previous learning from Building Knowledge in a Changing Climate (BKCC), a predecessor to ARCC CN.

The conclusions emphasise the learning of ARCC CN participants as to the importance of;

- attending to both the tasks of the project and the team undertaking the work;
- going beyond 'classic' stakeholder engagement and making best use of expertise in the team;
- discussing project goals and expectations throughout the research, to ensure coherence of the final output;
- allowing room for movement in the project plan, in recognition that circumstances and context will change during the project lifetime ;
- going beyond simple knowledge exchange to embrace broader practices of knowledge creation, discovery, mobilisation and brokerage, as appropriate to the collaborative research;
- nurturing goodwill;
- making sure it happens, by investing project time and resources in planning for, engaging in and reflecting on processes of collaboration.

Although the recommendations contain specific suggestions for researchers, for non-academic stakeholders, for the ARCC CN and for funding bodies, because the focus of this review has been on engagement across the boundaries, all recommendations are offered for the attention of all of these audiences.

Recommendations for researchers

- Invest time and support in 'glue' tasks and people, that draw together disparate elements and bridge the disciplines and the academic-practitioner boundaries.
- Because organising meetings among researchers and with stakeholders is time consuming, where possible arrange for this to be seen as a distinct role, for someone with the right skills.
- Accept that there will inevitably be changes during the research period e.g. in policy focus, interests of stakeholders, direct experience of extreme events, continuity of personnel etc. Ensure flexibility by building in strategies to minimise the disruption and identify and exploit the new opportunities these changes bring.
- Be clear about the research boundaries, or be open to them still being under discussion: where there is flexibility and where things are fixed. Be prepared to restate these as needed (e.g. through a diagram), to ensure that everyone is aware and shares realistic expectations.
- Begin open discussions with your stakeholders as early as possible, and continue to explore and monitor your own and their motivations, expectations and tensions – and be clear about the full range of stakeholders and the roles they might play in your research and in enhancing its impacts.
- At project meetings, as well as discussing the specific tasks of the team, allow time to address issues around the operation of the team itself. For example, these might help to address:
 - » How well team members are communicating and how this might be improved;
 - » Misunderstandings that may have arisen as to the scope and purpose of the work or expectations of engagement and how this relates to its relevance and usability;
 - » Changes in personnel and how these might be dealt with;
 - » Opportunities for 'quid pro quo' activities with stakeholders, for example to help them build the case for their continuing involvement.
- As a project team with your key stakeholders, aim to look beyond knowledge 'exchange' to 'knowledge discovery' and broader aspects of generating knowledge together. Ask yourselves 'how can we best go about creating new knowledge through this collaboration?'
- Be prepared to spend time exploring the perspectives, assumptions and language within all parts of your team – including your key stakeholders. Avoid being overly prescriptive of what this will involve and make full use of the skills and qualities within your team. Capture the process and the points of agreement and disagreement along the way, as part of your project learning.

Recommendations for stakeholders

- Clarify early on, and revisit with the researchers: their expectations and what they are offering; what you and your organisation want from the research itself and from the process of engaging in it; and what you can and cannot contribute.
- Be realistic about how much you can offer in terms of input and how you would like to offer it. Do you prefer to be involved on a regular basis, scheduled in advance? Or would you prefer the opportunity for more informal contact when you and/or the researchers identify a need?
- Maintain the dialogue with the research team throughout the project; and with the ARCC CN and other stakeholders in your own and related projects, where possible.
- Be prepared to ask questions if you don't understand the language or particular terms being used and constructively challenge the research if you can't see the relevance of the task or even the application of the overall research question.
- Develop informal, quid pro quo arrangements to gain support from the research team in: making the case for engaging your organisation and colleagues; maintaining your organisation's commitment; delivering practical assistance for your work on adapting to a changing climate; your own or colleagues' professional development.
- When internal changes or external pressures are likely to affect the continuity of personnel for the project, seek to enhance the transfer of learning from the engagement, so as to ensure the benefits for your organisation and for the project.

Recommendations for ARCC Coordination Network

- Encourage new teams to pay attention to the key messages from this report, particularly around team management issues as well as research task management.
- Explore with research teams, stakeholders and funders the potential for formal arrangements to support:
 - » stakeholders e.g. through contracts, payments, continuing professional development and other benefits in return for their collaboration;
 - » researchers e.g. through short notice funding for emerging engagement and dissemination activities within or between projects, early career events and programmes etc.;
- Identify stakeholders (who may already be involved in a number of projects) who can play a 'cross-pollinating' role: informing projects of what is emerging from the others; providing an overview of what is emerging in the network as a whole; and advising on key messages for dissemination and ideas for future research. Ideally, this role should be funded.

- Focus ARCC CN coordination on those activities most valued by researchers and stakeholders, which challenge them to improve dialogue, and which build lasting links between projects. For example, critiquing and distilling key findings from similar projects helps to make the findings as useful as possible to the end user without them having to spend time delving into different projects.
- Continue to investigate with researchers and stakeholders the impact of ARCC CN support on both individual project success (before, during and after) and the wider collective success across the Network and ways to improve ARCC CN's own offer to them and the funders.

Some thoughts for research funders

- Explore the possibility of funding stakeholders to participate in research of this kind.
- Be open to the opportunities and the added potential for creativity, learning and innovation that arise from allowing the research to emerge and change over the period of the grant. By accepting this, acknowledge that while it may not be possible to so clearly define all outputs and impact at the beginning of the project, the potential level of impact is likely to be considerably greater at the end.
- In order to improve impact, allow access to additional funds at the end of successful projects, for extra time to maximise the potential impact of their outputs just as the greatest learning is emerging.
- Provide funds to the coordinating networks to allow for stakeholders with a wide interest across the research network to evaluate the key messages emerging from all the projects and provide their insights on future research areas to investigate.



1. Introduction and aims of the work

1.1 Adaptation and Resilience to a Changing Climate Coordination Network

The ARCC CN was established in 2009, funded by the Engineering and Physical Sciences Research Council (EPSRC). Part of the Living with Environmental Change (LWEC) partnership, it is a contribution to the LWEC Infrastructure Challenge, which aims to make infrastructure, the built environment and transport systems resilient to environmental change, less carbon intensive and more socially acceptable. More information about the ARCC CN and the individual research projects can be found on the ARCC CN website www.arcc-cn.org.uk.

The network is intended to create collaborations and synergies between the individual research projects; to increase the 'societal relevance of the research by improving the involvement of end-users in the research projects and in their uptake; and thus to ensure that the portfolio of projects is greater than the sum of its parts'. More specifically, the roles of the ARCC CN are to:

- facilitate collaboration between research projects and with the broader research community;
- promote stakeholder and researcher participation;
- maximise the potential benefits of the research to all end users through broadening engagement and targeted dissemination;
- facilitate the further exploration of related knowledge and knowledge gaps.

The six ARCC projects consulted during this work – ARCADIA, ARCC-Water, BIOPICCC, DeDerHECC, FUTURENET and SNACC – focus on adaptation of buildings and urban environment infrastructure to a changing climate, including transport and water resource systems. All six projects started in 2009, involve multi-disciplinary teams of researchers and, to help enhance the impact of the research, include active collaboration with stakeholders to help identify evidence needs, to set the project direction and to ensure research outputs are relevant to end users.

These projects are now nearing completion and have gained considerable experience in developing and managing collaborative activities between researchers, between researchers and stakeholders and with other projects as part of the ARCC CN. To help maximise the learning from this experience and to contribute to the wider understanding of what is required for successful and effective collaboration, the ARCC CN commissioned the work summarised here, with the aims of capturing the lessons learnt by the project teams and helping guide future collaborative efforts. Although the key findings and recommendations in this report are derived from ARCC projects with a focus on the built environment and infrastructure sectors, they are relevant to other multidisciplinary and stakeholder-engaged research projects and networks, to overarching programmes such as LWEC with a broad remit across a range of subject areas and to funding agencies with a responsibility to ensure maximum impact from funded research. During the interviews, many researchers and stakeholders offered their experience from previous research activities, in addition to the ARCC projects under discussion.

1.2 Why is good collaboration important?

For new tools and scientific and technological solutions to the challenges of climate change to become absorbed and implemented in mainstream decision making, they must involve and be relevant to the people who need to use them. Participation between researchers and stakeholders brings, in theory, a wealth of experience which can save time and money, bring extra value, enhance project momentum and result in more widely applicable outputs. However, in practice participation is not always straightforward and tensions between differing motivations, timescales and unclear expectations may, if not attended to, increase the gap between academic understanding and practical insight and experience. It is therefore critical to learn the lessons that emerge from the teams undertaking projects such as those described here, in order to make future collaborations practical, realistic and effective.

The value of the skills and approaches identified in making stakeholder engagement effective is not peculiar to climate change adaptation. To a large extent, what is stated here is simply good practice for any collaborative approaches and would thus benefit all research that aims to inform practice. However, that the need for effective collaboration is paramount in the context of adapting to a changing climate (and simultaneously responding to many other changes), given that we are moving into the unknown and need to learn quickly about what makes sense at a practical level. Practice on adaptation has demonstrated that provision of information alone rarely leads to effective change. Adaptation research, to be relevant and to effect change, requires us to work collaboratively, see things from others' perspectives and understand and align with their priorities.

1.3 Scope of this review

In total, 35 interviews were conducted with participants in the six projects (21 with researchers and 14 with stakeholders, with some additional email feedback); two interviews were also conducted with staff at the ARCC CN.

The purpose of this review was to investigate the various project teams' experiences and reflections on working together, on what supports good collaboration and what gets in the way; and on how to bring together and make sense of different types of information (e.g. technical, risk based, experiential and values) and communicate complex terms such as uncertainty and risk. To this end, although there were differences in detail between the questions asked of researchers, of stakeholders and of ARCC CN staff, all of the interviews focused on: their overall experience of the project and of being engaged in it; what in their view constitutes good and poor collaboration in research, and how this project fits in such a spectrum; their motivations and drivers for being involved, and perceptions of others' motivations; experience within the project of understanding and communicating complex terms in the field of climate change, such as risk and uncertainty. Interviews were mostly conducted on a one to one basis, although there were also two group interviews. 16 of the interviews took place face to face and the rest were conducted over the phone. They generally lasted between 45 minutes and 1.5 hours. They were recorded using a voice recorder and transcribed. The following emerging themes were then used to interrogate the material and prepare the report:

- motivations and drivers
- goals and expectations
- communication between researchers and between researchers and stakeholders
- communicating complex language and terms
- making the research relevant to end users
- deciding who to work with
- personal qualities and skills needed
- the role of the ARCC CN
- practical considerations to bear in mind.

Further information on both the network and individual research projects can be found on the ARCC CN website: www.arcc-cn.org.uk

Project	Primary focus	Number of researchers interviewed	Number of stakeholders interviewed
ARCC-Water	Water system resilience	3	3
ARCADIA	Adaptation and resilience in cities	3	1 (+ email feedback)
BIOPICCC	Health and social care system resilience for the well-being of older people	5	5
DeDeRHECC	Increasing the resilience of existing hospital buildings	2	2
Futurenet	Resilient transport networks	2	1
SNACC	Adapting suburban neighbourhoods	6	2
TOTAL		21	14 (+ email)

NB: In addition, 2 interviews were conducted with ARCC CN staff.

1.4 Building on previous work

The work builds on a UKCIP internal review by Alex Harvey¹ in 2008 on lessons learned from his review of projects in the Building Knowledge for a Changing Climate (BKCC) programme (ARCC's predecessor, also funded by the EPSRC). Like ARCC, the BKCC programme was designed as a joint initiative to stimulate multi-disciplinary research on the impacts of climate change on infrastructure, the built environment and utilities, bringing together researchers and decision-makers. Its primary objective was to 'inform stakeholders on how to adapt successfully to the impacts of climate change'. Key messages from the BKCC review were:

While there was a prevailing positive view of BKCC, nearly all the interviewees commented on the inevitable tensions that exist when different groups with different objectives are involved in the same project. This was borne out by the challenges expressed by researchers and stakeholders:

- academics' challenges tended to stem from 'unrealistic' stakeholder expectations and demands.
- stakeholders emphasised that projects often did not go far enough in addressing end user concerns or providing for end user needs.
- stakeholder participation ranged from having full participation, providing important expertise and knowledge to the project; to being consulted; or to being relatively passive recipients of information.
- stakeholders expressed dissatisfaction in projects where they had little influence due to pre-determined objectives and where the capacity for stakeholder influence was limited. It was also mentioned that, for some, consultation was like having information "sucked out of them," with little return.
- the important role that personality plays was emphasised both in facilitating effective participation and creating barriers to stakeholder participation.
- informal outcomes such as useful learning, capacity building and involvement in subsequent projects were reported by several stakeholders. In some cases this was valued over the formal outcomes.

The BKCC aim to 'inform stakeholders how to adapt successfully to the impacts of climate change' was met in some projects but not in others.

Given the similarity of the aims of this review of projects in ARCC's predecessor programme, it was thought useful to compare its messages with those coming out from the present review. How have things moved on in the last five years? Are the current projects aware of and addressing tensions related to different motivations and expectations? Does personality still play a key part? Do the recommendations made still apply today? Are we learning how to 'inform stakeholders how to adapt successfully to the impacts of climate change'?

Unlike the BKCC review, this review also explored, in some depth, project teams' experience of language: particularly complex, scientific terminology and commonly used and commonly misunderstood terms such as 'risk' and 'uncertainty'. What can we learn about how the teams – consisting of researchers from multiple disciplines, practitioners and decision-makers – made sense of such information from their different perspectives and how the team developed a shared understanding?

¹ Available to download from the ARCC CN website www.arcc-cn.org.uk/wp-content/pdfs/Evaluation-BKCC-portfolio.pdf

2 Summary of key messages

This section provides the key messages that emerged from the interviews. The subsections respond to the nine areas used to focus the interview discussions:

- acknowledging and working with different motivations and drivers
- clarifying goals and expectations
- communicating between different parts of the project team
- communicating complex language and terms
- making the research relevant to end users
- deciding who to work with
- personal qualities and skills needed
- the role of the ARCC Coordination Network
- practical considerations to bear in mind.

2.1 Acknowledging and working with different motivations and drivers

- The overwhelming motivation reported by researchers for participating in these projects was to be able to provide useful outputs or engage industry decisions makers and practitioners in a process that was useful to them. There was a strong sense that this kind of research would not be possible without the genuine partnership of professionals grounded in their own practice and policy contexts who could provide feedback on what was realistic at a pragmatic level. The research simply ‘wouldn’t make sense without it’. The participation of grounded practitioners was essential at each stage of the research process to shape it, guide it, ‘ground truth’ it, develop useful outputs and disseminate these outputs to those who could use them.
- Stakeholders were motivated to participate because the research questions were of direct interest to their work but they had not yet been able to address these themselves – or address them fully – due to lack of resources, expertise or time or a vaguer sense of not quite knowing how to get started. They anticipated that participating would give them an opportunity to share their knowledge and experience and ensure the research was grounded in reality. Increasingly, adaptation is being seen as something that organisations need to be addressing and with this there is a desire for methodologies, tools and resources that can be used to make sense of what responding well to a changing climate means. Many stakeholders thus hoped they would get access to useful tools and approaches that would inform their current work. Some saw participation as an opportunity to pursue their personal interest in the subject and raise its profile in the organisation; some even spoke of ‘becoming a champion’ for it. This was perhaps something they had not previously had much space or support to do, or do effectively.
- For most teams the multidisciplinary and interdisciplinary nature of the project teams was a fairly comfortable and familiar way of working; they were prepared to put in substantial amounts of time to share differing perspectives on the work and on how it should be undertaken in order to build joint understanding of the overall plan. For some it was a less familiar but usually welcome aspect of the work that gave them an opportunity to learn about new ways of thinking and new skills. For a few projects the multidisciplinary nature worked less well, as there was a lack of ‘glue’ in the project: either glue people or tasks that had a remit to make sure that different aspects were brought together. Thus the different disciplines and their related activities remained separate and failed to become much more than the sum of some rather disparate parts.
- The researchers were aware that tensions might arise between the different parts of the project team due to different motivations. “The important thing to remember is ‘Don’t delude yourself that you’re on the same mission.’ Be honest with each other that your endeavours will be somewhat aligned but not completely aligned.”

- It is a good idea for researchers and stakeholders to have open discussion about different motivations for participating at the start of the project, which can be revisited during the project in order to monitor progress. This obviously requires that the team put time and resources into attending not only to progress on the tasks of the project but also to the way that the team as a whole is operating and the satisfaction of the individuals within it. Quid pro quo arrangements were used in a number of the projects as a way of offering 'in kind' payback: for example, extra information, access to modelling software, writing a report or even running workshops to meet stakeholder needs, even though these were beyond the stated remit of the research for the project. Both stakeholders and researchers suggested that stakeholders could be rewarded financially for their input and that this was something that should be explored in future work, especially in the light of the cuts due to the recession.

2.2 Clarifying goals and expectations

- The interviews suggest that often there was no open discussion at the beginning of the project about the expectations of the researchers and stakeholders. Assumptions were sometimes made but left unchecked and ultimately unfulfilled, leading to dissatisfaction with the process and perhaps unwillingness to participate in similar projects in the future. Sometimes the level of input expected was more than the stakeholders had anticipated and this occasionally became difficult to manage, especially as resources dwindled or people were made redundant.
- Some projects did include an up-front discussion at the beginning as to what could be expected, which could be revisited as new things emerged in the project or in the external world. In some cases, this discussion was prompted by specific requirements (e.g. a need to satisfy ethics committees, when working with certain vulnerable groups) or for certain types of research, specifically action research. Some teams felt that clear, upfront messages of what could be expected would be useful as it would help both researchers and stakeholders to understand which stakeholders could contribute and benefit. Clarity also helps to avoid or reduce stakeholder fatigue, forces both sides to be realistic about what is actually manageable and provides a baseline to monitor progress over time.
- Even where researchers say that stakeholder engagement is critical to the work, they can find that their best intentions to engage stakeholders in various ways in the work cannot be met as deadlines loom. One team suggested that their lack of clarity about expectations worked to their advantage as it meant that they had made few commitments and could thus be quite flexible in how they worked.

2.3 Communicating between different parts of the project team

- Maintaining an on-going dialogue between the various parts of the team was seen as the best way to share thoughts, check progress and reduce the risk of major misconceptions arising. This allowed them to establish effective working relationships: to iron out misunderstandings and state different views before the work became too set in stone. This applied as much to communications within the research team as between the researchers and non-academic stakeholders. Some felt it was important to formalise communication (for example, how frequently and through what means), in order to “be clear about what was OK in terms of communicating.” Poor and infrequent communication could be especially frustrating for the stakeholders and also for researchers.
- Face to face meetings and workshops, although time consuming, were thought to be the best way to explain the work, push it forward, interrogate it and build understanding in ways that are not possible by email or through written reports.
- Some researchers felt that there had to be a balance between getting feedback on all aspects the work and being realistic about what could actually be changed, due to the timeframe, the expertise the project had access to or other constraints. Some were more confident in expressing the boundaries of their project and what was realistically possible or reasonable for the stakeholders to influence.
- As well as asking questions for clarification, part of the work was about discovering better questions to be asking in order to move the work forward to the next level. Researchers were clear they wanted to move beyond ‘polite’ feedback; many felt they were happy to be challenged and receive critical feedback of their work. Developing authentic relationships where people can speak openly and honestly without fear of causing offence is highly valued; creating an environment where real conversations about the work can take place and a high level of understanding developed. It also breaks down barriers of ‘expert’ and ‘practitioner’ stereotypes and allows everyone to be an expert, a practitioner and a learner.
- By not being rigid in how they defined engagement, some teams were able to make very good use of opportunities along the way: to make new connections to people, organisations, other networks and policy initiatives etc. This ability to make the most of emerging opportunities requires a certain outlook and set of skills, which were certainly used to their advantage by some teams. The flexibility in this approach allowed them to respond and exploit changes and maximise the effectiveness of their output through good connections and targeting efforts most appropriately at any given point.
- The phrase ‘go the extra mile’ was used on several occasions to illustrate stakeholders’ and researchers’ experience of their projects, where people did things significantly above and beyond what was expected.

2.4 Communicating complex language and terms

2.4.1 Communication within research teams

- Language barriers may extend from a simple lack of familiarity with technical terms in different disciplines to mistaken assumptions that ‘common’ terms have the same meanings in these disciplines. The problem may extend further still, to underlying differences on how far language can ‘fix’ understandings of the phenomena the project is dealing with; as one interviewee commented ‘When you’re talking about language it’s an inherently much more slippery thing. And that’s just the way it is, at least for me as a social scientist’. It may be possible to develop a richer understanding of collaborators’ language on complex terms through defining them in common ways or else adopting metaphors that translate at least a sense of the different perspectives in each discipline.
- Developing mutual understanding in a team can take time; many researchers spoke of taking as much as 18 months, in parallel with other work on the project. Activities included one-to-one discussion, technical meetings, experimenting with writing glossaries, and flexible, informal space for open discussion. This phase also benefited from flexibility, open-mindedness, asking questions when confusion arises rather than deferring, using humour, recognising that the team may be able to operate with different understandings of ‘risk’ etc.; and accepting that this does take time.

2.4.2 Communication between research teams and stakeholders:

- Some researchers suggested needing to accommodate stakeholders’ own understandings of (and ways of dealing with) ‘risk’ etc. within the context of their work. Conversely, some felt that stakeholders still “want one answer” despite the uncertainty inherent in future climate change.
- In researchers’ perspectives, engaging stakeholders with these terms can be problematic and may lead to misunderstandings over the sorts of information that researchers are looking for, as well as to what they can provide; including stakeholders’ reservations over the reliability of project models in application. It can be hard to resolve these in short stakeholder events, with people taking away different understandings.
- In stakeholders’ perspectives, some emphasised the need for them to translate project messages for their own colleagues or stakeholders; that decision-makers often have very little time to focus on these issues; and uncertainty can cause people to disengage, even though it can be beneficial where people are willing to acknowledge it.
- Some stakeholders commented on ‘academic’ approaches with multiple definitions of words such as ‘resilience’, whereas approaches among practitioners may be more pragmatic, and governed by regulatory definitions. Others, however, recognised value in discussions around meanings: sometimes of direct value to their work, for example in developing a common understanding of ‘sustainability.’

- Researchers' approaches for communicating with stakeholders included: being clear about limitations; being flexible about the level of technical language; drawing on the different knowledge within the research team when communicating with stakeholders; having professional communications support for projects; exploring routes such as films and road shows, as well as technical metrics for developing and communicating project messages. When communicating with local communities, researchers raised ethical considerations around discussing possible climate impacts on specific areas or properties.

2.5 Making the research relevant to end users

- Obviously, not all stakeholders want to play the same roles in the research process or want the same thing from their engagement; thus there is unlikely to be a common idea about what would make the outputs relevant. For some, relevance related to the format, language and accessibility of the output but for others it was something less tangible, partly related to the experience of having been through the project. Different ways are thus needed to communicate with stakeholders to meet their needs, if the work is to be relevant to them.
- A simple way for the research team to keep the relevance of the work in mind was to keep asking "what is the value for the stakeholder?" when considering each task or event. This applies at each stage of the research process.
- 'Knowledge exchange' is a commonly used term to describe the sharing of knowledge and experience, which is often seen as a useful aspect of these kind of stakeholder–researcher projects. However, as some interviewees pointed out, knowledge discovery or co-creation might be a better way to describe what can happen and the desirable goal of such work. In knowledge discovery, participants not only learn from each other but also co-create something new through the process of sharing their knowledge and experience.
- Some saw that a clear articulation and understanding of the goals was important, to remind people of the boundaries of the work and what was possible or not. Some researchers and stakeholders were unsure how clearly these had been articulated, and whether this was a problem.
- The policy environment changes over time, as do other factors, such as stakeholders' ability to access resources and take time to attend meetings, or experience of a recent event affecting their lives e.g. heat wave or flood. It is thus not surprising that stakeholders' interests and priorities may, quite reasonably, change over the duration of the project. So there is clearly a need for flexibility in how the research process is managed, to allow for such changes and ensure that outputs remain relevant.
- A key factor in how well the work comes together is the closeness of the research teams, and a few mentioned interdisciplinary 'glue': people or tasks that ensure that the teams talk across their discipline boundaries, in order to create something that links the disparate parts to create a whole entity at the end.

- How the research outputs are disseminated is clearly important for ensuring the work has wide impact and reaches the relevant end users. However, many researchers described this stage as rather fraught, coming at a time when they are trying to complete their tasks, draw various sections together across the research, and think about what they might be doing next. There was a concern that having time to think up imaginative ways to disseminate the work to create maximum impact could get side-lined. To avoid this, some interviewees felt that a new influx of resources at this point would enable the team to stay focused. This could be in the form of finance or a person whose role it is to draw out messages and think of audiences and routes to reach them.
- A common response from stakeholders was that the research was relevant when there was a close alignment with their organisation's interests and goals (and sometimes to their own interests and goals within that organisation). Some recognised that although the research questions did not feel relevant to their day to day operations, they might become relevant in the future. Participating thus allowed them to explore things related to but slightly outside their normal remit. Knowledge transfer and secondments – either as part of the research process or somehow linked to it – might be a good way to embed learning, understand the opportunities and constraints of organisational life and create new ideas and knowledge through the process.

2.6 Deciding who to engage

- There is a balance between engaging all the people who might be able to usefully guide the work and the time and resources needed to do this. Identifying the right organisation(s) to work with is important; as is the right person within that organisation, especially when it is large and has many departments that may not communicate well.
- Who constitutes the 'right person' is, of course, partly dependent on what they are to contribute. Giving feedback on model data is clearly a different role to using the outputs to influence policy. Stakeholders play a huge number of different roles in research² and this was true in these projects; although in some cases there was a sense that their roles were limited to providing feedback or data. Where a good relationship was built, there could be considerable creativity in the different roles, tailored to the situation as it emerged and the skills of the particular individual. Many reported this to be more satisfying than only contributing to the project's progress meetings.
- A number of people suggested having a dedicated person administering the stakeholder engagement role, probably on a part time basis, because of the considerable amount of energy and time this important role took up.

2 For more information on this see Carney et al (2009), *A Dynamic Typology of Stakeholder Engagement within Climate Change Research*, Tyndall Centre Working Paper 128.

2.7 Personal qualities and skills needed

The word 'goodwill' came up for a number of projects as something that people felt had characterised the nature of their team. The existence of this goodwill, based on respect and appreciation of colleagues, stood them in good stead in getting through misunderstandings, differences of opinion and other frustrations that research sometimes throws up, and had encouraged teams to 'go the extra mile'.

Other qualities that were identified as particularly important for this kind of research were:

- Patience – to explain things that might be obvious to you but might not be obvious to others;
- Open-mindedness – to others' ideas and perspectives, and to the possibility of being wrong;
- Flexibility – able to 'create a bit of room for movement' in the work to make the most of opportunities and to absorb feedback;
- Confidence – able to express opinions and engage in discussions;
- Appreciative and respectful of others' contributions – feeling valued and that their voice was 'of equal weight' was something that a number of stakeholders mentioned as being good about the project they engaged with;
- Personal interest and ambition – seeing and using opportunities to develop the work, and their own role in it;
- Pragmatism – a "how are we going to make this happen?" attitude;
- Persistence – making sure the necessary things happen even when there are setbacks.

The skills identified as being important were:

- Able to relate the work to the bigger picture – understanding the influences of the wider system around the research questions;
- Able to drive knowledge exchange – seeing this as valuable and using their influence to do this;
- Good teamwork skills – co-operative, banding together when one of the team needs help and getting on at a social level;
- Able to juggle various demands – and know when to compromise;
- Good relationship-building skills – 'engaged scholarship' is an idea from the USA that to be a successful scholar you probably have to show that you can do good stakeholder engagement whatever discipline you're in, because it is part of effective research;
- Good time management skills – to allow the different elements of the project to dovetail together and prevent hold-ups;
- Good leadership skills – to "build an atmosphere of respect among diverse consortia";
- Good communication skills – to articulate the messages at the right level in the right language;
- Good people skills – to make sure everyone is happy and working to the best of their ability.

2.8 The role of the ARCC Coordination Network

- Many researchers reported positive experiences of ARCC CN activities, including publications, information on the ARCC projects and programme events. Of particular value were: ARCC CN's direct support, including project dissemination events; ARCC CN taking research findings from projects into discussions or reports to government; and the approachability and help of ARCC CN personnel.
- Many researchers commented on the benefits of being part of the wider network of ARCC projects, including access to each other's' advisors and other stakeholders and the communication across projects.
- However, some researchers reported poorer experiences. In some cases, these related to the different scope or scale of their projects to others in the programme thus limiting the additional value from cross-project activities within the network. Others related more to perceived expectations on them as to particular approaches to stakeholder engagement and thus demands on researchers' time.
- Some commented on benefits they had expected but had been disappointed. For example, common data management was one area for possibly enhancing the role of the network. Another opportunity was for more cross-project events, including sessions to help early career researchers, or to bring together the social scientists. Many suggested that additional funding or support for dissemination would help to exploit opportunities at short notice or over a longer period towards the end of projects.
- Stakeholders also commented positively on the value of the cross-programme conferences, both for the information these provide and for the exposure to the other projects. Suggestions for improvements via an expanded network in the future included: 'contracts' to clarify the stakeholders' roles, with funding to support their time on the projects; stepping back from the individual ARCC projects to examine what could be 'greater than the sum of its parts'; a mechanism for practitioners to feed in how they are applying outputs from the projects.

2.9 Some practical considerations

- Redundancies due to the recession, as well as natural staff transition, meant that there was a greater than usual problem with continuity and loss of institutional memory between the research teams and the organisations with which they were collaborating. Most of the projects had some experience of this. For some it meant that different people turned up to each meeting, often not well briefed and requiring the researcher to have to 'start from scratch' each time. Sometimes, in large organisations, messages did not get through to the right people and this led to delays.
- Many stakeholders felt that the recession would restrict their capacity to engage in the future. It thus becomes increasingly important to be able to sell the benefits of engaging. Some emphasised that the problem is not that they are not interested, but simply that they don't have as much time.

“At the exact point where academia has finally got the impact message and it’s suddenly become important and we’re being judged on it, internally it’s getting harder to do it because we don’t get resources to do it and our external partners are finding it harder to do it as well. So, knowledge exchange and impact – everyone agrees we should be doing much more of it and nobody’s willing to resource it.”

- Choice of venues and locations for meetings is important. Although obviously it is impossible to select a place that will be perfect for everyone, it may be useful to use a range of locations, so that everyone feels equal participant in the project – a genuine network rather than a hub-and-spoke model. In addition, using neutral venues, such as conference centres, rather than academic settings can also help to create a more comfortable atmosphere for equal collaboration.

3 Conclusions

This review has engaged a significant proportion of the researchers, stakeholders and network coordinators involved in six ARCC CN projects from the last three years. They have been generous in their time and their reflections on the successes and problems involved in building collaborative research between different academic and professional disciplines and interests and between the individual projects themselves. The ARCC CN activity sits within and contributes to a wider context of such programmes of research on adaptation and resilience to a changing climate and this review was commissioned to make learning and recommendations available for future research efforts. With that in mind, the review also took account of previous learning from the BKCC predecessor to ARCC CN, and the following conclusions make reference to them (see section 3.2).

3.1 Lessons from this review about what it takes to manage collaborative research on adaptation

The seven points that follow attempt to draw together the themes emerging from this work, particularly building on aspects of managing those collaborations that worked really well. Phrases from the interviews are used in some of the subsection headings to characterise what is meant by the theme.

3.1.1 Attending to both the project tasks and the team undertaking the work

For some project teams, there was a good balance between ensuring that the research tasks were on track and that the team itself was performing well: for example, that members of the team were communicating well, clearing up misunderstandings when they arose, able to ask for clarification etc. They understood that it was important to spend some time attending to the maintenance of the team.

For others, such maintenance issues were left unspoken, unchecked assumptions were made about what was to be expected, ; sometimes, team meetings were focused on the research tasks, although team members might voice frustrations outside it. To illustrate what sort of things might be considered as ‘maintenance’ Table 2 – taken from other work³ – gives examples of task functions and maintenance functions which help to ensure effective team work. For a work group to be successful and achieve its goals there has to be some time to address maintenance issues and check out any assumptions in the group as the project proceeds. This will help to ensure that people are happy e.g. with the level of communication, the support they receive from other team members etc.

Barriers to attending to the team’s maintenance issues exist where meetings are taken up with ‘urgent’ tasks, allowing little time for reflection; as only the tangible, factual, pragmatic aspects of the work are focused on, other aspects are ‘undiscussable’ and people respond defensively if such things are raised. Where it works well, there is a respect for difference and valuing all inputs, a desire to discover new ideas and knowledge, a willingness to be wrong and ‘not know’ something and an ability to place the research in a wider context and see how it links to other things. A constant questioning of fundamental assumptions about how the team operates would clearly interfere with progress. However, paying no attention to such things could reduce the capacity of the group for creativity and innovation.

Table 2: Functions needed for effective team work	
The lists below describe the functions needed for a team to achieve its short or long term goals (task functions) and to build and maintain the group as a working unit (maintenance functions).	
Task Functions	
Initiating, coordinating, developing method	Propose tasks and goals, define problems, and suggest procedures, solutions, and ways that different issues may be handled. Give direction and purpose, adjusting or harmonizing issues that may cause conflict. Suggest an agenda or order of business, where to go next.
Seeking information/opinion	Make group aware of need for information by requesting relevant facts or asking for clarification. Ask for feelings or opinions to seek group opinion and test for consensus.
Giving information or opinion	Offer relevant facts, avoiding reliance on opinion when facts are needed. State feelings or beliefs, evaluating a suggestion as a basis for group decision.
Clarifying, elaborating	Eliminate confusion and reduce ambiguity by defining terms, interpreting ideas, giving examples, developing meanings, and explaining.
Summarizing, testing for agreement	Pull together ideas and related issues, showing contradictions, defining common ground, noting progress, stating areas of agreement and asking if agreement is possible.
Acting as “philosopher-critic”	Draw general statements from specific ones, critically examining underlying assumptions and ideas.
Evaluating	Measure accomplishments against goals, noting progress and blocks and providing a sense of progress in line with goals.

³ Source: Quaker Peace Action Caravan. *Speaking Our Peace: Exploring Nonviolence and Conflict Resolution*. London: Quaker Peace & Service, 1987, 55.

Table 2: <i>continued...</i>	
Maintenance functions	
Harmonizing, mediating	Conciliate differences, offering compromise to reduce tension.
Encouraging	Accept others' contributions and opinions, being friendly, warm and responsive to others. Give others recognition
Expressing feelings	Call group attention to reactions to ideas and suggestions by expressing own feelings and re-stating others' feelings.
Checking environment	Ensure physical surroundings are assisting group. Check refreshments and furniture arrangements. Check heat and light levels.
Relieving tension	Make relaxing comments, joke, clown around, call for breaks.
Compromising	Maintain group cohesion by offering or accepting compromise, yielding status, or admitting error.
Assisting communication	Provide stimulating, interested audience for others, accepting ideas and going along with the group. Draw out silent members, and suggest procedures for discussion. Listen to, explain, and interpret what others have said.
Setting standards	Help group be aware of direction and progress. Express the group concern, suggesting tasks and stating standards for the group to achieve.

Source: Quaker Peace Action Caravan. *Speaking Our Peace: Exploring Nonviolence and Conflict Resolution*. London: Quaker Peace & Service, 1987. 55

3.1.2 Going beyond 'classic stakeholder engagement' – making best use of expertise in the team

'Classic stakeholder engagement', as described by one interviewee, is 'tokenistic', a 'tick box exercise' and 'focuses on data extraction only'. Classic stakeholder events might be events with '40 people in a room', where presentations are made by the research team but there are few opportunities for real discussions of the work. People in the audience are not sure why they are there and the research team do not know either. Although this extreme was not reported in the ARCC projects interviewed here, there were examples of a lack of a real connection with the work: situations where there were few or inadequate opportunities for stakeholders to query the research, give feedback or guidance to shape it and share their knowledge and experience appropriately. Although highly experienced people are participating as stakeholders, opportunities for them to share their knowledge effectively are sometimes missed.

Many of the researchers interviewed were concerned about 'overuse' of their stakeholders, but some stakeholders felt their skills and expertise were being significantly underused in the projects they were engaged with. Approaches that use their key stakeholders creatively, with input tailored to that individual and responding to issues as they come up, may be more productive for the research and more satisfying for the people involved, rather than only attending quarterly steering group meetings. Some of the ARCC projects did this very effectively.

3.1.3 ‘Don’t delude yourself that you’re on the same mission’ – discussing projects goals and expectations throughout the research to ensure coherence of the final output

If researchers and stakeholders are hoping to have a successful collaboration but are pursuing different missions through the research, it seems logical to describe these missions early on. That way, everyone can check that there is compatibility for a joint enterprise to go ahead in a way that is sufficiently interesting for both sides. Understanding the wider context for the work and how the different aspects will come together helps everyone to see how their input contributes to the whole, making it less likely for components of the project to remain in silos. This reinforcement of the connections can be done through ‘glue tasks’ and ‘glue people’ who have particular roles in ensuring that disparate parts are connected during the project and effectively drawn together at the end.

As the work continues the relevance of what is emerging needs to be checked by asking questions such as ‘is this what we intended?’, ‘is this usable?’, ‘by whom?’ and ‘how might we make it more widely applicable?’

3.1.4 ‘Allowing room for movement’

It is not possible to know in advance what might change during the life of the project: policy changes, recession, access to new data, loss of key people, flood events etc. There is therefore a need to ensure flexibility when planning the work. The only thing we can know with some certainty is that change is inevitable and brings with it as many opportunities as constraints. There clearly has to be a balance between stating goals and roles and not making the research plan inflexible to change. Some projects had this balance down to a fine art and were able to let go of some control over defining the project plan in the interests of making the most of opportunities as they arose, achieving greater impact and relevance in the process. Project managers have to manage a rather precarious balancing act between getting to the real questions underlying the research and being able to fulfil a research contract planned in advance and produce interesting academic papers. They thus need enough control to get a good mix of emergent and imposed order to give the team room to use their initiative to adapt appropriately (and creatively) to changes. An additional aspect of this is the need to be continuously seeking feedback and getting a sense of what is working and what is not, through on-going conversations with the wider project team.

3.1.5 Beyond knowledge exchange to ‘knowledge discovery’ and other aspects of building knowledge

Over recent years, language about engaging stakeholders has shifted from ‘knowledge transfer’ (indicating a movement in a single direction) to ‘knowledge exchange’ implying a two-way flow; and further, to recognise broader aspects of the generation and sharing of knowledge between academic, policy and practitioner or public realms. Terms that were offered directly by some interviewees were ‘knowledge discovery’ and ‘cogeneration of knowledge.’ Other widely used terms to capture a range of activities include ‘knowledge mobilisation’, ‘knowledge translation’ and ‘knowledge brokerage.’ Recent work has brought these together under the provisional label K*, to express the fluid nature of the terms. The conceptual framework of K* shows a nested set of activities (Fig 1), moving outwards from those of ‘information intermediaries’ and ‘knowledge translators’ to those of ‘knowledge brokers’ and ‘innovation brokers’.

As with the use of ‘knowledge discovery’ by some of the researchers interviewed for this review, which suggests the creation of new knowledge not previously known by any of the collaborators as a result of the interaction, the development of K* seems a very positive and exciting shift. How is such a shift achieved? From this review, it seems that where ‘knowledge discovery’ has been possible, the distinctions between ‘researcher’ and ‘stakeholder’ – whether as ‘expert’ and ‘practitioner’ respectively, or as having ‘theoretical knowledge’ or ‘applied knowledge’ – becomes less distinct and less important and there are creative ways to maximise the available expertise, experience and knowledge. Everyone in the team is seen as having valuable knowledge to contribute, all are viewed as having relevant expertise and all are open to learning. Academic knowledge is not privileged over other types of knowing, especially if that discourages contributions from people with a more hands-on understanding of the working of the system of concern but who are not familiar with the academic jargon being used. The role of the project team could thus be to widen out from the academic experts to becoming a network of experts with access to a much wider range of expertise and experience and thus a much greater potential for relevant, sustainable and holistic solutions.

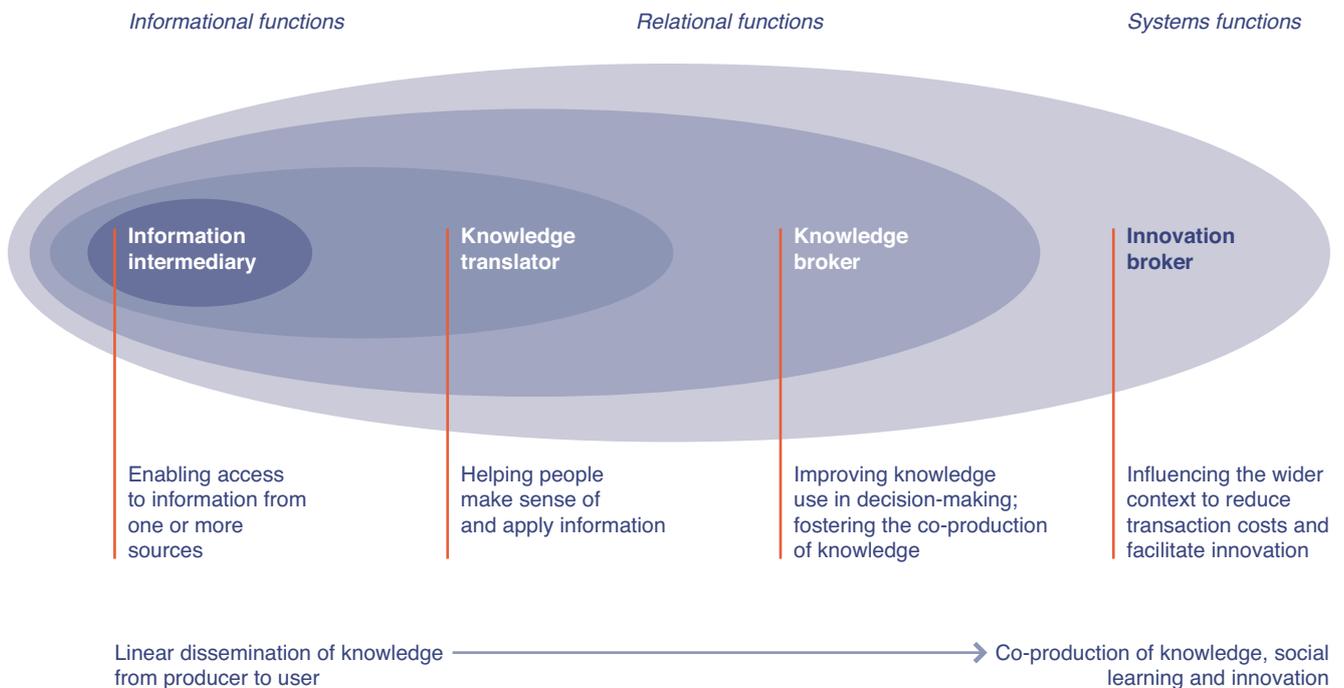


Figure 1: The K* spectrum. Source: Shaxson L et al (2012) Expanding our understanding of K*: concept paper and case studies: ODI, London www.odi.org.uk

3.1.6 Nurturing ‘goodwill’

Goodwill was spoken of on a number of occasions as being a critical element of getting through difficult times without causing friction. When goodwill is high, people will ‘go the extra mile’ for their colleagues; it therefore seems to be an important quality to try and nurture in collaborative research. The ability to build and develop it seemed to come naturally to some teams. What can be learned from them about how to do it? How do you share their skills with projects that did not experience this feeling of goodwill in their team? Can it be manufactured and learned or is it more intangible, a quality of the personality of the individuals involved?

One aspect that was mentioned as being important in building goodwill was valuing and acknowledging contributions made and enabling people in the team to ‘feel heard’. Doing this creates a feeling of ownership in the research, enabling everyone to shape and develop the research and voice ideas and concerns over its relevance. Good leadership was recognised as being important in creating a respectful collaboration with good morale and humour, where people understand how to participate and feel valued. Paying attention to basic facilitation techniques, such as making sure everyone has an equal opportunity to speak, summarizing and confirming contributions and drawing out concerns can help to build the team and build and maintain goodwill.

3.1.7 ‘Making sure it happens’

Learning from those projects that had high levels of collaboration, it seems that there are two aspects. Firstly, having a pragmatic outlook and a ‘how are we going to make this happen?’ attitude in the team; and secondly, acknowledging and adequately resourcing some key roles for good collaborative work. For example, funding a project manager, probably part-time, to do the stakeholder engagement parts of the project; and someone with a clear ‘glue’ role, who persists in asking questions about how disparate parts of the work will be drawn together so that the whole is greater than the sum of the parts and creates something useful and relevant at the end. This role is important at all stages of the research, not just in the final dissemination stages. To ensure that stakeholders can continue to be engaged as cuts in funding continue may require paying stakeholders for their time. This came up in a number of interviews and is worth investigating further.

3.2 How far has collaborative research moved on since BKCC?

The review also took account of the key messages from a review of the BKCC predecessor to ARCC CN, with the following conclusions:

3.2.1 Reflecting on key message 1 from BKCC:

- While there was a prevailing positive view of BKCC, nearly all the interviewees commented on the inevitable tensions that exist when different groups with different objectives are involved in the same project. This was borne out by the challenges expressed by researchers and stakeholders:
- academics’ challenges tended to stem from ‘unrealistic’ stakeholder expectations and demands.
- stakeholders emphasised that projects often did not go far enough in addressing end user concerns or providing for end user needs

Learning from the ARCC projects:

ARCC interviewees were aware of these tensions and spoke about them. On the whole, however, the academic researchers seemed generally more realistic about stakeholder input, were closer to the stakeholders with whom they were working and thus had a better idea about what was feasible. Some projects were very good at providing ‘payback’ opportunities (quid pro quo) for their stakeholders and there was a strong sense that they valued their stakeholders very highly, were concerned about not ‘overusing’ them, and certainly did not take them for granted.

The stakeholders too seemed more positive and realistic about the scope of the engagement and recognised their own role in creating a meaningful and useful output. Despite the odd comment about researchers being disconnected from the ‘real world’, stakeholder interviewees seemed to have a genuine respect for the role that researchers play and a belief that they wanted to create something useful and in collaboration. There seemed to be a general recognition that if the outputs from the projects did not go far enough in meeting their own needs then some of the responsibility for this was down to them.

3.2.2 Reflecting on key message 2 from BKCC:

- Stakeholder participation ranged from having full participation, providing important expertise and knowledge to the project; to being consulted; or to being relatively passive recipients of information.

Learning from the ARCC projects:

The stakeholder range for the ARCC projects extends across the spectrum from ‘full participation’ to ‘being consulted’, with no direct reports of being ‘passive recipients of information’. However, there is still work to be done on this. Some stakeholders felt their involvement had been poor, with goals unclear, expectations not clearly articulated, and catch-up meetings too far apart and too packed with presentations for them to provide meaningful input. However, the overall sense from the interviews is that, as a whole, the projects have made a significant shift along the spectrum towards ‘full participation’.

Certain projects have been particularly imaginative and flexible in how they have involved their stakeholders in running sessions, speaking at events, guiding, advising and providing data and engaging them on an ad hoc basis as interesting opportunities arose, rather than just asking them to turn up to steering group meetings. Others had a more ‘classical’ approach to stakeholder engagement and could definitely have learnt from others’ more flexible approaches and been a bit more imaginative in how they enabled stakeholders to engage in the work.

3.2.3 Reflecting on key message 3 from BKCC:

- Stakeholders expressed dissatisfaction in projects where they had little influence due to pre-determined objectives and where the capacity for stakeholder influence was limited. It was also mentioned that for some providing consultation was like having information “sucked out of them” with little return.

Learning from the ARCC projects:

While there were comments in some of the ARCC projects about a lack of clarity about goals, what roles people would play, and what might be available at the end, this was probably the exception. The research teams seemed to be generally much more imaginative in how they worked with the stakeholders they had engaged, aware of their needs and concerned not to overuse them. It seems that in the intervening five years since BKCC, stakeholder engagement in research has become much more the normal way to operate. Five years ago it was still quite unusual but now it is less remarkable; ‘we couldn’t do this research without it’ is the prevailing feeling, bringing with it an interest in learning how to do this aspect of the work well.

3.2.4 Reflecting on key message 4 from BKCC:

- **The important role that personality plays was emphasised both in facilitating effective participation and creating barriers to stakeholder participation**

Learning from the ARCC projects:

Quite a lot was said about the importance of particular personal skills and qualities in doing this kind of research. The word 'goodwill' was used a number of times and the existence of this seemed to be important in enabling the team to work through difficulties. Goodwill is built through interactions between members of the team, particularly by being 'modelled' by the people leading the work. The ARCC projects thus also clearly demonstrate that personality and attitude are influential on collaborative research. The next interesting question is 'are you born a good collaborator or can you be made into one?'. While there is probably something deep rooted and permanent in the personality of an individual that makes them better suited to collaborative research, there seems to have been something of a culture shift since BKCC which, by making collaborative research the norm, means that researchers (particularly the younger ones) accept this and simply feel that having good communication and facilitation skills is part of what it now means to be an 'engaged researcher'.

3.2.5 Reflecting on key message 5 from BKCC:

- **Informal outcomes such as useful learning, capacity building and involvement in subsequent projects were reported by several stakeholders. In some cases this was valued over the formal outcomes**

Learning from the ARCC projects:

Such benefits were also mentioned in the ARCC projects (including professional development). However, the ARCC projects seem to have seen them less as 'informal' outcomes and more as a key aspect of the work. This is visible in efforts to formalise some of these 'informal' yet beneficial outcomes through quid pro quo arrangements: seen less as a nice by-product and more as a legitimate 'pay-back' for services rendered, given that in none of the ARCC projects were stakeholders paid for their input. In future projects, such payback could also be financial.

4 Recommendations

The following recommendations emerge from what has been learned during the discussions with interviewees. These focus on suggestions for: researchers in multidisciplinary academic research teams; for non-academic stakeholders; for the ARCC CN; and for funding bodies. However, to avoid duplication of messages and because the focus of this research has been on engagement across the boundaries, all of the following recommendations are offered for the attention of all of these audiences.

4.1 Recommendations for researchers

- Invest time and support in ‘glue’ tasks and people, that draw together disparate elements and bridge the disciplines and the academic-practitioner boundaries.
- Because organising meetings among researchers and with stakeholders is time consuming, where possible arrange for this to be seen as a distinct role, for someone with the right skills.
- Accept that there will inevitably be changes during the research period e.g. in policy focus, interests of stakeholders, direct experience of extreme events, continuity of personnel etc. Ensure flexibility by building in strategies to minimise the disruption and identify and exploit the new opportunities these changes bring.
- Be clear about the research boundaries, or be open to them still being under discussion: where there is flexibility and where things are fixed. Be prepared to restate these as needed (e.g. through a diagram), to ensure that everyone is aware and shares realistic expectations.

- Begin open discussions with your stakeholders as early as possible, and continue to explore and monitor your own and their motivations, expectations and tensions – and be clear about the full range of stakeholders and the roles they might play in your research and in enhancing its impacts..
- At project meetings, as well as discussing the specific tasks of the team, allow time to address issues around the operation of the team itself. For example, these might help to address:
 - » how well team members are communicating and how this might be improved;
 - » misunderstandings that may have arisen as to the scope and purpose of the work or expectations of engagement and how this relates to its relevance and usability;
 - » changes in personnel and how these might be dealt with;
 - » opportunities for ‘quid pro quo’ activities with stakeholders, for example to help them build the case for their continuing involvement.
- As a project team with your key stakeholders, aim to look beyond knowledge ‘exchange’ to ‘knowledge discovery’ and broader aspects of generating knowledge together. Ask yourselves ‘how can we best go about creating new knowledge through this collaboration?’
- Be prepared to spend time exploring the perspectives, assumptions and language within all parts of your team – including your key stakeholders. Avoid being overly prescriptive of what this will involve and make full use of the skills and qualities within your team. Capture the process and the points of agreement and disagreement along the way, as part of your project learning.

4.2 Recommendations for stakeholders

- Clarify early on, and revisit with the researchers: their expectations and what they are offering; what you and your organisation want from the research itself and from the process of engaging in it; and what you can and cannot contribute.
- Be realistic about how much you can offer in terms of input and how you would like to offer it. Do you prefer to be involved on a regular basis, scheduled in advance? Or would you prefer the opportunity for more informal contact when you and/or the researchers identify a need?
- Maintain the dialogue with the research team throughout the project; and with the ARCC CN and other stakeholders in your own and related projects, where possible.
- Be prepared to ask questions if you don’t understand the language or particular terms being used and constructively challenge the research if you can’t see the relevance of the task or even the application of the overall research question.
- Develop informal, quid pro quo arrangements to gain support from the research team in: making the case for engaging your organisation and colleagues; maintaining your organisation’s commitment; delivering practical assistance for your work on adapting to a changing climate; your own or colleagues’ professional development.

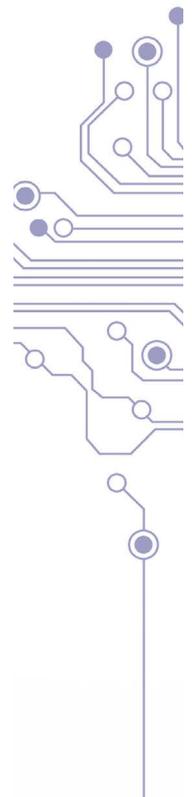
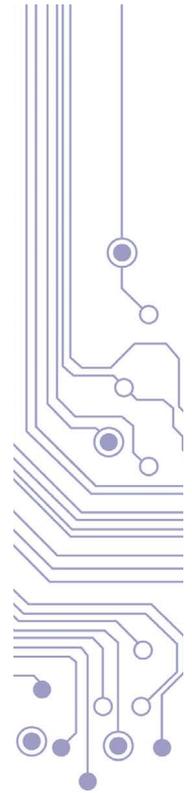
- When internal changes or external pressures are likely to affect the continuity of engagement for the project, seek to enhance the transfer of learning from the engagement, so as to ensure the benefits for your organisation and for the project.

4.3 Recommendations for ARCC Coordination Network

- Encourage new teams to pay attention to the key messages from this report, particularly around team management issues as well as research task management.
- Explore with research teams, stakeholders and funders the potential for formal arrangements to support:
 - » stakeholders e.g. through contracts, payments, continuing professional development and other benefits in return for their collaboration;
 - » researchers e.g. through short notice funding for emerging engagement and dissemination activities within or between projects, early career events and programmes etc.;
- Identify stakeholders (who may already be involved in a number of projects) who can play a 'cross-pollinating' role: informing projects of what is emerging from the others; providing an overview of what is emerging in the network as a whole; and advising on key messages for dissemination and ideas for future research. Ideally, this role should be funded.
- Focus ARCC CN coordination on those activities most valued by researchers and stakeholders, which challenge them to improve dialogue, and which build lasting links between projects. For example, critiquing and distilling key findings from similar projects helps to make the findings as useful as possible to the end user without them having to spend time delving into different projects.
- Continue to investigate with researchers and stakeholders the impact of ARCC CN support on both individual project success (before, during and after) and the wider collective success across the Network and ways to improve ARCC CN's own offer to them and the funders.

4.4 Some thoughts for research funders

- Explore the possibility of funding stakeholders to participate in research of this kind.
- Be open to the opportunities and the added potential for creativity, learning and innovation that arise from allowing the research to emerge and change over the period of the grant. By accepting this, acknowledge that while it may not be possible to so clearly define all outputs and impact at the beginning of the project, the potential level of impact is likely to be considerably greater at the end.
- In order to improve impact, allow access to funds at the end of successful projects, for additional time to maximise the potential impact of their outputs just as the greatest learning is emerging.
- Provide funds to the coordinating networks to allow for stakeholders with a wide interest across the research network to evaluate the key messages emerging from all the projects and provide their insights on future research areas to investigate.



Appendix A: Key findings from the interviews

A.1 Acknowledging and working with different motivations and drivers

This section explores what motivated people to participate in interdisciplinary projects which have a specific focus on engaging stakeholder or practitioner input and producing outputs relevant to end users. For some, this was a normal way of working, but for others it was quite new. Responses on motivations were occasionally pragmatic and edging on a self-interest relating to access to resources, but more often than not they expressed a strong desire to ‘be useful’ and that the type of questions being asked could not be answered – or would not make sense – without genuine input from practitioners and end users. Although a tension was not always experienced, it was almost universally acknowledged there were different drivers arising from the more academic and the more pragmatic stances, and that these can clash and cause tension. More positively, much was also said about what had been learnt about how to manage and minimise such tensions.

This section first reviews researchers’ and stakeholders’ reflections on their own and others’ motivations for taking part and then provides some key messages on how to work with different drivers and minimise tensions.

A.1.1 Researcher perspectives on their own motivations

When asked about their motivations for participating in these projects, the overwhelming response from researchers was the desire to provide something of use to decision-makers and practitioners or to engage them in a process that was useful to them in some way. In some cases, this was expressed with a real sense of the energy it could bring.

Personally we are still driven by academic papers but we also need to think about the whole point of the project and as my career progresses and as I get more involved in the inception stages – you want the output to be useful. That does change how you think about the work; you don't just look at the beginning and end and the technical bits in the middle! Certainly that is how I am thinking about it.

It has been one of those projects where the interest of the stakeholders has buoyed one up and kept one going and made one feel that what one was doing was generally having some use to people.

Clearly related to this was a strong sense that this kind of research would not be possible without a genuine partnership with grounded professionals and their feedback on what was realistic. As one researcher put it, the research simply “wouldn't make sense without it.” Practitioners' participation was essential and central at each stage of the research process: to shape and guide it; to provide information to ‘ground truth’ it; and to disseminate the outputs to those who could use it or needed to hear it. That the work would have been very different, and less useful, without their participation is summed up by two quotes:

There is no way that we could have done a project like this without their engagement. Because they supplied a perspective but they also supplied a lot of the raw data on which the project was based, and without that it would have been a completely different, theoretical project. It would not have been grounded in the real world at all.

As things are at the moment, it is key. If you don't have that engagement you can't do your work, as far as I can see. Because from the very beginning you have to be very clear how your research is going to impact at the national level, the local level, industry. So unless you have this engagement from your stakeholders you can't do your work. I imagine it was always like that, but maybe not; but now it is key. You need them at both levels – you need them to inform your research but you also need them to use the output and disseminate the output as well. You need to make sure they are in the loop, because you can't use them for one or the other, or only at the beginning or at the end.

The multi- or interdisciplinary nature of the research teams could be seen in either a positive or a negative light. Positively, in most teams, the researchers were fairly comfortable and familiar with this way of operating. They were prepared to put in substantial amounts of time to share perspectives on the work and how it should be undertaken, in order to build joint understanding of the research and how it would play out in practice. For others, it was a less familiar but very welcome aspect of the work, as it gave them an opportunity to learn about new ways of thinking and new skills (and importantly, links to new funding):

I think all of us felt attracted by the core question and thought it would be really interesting to get involved in investigating it. For myself, I was particularly attracted to the opportunity to work more with people from the world of engineering. I'd been involved in discussions with various engineering interests and generally found engineers interesting people to work with. In particular, the younger generation who were really interested in the interface between technical systems and human systems...

Once you work in science and technology studies as much as with engineering, you realise that once your innovations get out into the wild it's not an engineering problem – it's a social science problem ... When you take an innovation out into the world it has to be taken up by people and embedded in organisations. A true innovation is always going to be disruptive and there's going to be a lot of work to do to persuade people to change what they are doing in order to take advantage of it. And those things are social science problems.

It has helped to get me, personally, out of my technically driven outlook, looking at solving engineering problems. As I look back at my own knowledge building over the past five years or so, it has helped me realise that it's not just the technical that you've got to sort out.

For a few, however, the multi-disciplinary nature of the work – though seen as important and necessary – did not work well, as there was a lack of 'glue' in the project. The different disciplines remained separate and failed to become more than the sum of some rather disparate parts. This lack of glue is further discussed in section A.7.2 on personal qualities and skills (page 96) and in the section on ensuring the relevance of outputs (section A.5.4, page 79).

Further quotes provide a sense of the range of motivations expressed by researchers:

- **Getting access to knowledge and data, especially for validating models**

Well, obviously their knowledge is the fundamental thing. Almost unlike any other project I've worked on, stakeholders have been essential to the operation of the project because they've been the key to unlocking the doors and gaining access to the places we were needing to monitor in particular.

- **Having an opportunity to think on a different scale – to explore the 'bigger picture' longer term, beyond the single organisation and the specific short-term goal.**

The excitement is to do with the questions that are being asked – it's a pure researcher excitement. It's the fact that I can see that there is very novel work to do in the area and it's not going to be an end point. The project is nowhere near being the end point. It's just about defining what the landscape looks like.

I think both organisations have a very strategic directional interest in this and it's not just a short term interest, it's long term. Some ... are specific questions that need specific answers, others are just areas with a big question mark in them saying "We know we need to know something about this area and we don't know what it is yet or what the real questions are, but we know there is an issue here." So it helps to map out what the landscape looks like and produce some tools to quantify the overall issues for them.

- **Providing a space for stakeholders to stand back from their day to day work, to reflect on this and the wider system and to learn from their insights.**

They have had to think about things differently and they have had to change quite quickly to address the problems that the regulator has identified in their management structures. But I think that provides an opportunity for reflection. I suppose if you allow the space to work with you in an open way then you can bring people along with you. There are people I work with that have quite a different way of working. They are quite strong in saying “This is what is wrong with the system, this is what needs to change.” I try and work out where people are at in terms of their own thinking. For me that means that you work out more authentic working relationships with people.

It’s been particularly interesting ... We’ve been trying very hard to think about how can we use qualitative research methodologies in parallel with the conventional approaches to mathematical modelling in order to develop a more rigorous approach to scenario thinking about the future. That generated quite a lot of interest from our stakeholders, in terms of “Can we use this to stimulate strategic thinking in different ways?” Rather than “Here is a model and if we crank these things into it here’s a range of numbers we can get out”, “Here’s a set of visions of the future that would be consistent with different models. Which of those are we attracted by and which do we want to avoid?” Where the scenarios are less off the top of our heads or reflective of current values or debates simply projected forwards. I’m not saying we’ve cracked it but it is the sense that by collaborating, having different bases and things at the table you can stimulate a range of thinking about “where does this industry want to be in 50 years’ time?”

A.1.2 Researchers’ views on stakeholder motivations

When asked what they thought motivated stakeholders to participate in this work, researchers offered various reasons. In one or two responses, researchers seemed unsure as to why some people attended workshops and just turned up and left again without contributing; possibly, in some larger organisations, staff are told they should attend by someone higher up but, without any briefing, simply do not know why they are there. This was very much the exception, however, and in most cases researchers described very positive experiences, and offered good reasons for stakeholders taking part.

- **Wanting a space in which to think differently and to reflect.**

... people get really quite interested because they don’t have a place to do this in their everyday jobs.

- **Finding the research question to be of particular personal interest.**

I think some of ours are genuinely interested in research as well and genuinely interested in what’s going on, and that’s great. But you do get some that are just maybe sent to represent certain bodies, I guess, and organisations.

- **Wanting to use the data their organisation holds more effectively, and seeing the academic partner as being able to help with that.**

They have a lot of information, data, and they know that they don't use it particularly well. They want to know how they can exploit that. They want to know how to plan now for what's going to happen in the future ... They have a mechanism of maintenance and renewal which they can exploit to make adaptation changes. They have an acceptance as an organisation that they need to do that; they don't necessarily have the knowledge to be able to go in the right direction. So they have a very fundamental interest. Their motivation is they want to know which direction they should be going in for particular problems: what should they be prioritising? What problems can they deal with through this normal maintenance routine and development; what do they strategically need to do outside that maintenance routine; what isn't going to be coped with by normal renewal processes, and so on?

And with our core group of stakeholders, they are very much partners and users. You've got people involved who are generating a lot of data themselves and perhaps are working on the analysis of that data but aren't necessarily bringing the same sort of critical detachment to it that a university-based researcher would bring. So there are people in the partners who have a kind of R&D or 'research and intelligence' or information type mission. Where what they are doing is more narrowly focused on the agenda of the partner, but where the data and analysis they are generating can be incorporated into a wider, more diverse picture. Which then feeds back and becomes a challenge and a resource to strategic thinking in the partner, which they might find more difficult to generate internally.

- **Wanting to help in agenda setting or providing a strategic overview.**

There was also an interest from the stakeholders for a strategic overview. A lot of the stakeholders were saying "That's the problem. I want something that allows me to quickly say where is my biggest problem or where should my priority be? Is it what I think it is or is something else which I haven't seen yet?" And the stakeholders are not naïve in asking that question. They are well enough advanced to realise that it's a real question. And that I think makes them different from some stakeholders in some projects, who are coming in and going "Well, why should I do anything differently?" And there's a whole different discussion to be had with them.

I think mainly concrete or robust evidence that they can use in terms of policy or supporting their policy goals and maybe making sure that they have some kind of direction when it comes to setting research agendas. So that information that would be useful to them is available rather than people going off and looking at all kinds of things that they can't actually use. I imagine they would have a report on their desk that they can read and cite.

- **On a more pragmatic level, one project felt the vouchers they provided to community workshop participants helped encourage attendance and a range of participants:**

The money is really important for involving residents – giving them the voucher. I think it was good in terms of getting a spread of people rather than just people interested in climate change. Some of them said they would have come anyway and others clearly came for the voucher.

A.1.3 Stakeholders' views on their own motivations

One of the common reasons stakeholders expressed for being interested in taking part was that the projects address questions of direct interest to them. They often commented that these were things they knew they had to address at some point but had not yet, due to a lack of resources, expertise or time; or a vaguer sense of not quite knowing how to get started. Being asked to participate in a relevant project was thus seen as a good opportunity to do something and to get access to expertise despite their resource problems – while recognising that these would still limit their involvement.

I think it's something we were interested in because climate change is one of our key priorities to look into ... And we felt that we didn't need to get that involved. So when it came to resources, we were quite happy to supply what support we could, because we knew it wouldn't be a full time project, that we would have to do day in day out. And we'd get involved occasionally and the odd phone call or the odd e-mail, and the odd workshop which I got to go to.

There are various industry groups that we're part of, that we learn from each other, and we try and work together and get best practice really. And this is why we're very happy to be involved with something like the ARCC project. And we spare the time and send the data when we can. But what we can't do really is designate manpower to really help out and do sort of the hard grafting on it. Because we just don't have the resource. So we try to help out in different ways.

Obviously I would say I'd think about how much time it's actually going to take you. And think about your current workload as well. And I think I would say that the information will help you in the long term as well. As a local authority we don't have lots of resources and any information that comes our way, which is free, we will happily take up.

Taking part also offered an opportunity to refocus thinking on something that was already being addressed and to get a different perspective on it:

So, for me, the pilot taking place there was just fantastic. And it gave us the opportunity to just have different conversations, so it is not the same conversation all the time. It gave me a different perspective to refocus my thinking.

Stakeholder interviewees often saw it as a welcome opportunity to give their perspective and share their knowledge and experience: tempered perhaps by a slight concern about leaving these important questions to the academics and a fear they might go a bit off on a tangent if they were not grounded in some practical realities. Participating in the research was thus an opportunity to expose the researchers to the reality of the world in which they were working and the real questions they were facing day to day.

From my perspective, I've got a bunch of academics sat in the audience, who are people who can apply for money. Why wouldn't I want to take that opportunity to bang my drum? Why wouldn't I want to take that opportunity to say "We are doing some really interesting things"; "this is how we are thinking"; "If you are going to apply for some money, think of us"? You talk to people about what interests you from a practitioner perspective. Because, if I don't do that, who is the person who is going to bang my practitioner drum?

So I guess one of my initial motivations for partnering was to make sure that he didn't run off and excite people into how you build brand new buildings. I'm parodying that slightly but you get the idea. And he has been very amenable to that and I think we may have even changed his thinking slightly, into 'What does sustainable refurbishment look like?'

I have often invited him to events, not because I want him to get up and tell my colleagues what he thinks, more because I want him to hear what my colleagues would respond to his presentation with. I do it because I want them to shape their work by being exposed to the reality of estates management. That's what I call a successful process. So I'm quite clear on my objectives there.

Most of the stakeholders stated that a motivation for getting involved was to get useful tools and approaches that would inform their current work. One described herself as something of a magpie in picking up interesting bits and pieces from a number of sources.

I am not stuck within one paradigm of professional development; I'm not stuck in one paradigm in thinking about stuff. If there is a useful tool out there that will help me get from there to there then I will take that tool, thank you very much. I don't need to take the whole baggage with it and I have learnt that that is quite an interesting skill set. Because a lot of people get stuck in the 'this is how things get done'. I'm talking to communities about risk. There is all this literature about talking to communities about risk but actually the most useful stuff is coming out of GPs. And it is about them talking to people about cancer diagnoses – people living with and managing unknown consequences of serious information. That is a much more sensible paradigm in which to be working than 'let's talk to large scale communities about risk'. And there are a whole set of approaches that sit with this, that if you look just at the risk literature you don't see. And if you look just at risk practice you don't see. And these tools can help you have different conversations.

It seems from the interviews that, as adaptation is increasingly seen as something that organisations need to address, there is a strong desire for methodologies, tools and resources that can be used to make sense of what responding well means in their specific contexts. The following illustrate a handful of the many quotes we obtained on this:

It's helping the industry see "Look, there are people out there who are interested in what is happening in the longer term, they are trying to make some modelling tools and wouldn't it be a good idea to engage with them? Because these tools will help us perhaps influence policy in the longer term." I can say that I believe that the sort of work that this project has been doing – ARCC in general and me being a champion at the top of it – has helped to change things here.

The other thing of course is that I hope it has been helpful to them for me to pick up snippets of their research and drop them into our work: to say "Listen you may think that but XXX and XXX have demonstrated quite conclusively that that's a myth." That is very important; as you know, getting science into policy is a very challenging thing. I'm not sure I could evaluate the effectiveness but there are lots of times when I quote his work.

The reason to be involved was mainly the outcome-based tool that we might be able to provide as a means of dealing with the potential effects ... My understanding is that it wasn't a conscious decision that we needed to be involved. It was more that this is a topic that we do need to think about and then, if there is a toolkit that will be useful.

I suppose it was probably a sense that it's not just a very, very academic study. It is a very strong academic study but it's trying to relate climate change to communities and actually having direct contact with people. In terms of how it could raise awareness of climate change, how it could help people be better prepared and more resilient. And it also provided us with vital information on the different techniques we can use for engaging people, and how receptive people are to particular ideas. The fact that we not only have modelling data and evidence about things like overheating risk for different households in a couple of areas in the city; it's also the motivation, the receptiveness of our residents in terms of changes in the homes.

A couple of stakeholders reported being motivated because adapting to a changing climate was on their organisational agenda to an extra level; they not only wanted to be seen to be responding but also wanted to actively raise their profile.

If we are going to go forward, to be at the top table in terms of our performance and capabilities then surely it's incumbent on us to collaborate and work with the best in the industry. So that's one of the motivations really. I think there are mounting opportunities for this exposure. What a privilege to be associated with this university, I don't think we're shy about referring to that when we need to. Definitely there are marketing benefits from our part. It's part of our corporate social responsibility I think, to facilitate research and contribute however we can.

Some interviewees, particularly those who were more actively involved in the research, had a personal motivation from their interest in the subject. Participating was thus an opportunity for to pursue this interest and also to raise his or her profile in the organisation: perhaps something they had not previously had much space or support to do. One interviewee spoke about how participating had enabled him to become something of a champion in his organisation: the one to whom others now came to for advice. Another spoke of how it supported their continuing professional development, brought the potential to network and raised the profile of sustainability in the process.

For me personally the networking opportunities and the CPD. I think from the organisation's perspective, it's really helped us to address some of our cultural issues through this marketing exercise in terms of external engagement of researchers and stakeholders in raising our sustainability profile. We have benefited from that. I'd like to think if there was any opportunity for a follow on project then I think it would be very good to continue with that. And to build on that, partly because of us having transient staff, so if we could use the research as a datum, a steady influence that would be very helpful for taking our stance forwards. It's all good. There's nothing bad as far as I can see. I don't think the organisation sees anything but good out of it, which is why the organisation is very happy to support it.

A.1.4 Managing tensions between different drivers

As the accounts of motivations show, stakeholders and researchers have different agendas. And of course not all stakeholders (or all researchers) are the same, and the variety of different needs and motivations can be complicated further by assumptions each makes about the others' agendas. While there might not always be a problem from the participant's different drivers, it is worth having conversations to air the different perspectives and assumptions and ensure that any potential tensions are visible and discussable, should they arise during the project.

The important thing to remember is, don't delude yourself that you're on the same mission. Be honest with each other that your endeavours will be somewhat aligned but not completely aligned. So be clear and be focused about where you can really add value to each other's work. Otherwise it gets confused, messy, poorly communicated – and ultimately people will get hacked off. So be honest and clear upfront. Find out where you can add value, where you can gain value, where you can make one and one make three. That's the whole thing about partnership – not a warm feeling of huddling together for comfort but really finding where joint endeavour can do more than individual endeavour can. And that's hard work. You often have to give up something as well, something you hold dear to gain something much bigger that others will value.

The team needs to put time and resources into managing this, attending not only to progress on the project tasks but also to the way that the team as a whole – researchers and stakeholders – is operating and the satisfaction of the individuals within it: are their needs being met as far as is realistically possible? One stakeholder spoke at some length about the need to acknowledge the differences involved in the project and the need to build partnership and confidence between researchers and stakeholders.

It is not necessarily about having the most gifted researcher, or the most gifted practitioner in terms of their professional competence to be heading these things up; it is about having the most respected partnership manager to be heading those things up. And it is actually investing the energy and the resources into developing and managing a partnership. It is mutual respect, mutual understanding; it's acknowledgement of differences, acknowledgement that there might be at times – no matter how stroppy I can be as a practitioner – that the research is funded to do something different and at some point I have just got to recognise that that is how it is. It is not my own personal research team. If I can't change my perspective to be in line

with that particular research outcome then I need to disengage. I can't be the one that is constantly battling. I'm there to support the work, I am not there to put spanners in the works. And I think that might give researchers slightly more confidence in allowing themselves to be steered if they know that their stakeholder or practitioner groups actually understand the contract that they have with you guys is to deliver this piece of research. It is a commercial proposition, essentially. And it is that openness and honesty that those other perspectives are coming from. So it is me saying I am there to support the research that will further community resilience. That is the only reason I am there. Theirs is slightly different; they are exploring a particular research question that they are funded to do.

One common approach (to a greater or lesser extent) was to develop quid pro quo arrangements: researchers offering stakeholders extra information or access to modelling software, writing a report or even running workshops to meet their needs – even though it was beyond the stated remit of the project. Some built this in to the way the project was designed: saw it as fundamental to its ethos and built an expectation that there would be such tasks, although the nature of them would obviously emerge as the project progressed.

[We have been] trying to design activities which match the agenda of our stakeholders so we are providing enough payback to them to provide us with the things we need. So everybody wins – which is really important, obviously. There is no point in expecting stakeholders to get involved out of the goodness of their hearts just for our benefit. There has got to be something in it for them and you have to be a bit imaginative about that sometimes and be prepared to be quite open about what you originally planned, and let it grow a bit organically in line with these opportunities. That is also quite difficult to manage.

Quite early on in the project – somewhat nervously as we hadn't got many results – we were asked ... to come down and talk to their council members at a political meeting. It was an information meeting ... they just wanted us to come along and open up a debate with a new set of councillors because we had just had council elections, and there were about 40 of them. So members of the team came down and gave really nice, clear presentations, which were very well received. And which then enabled the local participants to get into a conversation almost amongst themselves. We weren't really there to communicate findings from the project but more as facilitators of a process that was going on locally. And that is part of the payback to them. One of the things you have to accept: that for some people, they have a policy liaison role so this kind of collaboration fits with that; but for other people they are giving up time and effort in investing in us, so we do have to give something back. And what they want back is not necessarily the whole package of stuff that we want to deliver from an academic point of view. What they want is something workable, that will facilitate the kind of things that they are trying to do on the ground.

For other projects the need for a quid pro quo only became apparent as the work progressed; and for a third group, it seemed to remain at the 'nice to have' level of offer and may never actually materialise.

If there is something relevant at that moment in time, or relevant to another project that is going on [for the stakeholder], we have been asked “If we were to do this, would you be able to provide information for this report, or project?” Sort of providing information on the side, to support other work that the stakeholders are doing rather than just expecting them to turn up to your meetings and give you information and data ... It is something that has been proposed. I think it's still on the cards but nothing concrete came out of it.

Such arrangements can also be used to manage differences in the timescales that researchers and practitioners and stakeholders are often operating at.

From the start the timeframe is a big issue. What the stakeholders needed from the project, they need yesterday. What we were doing and planning was for a three year project. I knew from the start it wasn't going to contribute directly to anything that they were doing now or in the next two or three years. It was more thinking about it in a long-term perspective: we have got this interesting research that is happening and there is a bit of an experiment going on to see if the perspective that we are taking works or not. So it is more of a long-term perspective. And it works.

I mean having said that, though, I think there's still always the expectation that they want things straightaway because they work on short timescales and we're like “Okay year three, we might be able to tell you this or give you this...”

Being able to offer such arrangements, even when it is factored into the design of the project, still requires the researchers to be open to what would be useful for stakeholders; and to be flexible in how they manage the tasks or at least aware of where in the project there is flexibility and when these arrangements are possible.

I suppose one way is to try and build in some flexibility. Certainly for the impact assessment we had these three key weather types and it is quite hard to deviate from that but if there's something specific, linked to one of those, that has particular interest for them we have been able to say “What specifically could we do to the impacts we are looking at?” So there is some flexibility. And I suppose it goes back to the beginning, the meetings at the very start, making sure that when you outline direction and outputs, take a forward-looking approach and build some flexibility into what you're doing at that point as well.

While such quid pro quo offers a ‘payment in kind’ solution to help manage tensions that may arise between different drivers, this raises the questions of whether stakeholders should instead be paid for their contribution. Some interviewees did take this view.

Well, I think there's a very strong argument for it. You certainly should try it. It is one thing to pay for a little bit of travel & subsistence to come to a meeting, but actually to pay them properly for so many days a year to be involved, to be part of the team; I think that that would be hugely valuable.

If they could get some serious funding, or sensible funding, to allow stakeholders to get involved, it's worth a try ... But it is hard. It's hard from a network point of view. You are asking stakeholders to come along to things and you hope that they can see the value in it but they have got a lot of other pressures on their time. So it is very hard to target.

There is almost a contract that is drawn up that says, "If you write this letter, and we are successful we will give you x amount of money to pay for your staff's time." Researchers get full cost recovery, I don't. My organisation doesn't. And when you see grants of £1 million kicking around... and here we are giving you our professional nous for free. So I think having that contract, memo of understanding, whatever, would be a useful thing to have.

The concept of a more formal, contractual arrangement is explored further in section A.2.2 (page 51).

A.2 Clarifying goals and expectations

And we have got an insight out of them and we've got some steer out of them and we've got some contacts out of them. All the kind of things that we hoped the stakeholders would provide they've pretty much come up with, which is good.

A lot of them are very happy that you're just a name on the list and you do or you don't turn up quarterly, whatever. That's the norm, I would say.

It is about not making assumptions, just having the conversation, isn't it...?

The previous section summarised what the interviewees expressed about motivations for participating in their project. This next section explores what was said about the expectations for the work: how these were articulated (or not) at the beginning of the project and managed during it; and whether these had been met, exceeded or missed (or were likely to be by the end of the project, given that they mostly still had some months to run). Stakeholders can play various roles in all stages of research processes, from identifying gaps; identifying and prioritising lines of enquiry; accessing data sources and modelling software; providing guidance and insight to the researchers; introducing other stakeholders who can offer their wisdom and experience; evaluating the usability and relevance of the work. The list could go on and yet the interviews suggest that there was often not an open discussion at the beginning. Without such a discussion of people's expectations of each other, what assumptions are made at that point and throughout the research?

Some of the projects did articulate upfront the need for clarity about what was expected from stakeholders, who needed to be able to make a case for engagement to their organisations:

Stakeholders need to be able to understand from the beginning what is needed of them. How many hours, what kind of input they need to provide; a lot of times it is not clearly indicated at the beginning. In most cases, they just ask you for a letter of support but they give you very little information to start with. So you write the letter of support but you have no idea what it means in terms of your time or your input to the project. So for stakeholders, a clear idea of what is expected of them, what is the value for them, for the organisation; because that is how they are going to sell the whole involvement into the company.

It was clear that people had had some pretty poor experiences of engagement in the past and could describe clearly how not to do it. Lack of clarity about what is going on and the expected amount and type of input was seen as poor engagement. To do it well, you have to discuss what is expected at the beginning of the project and revisit it throughout, as new things emerge in the research and in the external world.

It is a way of working ... where a number of people are coming to the table, and bringing something to the table – you might not be able to quantify all of it, but they are – and everyone is needed one way or another. You have to think about your approach, and how you work, and what your expectations are.

Often people get called on to participate in these things and it often just feels like it's a list of names to add credibility to the project. I never wanted to just do that. I would want to be a bit more proactive in terms of giving input where it has been appropriate and useful, and much more in a steering role and share thoughts I have.

External requirements on the project sometimes meant that researchers had to spend considerable time addressing their own approach to stakeholder engagement:

This project really went through the wringer in terms of the ethical position we took; so everybody knows the basis on which they are taking part it is all documented, we have very clear consent forms. So in that way, we are pretty much at the gold standard.

And even I had not anticipated how much time we would spend on that. And if you were going to do this in multiple locations and go through the necessary research governance processes, and to involve people who are being recruited through the partner organisations – this is not at all straightforward. Obviously, really good practice means that you do all that, but we have been required by these governance committees to be absolutely straightforward and write down very long forms – 60 page forms – to explain how we are covering all these ethical issues and explain how the participants' involvement will pan out, what they might expect to get from it; and there are issues of CRB clearance if you are working with people who are in vulnerable groups. That might not be immediately obvious to the EPSRC. It might be worth making the point that this is actually quite a costly process if you are talking about this kind of engagement. You have to jump through a lot of hoops to show that you have met the requirements.

One thing with this project is that we are engaging with lots of different stakeholders – different older people at different points. And we have to be careful with the older people we are talking to, in terms of processes to make sure they are comfortable and know what they are getting into as part of the research project and they know what will come out of it. We are very clear about these things.

Others made the point that articulating expectations avoids or reduces stakeholder fatigue, enabling them to be confident that their level of input was manageable. It forces both sides to be realistic about what is possible and provides a baseline to monitor progress.

I think [what] you said before about clear expectations is really important both from interdisciplinary stuff and also stakeholder engagement. I did my PhD on this kind of topic. I think the problem with large-scale projects, especially in this funding era, is that they promise the world and the delivery is often not quite matched with what was expected. It is important not to oversell what the project will achieve, and I think managing those expectations from the start is really, really important otherwise stakeholders do get burnt.

Of course, it is possible to ask the right questions at the outset but then not act on the responses, or – as in the example – ignore the response altogether:

They asked me at the beginning “What do you need?” Although they were very clear to say “Oh, you don’t need this; you actually need that.” So that’s another thing, that the researchers a lot of the times are overconfident: thinking that they know exactly what the industry wants. But they don’t factor things that perhaps are more important to the industry than the validity of the outputs, the thoroughness, and the rest. So I think it needs to be very open discussion and communication between researchers and stakeholders, especially among the researchers; because they need to be much more open to what the industry wants and what they tell them, rather than saying “They don’t know what they are talking about. We are going to do whatever we think is right.”

One respondent made the point that the success with which stakeholder expectations can be realised comes down to the value given to it by the researchers. Even when researchers espouse that stakeholder engagement is critical to the work, in reality – when deadlines loom – they can find that their best intentions to bring them in cannot be met.

The danger of not having explicit conversations about what could be expected is that unspoken and unfulfilled assumptions about what will happen lead to dissatisfaction with the process and perhaps unwillingness to participate in future. The following quotes express some of this frustration:

I would have hoped that we would have been fully briefed on the development of the model and the associated technical process because I imagine that they worked quite hard to get this thing up and running. And there is obviously a lot of learning that they have been doing and we would really have hoped to have shared in that.

The greatest benefit has been being alerted to the fact that someone is working in the area. Like I said, I have seen no outputs from the project and I have seen very little about what has been done. At the start, it struck me as a really useful piece of work, so knowing there are people out there doing stuff is useful even if we haven’t seen anything. Maybe we are not viewed as core participants, which is fair enough; I don’t really mind, but if there has been output generated then it doesn’t really take much to bang it around by email. I don’t want to drop them in it, because I do think what they are doing is a very interesting project. It is just that we haven’t seen much of them.

I think stakeholders often underestimate the investment they need to make in order to get the maximum benefit from it. It comes back to the question that it isn't about the individual's enthusiasm, it is about the organisation's ownership of the project and the commitment to ensuring that they will resource the engagement ... I did a lot of work in health and social care: fairly close working with policy professionals, provider interests. Where, in a sense if you don't have the collaboration you can't do the work, and that's always been true ... So I come out of a tradition where the academic side of the equation has always been perhaps taken for granted to a slightly greater extent, but it is having this recognition that actually stakeholders need to work at it as well. And in the current climate that's the part which isn't being communicated terribly well. The academics will be told to go out and get stakeholder engagement and for some that is a novelty and for some it's a bit of a problem but I don't think there's anything fundamentally alien there. But you can knock on doors and get the letters of support and then you go back when you've got the money and it's "Well, yes we wrote you a letter of support but we're not really interested.

Stakeholder motivation to be a part of the work may be high, but ensuring that the outputs they are hoping for materialise may need more input than they had anticipated or feel that they can manage, especially as resources dwindle or people are made redundant.

Well, you hope that they can see that the research will provide some evidence that they can use within their own systems of practice. But unless they're willing to put in some time and effort it is never going to be presented to them on a plate, is it? Even if researchers provide absolutely the right research answers they might not provide it in the right way. So, it's really hard!

Some felt that a clear upfront message of what was expected would be useful as it would sort out which stakeholders were worth working with.

In some ways, I'd rather see people who are half-hearted being frightened off – by perhaps a clearer message that "If you want to be involved in this and you want to get the benefits from it then you do have to recognise that it's going to require the time and resources on your side as well."

As one researcher acknowledged, a lack of clarity can work to their advantage:

At the start there was no plan of how the engagement might happen in the project. It might have been useful for them to know more clearly how to get involved in different ways throughout the project. We gave our email addresses and asked them to contact us, but we didn't have a broad plan. It may have been useful. But [not having one] did allow us to be flexible.

However, a clear articulation of expectations does give both stakeholders and researchers the opportunity to exceed these and go the extra mile. This is explored further in section A.3.4 (see page 61).

A.2.1 Managing expectations

We have had to manage their expectations! This is a research project – we will provide ‘guidance’, but it is more about the thinking behind it. But I am not sure if they have got that message.

Managing expectations of the different parts of the wider team of researchers and stakeholders requires paying attention to: how the team operates; the timespan over which commitment is needed; and the time spent on each interaction. When interviewees reflected on how to manage expectations, many of the comments boiled down to the apparently simple advice to maintain on-going dialogue. If this happens, then the potential for big misunderstanding is reduced considerably. Quoting at length from one interviewee gives a good flavour of this type of dialogue:

I suppose if you start from an early stage and build up the project between you, then the questions come together. It is the on-going dialogue: “We have these questions can you answer them?”, “No we can’t answer all of them. We can answer this bit, can use that?”, “Yes, we can use that, but only in a certain way; so can we change it?” “Yes we can we can tweak it that way”. And if you have that kind of dialogue... but that’s not easy to develop, especially if you are developing a project in a new area, I shouldn’t have thought.

I think the other thing is that our programme of work articulated very clearly from the beginning who was leading each part of the project; and made it clear really where, in a sense, certain specialist knowledge was leading... That, I think has helped people to get hold of that bit of the project and it has made it easier to see how the work has fallen out and has been able to be converted into publications.

The third thing ... was that we did have some explicit discussion in the group about how we were going to publish together and agreed a protocol for that rather than leaving it to chance to work through. We have more or less been able to stick to that which means that everyone knows where they stand as far as that goes. So those are examples of the kind of things that we knew we were going to have to put in place to make it work.

Some projects started with the best of intentions in asking for stakeholder needs but found that these questions brought a potential danger of raising expectations about what was possible; there had to be a balance between getting this feedback and the constraints of the projects and the expertise it had access to.

We wanted to involve them even during the early part of the project, the directions... We had the usual very general vague proposal but the specifics we wanted to fill in with their help. But that was sometimes a bit difficult because obviously we have a certain set of skills that we could bring to the project, that we could do. And then you go to a stakeholder meeting and they say “Why don’t you just do this?” “Because that’s not what we, what I do for a living so it’d be a bit difficult.” So it’s quite hard in some respects to try and manage what their expectations are. They were supposed to be steering us but sometimes we had to steer them as well just to make sure that what they were expecting wasn’t totally outside of our expertise or remit.

Others were more confident in expressing the boundaries of their particular research and what was realistically possible or reasonable – while acknowledging that there were other ways to approach stakeholders' questions, which also might be appropriate.

This is not a project that is based on co-production of the whole research question. We come in with an academic agenda which fitted very well with the ARCC agenda and it was more a question of "If we are going to do research on that, these are the key partners that we clearly need to engage, or people like them". That is not to say that I think that that is always the best way. I think sometimes it is better to be able to have a discussion right at the start about what the key research questions are and then say "Some of our colleagues in our research department are expert at doing this kind of research"; but that wasn't really the model that EPSRC was calling for. I think that this picks up on the points that I was making before, really. That was the call, and there are other models and ways of doing it and then it is balancing the academic research questions with what the end user might need and want.

Managing expectations often related to issues around the timing of outputs, and a sense of mismatch between when stakeholders want to have some output ('yesterday') and the reality of academic timeframes ('something at the end of year three'). Often, however, these assumptions were unfounded and stakeholders were much more realistic about what could be expected and still valued what they could get out of the interaction.

Yes I mean when we do things at the council sometimes things do take a long time, and you do have to wait – sometimes years and years – to get some kind of outcome. So I think we're quite patient with that. I mean the good news is, we have a climate change strategy developing and the info from this project will go towards forming that as well. So when they produce that – probably be next year – it will just time in nicely.

So our research can't fit in to what they're doing now really, because what they're doing now was planned five or six years ago, before we even started the project. What we do now could contribute to something seven years down the line. So they are more like friendly advisers about policy and practical data managers. When we needed data, a lot of them gave it to us.

For others it was clear that timeframes were an issue and that they needed something more in terms of output if they were to be able to make the case within their organisation:

That we are not going to see a product of for four or five years, that's too far away. I would have to work much harder to release my time. And there would have to be a much greater engagement in the geography. So if I was going to try to do that now I would have to be able to make the case for a pilot or for some ... research to actually be taking place in our area, and that is sometimes a more difficult case to make.

Not all stakeholders or researchers felt the need to set everything in stone. By not being rigid in how they defined engagement, they were able to make very good use of opportunities that came up along the way: to make new connections to people, organisations, other networks and policy initiatives. This ability to make the most of emerging opportunities requires a certain outlook and set of skills – which were certainly used to their advantage by some. This flexibility and serendipity can potentially maximise the research effectiveness by having good connections and targeting efforts most appropriately at any given time.

We had high expectations that this project would deliver something meaningful – what it might quite deliver we had an idea of, but... I was really encouraged by things like having different packages of measures. There's a lot more quantification, there's real tangible packages of stuff that I can give to colleagues, with data behind it. We probably did have expectations of that at the beginning but it might not have happened. So I think it has delivered, it's just that there are some things that we didn't expect to come out of it as well.

I don't think my role had been specified at the start and when it came down from the person who had been doing it before there was nothing particularly clearly outlined. So when I was asked to do something I just passed it by my line manager to say it's okay for me to do; and he'd say "yeah, yeah that's fine". I didn't feel it was clear what my role was, just kind of: turn up to the things I've been invited and to put my twopenn'oth in.

Even though my engagement was much more along the lines of "turn up twice a year", I have engaged with the researchers 'unofficially' – on an ad hoc basis as things struck me as being relevant or useful. And they seemed to welcome that and engage around that, and keen to have input around dissemination and that kind of thing. So that has been a bit more of a kind of open process as well, I think.

A.2.2 What is realistic?

There were some quite different views about what it was reasonable for people to expect stakeholders to contribute. Some stakeholders felt that they could have contributed more and that their skills and experience were being underused by just having a 'turn up once a quarter for three years for the steering meeting' attitude.

After that initial flurry of when you are asked to send a letter to say we are willing to be a stakeholder and support this project, and "you only need to come to a meeting once every quarter for three years..." That is kind of how it is sold..."it will be no trouble"; "We just want to have your name". And to be honest from my point of view, I'd rather do more than that.

I think it's really about looking at the expertise you have on that stakeholder grouping and what are the opportunities to make use of expertise to strengthen the research. It can be a very opportunistic thing. The reason why stakeholders are approached in the first place is because there some recognition of the value that they can bring. It often doesn't go much beyond demonstrating that you've got the right people on the list. But actually those people are the right people because they could contribute more. And I think research is better for that. It is not necessarily easier for the researchers! It is a whole other layer of management, if you like. And it makes it a bit more complicated and harder for the researchers. So, I can understand why they wouldn't necessarily welcome that.

It was what I would consider to be classic model of stakeholder engagement but there was no expectation on either side really that it could be more than it actually was. This is not a criticism of the project as they did a great job of always engaging and keeping people up to date with notes and minutes but this has been much more the classic engagement route. I would like to see that model become less and less prevalent.

While some researchers were concerned not to overuse their stakeholders ...

We don't like our stakeholders going to the ARCC meetings, because we're already using their time, and we don't want to exploit them further.

... some stakeholders felt it was completely reasonable that they be expected to stand up at meetings and give their perspectives:

So I went up and did ten minutes of presenting up there. Nobody wanted to check what it was that I was going to say, it was "you're a professional, get on and do it". I think I managed to get about three or four LOLs, which I thought was pretty good, considering the audience; it wasn't the easiest of audiences to work. But yeah... "You're a professional, go up and do it". There were other partners who were there who possibly didn't have that same ease with getting up on their back legs and talking to a room full of people. But they weren't asked to do it. So it was that acknowledgement that, you know, "We've brought you down, sing for your supper."

Whether you see these interactions as an opportunity ...

And I think that that is about respect and building networks. So, for me standing up in front of that group, you know what: "...This is how climate change relates to me, this is how the project relates to me. If you have any questions come and talk to me." What a huge opportunity! And I think that is how people need to sell it. If researchers feel uncomfortable asking their stakeholders to do that, then why have they asked them onto the group? What is it that they are bringing?

...or a waste of time depends on a number of factors, such as: how well the research subject fits with your core business or personal interests; previous experience of engaging with research or that particular team; and how well managed you feel it is and how confident you feel making useful contributions. Some of these

are beyond the control of any given project but some – by articulating them – can at least be made visible, so allowing an understanding about what the various players believe to be a reasonable contribution. Without this, there is a danger that unrealistic assumptions about what the project will deliver will go unchecked – potentially causing bad feeling on all sides.

You are there to take part in that process. And then from a network perspective, let's just bring the practitioners together and let them have a big whinge because that is what all stakeholders do when they get together. But then let's move them on, because if you have got me in a room with a lot of other stakeholders there would be some interesting conversations to have.

As discussed above, some stakeholders mentioned the potential for having a contract that would clarify their relationship with researchers and what it was reasonable to expect from each party:

Yes, a contract or a statement that says "As a stakeholder I will do this, and researchers will do that". Because then everyone is coming in with the same thing. "We may ask you to speak on behalf of the team to other participants." Not that you always will, because some people you want involved in the process are not going to have that particular skill set and it would be cruel and unusual punishment to expect them to be able to do it. But with that expectation that you are not just there to have tea and whinge.

Well I guess continuity in terms of speaking to the same person, rather than having to introduce themselves to people and the project and having to start from scratch. It is a very tricky thing to build a good team, either between the researchers or between researchers and their stakeholders. I would think that involving people contractually is important. So if EPSRC require that whole impact approach then there needs to be a contractual arrangement, where the projects allow some money to go to the stakeholders: either secondment, paying stakeholders for their time, paying for data, or case studies.

I think it is about making sure that you have the right levels of conversation. It is about saying to an organisation at the start, "If you write us this letter of support for this, then in this research we will buy out six days of your time," and for those six days of my time my organisation will release me to go and do the work for that particular research organisation. Because you are asking people to do this for free you actually have very little hold on them. Because you don't have that contract. It is difficult for me to go back to my organisation and say I can do it ...

A.3 Communicating between different parts of the project team

I think if you look across the ARCC programme as well, the first phase of projects weren't having that much stakeholder engagement. We felt it at the conference, in the way that they were presenting stuff. Even to technical people it was too much detail in a technical language that 90% of people wouldn't be able to understand. Whereas in the second stage there has been more; and I think that in the third stage there has been more. I have noticed perhaps a trend.

A.3.1 What was said about the skills needed to do this well?

Being responsive to the needs of the end user requires that the researchers create opportunities for the stakeholders to input into the design of the research and give feedback on things they produce; and then to explain how they will use this feedback to influence their work. After all, why ask for feedback and not use it or explain why you are not using it? But this ability to respond and change the research in response to feedback requires the researchers to be quite flexible in how they approach their work. Many of the researchers spoke of a balance that had to be negotiated:

Sort of finding the middle ground, I suppose. It's not possible to do exactly what they want, but to try and say "all that is interesting, and we could do this" and negotiate. And explain what is feasible from a scientific or academic point of view, what's relevant; and then try make clear how it could actually be useful for them as well.

The skills that are needed to do this are thus the communication skills of being able to listen and assimilate the feedback and assess which parts of the research can change in response; as well as using appropriate language to transfer the messages. Clearly, having people who can communicate across knowledge and discipline boundaries can be very helpful:

Is it not there is an ecology of knowledge here? You need somebody to be a boundary spanner. Because even as social scientists we talk our language of social science; we have particular epistemologies and view on the world, and with a residents' focus group that particular language isn't necessarily appropriate. The type of work we do, we understand that we need an act of translation; other disciplines might not even see that as an issue. So within a project someone needs to play that boundary spanning role and understand that there are different languages and that there is an act of translation between the spheres. You can still retain your specialists who speak their specialist language; you just don't let them out of the office!

Interviewees also offered practical suggestions about knowledge transfer opportunities and secondments offering good ways to create this communication across boundaries; these are explored in section A.5.5 (page 51).

A.3.2 What was said about how frequent communication should be?

It used to be collecting warm words of encouragement in a letter of support and then as researchers you just got on with it. And occasionally, from time to time you say to them "This is what we've been up to and if you want to come along and learn a bit more about it," and so on. But over time the EPSRC has got much more interested in deep and meaningful relationships with stakeholders, cemented in collaboration agreements and so on.

A common comment on the communication needed in these research projects was that it should be 'on-going'. This allows for effective working relationships to be established, misunderstandings to be ironed out and different views to be shared before the work had got too set in stone. We can only give a few representative quotes here, in addition to those provided in other sections:

For all the projects I think have done well, the reason it's gone well is because it is on-going collaboration. They really put some effort into it. They don't just expect the stakeholders to come to meetings without anything in between times. They seem to follow up on it, they seem to engage with them. They don't seem to try to side track it, they put the effort into it.

Everyone has busy jobs and is stressed out. Making space for conversations and ... keeping them up to date. That on-going contact is quite important.

To my mind this involves seeing and talking to people on a regular basis but not necessarily in a fixed way. It's the difference between having a relationship and a stakeholder meeting. I have the perception that the stakeholder engagement is being measured [by EPSRC] in terms of "how many people did you get in the room?" rather than the quality of the engagement. This is about having the right person in the room to talk to them and have a good quality conversation: out of which comes an understanding of what their issues are, how they can help, how that fits in with the research portfolio. It's a much more one-to-one relationship. And then you take that on and bump into them at various meetings, you have five minute conversations; it's that relationship.

I think there's something about momentum and keeping that contact going. Because there were times when we were all so busy that we pretty much kept it going. The couple of months where there was a changeover of staff, there was quite a marked difference actually when you weren't keeping in contact all the time. That continuous momentum of contact and information-giving from both sides needs to be kept going, rather than big periods in between advisory groups. If you let it drop, then interest goes to some extent, doesn't it?

We had early engagement with the stakeholders, where we tried to get lots of people in the room. Largely because that's what ARCC had in mind and that was what they wanted to see happen. Their expectations have shaped a lot of what has gone on, not necessarily to the benefit of the project. But the actual work that we've done, we see our stakeholders on a regular basis; there are key people, we probably see them once a month. It's not formal meetings and it could be about various different projects – there is a dialogue there all the time.

Iterative process: the review processes are to drip feed data and results, so nothing is going to be too surprising.

Naturally there has to be a balance between having these regular interactions and not becoming a nuisance:

You're not knocking on their door every five minutes saying "This is the latest little step that we've taken", but you are making sure that they know that this work is going on and there will be opportunities to engage.

And it's not bombarding them with useless stuff. It's contacting them enough times but not too many times, and pertinent information that's of interest to them rather than constant "Can you do this, can you do that?" Saving up, so that if you've got things to ask them you ask all at once rather than bombarding.

The regularity of meetings: tried to make it useful and frequent. I am not sure if frequency is better than usefulness. You want to meet up regularly but you also want to have something to say.

Getting the frequency of communication right and “being clear about what was OK in terms of communicating” was something that concerned a number of the researchers:

I guess that would be my main point here, it has been really rewarding working with the stakeholders from the beginning and having their involvement all the way through but it has also been a challenge getting a balance between making sure that you are communicating enough and doing the research itself. That has been a bit of a juggling act. I think we have developed good relationships with our stakeholders and, of course, everyone is busy. We are busy doing the research and they are busy doing things on the ground in local authorities, or whatever; so having that bigger pool of advisors and to be able to draw them in at the most appropriate times – depending on what we were researching, our areas of need, and their areas of interest – worked out well, I think.

In terms of resources we are all tiny fractions, less than a day a week, so we've had to be realistic. I've sat on panels where projects have 42 letters of support and “they're all going to be engaged, and we're going to have telephone conferences every four weeks” and you just know that you're not; you will just never be able to do that. So it's just not being overambitious.

There is inevitably a natural ebb and flow in the research process with times where there are useful things to share and others where the researchers simply need to get their heads down and focus on developing their side of the work.

There would be quite a lot active discussion and working together. There would be quite a few meetings where certain tasks are set and then researchers work on them for a bit and then report back. There would probably be much more interaction in terms of the actual research that is being done and in how it is being done. And at all the stages of it, rather than just having a meeting and six months later you go back and then say, “we addressed these points”. If it was a bit more interactive it would make it easier to be more flexible: at the start of the project, if somebody said “That is interesting, but if you did this it would be more useful”, rather than six months down the line someone saying “That's great, but we changed our minds, so can you go back and do it again?”

Maybe it's just lost a bit of momentum over the course of the project. As we come towards the end of the project hopefully it will pick up again. You have to go to meetings and say “We're still doing this and we still doing that”. Now we can show this: we have actually got the final results and honestly say “This is it”. Now that we can show the tool, hopefully, it will pick up again. This is the time issue. You get highs and lows at times. We have times when we want to be having lots of meetings and great things are happening and other times when you just need to go away and do the work.

Early engagement and open discussions helped the success of the early stage. Mid-stage has been about high levels of maintaining contact and champions in the organisation, to maintain that interest.

Many of the researchers found that although they wanted to have good stakeholder engagement, organising meetings and workshops significantly ate into their research time. There was an acknowledgement that persuading people to attend a meeting was sometimes harder if you were perceived as junior in the team:

The principal investigator needs to do it, or someone else on top of doing their research. And then, I suppose, if you are responsible for delivering work it is not really the key thing because you've got other deadlines to meet at the same time. I find it hard to get in touch with these people. But the PI of the project would probably get a response quite quickly, so you need someone they know quite well. I could probably spend all my time trying to chase these people and get nowhere. You need someone with a higher profile.

Because of the amount of energy and time taken up with administering the stakeholder engagement, several researchers suggested it would be useful to have a dedicated role for this:

I can imagine someone could do it as a full-time job because of the time it takes to get hold of these people... these people can be really hard and their availability is – well you need to be planning months and months in advance for a meeting. And even then they can't all turn up on the same day. At some point you just have to pick a day and go with it. So I don't think it's an easy thing to do. You could almost have a communication or knowledge exchange person working full-time organising it and making sure that regular information was being circulated and organising the meetings.

It would have been useful to have someone dedicated to this task as it does take a lot of time to do this – this is not usually included in the proposal – maybe a part-time person, to produce the reports. We have done it but it is a bit thrown together – and each time it compromises the research time.

It would have been good to have a project manager that wasn't one of the researchers. Not necessarily a full time position, but it is the energy that it takes to do really collaborative, integrated stuff. It isn't to say we wouldn't get involved – but it is all the practicalities of organising meetings and workshops and transfers of data and contracts between all of the different companies and the stakeholders. The number of hours I have spent on this and the amount of work that I could have got done in that time is phenomenal. I think it is a difficult balance – you have to sacrifice your academic outputs for effective collaboration. The time aspect of what it takes to get good engagement is often underestimated in terms of hours and in terms of the money it takes to do that.

Some of them who have done really well seem to have somebody who's been nominated to do that task and who embraces it is a job rather than just an add-on to what they are already doing. And then they have to keep going, and keep going, and keep going... I do think it is also up to the stakeholders that they have to put some effort into it too.

A.3.3 What was said about the form of the interaction?

Many responses emphasised the importance of meeting face to face, either among the researchers or in interactions with the other stakeholders in the project:

It's far better to have that personal level of interaction and networking; you can get far more out of that than you can out of a magazine or a webinar.

Technology is great but personal contact between people is the best way for forging relationships.

Things like the newsletter are really useful. But it'd be more valuable to sit them down face to face.

Locality does have a big impact on involvement, in terms of actually meeting people and going to sessions, other than email and phone. And that does help with that personal relationship, when you meet someone face to face.

Many interviewees felt that face to face meetings and workshops enabled people to explain the work, push it forward, interrogate it and build understanding in ways that are just not possible by email or through progress reports.

What I found really helpful to push anything forward is to meet in person which is difficult when you are spread all over the place. I found I could have phone conversations and e-mail exchanges that go on for weeks but then you sit down at a meeting for half an hour and you can get it all sorted out. So it would have been much more helpful if I could have gone up to them, say for two to three days, and work with people there, maybe every couple of months. Or they could come to us for a working visit as we've gone along, rather than just going backwards and forwards by e-mail. It's a really nice group.

Yes, more communication, but rather than by phone meetings and conferences, more working meetings or workshops, where you actually sit down and go through things in a bit more detail. To explain the research and the methods and why some things are being done the way they are in the model. Two-day workshops rather than the presentation-discussion format and then disappear off for six months ... Something more collaborative, more like you're working together on something.

I think the more valuable experience is the face to face meetings. Because you get their immediate reaction and their immediate feedback and their immediate thoughts rather than... I suspect they read [newsletters] and think "That's all great stuff." And well, they probably have ten or so questions but we don't really get any feedback on the newsletters.

Being part of a small workshop also encourages a different quality of engagement and participation:

Maybe because we then broke up into small groups so you couldn't really not participate or sit at the back and not say anything! Everyone got to join in and give their opinion.

The best meetings have been us maybe for an hour at the start presenting our results and then having breakout groups and having more open discussions about the issues or the direction. They've been the most valuable interactions, I think.

So while smaller, less formal types of interaction are valued as a way to 'rattle and shake' the work there is still an important place for more formal events to communicate the emerging messages to a wider audience:

Having two dissemination workshops during the project, not just at the end, is quite unusual, I think. It has been a good atmosphere at those events, people have enjoyed them. There have been quite lively discussions. Some of them, for me, on quite dry topics! It was good having them during the project. I think doing them throughout the project rather than having one final dissemination event has been really valuable.

We have twice yearly stakeholder meetings which are generally about half a day long. This is where we've presented the findings to date. When I started it was presenting what I was going to do and how I was going to do it. I think the interactions being quite good. The stakeholders always seemed very interested in what's being done – the types of things that we're looking at and the types of outputs were aiming to provide them with. And they've always been quite active in trying to steer the direction if it is not quite what they want or if it is not that relevant in certain areas. They've been really useful.

In contrast, one group decided to use their advisory group in a slightly different way and contacted them on an ad hoc basis as interesting things emerged. This approach was valued by the stakeholders interviewed, as they felt their skills and expertise was better used.

We also decided early on that we would have a group of advisors, and rather than meeting them once a year to let them know how we were getting on, and getting their feedback a bit retrospectively, we decided that we would engage with a wider group of people who we anticipated – and it is the case – would come in and out of the project. They haven't all followed us right the way through, but we were talking to them in the course of the meetings we were having in the group. We were making time in our regular meetings to talk to those advisors from outside the project. Sometimes they came to the meetings but it was a lot easier to have conversations by telephone. That made it a lot easier for people round the country to join us. On the whole, they didn't request payment. In several cases I think it was to their benefit to take part in the project because it helped to inform what they were doing and gave them ideas for the work that they were doing. So we actually have quite a long list of advisors, don't we? That doesn't mean that we sat down with a great sort of panel once a year and they were all there. It was a much more flexible process than that.

What I have felt that I have done on this project – which I had done much less on the other projects – is to feed in informally during the course of the project. And that has been better in a lot of respects because you feel like you are responding to issues as they come up rather than the much more formulaic ‘everyone sit around the table going through a preordained agenda that the researchers have set’. So it has been quite a different experience for me rather than the other research projects I’ve sat on. But I have really enjoyed it and felt that I’ve had useful things to feed in.

Another point that most interviewees emphasised was that it is a dialogue; the researchers are there to listen to the feedback and ideas of the stakeholders, as much as to present their own ideas.

I suppose we always arrive at the briefings expecting to hear as much from them as expecting to tell them about the work. It is more of a dialogue and we make sure that this is clear at the start as we don’t want to lecture them!

Understanding that it is two way, the fact at we have responded to their needs as well. We haven’t just asked for stuff, we’ve given them stuff too.

They have may be some long experience in working in that area that can be used to shape our thoughts a bit. And that’s why I think it has to be a two way thing. It’s not just us reporting to them but really the most valuable stakeholders are those who do get involved in the meetings that we have, or respond to emails and give their thoughts freely. We’re not afraid of negative feedback, you know; any feedback’s good feedback and it’s really good to have...

When researchers and stakeholders asked to describe what they viewed as poor collaboration, lack of dialogue (“we present and then there’s no time to actually talk” or else “extracting information”) was a common response. Researchers were keen to avoid this in these projects.

Good communication requires those involved to not be afraid to ask questions when they are not clear about what is happening or why a certain path has been chosen.

We needed to explain things which were obvious to us. But they also had to explain things that they also thought were obvious but which for us was something new. But I think that we learned quickly – not very quickly, in one year or so – and right now we feel very comfortable in working in this way. We feel more comfortable in asking questions. If we need some information then they are able to provide it. They have always been able to do that.

Well, always ask questions. You can be as involved as you want, as stakeholders. Obviously we’re not part of the research team but we can influence the quality of the project and how useful the outputs are from our perspective. And if you don’t understand stuff, ask questions, which I always try to do. Appreciate the world that your research team are working in and the pressures they are under and the fact that they don’t necessarily know what you know, because you work in a particular organisation that isn’t that straightforward. Be as helpful as you can, ask the right questions. You put time in, you get the quality out.

Some researchers mentioned building personal relationships within the team as key to encouraging a higher quality of interaction. It is not only important to have a professional connection, it also helps at a social level, through opportunities for informal interactions alongside the formal meetings:

Regular meetings that provide opportunities for both formal and informal interaction within the group. The opportunity to chat for half an hour over lunch, to develop personal as well as professional relationships; I think that is often undervalued.

I think at the start, make sure that everyone in the project team gets to meet each other and know each other. If there are more senior members on the team and you're relatively junior, once you know them a bit it is much easier to contact them and say "Can you tell me...?" or "I need this information on ...". It is quite hard if you have information that needs to get past one group to another or if you're waiting for work from other people and you can't do what you're meant to be doing. It is hard as a junior person to say this to a senior person, because I'm not in a position to chase them up. But if you get to know the people well and work with them actively it should become a lot easier to drive it forward.

A.3.4 What was said about the quality of the interaction?

I'm trying to deal with a few key people in the right places and so I think my view is different, perhaps, from other projects which have a different stakeholder cohort. But for me it's about quality. [Poor collaboration] to me is to have a hundred people in a room and to tick the box: "I have spoken to all of these people. I have no idea whether they actually listened to me, but they were there" – tick.

As discussed earlier, interviewees emphasised that on-going dialogue is important throughout the research, both between the researchers and between researchers and stakeholders; but what did people say about the quality of this dialogue, particularly the quality of any feedback on the research itself?

I wouldn't say we look for, but it's always a delight to have a good level of engagement and feedback. And I've had excellent feedback. And I think that that's in part due to the amount of work that we've put in at the front end, in response to calls for facilitation. I think out of the four partners, I believe that we have gone the extra mile and that has been recognised and appreciated by the researchers.

Some researchers expressed desire to move beyond 'polite' feedback and many of them suggested they were up for being challenged and receiving critical feedback on their work:

Some of them are quite outspoken and sometimes critical but I don't think that's a problem. It's quite good to have some kind of response to what you're doing and whether you're told that, "I don't think it's applicable" or they don't think its usable in the real world, that's good feedback. That helps shape the research that you're doing.

It's improving and it's evolved, and I would say certainly we're all much more aware of the others' perspectives than we were at the start. But I think it will always be an issue. But I think that's healthy, to be honest. It means you're both being challenged.

feedback: However, one researcher mentioned a mind-set that was less open to

You have some organisations which just have very closed cultures. If it's "not invented here" then they don't want to know about it. You do find that with some science and technology companies. You do meet some people with very closed minds, and the "not invented here" syndrome is about the culture of particular organisations. I've certainly found that with what I would describe as an older generation of academic engineers. It was really interesting when I was trying to develop this field, how much more enthusiasm I saw for collaboration in American engineering schools which had done much more to develop partnerships with the social science, a broader understanding of what engineering education was about than was dominating in the UK.

In addition to getting good quality, if critical, feedback one research group spoke highly of the quality of their collaboration with their stakeholders, as they were able to have difficult conversations in their presence and make useful progress without having to be concerned about how they might react:

We can actually have them in the room while we are having the difficult conversations, and they will engage in that and be positive about that. And that's the difference between having a relationship and only seeing them at meetings. If you only see them at meetings and it's a different person every time, they might well go away with the impression that you haven't made a decision or you aren't doing anything with this, when in fact you're trying to bottom out some very thorny issues and have a real conversation about it. So because we have that relationship they can come into the room, they can participate in the conversations and go away with the same sense that the researchers have of it: "Yes we made some progress today, with some very difficult issues which are now much clearer." And will be constructive rather than "You didn't answer my questions, therefore this project has failed."

Developing an authentic relationship where people can speak openly and honestly without fear of causing offence is highly valued as it helps to create an environment where real conversations about the work can take place and a high level of understanding of the work can be developed. It also breaks down barriers of 'expert' and 'practitioner' stereotypes and allows everyone to be an expert, a practitioner and importantly, a learner.

Our stakeholders are not expecting us to answer the question in a simplistic way today. They are not looking for "What is the right number?", they are looking for "What is the right problem we should be looking at?" Yes, we can come up with something that produces a number but the idea was to go through the process of getting the number, not actually what is the number at the end of it.

If you come in as an expert you immediately create boundaries around what is permissible to talk about. If you talk to someone from their perspective and in plain English the boundaries about who is the expert and who isn't become more fluid. Rather than coming in and saying "You should do this", you understand what direction they are going in: asking them "What would it be like to reframe it like this?" It changes the paradigm of science and the role of the expert.

I don't see myself as an expert, I see myself as a conduit of lots of different types of knowledges. The stakeholders hold a different set of knowledges than I do. And they are going to understand the system in a more detailed way than I do ... they understand the system better than I do, because they work with it every day. So giving them the space to reflect on that, if that is what they are able to do; some of them aren't, some of them are quite traditional.

The phrase 'going the extra mile' was used on several occasions to illustrate examples from interviewees' experience, where people significantly exceeded what was anticipated. There were several examples of this in projects where the relationship between researchers and stakeholders was particularly good.

Going the extra mile. It's things like if we've had an issue which we've been exploring... There's one we were looking at around that was going to help me with some other work I was setting a direction for. And I had a conversation with XXX. For a couple of days he thought about it and he came back with some pointers for me. So it wasn't related to the project, it was related to the overall theme of resilience. And I believe that I got an open door with problems like that.

And within our limits I think we have been as flexible as we can in terms of trying to listen to stakeholders and consider what they want to get out of it – to go that extra mile to provide some payback to them. It would have been a lot more difficult to do this project if we had been saying to them "Just hang on until the end of year three and then you will get your pay out". That wouldn't have worked. So we have had to be prepared to invest in things that are useful for them, and as it turns out, useful for us in ways we hadn't anticipated, but we were doing it primarily for their benefit. And I think that is probably good practice. Devotion over and above the call of duty by the team, I should think.

We have to give the researchers in the team credit because they have gone the extra mile, to do this, and it does sometimes involve some stuff that we hadn't anticipated. There are lots of examples of this.

What would turn me off would be if there was an unreasonable expectation from the research team for our contribution into this. Frankly our contribution is facilitation as a host for the research. I think we have assisted in data collection and accessing data, so I think we've probably gone the extra mile and in return the researchers have grasped that as an opportunity and taken forward the extra mile with the research. So I can see the benefits all round.

A.4 Communicating complex language and key terms

Researchers and stakeholders spoke about their experiences of communicating complex terms such as risk and uncertainty, both between the disciplines involved in the research teams and between the teams and the stakeholders engaged in the project.

A.4.1 Researchers talking with colleagues

Several interviewees talked of experiencing a language barrier between the disciplines working together in their projects. In some cases this can just be the lack of familiarity with the technical terms:

I think in any interdisciplinary research there's always this kind of language barrier that sometimes you go to meetings and there's so much jargon that it doesn't make any sense to somebody from outside of that world.

In others, the problem emerged when everyone initially assumed they were using common words in the same way:

But we all realised we were using not incompatible but subtly different versions of language, different definitions of what we were quantifying, what we were not quantifying. Slightly different uses of words. Which led us to think "When we come to fit these things together, are they actually going to fit together?"

The problem can go beyond one of language to the underlying assumptions and views inherent within the different disciplines.

[In the context of risk] obviously there is a lot of scope for complex communication between a social science perspective of how people understand [and] respond to it ... and how you bring that up against and mix it with the stochastic, probabilistic types of risk that the ... modelling is using. It is a different idea of risk ... Completely different ways of construing the notion of risk is really what it amounts to.

I do meet people in the engineering or computer science world who do think "We could get this semantically fixed and agreed and it would all be perfectly intelligible and uniquely understood." Well you can do that at the level of SI units but when you get much apart from that – and actually SI units work because you have an agency that's set up to define them and police them, correct deviant interpretations and so on. When you're talking about language it's an inherently much more slippery thing. And that's just the way it is, at least for me as a social scientist.

It is possible to bridge these different views and develop a richer understanding of the issues contained in the terminology. One researcher talked of common ground that emerged from looking at the differences in language:

We needed to define our terms because initially it was clear that they had a different understanding of the same terms so we needed to define them so it was bullet proof, but I think right now we more or less use the same language. So for example, 'infrastructure' ... we had some different views on. It has a clear meaning in engineering terms but I had never thought about it in terms of how it affects people. So turning it around and thinking about infrastructure in terms of how it affects human behaviour. I hadn't thought about this before.

While another researcher suggests how two apparently different perspectives might overlap through the use of metaphors:

Interestingly, I think that many of the approaches in science and technology studies tend to use 'uncertainty' in ways that are probably closer to those used by engineers than one might think. A central assumption in STS is that the world is uncertain and unstable, and the problem that we have as human beings is how do we create institutions that stabilise it? Curiously enough, I was talking with a civil engineer involved in soil mechanics and it turns out that's pretty much how they think about embankments ... 'soil is inherently unstable; what do we have to do to make sure it all holds together?' Once you start talking in those terms you do realise that actually it's possible to reach a common understanding if not necessarily to use your language in the same way.

A common theme was the time it takes for research teams to reach understanding within an interdisciplinary team. Many independently suggested this can take up to 18 months.

Some of them ... know how to change their language to speak to people who are outsiders. But, some of them I've found [it] was very hard to penetrate what's gone on in their work. And it's taken kind of 18 months almost of going round and round and round before finally you understand really what their talking about. Which is quite frustrating.

Much of the interesting discussion with researchers was around the ways they have found to work through the various language issues. Speaking of their own approaches, one researcher suggested that whereas in previous projects

[I was] sitting in an office as a natural scientist with others from social sciences, economics, law, the way I was having to communicate was quite difficult; there was a premise that certain terms had certain meanings but later you realise that you are not talking about the same thing... In [this project] I was starting with the assumption that most of the people I am talking to probably don't know what I am talking about. That is the premise I started with. I knew I had to be very, very flexible in the way I had to explain certain terms, realising that where we are starting from may be very, very different.

Another spoke of one-to-one sessions to get to grips with others' work:

But sometimes it took a whole day or a couple of days of sitting in with the person and going through, you know in front of your computer, 'Here's what my work is doing'. And then going through what they're doing and then finally 'Oh right, that makes sense now.'

One approach was to use humour to defuse potential tension from not understanding a colleague's technical explanations:

One of the best moments for me was in a project meeting I was really getting quite confused about what kind of data they were saying could be included in the model or not. So I drew a picture of a monster and asked 'What does the monster eat? This is what I want the monster to eat; this is what you say the monster eats.' And from then it has been called the monster model. It has been quite nice that that critique has happened but in a friendly way. As they have been getting more into the model they have been realising how frustrating and how embedded some of the problems are with it and how it needs to be changed in the future.

Another emphasised the need for researchers to talk to each other in clear English and to ask questions:

You just get more patient don't you? You get more used to it and you'll know that when you go into one of these meetings with eight people from eight different disciplines that it's going to be long process ... Well just be open minded. I think probably the biggest thing I've learned is to ask questions. Because if you just sit there thinking 'What does that mean? I don't know what that means, I'll just write it down and find out later,' then it just all goes, completely passes you by. But rather if you stop somebody and say 'What does that jargon mean? Explain that better,' then it makes life a bit easier at the start and then you can start to understand each other. I find anyway.

The need to talk went beyond jargon, to exposing each others' underlying assumptions:

Trying to help them understand the broader policy and social context for their work beyond the realm of modelling stuff. And some of the assumptions, I suppose, that were embedded in the different perspectives that they were adopting. We haven't done it formally, but enabling a critique of their approach; which are quite hard conversations to have.

Some also questioned whether discussions needed to be aimed at reaching a single view; one commented that

We've been able to operate with our various understandings and what's probably mattered more is that we've been able to understand where each other is coming from rather than that saying that we have to have a single language that we are going to use in the final output." Another agreed that "People are quite happy to deal with probability and risk in different ways in the project. And we've just been finding ways of putting those together. And we've largely got there so that we are talking about the same kind of thing. And it hasn't been a painful process getting there.

Key factors that researchers felt helped to make these conversations possible over a long period were the ability to get on well together and the need to invest time in meeting each other:

There is no ego there. We all thought it was important to understand where the other group was coming from. And talk through that"

So, there is a need to spend quite a lot of time. I've become a lot wiser about some of the issues that [a colleague] has. I think I wouldn't have got that without that face-to-face interaction.

This has been a key part of the project in terms of time spent. I think that is quite important. It was a bit of a learning curve for everybody, how to communicate to colleagues in different disciplines and beyond what the perspective we have and what we need to do our parts

One interviewee talked in more detail about the process their project went through to come to some common understanding of 'resilience', and it is worth quoting this at some length:

In terms of the project, we had an initial phase where we realised that what was written in the project proposal wasn't going to work in quite the way we thought. We actually spent quite a long time talking about "What do we mean by the word 'resilience' and what do we mean by the word 'failure'?" And coming up with working definitions that we could at least support in the project ...

We have regular technical meetings which all the partners and stakeholders are invited to. A couple of the key stakeholders do come to them, but most of them don't. All the researchers do and we have those kinds of discussions: 'We've got to this point. How are we going to connect the work that so-and-so is doing with this work here?' That's where this discussion came from to start with, because it became apparent as we presented our little bit of work and they presented their little bit of work that 'Hang on, these two aren't going to connect because you're actually using a different definition of what you mean by resilience.'

So it was a big, major discussion. Obviously it wasn't the totality of what we did for the year: it was an on-going discussion for a good year whilst other things went on. ... There was a vigorous discussion – I mean to keep it going for a year there has to be some energy in it.

Getting everyone to the same point – we tried writing glossaries, we tried all sorts of different techniques for coming to some agreement. I think everyone shifted and there were some very heated discussions around one or two models of "How is this going to work?" We sat down one day, a relatively small group of us and had this diagram on the whiteboard of how all these bits fit together, and took photographs of it and took it away and tried to turn it into a diagram that we could present to people. And then we had another ongoing discussion about "Okay, now we've got this diagram how do we deliver it? ... We found that trying to write down the definition in so many words didn't work until after we'd had the long discussion. Trying to predefine what it was didn't seem to work very well. Because you then wound up asking people what they meant by certain words in the definition, and we wound up going round in a circle of "What do you mean by that?" and "What do you mean by that?" ... So we have gone round the loop several times! Whereas if we all sit in a room and have quite a long discussion of different viewpoints of "What should we be doing with this?" and "How does that fit in with your viewpoint that this is purely an engineering problem?" and "What do you want from the sociologists?" It was about having that time for discussion, and it

had to be free. It wasn't really structured at all. It was a free and open discussion between people who respected one another, without it going OTT. Nobody lost their rag and everybody's view was respected.

We were lucky that the group in the room worked together. We didn't intentionally create a special space with rules in which that happened. It just happened for us, we very lucky. I have been in one or two sandpit environments where people have tried to engineer that and, yes I have found it incredibly frustrating. Because I think they led us so far away from the subject to create a happy atmosphere that I think everybody was bored out of their braincells. It was lucky, but it was long process. It wasn't one meeting, it was a long discussion: you're going to try and write it down this time, or you're going to try and draw out this diagram. "You do that, let everybody see it" and then we'll have a little go with it. And then we'll have another go at the next meeting. And eventually that paid off. The end point has been some sense of agreement and some sense of no one solution actually covered 100% of the ground. And hence the delivery would be in a number of different forms, because nothing satisfied all of the criteria. And so there was no one answer to the question in the end, and I suppose there was an acceptance that that was also true.

A.4.2 Researchers' perspectives on communicating risk & uncertainty with stakeholders

When asked about their experiences of communicating complex terms with the stakeholders in their projects, researchers responded that some stakeholders have a good understanding of risk and uncertainty:

... because our stakeholders are somewhat more educated they largely understand that those are already issues. So even if they're not familiar with dealing with them they are more aware of them – more than trying to communicate uncertainties to the general public.

However, even though stakeholders might understand the terms, some of them are looking for the research to deliver something that feels like certainty:

they still just want one answer sometimes even though they understand ... there being an uncertainty envelope around everything that we're doing

In others, the words themselves carry specific meanings in the working contexts of the organisations that researchers are dealing with, and this can present extra challenges where the research is bringing new insights.

Risk we didn't really talk about – it is a very dangerous term to fling about ... we will have to deal with it at some point but we will probably use a different way to look at it, as [they] already have their own ways of dealing with it. We will use their terms and fill in with newer thinking.

The fact that 'risk' and 'uncertainty' are everyday terms with a wide range of interpretations and underlying assumptions can compound the difficulty of talking with individual stakeholders when the discussion is taken into open stakeholder meetings:

... there was a man in the audience who was questioning the reliability of the mapping work because they were based on uncertainty, but I don't think he had the same understanding of uncertainty that was represented in the model as stochastic processes. So I think you can often end up thinking that you are talking about the same thing but it just leads to a misunderstanding.

There may be knock on effects from problems with communicating risk and uncertainty. Misunderstandings feed through into lack of clarity about the types of information the project is looking for from stakeholders and what they are able to supply; and confusion as to why organisations should use models that they perceive as being 'uncertain' and therefore unreliable, even though the researchers suggest that the major uncertainties lie in the system being modelled.

It can be particularly difficult to resolve differences in understanding and assumptions during short stakeholder events:

... the focus groups were quite short – two hours, and a lot of stuff to get through. We couldn't spend a lot of time talking about the residents' perception of risk.

When asked how the challenge from 'the man in the audience' mentioned above had been resolved, the response shows a number of things: that many of the stakeholders the project engages are actively trying to work out how they communicate the findings with their own audiences; that other stakeholders in the room can help bring clarity by translating issues out of the research context; and that the researchers themselves may perhaps be feel reticent or unsure about the way that their work and how their attempts to explain it may be received and used in the wider world:

I'm not sure actually. I think we just moved on because of time. I don't think that common misunderstanding was resolved. People went away understanding different things ... [another] participant in the meeting answered it by saying "You always make decisions under uncertainty, you are better informed but still uncertain." I thought the guy who asked the question backtracked a bit. He later said he was playing devil's advocate and that these were the kind of questions that he would be asked from those higher up in the system about the basis of his decision making. I think the thing that worried me when he was asking that sort of question was you can imagine some situation in the future when someone builds some kind of system and someone blames [us] for having an uncertain model that didn't predict exactly what it was going to do. Therefore it isn't whoever implemented the system's fault, it is the model's fault. And I think that is the end point of that kind of argument.

A.4.3 Stakeholders' perspectives on communicating risk & uncertainty with researchers

The stakeholders we spoke with generally showed a more relaxed response to the problems of discussing risk and uncertainty with the researchers. However, some raised the issue of needing to translate the project outputs into language that their own audiences could use:

We're used to dealing with sort of in depth reports and trying to get around other people's terminology. I think what the issue we have is ... the way I see it working is that we're getting all the information from the projects and then we'll have to sort of speak to our directors and members regarding this information. But we will have to interpret it or we will have to present it in a different way, because of the language ... I mean when we sit down properly and start looking at it in a bit more depth we might struggle. But I think that hopefully we'll have somebody to go back to, to discuss it.

I know that taking the UKCIP model of communicating the probabilities, that immediately foxed our senior management team when we took our climate change strategy there [whereas] at the workshop with practitioners, I think people at that meeting had a reasonable grasp of that, only because we had shared some of the UKCIP information in local climate impact profiles, we'd got our heads around that, I think. Having said that, most politicians, decision-makers will be talking about this for 20 minutes before going on to talk about older people, housing and so on; it's quite difficult to get that across ... The big challenge as practitioners is, what we want to know is 'is it going to happen or not?' and you can't answer that.

For some stakeholders, discussing uncertainty in their work context can be a problem:

Uncertainty – I can see why it is important; we are uncertain about these things. But because I work in the research-policy paradigm I tend to focus on those things we do know and ought to act on, and those things we don't know therefore require more research. And if I spend too much time in the area of uncertainty, people disengage very quickly. That's just the nature of the environment I work in.

The same stakeholder elaborated on how uncertainty was not an issue that engaged colleagues in their environment:

it would be good if it were. In the sense that if people come to me and say we are uncertain how to run the [organisation] – because we are, there are a huge number of known unknowns that we need to crack on and establish. So if people came to me and said they were uncertain about things, that would be great – as long as they came with accompanying willingness to make them more certain. People tend to come and say "Hey, I've got this great idea. We ought to do this" ... I say "That sounds like an intuitively good idea, is there any evidence it would work?" No, they believe it would work – well that's not good enough I'm afraid. We can't run a big system on belief, we've got to run it on some evidence. So I'm not unhappy with uncertainty. In fact I welcome it and cherish it, as long as it comes with a willingness and an ability to make things more certain. Not just "Oh it's too uncertain, too difficult. Let's brush it under the carpet. Let's hope it never happens." That's not helpful.

A pragmatic and flexible approach is often needed when using specific terms with different audiences

... because people can get hung up on them too much. You need to establish a certain understanding, but you almost need alternatives for those particular words. In some conversations, 'risk' would work for people, for others it would be a complete turnoff ... Some people are comfortable with uncertainty, whereas with others you try and couch it in a slightly different way, and maybe relate it to how they deal with the stuff now. Because everything is riddled with uncertainty, we make projections and assumptions about what might happen. It's trying to help people understand that these are things they are probably dealing with now in their everyday work, so it's not that different but it's reframing climate change.

A.4.4 Experience discussing other terms in the context of climate change

Researchers and stakeholders were also asked whether there were other terms they had needed to discuss within their projects. Examples included 'resilience', 'robustness' and 'sustainability' and one researcher commented:

We need to be clear on what we actually mean... I think we've done that. But that will become probably more important ... because we're going to be evaluating different solutions against how robust are the solutions and how resilient are they. So, I think it will be key then in how we expose those and what they really mean. Because they're used quite a lot, quite freely by different people and can mean quite specific things.

Some stakeholders echoed this sense of multiple meanings – sometimes in frustration at what seemed an overly 'academic' approach to what is seen more pragmatically in real decision making:

Currently I have 252 different definitions of what resilience means. Everyone who writes about resilience wants to define it in some other way. I can understand why people have the need to do that. I don't think it is helpful ... I suppose if I was in there as a researcher in that group I think I would have probably had to nail down meanings but because I was there as a practitioner I didn't have to get involved in that debate. Because from a practitioner perspective there is a two line definition that explains what resilience is ... It is in statutory guidance, it is part of legislation that drives how I do my job. Why would I want to waste energy unpacking it? It is good enough. It is not perfect but it is good enough. It's not like this is brain surgery.

Others appreciated the value of the process and the need for agreement, even if they did not feel a need to be very engaged in the discussion:

I think 'resilience' is a good one because we are trying to think of a metric to measure resilience. And that rumbled on for a while. I must admit I didn't take too much interest in the process of debates, I just let them get on and do it, because there's many ways you can define it. But the fact that they had that debate, that they came up with that decision, I think that was a positive thing ... I'm used to that, because I've written standards before: "If you use this word, it means that." And that's very important – common language. Coming to an agreed definition. I know it takes time to do it, fine. I think it probably took longer than it could have done.

In other examples, stakeholders found it helpful to engage fully in detailed discussion on sometimes ambiguous terms, and that this had a practical outcome:

We recognised that we'd got a very diverse built environment and I've got expectations as to how we could actually define sustainability in a different mode to what might be the traditional and accepted norm around green issues. So this project has certainly helped to consolidate some definitions ... there was a great deal of stakeholder engagement, and workshops to actually define this topic ... I found that very interesting and very useful, in terms of understanding what other people's perceptions were, but also in formulating what our understanding was ... The objective was to have a common understanding. And along that journey to hear other people's perceptions was hugely interesting, but ultimately the whole group collaborated in defining various attributes and terminologies around the research topic.

A.4.5 Approaches to building effective communication between researchers and stakeholders

Researchers and stakeholders offered a range of ways in which the communications around risk, uncertainty and other terms can be made easier. One approach for researchers is to lay some 'ground rules' that will support communication later on, by managing the expectations of stakeholders:

I think that's an important point across the board not just when dealing with the risk of uncertainty but dealing with anything that you're doing is to be very clear about the limitations of it. Because I think some stakeholders come on board with the expectations that you're going to do something amazing and solve all of their problems and you have to be very specific at the start ... I think once you get the message across that this is what we're focusing on and we can't really do anything else then it's a bit easier to communicate.

Another response suggests a need to treat each stakeholder and each discussion individually:

What I have learnt is how flexible you have to be – when to pitch it at a very technical level and also not to lose people because you are being too basic. Not knowing how to pitch it until you meet the person. So starting from quite basic and asking them if they know what we are talking about – checking it out ... and being willing to listen to what the stakeholders do, even if it may not seem directly relevant, but through the conversation it may transpire that something is relevant. Patience, I guess

Initial preparation for discussions can be assisted by drawing on the different disciplines within the team:

What has helped [is] going to these briefings and working as a duo. He is an engineer and has a deep understanding of the regulatory frameworks; I am more on the modelling side of things. He knew the companies or if he didn't know the actual people he understood the way the companies were working and from these initial telephone conversations we started to understand more about what these people did in their particular roles. These calls paved the way.

When it comes to final outputs, one researcher emphasised the value of having professional communications support:

We have a full time specialist in science communication working on various projects, helping us to translate scientific messages for a wider audience. And we do also have very helpful colleagues in our media relations department and a combination of their advice and advice from a colleague whose field of research is about how you communicate these ideas about probability. That allows us to move towards what might look to an academic as a very, very, very simplified version of the results, but trying to present the whole story in all its gory complexity is going to be no use to anybody because they won't be able to interpret it. So there is quite a major issue really for academics whose concern is to be able to convey a really accurate, precise picture that reflects all the nuances of their research against what is really needed by people who are not coming at it from an academic perspective.

Another project involves a roadshow to relevant workplace, and a film:

Whether we set ourselves up in the canteen for the afternoon and maybe do two or three sessions: anyone can turn up that wants to and watch the film and maybe there's a Q&A, something like that. So it should be pitched fairly broadly. The road show wasn't something we originally envisaged doing, but the film was always anticipated ... All the stakeholders are pretty fundamental to the film because quite a few of them feature in it. And that's quite important because the film shouldn't just be us talking. The film maker has his own hand in it to a degree as to what he wants to do but we've been very clear that he should be asking them 'What do you think is important? Why are you worried about this? What's this research going to do that will actually help?' Which hopefully should mean that when the final film is put together people will watch it and won't only see "Oh there's something interesting in here" but they'll see people in a similar position to them saying 'Actually this is important'.

In another example, one final output would have to communicate detailed information in a way which would help technical decisions:

So we developed the idea of life expectancy [of space in a building] where you have all the rooms down the left hand side of the table and draw bars across to the right which would show you green, amber, red. With time as the axis you could look at the length of the green bars, which would show you the safe life expectancy of the rooms. There was some thinking of ways of showing this information that might be visually understandable and get away from the probabilistic stuff. Which even for engineers is really quite difficult to communicate. Because when push comes to shove and the question is "Do we spend a lot of money or do we not spend a lot of money?" the answer "You probably might want to spend a lot of money" isn't really that helpful. As engineers, when we are presented with probabilistic problems, they have to be boiled down ... There's always this step that has to be taken between the probabilistic approach and the "Do / Don't do" question.

Where researchers or stakeholders were communicating with the general public about climate risks for their local areas, there were a number of additional challenges. One researcher raised ethical dimensions to what and how to talk about climate risks:

There was quite a lot of information we could have shown them about potential risk scenarios going forward into the future, and pictures of flooding. Things that could have been potentially distressing to a lot of people, and we selected our climate scenarios – we didn't want to scare people.

Here the project needed to balance accuracy of climate information with clarity for the audience:

The climate modelling gives you a lot of complicated information which doesn't always translate into the 'everyday life' talk you need in a focus group. We did spend quite a lot of time trying to get that to work ... 'Temperature will increase by no more than 4.7 degrees' means nothing. There are issues of how you translate the technical answers that pop out of the modelling to people. What we wanted was 'If you have an experience of weather in this particular way, will you change your house or garden in this way?' I can't make much sense of whether it's 4 or 4.7 degrees but I can make sense if it's like Marseilles... " A colleague added that "It's still very much experientially driven really, but we did think long and hard how to communicate risk. Particularly flood risk, particularly for vulnerable people who aren't in a position to make any changes, they might not know. We got the flood risk maps because we wanted to choose areas with risks – and they're in the public domain but we chose not to show them... I think we've learned that almost whatever we were saying wasn't hitting home. I just don't think that people are in a place to see climate change.

A stakeholder who had experience of communicating climate change information to the public commented that:

I've learnt that there is a whole boat load of other people out there that need to care about resilience now, not resilience in 50 years. The conversation we need to have is not about this big time scale stuff, it is about bringing the impact that is at that point and making 'there' (long time scale stuff) 'here' (now, today). It is only by bringing 'there' here that we get the chance to have the robust conversations in communities about climate change from your perspective and the impacts of climate change from my perspective. It is giving me a different set of conversations to have. I am hugely pragmatic in everything that I do ... If there is a useful tool out there that will help me get from there to there then I will take that tool, thank you very much. I don't need to take the whole baggage with it and I have learnt that that is quite an interesting skill set.

The same interviewee elaborated on looking to other, non-climate discussions for communicating with the public:

There is all this literature about talking to communities about risk but actually the most useful stuff is coming out of GPs and it is about them talking to people about cancer diagnoses – people living with and managing unknown consequences of serious information. That is a much more sensible paradigm in which to be working than ‘let’s talk to large scale communities about risk’. And there are a whole set of approaches that sit with this that if you look just at the risk literature you don’t see. And if you look just at risk practice you don’t see. And these tools can help you have different conversations.

A.5 Ensuring the research is relevant to end users

I always say “make sure that outputs are relevant” but what is relevant? We have to ask the stakeholder “What would be relevant to you?” They find it hard to answer. It is an iterative process: we say “This is the sort of thing we might be able to produce” e.g. this is a framework for how you might use these methods... and the methods we use are very resource intensive but it is the thinking behind the methods that is important. Knowing how they might be able to use the information.

The end product has to be useful – but what do we mean by useful?

A.5.1 Ensuring relevance at all stages of the research process:

Having end user relevant output was a clear and laudable driver for projects but it quickly became obvious that there was no simple or universal definition for what was meant by the word ‘relevant’. For some, relevance related to the format, language and accessibility of the output, but for others it was something less tangible: partly related to the experience of having been through the project.

Our stakeholders are not expecting us to answer the question in a simplistic way today. They are not looking for “What is the right number?” they are looking for “What is the right problem we should be looking at?” Yes, we can come up with something that produces a number but the idea was to go through the process of getting the number, not actually what is the number at the end of it.

Thinking about how to ensure the research provides relevant and useful tools, messages and other outputs requires thought at each stage of the research process. These stages are covered in turn below.

We will be presenting findings at the Local Government Association conference and two Chief Executives [from local authorities in this non-ARCC project] will be presenting the research with us. I think that is quite a positive thing because then we are hearing leaders give feedback on the usefulness of the research. And it goes back to what we were saying earlier about co-creation of the research agenda – genuine collaboration right throughout the research project.

Doing each bit well builds momentum to maintain contact. So the fact that we engaged and managed to frame the questions early then got their interest in the doing phase, and hopefully the fact that we have kept them in the loop for the doing phase will keep them on board.

A.5.2 Ensuring relevance at the start – articulating the goals of the work

There were mixed experiences and views about how much stakeholders should be involved in the process of shaping the project in the early stages. Some felt that it was a definite advantage to have demonstrated good connections with stakeholders and ‘relevance testing’ at an early stage.

I don't know this, but one of the reasons I suspect we received the grant was that we did engage with stakeholders creating the research proposal in the first place. So there was quite a good effort to make these links with stakeholders as part of the submission. I think generally we have stayed with what we said in the proposal on stakeholder engagement. If you can co-create research projects with stakeholders they've got a strong interest in sharing the discovery process with you. And I'm not saying we perfected it but there was some strength in this proposal that brought people in.

But that impacts on the whole nature of the way proposals are put together. The time, taking it seriously: which again makes the researcher's job much harder. So you can see why it's not done like that.

Others were less clear about how stakeholders could contribute at this stage:

I don't think we anticipated anything. Our model hadn't been built so it was a bit of a blank canvas. We knew that it would be heavily influenced by the stakeholders – what they don't want us to include and what they want. We didn't know whether that interaction would happen. In the end we still did a lot of the thinking ourselves but we also had guidance [from them] on some of the big issues we needed to determine. Not the majority, but certainly some of the key aspects.

Basically until the money is given, really all we have done is written letters saying “Yes, will support it”. I might have read a four page outline about the project. There is not much time at that stage for engagement. Often you're given a day, or a week if you're lucky, to say ‘yes’ or ‘no’ to engagement.

There were a number of contributions about the importance of clearly articulated goals for the work and whether they were openly discussed, simply accepted or not particularly visible. Some clearly saw that a clear understanding of the goals was important and a good way to remind people of the boundaries of the work and what was possible and what was not possible within it. Others were unsure how clearly the goals had been articulated, and whether this was a problem. Something of this range is given below:

We have made quite clear from the start what we are trying to achieve. We have continued to say this each time we meet. Trying to make it clear each time, what the goals are: this needs to be done.

Stakeholders may know that the project exists but they have no idea what the point is and certainly don't have any idea what is going to happen in the end.

Yes, keeping the overall aim of the project in mind is quite a difficult thing to do sometimes, I think. When it's such a big project with so many participants, I think it's very easy for those participants to forget what the point of the project is. And try and focus so much on their little tiny bit of work and forget why they were doing it in the first place. I think that's very easy to do unless you're constantly reminded or remind yourself "Why am I doing this again? How does this fit into the bigger scheme of things?"

But the barriers are everything we have spoken about: timelines, lack of understanding of what the actual question is and at what level you need to answer that question. They may think they are answering the same question but they are not. A lot of work can go into answering not the right question. But you can only get over that by a constant dialogue: "This is our interim result, is that useful?", "You need to tweak in such a way..." If they are able to do that then that is good.

A.5.3 Ensuring relevance during the process

Their interest in the results goes towards them saying "It would be good if you could do this," or "It would be interesting to do that." In some sense, giving nudges to the direction of travel as the project evolves.

I think what's gone well from my perspective is that I've been able to go along to most of the meetings and listen to some of the technical stuff and some of the managerial stuff. And also the fact that they do listen to me! Because I do from time to time remind them that it's not just an academic study, you are providing tools that we can use. So they listen to me. I mean that's quite good and I think it's quite important that there's a strong end user influence on what they do.

One interviewee offered the simple and valuable advice on to how to keep the work relevant: to keep asking "What is the value for the stakeholder?" every time they were considering what to do next or how to run an event.

And working at the co-ordination network we've been changing a lot of the practices in terms of engagement. And always when we are organising a co-ordination meeting or a meeting where the stakeholders are invited, the first thing we always ask "What is the value for the stakeholder? Why should they come? Is it information, is it networking?" Because there are different aspects, it isn't always that they will get specific outputs. It could be knowledge generally, or networking, or learning. But it has to be clear why they are coming to the project.

Other questions to ask to check for relevance include:

It is about asking "What does this mean?", "What is going to be the use of this research in the next three years?" and "Who is it going to be useful for?" It is really just pushing on those.

One aspect of keeping the work relevant is that the world does not stand still. The policy environment shifts, as do other influential criteria such as stakeholders' ability to access resources and take time to attend meetings. It is thus not surprising that stakeholders' interests and priorities may change over the duration of the project. They may have said one thing at the start of the project but as policy environment changes or they experience a particular event, their focus may change.

Depending on what is policy relevant at that time, their focus can switch quite quickly. So what was key to them two and a half years ago, now is not quite as important as something else. So one example was after a really bad winter when they said, "Oh, but what about cold winters?" That was never one of the key areas at the start of the project so it was never something we were looking at as part of the work. It's a bit late then to go back and switch but, I suppose their timescales are different.

As with managing the tensions between different motivations for participating in this kind of research there is clearly a need for flexibility in how the process is managed to allow for things changing, to ensure that the outputs remain relevant.

The research has to be set in such a way that it can be flexible – not break points exactly, but the ability to keep options open, in the background if they need to adjust as things change. There are situations where you put in train some research and you cannot change it and that can be a huge barrier if the policy changes or is withdrawn or whatever: you are stuck. So to build that flexibility in at the first instance.

There's a lot of people in my organisation who focus so much on the next two, three years that they regard research as not really helping because the outcomes are five or ten years. And one frustration that I've expressed is that the research needs to go on at its own pace, whereas regulatory cycles, five year cycles have deadlines. And if you miss one by two months you might have to be locked in for perhaps five years.

Many of the stakeholders felt quite happy in the role of grounding the research teams and felt that this was an essential part of providing useful outputs, asking questions, showing the researchers things they were saying that were not immediately intelligible to non-academics, and showing how the quality of the end product could be increased.

I think the role I take quite seriously is when I go along to the project meetings I bring them back down to business basics, if you like. If they go off on a tangent and they might get into an academic argument, I say "Now hang on a minute, remember what the end user wants."

Be as helpful as you can, ask the right questions. You put time in, you get the quality out. I know particular people in my organisation and in terms of my own network and I have an idea of what might be useful for them, but it's really a question of establishing how can this project deliver and move things on a bit further? And if it can't then it can't, maybe that's not what it's set up to do, but it's a question of getting the most out of it for the time I put in. Or you've only got yourself to blame. You can't moan at the end of the day!

One researcher made the valuable point that it can be hard to have useful discussions about relevance without having something tangible – a model, set of results, vulnerability map – to discuss.

We always ask “What kind of outputs do you want?” when we meet them. But it is a difficult question to answer unless you have results to show them and then they can say “No, we don’t like that!”

As the work progresses the stakeholder can use their connections to make new opportunities to move the work forward.

When I first got involved I thought this will be quite handy in developing modelling tools that the industry can use. I still think the same but there are challenges. But that’s why I’m looking at a longer term programme now. I tried to do something with my – I call it ‘my’ – climate change study work to look at tools but was part successful: limited, and limited budget. Well now I’ve set up this longer term programme; this [ARCC] project will complete during that time and then we can take and modify and have a structured way of introducing it into the industry’s thinking. Whereas initially I was a bit of a one man band with ideas that didn’t quite match where the company was going, now I’ve got industry support; I think I can take the research and champion the introduction into the whole industry, through this well-funded research programme.

A.5.4 Ensuring relevance at the end

I think what we have done so far has been ok. It is how we finish it off in the next few months...

I think when you think of the research critically particularly around this issue, adaptation, the research that has had genuine lasting weight and value has been when a stakeholder is really quite embedded in that research. Particularly around dissemination, or if it is around a tool, “How is this tool going to help us?” And I think that those kind of things are challenging to the researchers, but in a very good way for the research outcomes.

The final stage of large inter-disciplinary research projects is often taken up with how to bring disparate parts together to create a sense of a single entity. How well this is done is clearly related to how well the separate parts have fared, and just how disparate they were:

The project was designed as a set of work packages and a sense of how they would all fit together in the end. Inevitably, the fitting together is proving to not be so straightforward as envisaged in the original plan, but it is being helped by the degree of goodwill that has built up within the team. And I think the mutual respect for each other’s’ professionalism. So even if other people don’t quite understand what I and my research fellow are doing, I think they accept that we know what we’re doing! And I think that’s been quite important.

A key factor in how well the work comes together is the closeness of the research teams and – as a few of the teams mentioned – interdisciplinary ‘glue’. This glue is the people or tasks that ensure that the teams talk together across their discipline boundaries throughout the research, in order to create something that is interdisciplinary and that links the parts to create a whole entity. The importance of this was mentioned in some projects and its absence noted in others.

Project plans are still written as “Work Package 1: climate”, “Work Package 2: economics” and you know once they get to the end of the aims and objectives they think “Oh that’s it, I’ve done my bit.” Whereas that’s not really it... There might be something in the middle that brings these together, and the people that are doing that are the ones they’re having to tear their hair out when dealing with the others. But I think it’s important that those working on what they see as discrete work packages realise that they’re not and they need to see it through to the end, basically.

So maybe we could have better integrated the new people in what the overall project was about because I think some people have come on board who were – like I said before – very focused on their little bit of work. And the person who’s overseeing them is very much like “This is what you have to do for this project, go away and do it.” But then, because they were not involved with the overall aims at the outset or with meeting the stakeholders and that kind of thing at the start, then maybe they don’t have the full picture. And I think that needs to be very well managed. I don’t know how you’d do that there but I think that’s something that is quite important.

The final product may still be quite an academic output which needs a degree of tailoring to make it usable by end users.

One thing I am going to be doing over the summer is to think how we might tweak the toolkit to think how we might use it with ethnic minority groups as we haven’t really done so far. So again that has given us the opportunity to do a bit more engagement with potential end users.

When the toolkit comes out and it is too academic or too strategic my role is in making it functional for the operational level. How will your care coordinator, your social worker use this on the ground? How will they deal with this situation using this toolkit? And that is the interesting bit for me.

One stakeholder had quite a low expectation that what would come out of it would be something that he could directly use in his day to day work, but was more something that might help him think differently or ask new questions about his work:

I don’t think it is our role to get involved more in [shaping] the research. Research is research and it is different to applying stuff. This project was about developing new ideas... It is probably not something that you can pick up and use directly. I would think there was a stage of doing the work, getting some sort of output from the research; and thinking in a second stage about how it would be applied.

How the research outputs are disseminated is clearly important for ensuring the work has wide impact to all relevant end users but, at a time when researchers are trying to complete their tasks, draw various sections together across the team and think about what they might be doing next, many described this stage as rather fraught. There was a concern that having time to think up imaginative ways to disseminate the work to create maximum impact could get side-lined. This is clearly frustrating as, after all, what is the point of doing work to inform practice if the final mile is not covered and the messages do not reach the people who could use them? To avoid this, a number of people mentioned that a new influx of resources at this point would really help the team to stay focussed.

This resource could be in the form of a person whose role it is to draw out the messages, the audiences and the routes to reach them:

Having someone dedicated as a dissemination champion. That has been his focus. He's got a small amount of time on the project, he hasn't had to get too involved in the nitty gritty of the research but he's had to keep us in check and say "What are the key messages?"

He has helped us because he looks at it from – not from an outsider's perspective, but he looks at it at intervals and he brings it together in a way that is relevant.

The resource could be about having an agreement with the stakeholders that this is a role that they could be helping with:

I think it is the dissemination stuff... how as a practitioner would you support in the dissemination of the research findings, because that helps to address some of the issues. For me it would be about getting the research into my professional networks. There is an XXXX peer reviewed journal. It is about providing the ins for people to be able to go and do that ... Because some of the outcomes could be used for that, so it is about being those professional eyes and ears on the ground: "I will help you with this aspect of your impact."

They all now know that they need to do their dissemination of academic papers or they need to do some kind of other dissemination but once the funding runs out then what? I suppose that's another point at which stakeholders who have been engaged and understand the research, take it on and take it forward: when the researchers necessarily have to go and do the next project. So that's another point... before the project and after the project, possibly where stakeholders can add more value and make sure the work lives on and is not just a link to interesting stuff on a website: "Actually, how does this change practice?"

One of the things we find with the practitioner side of research is that most research goes to 'proof of concept'. I don't want proof of concept; I want you to go from proof of concept to a tool that is deliverable. I don't have the time to be able to do that. So taking stuff past that proof of concept and into delivery is what the practitioners could really help with, so long as it is written into the research itself. That is something about writing of the calls. Proof of concept, great; we know that cold fusion can happen – the concept has been proven but it doesn't help me.

And you know, a stakeholder that might promote the work as well and tell others, and not just in their own organisation. But I suspect some of these stakeholders are involved in a lot of projects. And they probably have more contact with these different projects, perhaps, than we do. You know, we might see people working on the other ones once a year perhaps at the annual conference.

These are increasing issues for the research councils and therefore for research projects demonstrating impact. Dissemination is an integral part of that and that's where outside people engaged in the research project perhaps, in a more structured way, can actually help in generating useful research outputs.

The additional resource could also be funds that are fairly easily accessible at short notice, possibly from the research councils, for successful projects with messages to share:

It would have to be sold to the funders. It wouldn't necessarily change the research dramatically. We have probably spoken about this before but whether the funders could have a KE pot of money which can be accessed in the short term rather than having to go through a lengthy procedure. They do give money to individual universities. But then you are fighting against everybody. Maybe they could do something like that that would facilitate it.

Because we have been so successful in pushing the project forward and it fits so well with the timing of policy processes, we are quite in demand from people wanting input from this project. Without extra money for dissemination [EPSRC funding through the university] it would have been quite difficult to meet these demands while we are still trying to complete the project outputs. There is a general message to the research councils about the importance of those contingency funds, where you have a project that is successful and is just hitting the spot in terms of communicating to the policy process at the crucial moment: to be able to call up at fairly short notice to make that happen. This was really important, it enabled us to keep everything else going when we were very busy finishing the project.

So for research councils it is maybe more about making sure existing science has reached the audience you want it to reach and that there has been the opportunity to influence policy. The research councils may be driving forward the scientific agenda but they need to consider the latter too. So by giving money to dissemination projects can be quite handy. If you ask the local authority what is most important to them – picking up on things that came up in a workshop we ran, funded by ARCC in May – as they are being cut at the local authority level, they rely a lot more on research funded through programmes like ARCC. And they need a solid evidence base to do their planning and things like that. It does make you sit back and think well actually, what we really need to think about is how will the science from all these various projects actually be communicated, and what this solid evidence base is ... The knowledge transfer money has definitely been really useful for this but also at different times existing research may be useful to different people, so having some sort of collective overview of dissemination to local areas for different projects would be really useful and I am not sure that this is currently funded.

I think the EA and Defra really want to know what the key outputs are from our project for Climate Ready and Climate Local ... It is that kind of thing. I guess it is research councils being mindful and sharing those messages out, as well as funding new research and making sure that there is the money there for that bit.

A.5.5 Good link to organisational agenda

When asked what makes the research relevant to stakeholders, a common response was that it was because there was a close alignment of the work with the interests and goals of their organisation – and sometimes also to their own interests and goals.

They're just really engaged with the idea of the project. I suppose they see that there are benefits to them as an organisation, and potentially professionally as well: that that they are dealing with something that is on the agenda and that they want to be seen to be leading on this. It's really because they are getting a very strong lead out of their Estates department. So in that particular case there has been a very strong alignment of what we are trying to do with what they want to achieve. And what's interesting is that depending on the costs that come back on the schemes that we've proposed, there's a real chance that we might get to implement some of them.

Are you going to be able to sell to your directors, your head of service, your customers, why you are taking that time out? You need to be able to strongly articulate what that project is bringing, either to your organisation or to your professional development; and you have got to be able to subsume both of those into the needs of the project, because they have a contract to deliver and if you can't support the delivery of that contract then don't get involved in it.

Close connections could be made when there were obvious mechanisms within the organisation that could be used to reach key people:

I feel very positive about it. I feel personally that, whilst research at ground level can be a bit abstract for an organisation, we've actually managed to capture that in a meaningful sense in order to support and promote our general sustainability agenda. So that's been very useful for us and very important. So we've actually informed two or three articles within our magazine here and maybe a couple of press releases. In terms of the engagement of the overall project I think we've had a very good level of engagement. I do think in part that's due to our openness for engagement, promoting to our internal stakeholders to get them to engage.

A number of stakeholders recognised that although the research did not feel all that relevant to their day to day operations, these were research questions that could become relevant in the future. Participating thus allowed them to operate outside their normal parameters and explore things beyond their current remit. A researcher gave the following perspective:

If we were trying to answer questions the industry wanted us to answer we would just come out with what they are already regurgitating. I think it is that space that gives you the opportunities to do something novel and new. And it is a risk as it doesn't always work, but it's good to have this opportunity to take those risks and hopefully it will link into their next phase of management. So, we'll see. I'm a bit sceptical that it will be co-opted for a different agenda than we intended. But I think there are a lot of opportunities to really reshape what they're thinking.

A few respondents mentioned knowledge transfer and secondments, either as part of the research process or somehow linked to it, as a good way to embed learning, understand the daily realities of other organisations and the opportunities and constraints they operate within and create new ideas and knowledge through the process.

One of the ideas we had – and some of the projects have adopted it already – is the idea of having a secondment from the organisation into the research. Or the opposite: to have a junior researcher in the company. Because then you have someone day to day to translate the research to you or the opposite, to get all the information from the stakeholder into the research group. That might be the next step, and I know some of the energy projects are looking into doing that because some of the key stakeholders have the appetite, because they are looking at multimillion pound investments for the future. So if they can inform those investments and technological advances in the future then they are very keen to collaborate with them. It is knowledge transfer as well as communication. It's making that link, a much more meaningful link than "I'll just go to that meeting where the researchers are going to present to us all their outputs and some of them might be useful and some of them might not. Some of them might be completed, so I won't have anything to contribute – a very random get together and presentation of random facts."

I think it would also be really useful for funding agencies to fund extended periods for academics to spend in local council areas or utility companies and the other way round. So you have private companies releasing people to ensure that models that are developed are interesting academically but also are useful longer term, to be applied. And I think that we have really tried to do that. Although it is difficult to do, because although you are meeting people fairly frequently, the amount of time it takes... I mean if you were working in a company developing software you would be meeting regularly to get requirements and developing and iterating the software.

It is clearly wrong to assume that all stakeholders want to play the same roles in the research process or want the same thing from their engagement. There is therefore unlikely to be a common idea about what would make the outputs seem 'relevant'. Different ways are needed to communicate with different stakeholders if the work is to feel relevant to them.

And not only updating them in a common forum but in one-to-one sessions as well. Because not all stakeholders will be expecting the same things from a project, or be expecting to provide the same kind of input. So if you are serious about involving key stakeholders in your project – of course you won't be able to do it with all of them, but if you have identified some key stakeholders – you need to engage them in one-to-one, in-depth communication.

A.6 Deciding who to work with

We're not trying to deal with large numbers of people; we're trying to get to the right person and talk to them.

I'd say we've got some stakeholders who we deem have been very good and others who have been less interested, I think; and that probably morphs in with their other pressures, I think, than lack of interest. And possibly we could have been better at being more regular with our interactions, perhaps partly because we have fallen behind slightly, we probably could have given more updates.

The ARCC projects were set up to with a specific focus on engaging end users in the process of developing the research. It is therefore interesting to explore what was said about how these end users were chosen to participate in the project. There seemed to be a fairly even split in the projects: between starting from scratch with people and organisations that the research teams had never worked with before; and tried and tested stakeholder colleagues, where the teams had long term links, were confident that they had questions of mutual interest to explore and knew that they enjoyed working together. Many of the projects were a mixture of old and new, while some favoured new partners even though they were untested and had to build the relationships with them during the research process.

Unlike other projects we did not specify case study areas at the start of the project, but said that there would be an initial phase where we would assess sites that would be suitable for this on the basis of new research; so we didn't know that until we started. That meant that we did have to build the relationship from the ground quite quickly really, and invest efforts in things that would give them a quick payback so they could see why they should get involved with this.

We had worked with most people before. There was a certain element of luck in that we hadn't worked with the sociology group before and I happened to meet them for the first time at a totally unrelated event. As a throwaway line he said something about the industry and I went and spoke to him afterwards... so that part was pure luck but most of the others, we have had some relationship before.

We didn't know really the people in the local authorities when we started, and just the development of personal relationships; and the way they'd been able to slightly mould the design of the research to get useful answers out of it, and to suggest the good times when to do a survey might be.

We already had links with some organisations and those have matured through this project and they obviously had a particular interest in this. We had connections through the department to the Environment Agency, who we had already worked with and that continuity has been maintained. We had prior connections with organisations which support the distribution of information about good practice amongst local authorities; and also we had strong connections on the ground with people working on hazard, risk and resilience, who were engaged in resilience planning. So those were the kind of partners that we started with and some of them have been pretty faithful all the way through.

There's also a context: it was our local university, so there's a history of engagement around a series of issues; there's a mood music about how that works. The other PI has connections with the other university involved The third university has sort of been interested, but their final round of interest is because they had a European bid to put together on community framing of climate change. So there was a fortunate coincidence of interest at various points, which worked for us. You can't control the broader context.

Some research projects felt that it was important for their work to get a good breadth of people from across the whole system to support and guide the work, whereas others had identified a few key individuals that they knew they wanted to work with and were confident were the right people to give them the links and the quality of feedback that they needed.

What I think we have done well is that we have brought in a whole range of people across the whole system. So I'm talking about local authorities, health trusts, fire, lots of different community and voluntary organisations in localities.

I think we have done pretty well to cover the range of stakeholders and I think that is unusual as well. We are not only talking with people in central government for example, or utility companies. We are talking with a wide range of people. Which I think is good.

One thing that has been apparent to me from the beginning is that our engagement with stakeholders has been different to many of the other projects, particularly the first cycle of ARCC projects. In that we were not trying to address a large group of building design consultants or a national group of stakeholders. Our stakeholders tend to be more national organisations. So we have a much smaller group of much larger stakeholders who we are trying to interact with ... So our interaction with stakeholders is slightly different to what ARCC had in mind, which is "You've got to get hundreds of people into a room and talk to them and try and do all these things." We actually have a small group of core people within these organisations, which we try and interact with, and they are very integral to the project. As far as we're concerned it works wonderfully. And I could back that up by saying that that interaction has led to lots of spinoffs, involvement in other bids; so from our point of view it's a very fruitful relationship to have had and strengthened over the time that the project has been running.

I think it's all trial and error isn't it? So I'm sure if they did another research project that they would find better ways of doing things. I think, just thinking back, one of the workshops that I attended they were speaking about trying to find out information about electricity cables and sub-stations, that type of thing. And they were asking if they knew where they were. I just couldn't get my head around why they weren't asking electricity companies where they are, that type of thing. That's what crossed my mind. So if they're doing these workshops they need to get more, perhaps more people, the relevant people involved as well.

One project was able to pull together an international team of visiting researchers to give them feedback beyond the UK perspective. They were particularly influential at the start of the process.

So we gathered that group at the very beginning to start us off in the right direction. I remember that we had five key points from that and I went back to them to prepare this presentation and it's amazing how much we'd stuck to them: heat; flooding; don't overcomplicate things; select case studies; and get on with it. Very good advice really.

I think it's a very good lesson for research more generally, to have an international expert group. It's not unique this but if you think about many of the challenges we're facing, it would be surprising if the only useful knowledge was in the UK. My experience with research councils is that they're not very good at funding international comparative work. I think we can make a case for saying that's helped our project enormously, for a fairly modest outlay. And those researchers in other countries have been happy to feedback how helpful being involved in this project has been for them.

Clearly there is always going to be a balance between engaging all the right people who might be able to usefully guide the work and the time and resources you have to do this. So, in the end it comes down to how important that group is for you.

There may have been other organisations that it would have been good to pester because they ought to know about the work we are doing but if you don't have the time you don't do this. There probably isn't anyone that is so key that the project will fail. But there may be people that it would have been great if they could 'fly the flag' and we could have communicated with. There are a few organisations that we have tried to do this with, but there is so much one person can do! If there is someone with very important information I will pester them until I get the answer – it depends on the priority.

I guess the more you sign up the more resource intensive it becomes, without necessarily further benefit? If they all sign up and they are all expecting you to produce information for their benefit, then you get stretched. It's a balanced judgement between that halcyon position and the reality that some of them will be a bit less collaborative.

Identifying the right organisation to be working with is one thing, but identifying the right person to engage in that organisation is quite another – especially when the organisation is large, has many departments and does not communicate well between them. Who the right person is, of course, partly depends on what the research team want them to contribute to the work. The person you need to give feedback on model data is not necessarily the same person that you want to steer the work or help you influence policy.

On the other level, it's the people further up in the organisation and at strategic levels in the NHS, whose policy direction is tilted by what they find out by attending our steering panel meetings and our presentations and so on.

When we were approaching stakeholders to get them to participate, it's not that difficult to get a letter of support really but these letters had to say the amount of support they had to give – £50,000 of effort from each of the local authorities. So we got two of the Chief Execs to sign these letters, and the third was the Director of City Development. And I think that not only got them in at a senior level at the beginning, but I think it was seen by players in the local authority that it was a useful thing to be doing.

On a pragmatic level, continuity of engagement is important – particularly of individuals who are able and willing to play a championing role for the work in their organisation.

But in terms of a three year project, with a local authority you need the key person to still be there. So there needs to be longevity of support – of championing in the organisation – for it to work. Looking at the timeline, it's a three year project, you might talk to the stakeholder even six, nine months prior to submitting it; and then impact's likely to unfold over years after the project's complete. That's quite a long timeline. You do need some continuity of engagement in that second group – that group where you're trying to make a difference.

In some cases people have a budget or a job description that allows them to participate easily in this kind of research, but for others it is harder for them to make the case for participating and they need to prove why it is relevant for them and for their organisation.

In some places the facilities management are relatively powerful and if they want to do something and have a budget they can do it, or if they don't have a budget and they are seen as important they encourage XXX to give the funding to do what they want. Others, for whatever reason they just have their backs to the wall – meeting government targets etc – and engaging in anything other than core business requires a higher level of sign off.

It was easy to make the case as it was very clear that it was very relevant to my job, as one of my tasks was keeping up-to-date with all the research relevant to sustainability and environment. So it was never an issue with my old organisation funding me to travel and attend those meetings. That was quite privileged position in a way and that is often not the case.

One team seemed genuinely unsure about how the stakeholder group had been chosen or even why particular people turned up to their events and did not contribute or interact in any way.

I don't know how those bodies got signed up. Again I think it's probably what the PI did at the start. But sometimes you get a representative from a group or an organisation, who will come to the stakeholder meetings and then really sit in silence for three hours and then go home. And you kind of think, "Well should we, you know how, do we bring them in? We've done all we can to try and get it through." But other stakeholders are genuinely interested and see the benefits to them of what we're doing. And really want to drive what we're doing in a direction that will be beneficial to them. And obviously also produce some interesting research for us.

One researcher made the point that he felt there was a need for redundancy in stakeholders (data providing stakeholders in this case) as there could be a number of reasons why an organisation had to pull out or were not for some other reason suitable to work with, even if they had been keen to participate initially.

You don't want to go into a project with a very small number of stakeholders. If we had gone in there with just two organisations supporting it and they had been the more difficult ones to work with, life would have been a whole lot more difficult and the project much less successful. So I suppose one thing that comes out of it – I'd never thought about it this way, but as a learning point: it's good to have a bit of redundancy in the stakeholders that are willing to sign up and offer you access to information.

Several of the projects mentioned this problem of stakeholders dropping out – especially due to turnover of staff – and that loss of connection with an organisation could be significant and frustrating (see section A.9.1, page 108). One project had the 'problem' of being too successful in recruiting organisations to co-create and test their work with, and ended up having an inner group with whom they worked more intensely and an outer group who benefited from the materials being produced and who had opportunities to give their input at various stages.

Many of the researchers mentioned organisations they would have liked to work with or who had been particularly 'hard to reach'. Some persisted and found ways to connect as it was core to their work, even though it was time consuming and difficult to do this; others noted that it would be more of a 'nice to have' part of the work, if time and resources had allowed.

Some people who are older and in quite frail health and may have a number of other difficulties in their life; and in a sense they are the 'hardest to reach' groups and I think we have gone as far as we possibly could within our limits to do that. If we could have done even more of it we would have been happy, I think. So that is one limitation. One could have framed a whole project on communication with those groups. But because we wanted to provide a spectrum we couldn't focus entirely on them.

Getting the utility companies on board has been really hard and they are quite important for the modelling work. So, that is not through lack of effort on the part of the project and even ARCC helped.

We haven't had much dialogue with DECC or Defra, and not through lack of trying; and EA people have hokey-cokeyed in and out.

A.6.1 What roles are played?

Choose your steering group with care because, if they are steering, you have got to live with what they say.

What makes a good stakeholder? This naturally depends on what they are being asked to contribute to the work. Clearly having relevant knowledge and an understanding of what is relevant in the 'real world' they operate in and ideally ways to influence this, are important; but not all stakeholders need to be able to fulfil all these criteria.

Well I think, yes I think stakeholders who have that interest combined with an expertise in the area that you're working in makes for a much more fruitful involvement, in that they have contacts that can give you data. They have insight into how the research might apply in the real world.

I don't think it's necessarily that they have things that you transfer. It's the avoidance of group think. If you work in a particular national context there are ideas and knowledge that are bandied about without question. And the idea is sometimes you ask a bunch of people who don't work in that context to come and you ask them "What do you think?"

The ability to influence policy and think about the longer term agenda was seen as important for stakeholders playing an advisory or steering group role.

I think that's something that these projects need to think about if they want to engage not just with DECC and DEFRA, but want to be engaging with other parts of the world where action needs to happen.

But yes, in terms of kind of looking to the future on this agenda, I think both ARCC and individual projects probably need to do thinking about who to influence, and how, and who are the right people.

As previously mentioned, stakeholders play a number of different roles in research⁴; our interviews showed this to be true of the ARCC projects, although in some cases there was a sense that the roles were limited to providing feedback or data to the team. Where the stakeholder–researcher engagement went well and a good relationship was built, there could be considerable creativity in the different types of roles played, and these could be tailored to the situation as it emerged and to the skills of the individual. This was considerably more satisfying than merely contributing to the project's progress meetings.

There's the stakeholders in terms of the shapers on the advisory board, there's the stakeholders in terms of the local authorities, with whom the aim was really to try and make a difference with them in a more hands on type way, and then there's the stakeholder-respondents who we've engaged in terms of finding stuff out or who contribute to our evidence. There's a number of different ones. Because it's not only about making sure you're asking the right questions, that are of interest to at least one of those groups.

And I don't know if they've talked particularly about their aspirations in that regard, or in terms of influencing that level, and how they would want to do it. But they probably benefited in one sense from me being kind of free ranging, and looping around and making the connections, which you can do from the outside.

So you have the people who are simultaneously stakeholders and partners. And at the other level there is the audience for the work, which is a much broader group of organisations, where the focus so far has largely been them becoming aware that the work is going on rather than there is anything definite to share with them. That's something we as a team are beginning to talk about in a much more focused way as we head into the last seven months of the project.

Being able to stand up and speak on behalf of the project at ARCC or industry events was highly valued and appreciated by the researchers as it helped them to demonstrate their end user relevance and learn from the stakeholders' reflections on their experience of the research. But not all stakeholders should be expected to do this. As one stakeholder put it:

⁴ For more information on this see Carney et al, *A Dynamic Typology of Stakeholder Engagement within Climate Change Research*, Tyndall Centre Working Paper 128

Not all the people you want involved in the process are going to have that particular skill set and it would be cruel and unusual punishment to expect them to be able to do it, but there is still that expectation that you are not just there to have tea and whinge.

A.7 Personal qualities and skills

Can anyone participate in this kind of research and do it well? Are there different skills that are needed to encourage participation and build strong and well-functioning teams? When asked about what they felt supported good collaboration, researchers and stakeholders gave a range of responses, many of which related to the qualities and skills of the team members themselves. As was found in the review by Alex Harvey of the Building Knowledge for a Changing Climate (BKCC) projects, personality is important and greatly impacts on how well a team comes together and the enjoyment with which they collaborate. The word 'goodwill' came up for a number of projects as something they felt had characterised the nature of their team. The existence of this goodwill – based in the respect and appreciation of their colleagues – had stood them in good stead in getting through the misunderstandings, differences of opinion and other frustrations that research sometimes throws up; and had encouraged teams to 'go the extra mile' (see page 27).

A.7.1 What was said about the qualities that are needed for good collaboration

Patience

I think the main advice would be patience and understanding. You shouldn't expect people from other disciplines to have knowledge about your research: engineering for example. It takes time. Goodwill also.

Goodwill

And we are also relying on the goodwill of colleagues in London that we are collaborating with, who have put in time an effort to organising that.

The project was designed as a set of work packages and a sense of how they would all fit together in the end. Inevitably, the fitting together is proving to not be so straightforward as envisaged in the original plan, but it is being helped by the degree of goodwill that has built up within the team. And I think the mutual respect for each other's professionalism. So even if other people don't quite understand what I and my research fellow are doing, I think they accept that we know what we're doing! And I think that's been quite important.

Open-mindedness

Well open-mindedness as well I think. I do think some disciplines probably have some conflicting views on the odd thing.

Well I think usually there's the eternal science-social science conflict or tension – no not conflict, tension in most of these projects. But if you go in with an open mind....

A lot of people have preconceived ideas of what social science might be or what economics might be. And you have to put them aside I think and hope that what your perceptions are aren't going to turn out to be true and they will deliver something useful.

If you give someone public money for research they are likely to do it somewhat in their own image. And I slightly worry with anybody that they are not open minded, they don't say things like "I could be wrong"; "Am I doing this work to support my own hypothesis or am I doing this work to test my own hypothesis? And if I am wrong, then I'll completely redo the way I've done my work for twenty years." That's the hallmark of really enlightened research, that if you prove yourself wrong you shout from the rooftops. That doesn't often happen. If XXX got up and said "At the start of this project I was a firm believer in A, B and C but the work we've done has completely refuted that, and actually it's D, E and F we need to do." I wouldn't be worried by showing me something I didn't expect. That's fine, that's the beauty of research. I would be worried if it came up with things that weren't useful for me. I always worry with academics – and I do have an academic past – that they live in a complete bubble, they don't get the reality. But the beauty of XXX is that he is practising, he has a business to run, and he's not living in a bubble in that sense. That's the strength, that he has clients and he's built some of these things and he's probably been rewarded or suffered as a consequence of his actions. So he's not detached from reality, by any means.

And they were both always very ready, and willing, and helpful. And also pleased to meet other people, and to learn, and to link with me; because it was all for the greater good.

Naivety

I suppose coming in as a naïve person really helps. You can ask naïve questions, but then I would do that whether I was in a new system or not, I suppose.

Flexibility

They need to have a certain level of understanding of what the stakeholders need and if they don't have it they need to have the willingness to get involved and try and understand it and then a willingness to adapt accordingly. Research is not an end in itself. It is the old problem. Research can go on for three or five years before we get a decent set of results, by which time the original question might be slightly outdated. So you have to be able to tweak it as you go through. And if they are not willing to do that then they using the research council money but it's not working, is it? And some of them are very good at that.

Flexibility is the key word in the network, if you ask me. If you see the original scope of the network back in 2009, compared to what we do now – there is no comparison. Some of the big events like the conference or the annual report are still there. But in terms of engaging stakeholders and researchers, we had to adapt to changes all the time. So I think flexibility is key.

The team was quite a big team and it was difficult to work out who was doing what, who was working which work package. But that became clearer with time, and also I just asked the questions. The characters of the people and how they work together, that has a big impact on the project, and the extent to which you can collaborate with them. I suppose where there are opportunities to build things in – like real time monitoring data to make the project more valid – we took those opportunities. Creating a bit room for movement makes projects successful, and letting people use their initiative is good.

Confidence

Yes, a huge personality issue. They have confidence in their research; they don't feel they have to hide behind the rules and regulations. They can go out there and talk the language.

And I'm naturally arsey. I am able to represent myself, hopefully appropriately, in big meetings. Whereas there were a couple of stakeholders that needed slightly more support than I did to be able to have those conversations.

Kindness

Clearly there would be a problem if I felt we had a research assistant who wasn't really a pleasant, genial, kind, helpful, nice guy. A number of the ARCC projects are quite close to people aren't they, in what they are trying to understand? So it's important to have an RA with the right personal skills. But it's not hard to unwittingly or unfortunately create little frictions. You go in to measure something and you've got some equipment that you've put somewhere. And you've discussed it with someone, and someone else comes along and says "What is this doing here? What about infection control?" Or "Has this been swabbed with alcohol?" And the answer to that is "It's not interfering. Yes it has, blah blah." But it's just another darned thing that someone who is under pressure already, with regard to infection in hospitals, has to deal with, and they just don't want to.

Appreciation of others' contributions

I felt valued, actually. And that's something that I should express because the team have made me feel valued, which I guess is very important I think. Everyone likes to feel they have some value, and comments that I've made have been listened to and acted upon. And I've enjoyed that as well, the feeling that I've actually made some – albeit very small contribution – a positive contribution to something. Taking knowledge forward, it's a fantastic opportunity in that respect.

So, having the feeling that my voice as a practitioner is of equal weight to people who are professors and doctors, because that is often not the case. Often it is “We are academics! We know stuff!”, “You are a practitioner, you do stuff!” It is about feeling valued, it is about feeling as though you are part of a team. It is about being able to have conversations about the project. It is building that level of personal networks. Being given the opportunity to direct. Even if your suggestions aren’t used, having your suggestions acknowledged. It is respect, decency, it is all the good partnership working stuff. It is partnership rather than “I am there to tick a box and I will help them get impact for their REF.” That is why the work is there, we know that is why it is there but let’s make the most of this opportunity ... Let’s take what is essentially a ticking box exercise and make it useful.

I think what’s gone well from my perspective is that I’ve been able to go along to most of the meetings and listen to some of the technical stuff and some of the managerial stuff. And also the fact that they do listen to me! Because I do from time to time remind them that it’s not just an academic study, you are providing tools that we can use. So they listen to me. I mean that’s quite good and I think it’s quite important that there’s a strong end user influence on what they do.

And I feel that when I have contributed ideas, people have responded well and my opinion and the opinion of the council has been actively sought during the process. So it has felt a very participatory thing; instead of just being at the receiving end of the process we have helped input and shape and contribute, which has been very meaningful.

My professional knowledge was valued. My practical knowledge in doing different types of stakeholder engagement and community engagement was acknowledged. I had the opportunity to feed into different types of questionnaires. I had the opportunity to influence where the pilot project was run, so we had it in an area that I had a particular interest in. I was invited down to all the various things; when I was interested in doing something specifically in one of the events we ran that as part of the session. There were huge opportunities to have interesting conversations with people. So from my perspective, absolutely fantastic.

If you looked through any interim reports and they mentioned none of the research that we’ve done and its relevance to their work; if it didn’t cite any of our work – I’m not getting precious about being cited, I’m just saying I would say that would be rather odd. I would be miffed, and not because my ego was bruised but because I’d think “I’ve spent all this time at meetings, saying these things and engaging him, and it doesn’t seem to be reflected in whatever is going to third parties.” And I’ve not seen any of that yet but it does worry me sometimes. And I worry about everything like that. It comes back to self-delusion. I don’t mind it when somebody says “There’re no point us collaborating. We’ve got nothing in common – it would be a waste of time.” What really hacks me off – and again I’ve not got evidence that this is the case – is when you go through lots of ceremony and process and it results in nothing. And people simply aren’t listening.

If I have introduced him to people and said “You should talk to them because their experience is not compatible with what you are trying to show”, and if they followed up on none of those people, then that would be poor collaboration. Because I have put a lot of effort into brokering those relationships, so if I were scrutinising his work I would ask him to what extent have you followed up on any introductions that you were given?

Mutual respect

We all think we are right. We are all right, we are just right from different perspectives. And everybody’s perspective is fine, but it is not necessarily about having the most gifted researcher, or the most gifted practitioner in terms of their professional competence to be heading these things up it is about having the most respected partnership manager to be heading those things up. And it is actually investing the energy and the resources into developing and managing a partnership. It is mutual respect, it is mutual understanding, it’s acknowledgement of differences, it is acknowledgement that there might be times – no matter how stropy I can be as a practitioner – that the research is funded to do something different and at some point I have just got to recognise that that is how it is.

I guess it’s always good to establish those personalised relationships, both with academics and stakeholders. So they trust you and you’re not trying to waste their time.

I think it is about promoting mutual respect, taking the partners equally seriously. About the fair and transparent distribution of resources and credit.

Personal interest and ambition

I’m always an opportunist. So where I could see that there might be a benefit here, I seized that and worked it for everything that I could. What an opportunity in terms of personal development to have some small association with a research project and to contribute in some way. And of course they would come back with questions on ‘How?’ and ‘Why?’ and “What’s the value to me?” And once it’s explained I think that all the staff have seen there’s a good amount of value to come from this personally.

I’ve taken every opportunity to make the most of personal development opportunities which have arisen outside of the normal curricular activities we would do here. Actually I think that’s probably more important than some other aspects.

I think a thing I picked up: in our advisory group we had a number of people who lost their jobs and some of those have stayed on. XXX is still very well connected. So it’s not just led by the organisation you work for, it’s also led by the individual.

Pragmatism

So I think that sort of attitude, and respect, and sort of degree of pragmatism. Not, “This is our project. We’re going to focus on this in a very narrow way” – which you get from some people.

It is a sort of an attitudinal thing, isn't it? They are smart, and focused, and they know their stuff. And as far as I can tell, because I'm not deep in it, have got academic credibility. And so they've got the respect of their peers in that sense. But there's sort of pragmatism. A sort of straightforwardness of "Well, how do we make this happen?" It's coming from somewhere. And that's not always the case in academia, because of the premium put on specialism, which is understandable, and the very tight restrictions or constraints that can be put on funding. I suspect that historically, though maybe it's changing, it's not culturally what your average academic expects to do.

Persistence

This has brought me into contact with people I've not had dealings with before in terms of trying to get information from people. We got to the bottom of it eventually, but it isn't that straightforward getting hold of mapping data. I'm a lot more well versed in it now but it was quite tricky in the moment. And if I'm not entirely sure what I need to get hold of and the team are trying to get to the bottom of what they need, it makes that quite tricky. But the team are very proactive once I've given them the key contact, being persistent. Depending on how fruitful my initial contact had been and whether there needs to be to-ing and fro-ing between someone from a technical perspective and someone who is responsible for that dataset, so was quite a protracted process.

A.7.2 What was said about the skills that are needed for good collaboration?

Able to relate the work to the bigger picture

A lot of people assume that helping a system adapt to climate change is around its building stock – period, end of story. Of course that's completely wrong, so it's particularly powerful to have someone like XXX or colleagues say "Look, we've done work on how you construct buildings in a different climate and these are the results, but you need to remember that this is part of a much bigger picture." It's much more powerful coming from someone inside the construction sector saying that this is only one facet of a more complex and bigger picture. That's been particularly useful for us; they've been very amenable to saying those sorts of things and to reminding people that it's often not so much structures of care but systems for care. So what I think they've been particularly good at is seeing their own area of expertise in a much larger picture; that is often what a lot of people are not good at doing. You know, they become very professionally egocentric and the whole world revolves around them and their issue is the most important issue. So I have been very impressed with the way they have done that. That has been good.

Able to drive knowledge exchange

It doesn't have to be the PI who is a great knowledge exchange person but it has to be someone in the team. It doesn't have to be the PI that is driving it forward but perhaps it often is because they have experience and expertise and credibility. Or it can be one of the research associates or whatever. I don't think it has to be the PI.

Good teamwork skills

I think we are an approachable team. We work together, we are quite open together with each other and we have the same relationship with the stakeholders. When XXX needs something quickly – she needs to give a presentation or something – on the whole we are trying to be helpful, and vice versa. And the tone of emails and all that daily stuff, it really matters. Personal things – personal connections, knowing the areas.

We do have a very good and co-operative team and everyone has been prepared to work together and on the whole things have gone pretty much as we expected. Inevitably there are some things that no one would have anticipated when we started off. That is the nature of research. You end up doing some activities that are necessary for the study but not perhaps the ones you expected to do, or perhaps as much of them as you expected to do. So it has been great that people have been able to cooperate around that.

Go out for a cup of tea with the people that you would be working on the project with. Think about if you are going to be travelling three hours on a train are you going to be able to have interesting things to say?

Able to juggle various demands and compromise

We had funding to work with two local authorities but we had a lot of interest at the beginning; and we had several others who really wanted to work with us, so we kept them in the loop. Some of them have since dropped out because, perhaps they have lost key members of staff with budget cuts etc. But about three have stayed involved and one has adapted the tools and put together a separate funding proposal. That wasn't something we were anticipating but it has been great to get feedback on the way the tools could be used and taken up. I think that is really valuable. You could start with the stakeholders themselves to find the question or define the problem or you could start with the researchers. But the research councils want you to push forward the social science agenda – so that is a lot of balls to juggle. It can be done but it sometimes involves compromise.

Good relationship building skills

A lesson that comes out from this is, "Are we educating, training researchers in relationship building with stakeholders?" This is a skill which even the social scientists could get better at, never mind the scientists. Personally I think you can, and I encountered it in the States, with the idea of engaged scholarship; to be a successful scholar you probably have to show that you can do good stakeholder engagement whatever discipline you're in, because it is part of what effective research is.

Good time management skills

Well I think time management is very important given the amount of reliance on other people in these kinds of projects and where you've really got to dovetail together towards the end and bring things along at the same time. And sometimes there's a lot of waiting around. If I'm relying on someone else's results before I can do my bit of modelling and I'm ready to go and nothing happens and two months later I'm still twiddling my thumbs, then that can start to become quite demoralising after a while.

So I think it's quite important that. I mean I'm as guilty of this as anybody else but try and keep to the schedule that you've agreed to deliver things on. And I think that can be the downfall of a project; if one bit goes awry then everything else is knocked on. Very easily you can run out of time and everybody disappears off to the next funded project and nothing... What could've been some really good outputs and some really interesting results end up being brushed or skipped over entirely and the interesting bit of the project's lost.

It can be much more time-consuming than you'd imagined, on every step of the way there are delays and hold-ups. If one model doesn't work then you can't run the next part of the model... It is useful to have a very good idea of the timeframes and being aware that other people are relying on you; and so you really do have to work together and be quite well integrated as a group. I think this is a problem across all projects like this. I don't know many that work that smoothly.

This is where time management really is an issue. In that pressurised, 'got to meet the deadline' environment. And maybe that's the point where the challenges should be, rather than once the money has been given and the research team is together and have identified their work packages. Then the train is already in motion.

Good leadership skills

I have been very favourably impressed with how determined everyone is to get on with each other! And you don't necessarily say that about all teams, where they come together because there is a pot of money on the table and there are arguments about how it gets split and who gets credit for what. And I've just not seen any of that. I do think it's a real tribute to the quality of the leadership.

At lot of that goes down to the leadership of the PI, which has done a great deal to build an atmosphere of respect among a very diverse consortium.

There's probably an element of kind of humility as well. I mean there's not that kind of mega professorial ego.

Good communication skills

Being able to articulate the messages at the right level. Some people are very good at that – bringing people together and sharing the value. You do have to have a good understanding of the projects and where it fits with the policy landscape. I'm admin and I organise meetings and coordinate it all. You need the glue – true in research and here.

We've seen really awful examples of how they genuinely can't communicate with non-academics, and the collaborations have almost needed a translator. And it's a good tip – using professional science communicators, to step in and smooth things out. It's not really a criticism of our more sciencey partners because it's not really what they do – it's moving people into a new realm.

As someone with a social science underpinning, it's not abnormal for us. Nearly everything we've ever done has involved stakeholders – residents, public developers: it's normal. Whereas for people who are involved only in the modelling it's a different skill.

Good people skills

So there has had to be quite a good degree of co-operation just to allow even that process to happen. And also liaising with the staff so that they are happy with these things being around, and how they are fixed to the walls... So that has been fundamental to letting us actually do the work

They gave a lot of support particularly to one of the stakeholders to make sure that her point was coming across. So it was inbuilt from the beginning in how the project was working. I think if you'd had a group of architects or engineers doing the research, or if the lead for stakeholder engagement had been an engineer, you'd have got a very different feel because you'd be asking an engineer to operate outside their normal skill set; whereas it is what they [social scientists] do as part of their professional skill set, if that makes sense.

Building on previous experience

I think those of us who have worked on these kinds of projects now know intuitively what makes them work and how to keep on top of them; or how easily they can fall off the rails and then get six months behind schedule.

So the companies that had worked with him in the past were probably more responsive because of that personal relationship. I suppose there is a lesson there in terms of positive experiences with projects that open up new opportunities for collaboration in the future.

So we've actually had benefits come back from there and I think that's maybe opened the door for further appreciation of mutual benefits. So I think there's a general openness anyway to collaboration. I think in part it's the organisation's approach, its attitude to research, recognising that there are benefits. It just seems to be within our culture.

A.8 The role of the ARCC Coordination Network

A.8.1 Aspects of ARCC CN's role which researchers and stakeholders valued

From researchers' perspectives, the many positive experiences of ARCC CN included: publications, information and events; the expectations and encouragement from ARCC CN staff; their exposure to the wider network of projects; direct support to the project; and ARCC CN staff's use of project findings.

ARCC CN publications, information and events:

I think the annual reviews are pretty good and it's good to hear what everyone else is up to and you can start making the links with the researchers through that.

The information on the projects is really good. You can find out what they all do and who is doing what. There is really good information on all the other teams and their papers and their outputs.

I mean they were all great. I had lots of good conversations. It didn't ever feel hierarchical ... the ACN people in the breaks were really actively engaging people in conversations.

What was useful was the presentations and the posters so you could find out what the others were doing.

From my point of view they went well. One thing I would like to say is that one meeting once a year is not enough. But on the other hand we have so many different meetings that have to attend that another meeting would be hard to fit in.

They set up the events at which we got to hear what these people were doing and meet them. So without those I wouldn't have known. So pretty core really.

The expectations and encouragement from ARCC CN:

The push for the stakeholder side of things may not have fed directly into the work but it is good to know that other projects are having similar problems. The continuous emphasis is useful as it means that it is always at the front of our minds.

XXX certainly comes to our project meetings and [is] able to do some of the project joining up for us. The documents like the 'So What?' document that we're going to write and all that sort of stuff is all good and it reminds us all to write our outputs in a way that's accessible to the practitioners, which is good

XXX have been very helpful when we have had direct questions – that was very good. But we have had very little communications in the middle part of the project, but in a way that was quite nice! I don't think there was anything that we needed or there wasn't anything that they provided that we needed; apart from the management of the network in promoting the role of the stakeholder.

And again, XXX being quite proactive in saying "You're coming to the end of your project and there's the potential for doing something here. Why don't you have a chat?" And pushing us together. It's been really useful.

They were really active at the beginning. I remember XXX was on the phone all the time saying 'Have you thought about his or that'...

But I have to say that the people are great that are involved, because XXX makes things ... just great, actually.

I think the network is a concrete thing. In other projects you know you are part of some consortium, there is some sort of funding for it, there is a webpage. But you meet very rarely and in between times nothing much really happens. But with this is totally the opposite and I think it is that XXX is always there on emails and sorting things out. You are very aware that the network is there all the time

And the people who have been involved in ARCC have been really useful as well. When they needed something from you or you needed something from them there's a really good communication. Very approachable and very helpful, and that is one of the most important things, particularly in research when timescales are short and you need to get things done. Everyone's been good on that front.

Their exposure to the wider network of projects:

My view is that it's nice that there is a network of people in overlapping areas that we can be part of. It is much easier to interact with people ... and discuss research but it is down to the individual researchers to get more involved as well and collaborate more with other people...

Some people [who] have come in to advise the team and have moved to subsequently participating in our dissemination event are actually people who were contacted via the ARCC network. So those meetings that ARCC organised to get us together and everyone was bringing along advisors to the meeting meant that you got to meet with a bigger cluster of advisors who were interested broadly in this agenda. And some of them we sort of adopted. That has been a really useful part of the programme.

I'd say it does feel like a proper network. I mean, I have worked on another programme and it was less coherent; we had occasional meetings in London but it didn't seem as joined up as this ... It is just very noticeable that this is an active network of different projects. There is a lot more communication across the projects ... and we are kept in the loop. So we hear a lot more about other projects and what they are producing.

We've picked up a lot of contacts in other bits of government ... which has been very useful. So our stakeholder group has grown through the course of the project as we found these new people. And because they are involved in other projects as well it has helped make the linkages between the various projects. Often through the meetings, or XXX have made suggestions. That's been very good and broadened out the stakeholder base. It has been great because we are now developing a couple of projects ... These are people we wouldn't necessarily have met if we hadn't had the co-ordination network, particularly the meetings it organises.

It's quite jolly being part of a group. I have previously been part of EPSRC projects which have had nothing like this, to the detriment of the collective good, I think. A lot of repetition of project. They have largely avoided that by having the network.

And they kept the link going between us and LWEC, the dissemination routes and that sort of thing. So for the resources they've got there's definitely an added value to having a network structure for these combined programmes, definitely.

Direct ARCC CN support to the project:

ARCC has supported two dissemination events on top of the dissemination we had already planned as part of the project which has been great both in terms of logistical and financial support and also that network of people we could invite and contact through contacts XXX and XXX have that we can draw in.

And then the additional help from ARCC to help us do combined meetings [with other projects], which we would have found it difficult to anticipate, when we first set the project up, was obviously worthwhile ... That is really a good aspect of taking part in a programme as opposed to a free standing project.

ARCC CN use of project findings:

I know that XXX has been making a response to the CCRA ... compiling stuff from the different projects to see how they address issues within CCRA, and that's a potentially a useful thing.

And we know that they have actually carried through the dissemination process, so for example, XXX have been to the Cabinet Office, and talked about a briefing that includes results from [our project]. So then when I meet up through another route with someone from the Cabinet Office, working on community resilience, they say "Oh yes, I have heard of that, so tell me a bit more about this." So that has worked too.

From the stakeholders' perspectives, the ARCC CN events stood out as their main exposure beyond their individual projects; some also commented on the openness of the ARCC CN approach.

ARCC CN events:

I thought it was a fantastic event yes. Very useful information coming out, lots of information... in comparison to other sort of seminars that I've attended I found it very useful and very interesting and I was quite engaged with it. And quite impressed with the way it was run and quite impressed with the passion of the presenters there.

Yes, well I think they are great to go to. I don't think 'oh, not another one of those'. They seem well organised, perhaps not as many stakeholders as I would like.

It is [helpful] because it's not just [this project] that I pick up on then, it's the other ones as well, that go into my overall climate change adaptation programme. And indeed with the network I know that other organisations have got in touch with me to say "We've done this. Is it relevant to you?" ... I think there is relevance to us because they have developed some tools and in my on-going programme I'll be looking at all these other areas to see what I can pick and choose from.

Openness of the ARCC CN approach:

And I got the impression ... that XXX were willing to make stuff happen, but probably had to wait to be asked. And maybe people don't think to ask that question. I don't know. So if [a project] said "Well, could we do this? It's not quite what we said we would do, but we think it would be interesting. And could we use the spare bit of dissemination money in this way and then we'll get the good connections?" [ACN] was just up for it as well.

So it's had that two-way influence on me. It's helped me to learn what's been going on and bring that to people in the [industry] and now the national ... level, and the other way round I think I've had some influence as to where we should be looking. I see an ongoing need for something like ARCC to indirectly sponsor work via EPSRC funding. I think we need that sort of thing for the good of UK PLC.

A.8.2 Aspects of the network that researchers and stakeholders found problematic

For some researchers, a poorer experience sometimes resulted from the nature of the other projects involved in the ARCC programme not being directly relevant to them.

The network because of the different phases, means that most of the other projects do not relate to ours – more about buildings – there isn't much connection to what we do so it is hard to engage ... I think it wasn't a problem with the workshops but just the lack of connection in research focus.

No, we've not had much interaction. [We] went to a data workshop fairly early on and I think at that meeting it was fairly obvious our project was quite different to the other ARCC projects. Whereas some of those had quite strong overlaps in how they were looking at their projects, we felt a little bit like, 'Hey, ours is very different, different scale, the way we're trying to use the UKCPO9 protections is going to be different.' So, I think that probably did mean that we perhaps focused less on interacting with other ARCC projects. And there have been projects away from the ARCC programmes that have been perhaps more relevant that we have more linked with.

One commented on being unsure of the role of ARCC CN in providing direct support to their project or building connections with others:

I haven't actively engaged with it. I suppose I was unsure about what their role really was and how engaged they should be in brokering collaborations – I was unclear about that. I knew that at the broader policy level they were engaged but I wasn't quite sure how much I could turn to them to help in coordinating a workshop ... Maybe the ACN assumed that people understood. Perhaps they could make this clearer.

In terms of less satisfactory experiences, some reported of the ARCC CN events and website that:

I have been to the ACN conference each year. They were OK... I mean it is obviously hard bringing together so many people. I suppose I like doing things that are a bit wacky. I just don't think that there was enough space to look at the – I mean there were a lot of presentations which were fine, it is a conference, it is what you expect – but I think it lost a lot of opportunities to get people to really just talk about their experiences and potential cross-cutting themes ... It was just that it could have been more innovative and stimulating sessions.

Well, I've only been to maybe two of them, I think. They haven't been a waste of time, no. I think any more might have been perhaps, I think, given the mix of projects. I think, in principle, if there had been other projects that had been looking at the same issue as us or the same sort of scale, then maybe more would have been useful. But I think we would have made those efforts in that case in any sense. So, it's not been a waste of time, but given the differences in the projects, any more I think would have been more of a burden than a help.

I think the ACN website and portal has been quite static, and the thing is if you get that sense from a website, you then don't bother looking at it so much and then it naturally stays static, doesn't it, because no-one's then feeding into it. But again, if there had been more closely-linked projects, I think that would have been different.

Others commented on other 'added value' activities that had not met their needs:

There was an early attempt to have a data management committee as a group of projects – to help us get connected, to get the data we needed and other things. That seemed to die a death because although the projects could identify what they wanted there was no way that Defra was going to deliver. So it died at that point. I think there were two meetings of that group which I went to.

And some reported negative experiences of the expectations they perceived ARCC CN placing on them:

The other role which the network seems to fulfil is making demands to attend things and do things and stand on parade, which we do because we are required to do it but I don't necessarily feel it's particularly helpful ... So in terms of ARCC events it hasn't added anything other than a requirement to beg favours off some of our stakeholders to go to events and present. Otherwise we're seen as not doing anything to satisfy stakeholders, which is rather offensive.

One researcher reported a very negative experience with one ARCC CN event, with a lasting impression left by two exchanges relating to stakeholder engagement. It is worth quoting this at some length:

My take home message from that was framed very much by a conversation I had with somebody ... who congratulated us on engaging well with our stakeholders because we had trotted out our key contact who had done an integrated presentation with our PI, showing how we were dealing with things. Congratulated us on that and contrasted it with the "utterly futile attempts" of all the building design people to engage with their stakeholders because not one of them had delivered what he required in order to design a building. And I had the start of a conversation with him about "Well I think there are a number of civil engineers who would say that architects don't design buildings." He told me in no uncertain terms that architects do design buildings and anyone else is a contractor. Now he clearly has strong views on things but one of them was on stakeholder engagement. And I thought thank goodness XXX came down and made his half of the presentation, because clearly this guy was going to take a very black and white view on whether we had succeeded or not. And that was my take home message from the conference. So did it help? No, it didn't help!

The people who were lined up for the final session including the representative from DCLG harangued us for not engaging DCLG at an earlier stage. I invited them – I'd already invited once but I made a double point of inviting again – to our next stakeholder event: no reply, absolutely nothing ... CLG don't engage. So I just didn't get anything positive from that whole exercise. We went down there, we presented, we got a tick in the box, we came away again, we thanked XXX very much for doing his bit ... I haven't found it a particularly helpful thing to be a part of. It has made lots of demands on our time.

As with positive comments about the work of the network, stakeholders generally had fewer comments about problems. One remarked on the overall level of communication from ARCC CN:

Funnily it's more talking now that you can sort of appreciate that they're disparate projects. It wasn't quite so clear, was it: other than the original sort of high level explanatory pdf that we got. That's probably unfair. And it isn't meant to be. But I think because there have been several months between any sort of communication ... it tends to drop off your radar. And then it pops up again. So yes, you don't tend to think of it.

Another reflected on the level of integration by ARCC CN:

I was both surprised and not, because it's not unusual that two projects which seemed to me to have a lot in common – and other pairs or trios of projects might also have things in common, I don't know – hadn't been more joined up. And this may not be fair at all, but the impression I was getting, which might be down to resources, was that the projects were brought together, but they were all brought together at times which weren't necessarily relevant to the projects. It was sort of 'Right, this is one year into all these projects, into the funding, therefore you'll all come together' kind of thing. It may not be fair. But I suspect that was the case ... But there must be a way of making the connections richer by thinking about this, and so forth, and it wasn't obviously happening. But I may be completely wrong ... I come at ARCC just through two projects really, so it wouldn't be fair to judge overall. But I didn't get a sense that there was very active linking up beyond the basics ... You could kind of reflect about the things which were emerging, or say, "Well look, there's this cluster of two, three, or four, who clearly have things in common."

A.8.3 What aspects of ARCC CN's role could be enhanced.

For researchers, responses covered issues of polling resources, focusing ARCC CN events differently, and supporting additional dissemination from projects.

Centrally pooling data needs and available datasets:

I think, I mean there could be perhaps more benefits in terms of requiring datasets and licences and maybe even managing data as well. Well it's probably annoying for stakeholders if three projects are asking for the same datasets ... Or you know at the start if the projects are being coordinated if we could maybe start identifying what datasets each project needed and they were sought and then put in one place ... And of course some datasets you have to pay for as well and you can club together and that's good.

Changing the format of ARCC CN events:

I'm a bit anti conferences at the moment, I just find them really boring... sometimes they are great but when you get 100-150 really interesting and intelligent people in the room and they are just listening to one person it is a shame not to draw on that intellectual capital sitting in from of you. I don't know what it would look link in practice.

I think more cross-cutting events too. There is a lot of time and energy in the impact and dissemination stuff that there could be an economy of scale for that to be organised through ARCC.

More hands on facilitation of these kind of cross-project events would be where I would concentrate.

Extended events aimed at researchers across the projects:

This other project that I am engaged with has funds from ESRC specifically for a session for post docs and we decided to go to the Lake District for three days of talking and writing and make it really informal. It was amazing and it meant that as an early career person you get to know people. I don't really like working with people I don't know. You can break down boundaries and it then provides that informal space to share writing and thinking.

Yes, that might be useful now for the research team. In terms of how we could have made it more for the stakeholders as well, I don't know. But, yes, I think for the research team, that might be useful.

Maybe look for ways to bring the social scientists in ARCC together from time to time. To discuss their experiences of working with the various science partners, to see what we could learn from that experience, to see where we could share things ourselves ... I don't really have the resources to invest in that sort of community building. With all the administrative support I could have gone to the [ACN] and said 'Look I think such an event could be useful, how about working with me to promote it?' I think it would be a valuable thing to do, particularly for the research councils funding the ARCC programme, to see what learning could come out of it in terms of how do we make these collaborations more effective.

Support for additional activities within the projects, especially funding that would support dissemination at short notice and towards the end of projects (see also section A.5.4, page 79).

For stakeholders, responses related to clarity on the expectations on the stakeholder role; possible funding for stakeholders' time; greater focus – with stakeholders – on synthesising the learning from projects; distilling and critiquing the various methods and tools that stakeholders might use; providing a network of the different networks on climate change research.

I just think it has been fantastic for the researchers to be part of a larger cohort producing knowledge around this theme. I'm not sure about the connections between the projects. I think that is something for that the stakeholders and the coordination network ... to take a step back and think "Have we got different pieces of a jigsaw puzzle here? Or have we got different pieces of lots of different jigsaw puzzles? Is there something greater than the sum of its parts? What is the knowledge coming out of this?" And I think the individual research projects have to be too focussed on their own projects, in a way ... I think stakeholders across the projects [should be involved]. It would be good to see a small team who've got their appetite to do this ... That's the value of having this group of projects, I think, particularly thinking about it from "what's emerging in terms of advice for the built environment?" It is understanding where there are contradictory messages and what does that mean, and if there is a gap does this need further research? Or where is there consensus and how does that translate into advice and guidance that people can use beyond the stakeholder grouping? I think that would be really great and I don't know if it is happening. A lot of the time is spent with the individual projects reporting back. Rather than synthesising or looking at what you have got.

I'll tell you where we haven't succeeded is working out where this all fits together. It's a bit like I'm looking at this through a fence, holes in a fence, looking at different aspects of a bigger system. And I haven't yet put all these things together.

It would be good to have somebody distil the different methodologies and say "We have critiqued these and this one's relevant for this situation, this one's relevant for that." Somebody has got to do that filtering because it's impossible for me, as I don't have the skills to do that. People do have to explore how to manipulate this data and how to apply it but there's got to be another stage ... Quite how it would work in practice I don't know, but maybe a mechanism to feed into it and highlight some of these issues. Like how practitioners are trying to apply some of the outputs that are coming out of the ARCC.

I see ARCC as being one network, and I see other networks around. It's a bit like country markets; you have a farmers market once a month in my village, you have one once a week in another village and once a month in another. And you look around the country and there's people that go to these, and every month they meet up in this one village. It's something like that. We need a network of networks that join together and share the thinking in several directions. There's so much going on and we don't have visibility of it all. And it's all going on in different directions and different speeds.

A.9 Practical considerations

A.9.1 Redundancy, staff transition and the resulting loss of institutional contacts and memory

This has been an issue for many of the ARCC projects and has caused a reasonable amount of frustration.

In many cases, it was a fact that you got the agreement from one person to help you in the research, but then they were made redundant or changed position or whatever. And then you are struggling to find the next person, and you have to engage them from scratch. So I guess continuity was a big issue.

There's been a kind of drift sometimes – whether it's interest or whether it's people changing jobs and disappearing. Because we work on such a long timescale, by the time we've got to this stage of the project a lot of people have moved to different organisations. So you've got different people, or you're expecting different people, from the original organisations who were on the board.

Effectively it puts you back at square one doesn't it? Because you're having to explain the project from scratch and then... And every stakeholder meeting we have, we have the whole overview of the project every time, rather than using that valuable time that we have them to tell them and get their input on what we've been doing recently.

It's the turnover of people. So if you've got somebody there who is answering their email and engaging it's great, but as soon as that person moves onto another job it just vanishes. And my favourite was sending out invitations to technical meetings when I got an email back from somebody's boss saying "Please stop sending emails to this person, they are no longer here." And I wrote back and said "Well could you tell me who the project's new contact is in the organisation, who I should be communicating with?" No reply. Not only did I not know they'd moved on, the organisation clearly didn't care at that point. But I was clearly annoying them by sending them emails.

It is not only dealing with loss of key contacts that can be frustrating; in large organisations agreements can be made with one person but messages may not get through to others who may actually be more critical to your ability to get the work done.

It's when the higher level interest doesn't percolate down to simple actions that enable you to get along in a practical sense. That has been the most frustrating thing, which means with my RA it creates quite a lot of delay and expense. Yes, it's quite clear some are very helpful and with others you just get this repeatedly. But the thing is that it is such a big organisation, and just because someone over here decides to do something it doesn't mean that other people who have different roles and responsibilities also think it's a good idea. You know what it's like, you can quite see how you would get the blowback from that kind of thing in a project like ours. We can't do anything about it, we just bend with the wind. And capitalise on the relationships that are going very well as much as we can, and use the other relationships as effectively as we can notwithstanding all the difficulties.

A.9.2 Time, effort and resources – what was difficult and what might have made it easier?

As having a lack of time and resources is a common theme for all research work, it was useful to explore whether there anything particular about these projects that exacerbates this problem. People were aware of the extra requirement to attend meetings that were coming from the ARCC CN. While the researchers were very good at attending these meetings there was a feeling from some that the value gained from attending them, particularly for their stakeholders, was unclear. This was particularly so where the research questions were less closely connected with those of the other projects.

So it was very, very hard work for us to get people to be a part of the network. So I tried to develop a personal relationship with people so that they know who I am and when I invite them to a meeting they know that I'm not wasting their time, and it will be worth their time. It takes a long time, a lot of effort. While if EPSRC had said "You have to attend all the meetings you are invited to from the network", that immediately allows me to do my work and not to have to spend all my time having to persuade people to come to meetings.

Many stakeholders felt that the recession would make it harder for them, and others like them, to be able to commit their time in the future:

People have less time to participate. They are doing the same work with fewer people so there is less time to attend meetings. So it is going to be increasingly important to be able to sell the benefits of engaging. There are two sides to it: they need the research more because they have got less money to do it, but actually they have less time to participate. I think that is definitely going to become more of an issue.

I think it has been very interesting for us, because at the exact point where academia has finally got the impact message and it's suddenly become important and we're being judged on it, internally it's getting harder to do it because we don't get resources to do it. And our external partners are finding it harder to do it as well. So, knowledge exchange and impact – everyone agrees we should be doing much more of it and nobody's willing to resource it.

If I was trying to make the case [for participating] now it would be very different because when we were doing that it was before the CSR 2010. Now it would be more difficult because they would need to fund my time. I would have to say to my local politicians, actually I am not working in this particular area for the organisation I'm working for; for this time, I'm doing free work for an organisation that is being funded externally to do it. It is a much more difficult case to make now.

Even within this set of ARCC projects the effects of the cuts were being felt, and being given travel and subsistence money did make a difference to their ability to attend:

So three years ago travel to events like that was ok, but now things have changed and to attend a symposium for free is the only way to get there.

When I go to meetings I have now taken advantage of having my travel paid but my time hasn't been paid. So I have volunteered my time. But personally I have been happy to do that but obviously I think it is an issue for stakeholder engagement in research projects and I think that is something for the research councils to really think about how they fund projects because ... there won't be many people, who are in relevant positions who are able to spend time doing this.

The solution to this, suggested by a number of stakeholders and researchers was to simply pay stakeholders or their organisations for the time they give.

For some people it's part of their job so there is no need for them to get payment. If, for example, you are in some public sector where you are salaried and it is your job to engage in these things; but for other people where they are giving up time and that time is therefore not paid for, I think there is a strong case for that.

A.9.3 Location of meetings

It is obviously impossible to find a place to hold meetings that is perfect for everyone but here are a couple of reflections on things to bear in mind when choosing a location.

Oxford and Cambridge are really crap to get to. And they were stakeholder engagement events and yet they were held in an academic institution, which instantly puts one person on the front foot and one person on the back foot. I'm arsey so I don't care but that's an idiosyncrasy of mine. From a location point of view it is much easier for you guys to do it in the universities 'cos that's where all the contacts are. If in Cambridge instead of having it in one of the colleges you have it in one of the big conference facilities near Stevenage, just off East Coast Mainline, it gives a very different message. It says we are not having it on our own terms, we are having it on different terms and we are having it in a big wide open space. Because the researchers are probably more at ease working among other researchers at their event, but the practitioners aren't. Maybe that is a piece of learning to take back.

Well the regularity of meetings has been important, and the fact that those meetings have been held at a range of locations. That has been very important I think in terms of everybody feeling part of the projects; it's not the case that we've all had to go to Birmingham for everything. The feeling that it's not a hub-and-spoke model, it is genuine network. So although it's led from Birmingham, it's not that Birmingham is everything. I think again the PI has been successful in fostering a sense of a consortium which is genuinely made up of equal partners.

The Adaptation and Resilience to a Changing Climate Coordination Network brings together a range of research projects funded by the Engineering and Physical Sciences Research Council. These look at the impacts of climate change and possible adaptation options in the built environment and its infrastructure including water resources, transport systems, telecommunications, energy and waste. The overall programme contributes to the Living with Environmental Change Infrastructure Challenge which aims to make infrastructure, the built environment and transport systems resilient to environmental change, less carbon intensive and more socially acceptable.

UKCIP provides the management and support role for the network which aims to enhance the cooperative development of the programme and help promote benefits to all participants.

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