ARCC coordination network: Annual report

Contents

ARCC coordination network: Annual report 2009. UKCIP, Oxford.

UK Climate Impacts Programme,
School of Geography and the Environment, OUCE,
South Parks Road,
Oxford OX1 3QY

T: 01865 285717
F: 01865 285710
E: enquiries@ukcip.org.uk

www.ukcip.org.uk

Executive summary

The Adaptation and Resilience to a Changing Climate (ARCC) Coordination Network (ACN) is a project funded under the Engineering and Physical Sciences Research Council (EPSRC) EP/G036586/1. It exists to enhance the cooperative development and dissemination of research between and beyond a portfolio of 14 independent research projects, including six funded under the ARCC programme. These focus on adaptation to a changing climate of certain aspects of existing buildings and urban environment infrastructure, including transport and water resource systems. The ACN is coordinated and supported by the UK Climate Impacts Programme (UKCIP).

The ACN is steered and developed by a number of key network activities/events. Five of these are key milestone events. The inaugural event (held on 5 May 2009), the mid-term conference, two events to map the potential for future research and the final dissemination and a looking forward conference. The ARCC Coordination Network project inaugural event was held at Austin Court in Birmingham on 5 May 2009.

There are three primary engagement mechanisms with the function of integrating the research project teams and stakeholders: The Stakeholder Forum, the Integrated Researcher Forum and the Data Management Group. A website providing information and a supported online forum allow the ACN community to keep up to date with events and to contribute to the exchange of information and the development of cross project cooperation. A newsletter has been distributed, with another due to be published in January 2010. The Stakeholder Forum and Integrated Researcher Forum will both be meeting in March 2010.

The thematic approach presented at the end of the report provides a possible framework for those wanting to find information, to use an intuitive structure to explore and understand the aspects of the research projects relevant to them in a context that allows them to look beyond their own specific interests. It also provides a number of possible thematic options for identifying and building collaborative relationships among the research projects. Additionally, for the purposes of dissemination, the themes outlined provide some potential streams around which to coalesce for the purposes of a synthesis report; bringing together the outputs of the research projects in a logical context for wider dissemination.

Background to the ARCC coordination network (ACN)

The ARCC Coordination Network exists to enhance the cooperative development and dissemination of research between and beyond a portfolio of 14 independent research projects, including six funded under the ARCC programme. These focus on adaptation to a changing climate of certain aspects of existing buildings and urban environment infrastructure, including transport and water resource systems. This 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.

The importance of working as an integrated network

A good coordination network is characterised by a common purpose, with clearly defined benefits that suit all participants. It should maintain relevance over the duration of the project and should allow for communication among those participating, drawing people in for the early stages and keeping them involved for the life of the network. Identifying and facilitating the development of sub-structures that focus on specific issues and disciplines can create beneficial connections and relationships, and encourage ownership of the resulting output.

Coordination of the research efforts, dissemination and end-user engagement, can benefit the research conducted by the portfolio of ACN projects by: reducing replication of research, by encouraging positive reinforcement of results, and by opening the potential for shared resources, data and results. It will also provide opportunities to address cross-project issues and challenges as a portfolio, rather than attempting to deal with them individually. The ACN can further enhance the benefits of the research through systematically broadening the field of end-users and interested parties outside the bounds of the individual projects.

Experience gained through the Building Knowledge for a Changing Climate (BKCC) (Harvey, 2008*) has shown that end-users engaged through a network such as the ACN are more informed and better able to contribute to the research, better able to understand the utility of the research and more willing and able to exploit the research results. They will also be more capable and likely to become involved in further dissemination of those results within their respective communities.

** Harvey, A. (2008) Evaluating stakeholder participation and engagement in the BKCC portfolio. http://www.ukcip.org.uk/images/stories/Pub_pdfs/BKCC_evaluation.pdf*

The ACN portfolio of research projects

The projects constituting the ARCC portfolio have originated in four distinct stages. The first stage was a response to a call for climate change research into urban environments which resulted in the projects LUCID and SCORCHIO, both of which started in 2007. Both research projects are set to finish in summer 2010. The second stage came about with the start of the CREW project (February 2008) in response to the EPSRC IDEAS factory's call for coping with extreme weather events. This project is set to continue until February 2011.

The third stage of projects: COPSE, DOWNPIPE, PROMETHEUS, PROCLIMATION and Low Carbon Future have been funded under the May 2007 EPSRC call on the use of probabilistic climate scenarios in adaptation decisions within the buildings sector. Each of these five research projects began in mid to late 2008 and while COPSE and DOWNPIPE run until the latter half of 2011, PROMETHEUS and PROCLIMATION finish at the end of 2010. The Low Carbon Future project runs until Summer of 2012.

The fourth, most recent round of projects: ARCADIA, ARCC-Water, BIOPICCC, DeDeRHECC, FUTURENET and SNACC, are funded under ARCC (June 2008). These projects are expected to run until mid or late 2012, with the exception of FUTURENET, which is scheduled to continue until February 2013. The ARCC programme has been developed under the auspices of Living With Environment Change (LWEC) in order to build upon on the successes of the EPSRC/UKCIP programme, BKCC, and the knowledge transfer and networking activity 'Sustaining Knowledge for a Changing Climate' (SKCC). ARCC is a collaboration between the EPSRC, the Economic & Social Research Council (ESRC) and UKCIP. It is a £6 million programme funding six projects conducting research aimed at making infrastructure, the built environment and transport systems resilient to environmental change and developing more sustainable, less energy-intensive systems and approaches that are socially acceptable, economically advantageous, and more environmentally harmonious.

Full titles and contact details can be found in Projects (Section 6) or on the website (http://www.ukcip-arcc.org.uk/).

The coordination network

2.1 ACN management

One of the key roles of the ACN is to enhance the dissemination of the results, building on the outputs (reports, publications, data sets, tools and guidance) generated by the individual research projects. Additionally, the ACN is expected to provide a means to facilitate greater networking for the associated research teams and the stakeholders, within and among the projects, but also throughout the wider research and industrial community. The individual research projects will be generating their own output as agreed with the EPSRC, creating a range of documents, data sets, tools and methodologies. The ACN aims to enhance the benefits and dissemination of these outputs by producing a series of synthesis reports at key stages of the research development. The ACN is however, only as useful as the information contributed and exchanged within it. It is vital therefore, that involvement and contributions are encouraged and facilitated. The mechanisms that the ACN uses to achieve this working network are briefly described below.

Project management advisory group

The ACN is overseen by the project management advisory group consisting of the principal investigator (Diana Liverman, Oxford University, Environmental Change Institute) and two co-managers (Chris West and Roger Street, UKCIP) with responsibility to monitor and report regularly on the progress of the ACN relative to milestones and objectives. This advisory group meet to discuss the ACN's direction, target setting and evaluation. The group is also to be represented at the key coordination events.

UKCIP liaison and coordination

The ACN is a resource that is very much in the hands of the research and stakeholder communities. The expertise in the respective fields of research and in the stakeholders lie with them, and it is the responsibility of the research projects (both the associated researchers and stakeholders) to contribute to and interact with the network resources. Each of the 14 research projects have been assigned a liaison and support person within UKCIP. Nine UKCIP staff members are involved and they each have responsibilities to participate in, and learn from, the research and stakeholder engagement of their respective assigned research projects. Twelve UKCIP personnel in total are involved with work relating to the ACN.

2.2 Regular coordination events

The ACN is based around a number of key network activities/events. Five of these are key milestone events. The inaugural event (held on 5 May 2009), the mid-term conference, two events to map the potential for future research and the final dissemination and a looking forward conference. These events will involve representatives of the research and stakeholder groups of individual projects, but will also be open to the wider community with an interest in the research, to enhance the reach of the ACN, showcase progress and results, and point the way forward. The outcomes generated from the inaugural event held in May 2009 are described in Section 4. Groups to bring together stakeholders and researchers from across the individual projects will also have their own associated events and activities, and these are defined below.

Stakeholder Forum

The ACN will be seeking to maintain and build upon the cohesion of the stakeholder communities established by the individual research projects (each have their own stakeholder engagement process) and engage the broader stakeholder community through regular activities and meetings. This engagement is intended to elicit feedback on their participation within their respective research projects and to build beneficial relationships and networks across the research projects. However, meetings with stakeholders involving projects distributed all over the country can be expensive, inconvenient and carbon intensive. For these reasons, and given the general availability of IT and the convenience of web-based conference resources, the potential of using IT media and the appropriate balance between these and face-to-face meetings will be explored with the stakeholders. Information resources are also available and links to these can be found via the website: www.ukcip-arcc.org.uk

Integrated Researcher Forum

Bringing the research community together face-to-face can help familiarisation with the individuals involved and allows communication of concepts and ideas. However, the ACN Integrated Researcher Forum (IRF) also exists to build working relationships between the research groups of the individual research projects, to determine where working together may result in extra benefits, especially where research fields overlap or where gaps unresolved by some may be addressed by others. The IRF is there to provide an environment in which steps to develop the ACN as a place where issues can be raised and decisions made. The IRF will have its basis in eight face-to-face meetings, hosted by the research institutions on a rotation basis. Resources for the IRF are also provided online via the ACN website and the Network Discussion Forum, with contact between the research projects expected to continue between organised forum events.

2.3 Web-based facilities

The ACN website (www.ukcip-arcc.org.uk) is the primary communication tool with members of the Network (and beyond). It is designed to integrate the actions and resources of the ACN and as such, to be accessible by all potential users, while providing a number of routes into website material. There is a public access level to the site allowing the general information and descriptions of the research projects to be browsed, but registration is necessary to access the interactive resources of the site. An online calendar gives access to forthcoming events for each of the projects, enabling project events to be planned in a transparent environment offering opportunities for combining events as well as avoiding clashes.

ARCC Coordination Network Newsletter

This is a tri-annual distributed electronic newsletter with contributions invited from the Network. It provides updates on research within the ACN, and promotes and reports on activities and events. The newsletter is intended for the broader interested community as well as those directly involved and will therefore be publically available. The newsletters are available from the ACN website (http://www.ukcip-arcc.org.uk/content/view/600/9/).

ARCC Coordination Network Discussion Forum

This forum is intended to encourage the ACN community to contribute to discussion topics. Currently there are dialogues on: i) Experiences of Projections in Practice (PiP), ii) Experiences in using UKCP09, and iii) Current policies that affect ARCC projects. This discussion forum requires a login and password, which are obtained after formal invitation only. Once a member has logged in, they are able to access all discussions and may initiate new discussions if they wish.

Webinar events

These will be particularly useful for holding an event to deal with a specific issue, or to hold regular events for a dispersed community for which a single attended meeting might be impractical. The webinar tool enables a large group to interact during a presentation visible to all. Interaction is possible by audio link, but will operate principally via a text facility that allows topics to be discussed sequentially or categorised by topic.

2.4 Data Management

The provenance and mode of use of data is of paramount importance to the projects for academic standards, but also to the wider community as much of the output from the research projects will further develop guidelines for adaptation.

The Data Management Group within the BKCC programme made recommendations that would further enhance the success of a coordinated approach among the participating research projects. These recommendations have been taken into account in the proposed operations developed for data management actions within the ACN.

- The identification of joint data requirements, and assistance with the acquisition of data from third parties. This requires good communication between the projects, with substantial knowledge of the work programmes involved at key stages as well as an understanding of the constraints attached to some data resources.

- Production and maintenance of a decentralised metadatabase resource with an index of the data resources being used or developed by the research projects. The hosting of a centralised database resource was considered impractical, whereas an index maintained to enable all involved to see resources available and view the provenance and availability and application examples would encourage cooperative engagement. Along with this information should be listed the names of key contacts with regard to the use of any specific dataset.

- Data Management task groups will deal with specific data issues where coordination of data development and application is required. Using task groups will avoid duplication, and provide an agreed uniform approach where it might be beneficial, e.g. establishing an agreed threshold parameter value for a particular process used by two separate models in order to be able to compare better the outputs. Such task groups

provide a focus upon specific issues that create connections between the projects and individuals and promote the perception of the benefits of a cooperative relationship and encourage ownership of the output.

2.5 Synthesis activities and dissemination

Sharing information and results across the research projects will enhance the overall research effort. This is particularly true for those projects which share common aims, approaches and case studies. The differences in timing, especially with some research projects finishing earlier than others, offers an opportunity for one research project to build on the results from others. The ACN is to facilitate realisation of these opportunities.

Dissemination

In terms of dissemination, the ACN is to present the results targeted for users in an accessible, contextually coherent series of synthesis reports and web-based resources. These will answer specific questions and address knowledge gaps identified by the research and end-user community. The ACN is intending to enhance the value of the research results (more than just the sum of the results) to practitioners, policy makers and other end-users. It will demonstrate the value of promoting dialogue on results across the stakeholder community and soliciting feedback on the value of the results from targeted end-user communities. The results are to be disseminated at the national and international level, but the specific manner in which these outputs is brought together for dissemination purposes will depend on the nature of the product, the target audience and the broad field of research and communities involved. The proposed thematic organisation of the ACN into five themes: sectoral research themes, impact themes, process and analytical themes and product themes (described in Section 5) provides a framework for bringing these outputs together contextually.

Task group actions

Task groups are intended to permit issues and opportunities, which have arisen from the research projects working together or through deliberations with end-users, to be explored and potential directions identified and implemented. This also includes coordinating work programmes that are not necessarily part of the original research agenda of the projects, but will be useful to them or their stakeholders as a shared resource, and that may also provide platforms for publishable material. Examples identified so far where cross-project collaboration is needed are: Weather Generator files and recommended use, wind data methodologies, and regulatory framework information resource. These task groups may provide a central core for the research approaches within the individual research projects, including the results, but also provide a focus for many of the tasks central to the Data Management Group.

CIBSE Climate Task Force

The Chartered Institution of Building Services Engineers (CIBSE) is an active stakeholder in a number of the ACN portfolio research projects, but they also provide free resources to the ACN and opportunities for the dissemination of the ARCC outputs. CIBSE is the primary professional body for the engineers who design, install and operate systems, both mechanical and electrical, which are used in buildings. The CIBSE Climate Task Force (CTF) has been recently reconstituted to include a group of practicing engineers identified as being at the forefront of building services design. As such it offers a valuable resource for the building focused projects to benefit from additional stakeholder input. The inaugural meeting of the CIBSE CTF was held on 13 November 2009.

ACN activities

3 Accomplishments of network and ACN promotion

A number of events have been held and activities are underway to prepare the research project teams for working as part of the ARCC Coordination Network (ACN). Initially, these have focused on the release of the UK Climate Projections (UKCP09) which are fundamental to many of the projects. Given the complexities involved with the use of these data and related information, considerable effort has been put into ensuring that the projects' use of UKCP09 could progress in an informed manner.

3.1 Coordination events

Initial meetings of the first eight projects

An initial meeting of the Principal Investigators (PIs) of the EPSRC research projects already underway was held in Birmingham on 15 September 2008. This meeting was held to begin the process of establishing the Network: bringing the projects together to inform them of the intentions of the ACN. The second meeting, held on 30 January 2009 enabled the same projects to present their research to date, to discuss potential relationship-building between the projects and for UKCIP to introduce the ACN and to facilitate the projects' use of UK Climate Projections (UKCP09) data once released. The projects were also introduced to the UKCP09 dummy data, intended to make the transition from design stage of the projects to use of actual projections data run as smoothly as possible. A significant outcome of this meeting was the interest raised in the development of a Climate Task Force Group with CIBSE. Both of these meetings were funded by EPSRC and not by the ACN.

ACN inaugural event 5 May 2009

The ARCC Coordination Network project inaugural event was held at Austin Court in Birmingham on 5 May 2009. Research and stakeholder representatives from all of the 14 projects attended the event, with approximately 80 people present.

The main purpose of the event was to bring representatives of all the projects together for the first time, with the intention that all those attending should learn more about the other projects and identify where relationships could be built. To this end, the projects were invited to hold introductory sessions, with stakeholders from each project highlighting their respective interests through presentations and chaired discussion.

This was the first time that all the projects had been together and it was a great opportunity to explore the potential for relationships that might be developed between research teams and their stakeholders. The main issues that arose from this event are presented in Section 4 and a more detailed account can be found on the ACN website (www.ukcip-arcc.org.uk/content/view/597/9/).

3.2 Data management events

UKCP09 webinar

A webinar providing details and an opportunity for further discussion on the use of UKCP09 was held on 15 June 2009 with the PIs and research associates (RAs) from those research projects associated with the ACN and that were already underway. This was held to address some of the emergent evidence of uncertainty surrounding the use and potential for misuse of UKCP09, particularly the probabilistic projections. The presentation used during this webinar is available on the ACN website (www.ukcip-arcc.org.uk/content/view/596/532/).

UKCIP facilitating the use of UKCP09

The webinar (above), was followed up with face-to-face meetings between the individual research teams of the probabilistic projects and UKCIP liaison staff throughout October and November 2009. The aim of these meetings was to ensure that the research maintained appropriate reference to the originally stated research proposals, as well as familiarising the UKCIP representatives with the research method applied by their respective assigned projects.

Data Management meeting

A meeting was hosted at ARUP on 7 May 2009, facilitated by CIBS), it was held as a data management exercise of the ACN. This meeting included representatives from some of the probabilistic projects (COPSE, PROMETHEUS, PROCLIMATION and Low Carbon Future), and was focussed on the opportunities for building design guidance arising from probabilistic data available with the release of UKCP09. Notes from this meeting are available on the ACN website (http://www.ukcip-arcc.org.uk/images/stories/pdfs/ARCC-CIBSE_minutes_3.pdf).

ACN and the wider community

A number of presentations on the ACN and its portfolio of research projects have been given generally in response to invitations by organisations and other audiences interested in contemporary research in the field of adaptation and the built environment. Presentations have been given to LWEC, Climate Change For Business (CCFB), SKANSKA and Department of Communities and Local Government (DCLG).

Forthcoming events

- Newsletter – January 2010
- Integrated Researcher Forum event – March 2010
- Stakeholder Forum event – March 2010
- ACN Management meeting – December 2009
- Website update – December 2009
- Next annual report – March 2010
- Data Management Group meeting – January/February 2010

Financial statement for 2008–2009

	Detail	Total Budget	Total Expenditure	Remaining
Staff		**188,902.00**	**35,231.30**	**153,670.70**
Event Costs	Venues & catering (to date)	34,945.00	3,220.00	31,725.00
	Travel & subsistence	90,405.00	2,284.52	88,120.48
	Other	2,775.00	0.00	2,775.00
	Total event costs	**128,125.00**	**5,504.52**	**122,620.48**
Consumables	Web development	13,500.00	2,020.00	11,480.00
	Annual reporting	9,500.00	2,375.00	7,125.00
	Other	45,000.00	0.00	45,000.00
	Total consumables	**68,000.00**	**4,395.00**	**63,605.00**
Total		**385,027.00**	**45,130.82**	**339,896.18**
Overheads (unverified)		288,413.70	7,998.50	280,415.20
Total ACN (based on FEC)		643,858.00		

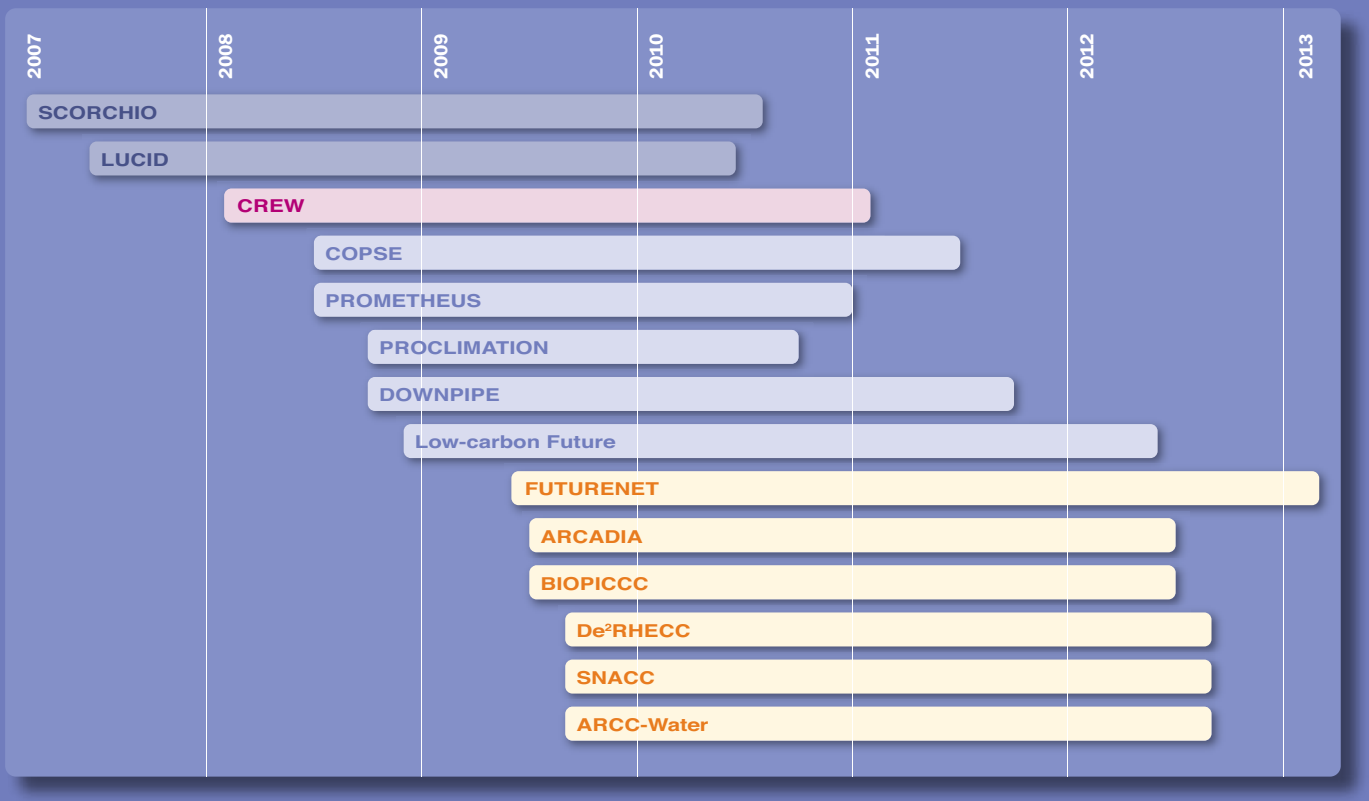
The ACN research projects' progress

LUCID and SCORCHIO are reaching the final stages as they are due to finish by mid 2010 and the results that they have achieved and the plans for dissemination and integration with research from the other projects are expected to form a strong focus for the Integrated Researcher Forum and Stakeholder Forum events to be held in March 2010.

The case studies for the probabilistic projects are well developed, but flexibility exists in most cases to add more: this will be the focus of one of the discussion forum dialogues. The five probabilistic projects have, however, been adversely affected by the delay to the release of the UKCP09 probabilistic projections. They had hoped to have developed methodologies by this stage, but had difficulties because they did not get access to the data as originally planned. Support is ongoing from UKCIP to answer questions and ensure appropriate use of the probabilistic data. In response to the concerns expressed about this delay, example 'dummy' data sets were provided prior to the launch of the projections to enable some familiarisation and development in preparation. Four of these research projects have been involved in a CIBSE facilitated Data Management initiative to discuss environmental design parameters. This meeting is referred to in Section 5.3.

The six ARCC projects have now started, with the majority of them well under way. Technical management groups and research coordination meetings have been held for all of the projects, and updates on the progress will be posted to the ACN website and highlighted in the next ACN newsletter (January 2010). Stakeholder engagement has been active for all the projects with some events used to outline the main aims and objectives, and with other events used to engage the stakeholders by formal consultation and discussion. Presentations have been made to a number of institutions, conferences and industrial partners.

Below: project start dates



ACN challenges & issues

Many discussions have been held at the events described in the previous section. In terms of the ACN, its inaugural event provided an opportunity to introduce the Network and to discuss with a broad range of its members (researchers and stakeholders), its nature and scope, and to identify related concerns and issues. The issues that arose at this time reflected the concerns and ambitions of the individuals involved, although as a result of the timing of this meeting, concerns related to the imminent release of UKCP09 were ever-present.

Issues and concerns that have been raised or that have been otherwise been identified are below.

Possibility to expand the ACN umbrella

The possibility of involving other related research projects, directly and indirectly in the ACN was raised. A number of advantages to their inclusion were suggested, including being able to keep abreast of ongoing related research in the wider climate change and the built environment research and stakeholder community, and to avoid a recurring network that only involves the 'usual suspects'. This expansion of the ACN community was seen as essential to facilitate establishing connections with other relevant research. It would assist with identifying and realising mutual benefits, and maximise the opportunities for improving the value of the research results from the end-users' perspectives. Expansion would also provide opportunities to broaden dissemination and exposure of the ACN outputs.

Efficiency of research

There was a strong feeling, especially among the research projects exploring the use of probabilistic projections, that with similar data sets and targeted end-users, there is the possibility that some of the outputs may be seen as being redundant. It was felt that lines of research might lose their value unless cooperation and beneficial coordination are achieved. These concerns may not be true for all aspects of the associated research. Concerns were also raised related to maintaining intellectual property over the research output. With respect to some areas and data needs, however, it was recognised that a common approach could enhance the strength and effectiveness of the research among the projects individually and as a group, as well as increasing the value of the research as perceived by the intended end-users.

Mutual gains by cooperative research

The potential benefits of the breadth of the research focus of the portfolio of projects should be considered. It may be that some of the secondary benefits of the research of one project may be of considerable benefit to another. It was suggested that sharing case studies, either in terms of subject and or actual location/scope may be helpful, especially where there are perceived benefits to more fully understanding built environment adaptation issues, and where it is cost-effective. It was also suggested that such an approach may provide a mutually beneficial environment for research and engagement, forming an environment for further collaborative research projects, as well as being beneficial to the stakeholders' need for research. The ACN discussions should explore potential opportunities and possibilities for realising the desired benefits (e.g. collaboration within the research effort, including sharing and similar case studies, and joint reporting).

Communicating with stakeholders and end-users

Probability and communication of risk to clients remains quite difficult and there is still considerable uncertainty in how the probabilistic data should be used. Institutions need to be included in these studies, including, for example, building managers in order that the benefits of the research undertaken are understood. Stakeholders need to have this knowledge, so that they have confidence in the information that they are provided with, that they can also have the confidence to ask the questions they really want the answers to. Many stakeholders and research partners specialise in knowledge transfer; UKCIP, for example, specialises in such communication and has a wide range of tools and examples that could be a useful resource.

Probabilistic information

Can the probabilistic data be used for all the situations envisaged at the projects' conception and will it be useful? How can the various research projects be informed on how best to use the probabilistic data? How many activities are these data involved in? These are questions that need to be addressed, especially as the ARCC projects get under way. It was suggested that specific events/activities involving both stakeholders and researchers should be held to promote appropriate use of resources and data. This is especially true for the probabilistic projections. A number of resources are available. For example, the Projections in Practice (PiP) events have been held across the UK throughout October and November 2009, and the User Interface (UI) for the online access to the UKCP09 data resources, supported by an online Helpdesk service.

UK Climate Projections (UKCP09)

Delays to the launch of the UKCP09, and limitations of the data not anticipated in the original research proposals, have raised concerns as to the ability of the earlier research projects to use UKCP09 to achieve their objectives using the methods originally planned. There is a need for early action by the ACN to engage all the affected projects as a network.

Web resources

Feedback from members of the ACN indicated that they see the web as the primary resource for obtaining information on the ACN. As such, they have high expectations on what the website should be supplying and the accessibility of that information. Based on this feedback, the website has been designed as a fundamental resource for communications about and within the ACN. It is flexible in providing access in different ways to different groups (both stakeholders and researchers involved and interested in the ACN and its associated research). It provides access to information of interest and enables stakeholders and researchers to engage with one another.

Mode of engagement of stakeholder and research community

Giving people the motivation to get involved, to exchange information and build relationships are a complex set of challenges. The expectation is that the ACN will begin to address these challenges, including: informing all members of the Network of the information available to them, and how they might become engaged. In terms of informing members of the Network, the ACN is addressing these challenges through its website, by bringing together interested stakeholders (Stakeholder Forum) and the researchers involved in the research projects (Integrated Research Forum). In addition to planned face-to-face meetings, other options including targeted (issue and task) sessions and the use of electronic technologies, including webcasts and webinars will be explored and used as appropriate.

Dissemination

How do we bring the research produced in these projects into the broader end-user and research communities? There is an enormous range of media available for making research outcomes available to a target audience. With lesser requirement for printed output there is an ever increasing requirement for electronic media and interactive systems access. An important issue of concern to the stakeholder community was “Does the research answer the question – how does this benefit me?”. Being able to communicate the results of the research projects is a crucial issue that often receives very little attention. Towards addressing this, the ACN will include reports written by representatives of the end-user community on the value, from their perspective, of the research and its results (“So What?” documents).

Future research needs

What sectoral interests are represented and what research are we missing? One of the aims of the ACN is that it works with its members to continue to identify research needs as a result of and beyond the current set of associated research projects. It has been suggested that some effort should be put into the requirements for further research. Future research mapping events are planned for later in the ACN timetable, but it has also been suggested that there is a need to be aware of the potential requirement for further research that should be addressed as part of the current research efforts.

Problems and conflict resolution

What does the ACN provide in terms of resolving conflicts of interest, intellectual property (IP), plagiarism and continuity? There is facility within the ACN, and there are resources set aside for the provision of data as a joint resource, especially where one project alone is unable to obtain it, but where one research project has negotiated exclusive use of a resource, the agreement made will stand. The ACN can provide a more transparent means of communication between the research groups, and the data management group can provide facilities to negotiate between the parties concerned if required. In terms of IP, different research institutions have their own policies and contractual agreements. However, it is important to note that there is a strong expectation by EPSRC that the research projects will actively seek to build cooperative relationships and that the research output should be in the public domain. The issue of consistency of research method and output can be addressed within the proposed synergistic development and dissemination activities of the respective research themes (defined in Section 5). With research being conducted with transparency as it is developed, differences between research groups can be more effectively explored and understood.

1 2 3 4 5 6

Project interaction & dissemination of results

5.1 Thematic overlap

The projects involved are quite diverse with a physical focus on a range of issues including: individual building characteristics, transport infrastructure, water management at building and wider scale, urban fabric and community-level adaptation. Despite this diversity, and that they also deal with different physical/ structural issues, there is some overlap or thematic similarities among the research projects. A number of the projects are concerned with the interaction between society, the economy and climate change impacts, with the provision of tools for climate change adaptation, with interpreting and applying UKCP09 and/or the development of guidelines and reference materials. These and other potential themes that combine some of the interests of the associated research projects are noted below, along with the research projects and how they may relate to one another conceptually.

The thematic approach put forward here provides a possible framework for those wanting to find information, to use an intuitive structure to explore and understand the aspects of the research projects relevant to them in a context that allows them to look beyond their own specific interests. It also provides a number of possible thematic options for identifying and building collaborative relationships among the research projects. Additionally, for the purposes of dissemination, the themes outlined provide some potential streams around which to coalesce for the purposes of a synthesis report; bringing together the outputs of the research projects in a logical context for wider dissemination.

5.2 Potential sectoral themes

Building design

This theme includes projects that focus on adaptation principles behind the design of buildings for efficiency and Low Carbon Future design; these include retrofit and refurbishment (Low Carbon Future, COPSE, DOWNPIPE, PROMETHEUS, PROCLIMATION and DeDeRHECC).

Heating, Ventilation and Air Conditioning (Low Carbon Future) and building interior adaptation

Designing adaptable internal structures of new buildings, and retrofitting existing buildings to be more comfortable working and living environments can be expensive and problematic in an uncertain climatic future. With ill-conceived short-term solutions potentially resulting in longer-term problems, these research projects are looking at practical responses; looking specifically at these systems but not in isolation from external factors (Low Carbon Future, PROCLIMATION, DeDeRHECC and BIOPICC).

Healthcare and vulnerable populations

A number of the projects are looking at healthcare infrastructure and health aspects of climate change impacts. This theme can include building design factors and the logistical framework of healthcare infrastructure resilience, but also the potential effect upon vulnerable populations and the way in which such vulnerability may be defined (BIOPICCC, LUCID and DeDeRHECC).

Public services

Several of the research projects are focussed upon public resources and services such as public buildings, utilities and transport infrastructure and the potential vulnerability and consequential impacts from climate change effects. These systems need to operate to allow a community to maintain its cohesion and resilience (FUTURENET, ARCC-Water, CREW and ARCADIA).

Water management

Water systems are likely to show the greatest direct environmental impacts of climate change. A number of the projects look at different aspects of water management issues. DOWNPIPE looks at the drainage characteristics of individual buildings, while ARCC-Water has a broader catchment view incorporating the water utility industry and environmental regulatory framework. Other projects look at flood risk and infrastructure security issues relating to this (DOWNPIPE, ARCC-Water, CREW, ARCADIA and FUTURENET).

Transport infrastructure

Transport infrastructure is incorporated into the ACN portfolio at a much greater level than just planes, trains and automobiles. Transport corridors keep the economic pulse of a country operating with the flow of commuters, goods and emergency response resources among others . The cohesion of a community and its economy can be very dependent upon good communications that are able to accommodate a realistic range of climate extremes but also a general change in trend, whether in the centre of a large urban centre or a remote rural village. The physical, socio-political and economic factors involved make the transport sector a rich research environment (FUTURENET, BIOPICCC, CREW, ARCADIA, LUCID and SCORCHIO).

5.3 Potential process and analytical themes

Provision of decision support systems/tools

Some may be classed as iterative computer-based tools, others may be simply sources of information, but academic research and private sector service providers have been inundated with an ever-increasing number and range of models and decision support systems (DSSs). What type to use and which are of contemporary value can often be hard to determine. The majority of the research projects have some research devoted to the development or use of DSSs of a wide variety.

Economic modelling

Several of the projects have a degree of focus on economic modelling as a means of understanding and evaluating potential impacts of climate change. It is a fundamental means of evaluating the potential impacts and the adaptation measures likely to be required (ARCC-Water, CREW and ARCADIA).

Quality of life

The human aspect of climate change is of paramount importance, especially with working environments becoming untenable more frequently due to extremes of weather and the impact on the economy as a result. What measures of adaptation might be considered? (SNACC, ARCADIA and LUCID).

Risk management and assessment

What research is being conducted into the risks of insufficient adaptation, or taking measures too far? Who pays for the consequences and how can such issues be understood, quantified and relayed to others? This is a field of research becoming increasingly important for climate change adaptation (COPSE, PROCLIMATION, Low Carbon Future).

Stakeholder engagement

Some projects focus on stakeholder engagement as one of the practical outcomes of the work undertaken; in other cases the stakeholders may be end users, data providers, or community representatives. All of the research projects have very strong stakeholder engagement programmes with a combined range of technical and professional experience that will greatly benefit the research community as a whole (COPSE, PROCLIMATION, ARCC-Water).

5.4 Product themes

Best practice guidance

Several of the projects are producing guidance as deliverables from the research. This theme brings together these products as they are made available and places them in the context of the policy and guidance environment (COPSE, Low Carbon Future and DeDeHRECC).

Reference data

A key objective of the ACN is to have the outputs of the research projects feed into the development of the others and the wider research community. This theme is to identify the potential for dissemination between the projects to promote uptake of the data sets produced and will attempt to identify the compatibility between them (PROMETHEUS, COPSE, Low Carbon Future and PROCLIMATION).

5.5 Effects and climate change impact themes

The 14 research projects working together under the ACN cover a wide range of climatic impacts, vulnerable sectors and ways of enhancing adaptation potential. The themes below are the most common conceptual subjects of specific focus of the research projects.

- Flooding, drought and other Extreme Weather Events (EWEs)
- Urban heat island
- Resilience
- Vulnerable communities
- Practical adaptation
- Health impacts
- Drainage

5.6 The next steps

The priority for this stage of the development of the ACN is to identify and make clear the potential for cooperation between the projects as they develop in their early stages. For this to happen effectively, the research teams and the stakeholders should be given the resources to interact transparently with the other projects and their research partners.

The first step in this process is to engage in a dialogue with the ACN community, focused upon the themes in order to establish familiarity, as well as enabling everyone involved to have a say in how the shape of the ACN is to develop. Questions to be addressed include: What is the value of themes as expressed here? Are these the right themes to pursue? How will the interaction between projects and themes operate? The dialogue should be at an advanced stage by the Integrated Research Forum and Stakeholder Forum in March 2010.

The second step, running concurrently with the first, is to populate the ACN website with the proposed thematic structure, to encourage a thematically-driven interface with the research being conducted. This will enable the wider community to access the research projects in a context that they can identify as being relevant to them, but it should also raise interest, build familiarity with the research and encourage a more comprehensive level of engagement with the online discussion forum.

The third step is to have general consensus on themes and a number of other key cooperation initiatives by the time the Integrated Research Forum and Stakeholder Forum meets in March 2010, at which decisions will need to be made.

Projects

1 Sustainable Cities: Options for Responding to Climate Change Impacts and Outcomes (SCORCHIO)

Geoffrey Levermore, University of Manchester

Aim: The aim of the proposed research is to develop tools for analysis of adaptation options in urban areas, with a particular emphasis on heat and human comfort in the built environment.

2 The Development of a Local Urban Climate Model and its Application to the Intelligent Development of Cities (LUCID)

Michael Davies, University College London

Aim: LUCID will develop, test and apply state-of-the-art methods for calculating local climate in the urban environment. The impact on the internal built environment, energy use and the consequences for health will then be explored. The implications for urban planning will be considered in detail.

3 Community Resilience to Extreme Weather (CREW)

Gavin Wood, Cranfield University

Aim: To gain a better understanding of the effects of extreme weather events and to develop a set of tools for improving the resilience of local communities.

4 Coincident Probabilistic climate change weather data for a Sustainable built Environment (COPSE)

Geoffrey Levermore, University of Manchester

Aim: To develop a methodology for deriving weather data for building designers etc that is based on future data rather than observational records from the last 20 years or so.

5 Decision support for building adaptation in a low-carbon climate change future

Phil Banfill, Gavin Gibson, Gill Menzies, Heriot-Watt University

Aim: To produce a general, deterministic and computationally efficient methodology for adequately sizing Low Carbon Future (heating, ventilating, and air-conditioning) plant and equipment in buildings.

6 The use of probabilistic climate scenarios in decision making for adaptation of building and property drainage (Design Of Water Networks using ProbabilistIc PrEdiction – DOWNPIPE)

Lynne Jack, John Swaffield, Alan Prior, Grant Wright, Heriot-Watt University

Aim: To realise potential benefits to property drainage design and adaption by using probabilistic data from UKCP09. The location and extent of any under-capacity will be identified and adaptation solutions proposed, thus impacting positively on the mitigation of flood risk.

7 The use of probabilistic climate data to future proof design decisions in the buildings sector (PROMETHEUS)

David Coley, University of Exeter

Aim: To develop a new set of probabilistic reference years that can be understood and used by building designers.

8 The use of probabilistic climate scenarios in building environmental performance simulation (PROCLIMATION)

Vic Hanby, De Montfort University

Aim: To develop and implement methodologies for using probabilistic climate scenarios (UKCP09) in building simulation and other related analytical procedures.

9 ARCADIA: Adaptation and Resilience in Cities: Analysis and Decision making using Integrated Assessment

Jim Hall, Newcastle University

Aim: To provide system-scale understanding of the inter-relationships between climate impacts, the urban economy, land use, transport and the built environment and to use this understanding to design cities that are more resilient and adaptable.

10 BIOPICCC Built Infrastructure for Older People In Conditions of Climate Change

Sarah Curtis, Durham University

Aim: To develop a methodology for selecting locally sensitive, efficient adaptation strategies during the period up to 2050 to ensure that the infrastructures and health and social care systems supporting well-being of older people (i.e. those aged 65 and over) will be sufficiently resilient to withstand harmful impacts of climate change.

11 ARCC-WATER: Water System Resilience

Mark New, University of Oxford

Aim: An integrated 'whole system' approach to water resource planning in SE England under multiple uncertainties, in which portfolios of infrastructure and demand management options maintain secure supplies (increased reliability and reduced vulnerability to failure) and enhance the environment.

12 Suburban Neighbourhood Adaptation for a Changing Climate (SNACC): identifying effective, practical and acceptable means of suburban re-design

Katie Williams, University of the West of England (UWE)

Aim: The proposed research answers the question: how can existing suburban neighbourhoods be best adapted to reduce further impacts of climate change and withstand ongoing changes?

13 FUTURENET: Future Resilient Transport Networks

Chris Baker, University of Birmingham

Aim: To determine: What will be the nature of the UK transport system in 2050 (taken as the mid-point of the UKCIP scenarios), both in terms of its physical characteristics and its usage?

What will be the shape of the transport network in 2050 that will be most resilient to climate change?

14 DeDeRHECC: Design & Delivery of Robust Hospital Environments in a Changing Climate

Alan Short, Department of Architecture, University of Cambridge

Aim: The project aims to investigate the design and delivery of economical and practical strategies for the adaptation of the NHS Retained Estate to increase its resilience to climate change whilst meeting the challenging carbon reduction goals and performance requirements of the NHS.

Adaptation and Resilience in a Changing Climate (ARCC) brings together research projects involving existing buildings and infrastructure, including transport and water resource systems in the urban environment. The programme will enable the design of urban systems that are more resilient to climate change.

ARCC is part of Living with Environment Change (LWEC) – a 10-year programme to provide decision makers with information to manage and protect vital ecosystem services. LWEC will improve tools and knowledge needed to build resilience, mitigate problems, and adapt to environmental change.

Living with Environmental Change (LWEC)

LWEC is a collaborative partnership involving the UK research councils, business and policy-making organisations, and was launched on 18 July 2008. LWEC will provide the impetus for finding ways in which society and individuals can prepare to adapt to the environmental changes that we face now and in the future, as a result of a changing climate. As a contribution to the LWEC programme, EPSRC initiated the Adaptation and Resilience to a Changing Climate (ARCC) research programme.

Engineering & Physical Sciences Research Council (EPSRC)

EPSRC are the main UK government agency for funding research and training in engineering and the physical sciences, investing more than £800 million a year in a broad range of subjects – from mathematics to materials science, and from information technology to structural engineering. EPSRC has funded and is continuing to fund research directed at improving understanding of the impacts of, and adaptation to, a changing climate focusing on the built environment and infrastructure.

Ecoomic & Social Research Council (ESRC)

The ESRC funds research and training in social and economic issues. It is an independent organisation, established by Royal Charter, but receives most of its funding through the Department for Innovation, Universities and Skills.

UK Climate Impacts Programme (UKCIP)

The UK Climate Impacts Programme (UKCIP) works at the boundary between research and society on the impacts of climate change and on adapting to those impacts, helping organisations to adapt to inevitable climate change. Since 1997 UKCIP has been working with the public, private and voluntary sectors to assess how a changing climate will affect a range of businesses and organisations.

Since 2001 UKCIP and EPSRC began working together to simulate multi-disciplinary research on impacts and adaptation related to infrastructure, the built environment and utilities.