LWEC Knowledge Exchange Guidelines

November 2012

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Introduction

The term 'knowledge exchange' (KE) refers to the exchange of information, ideas, expertise and people between researchers and research users such as policy-makers, businesses and members of the public. The overall aim of KE is to maximise and accelerate research impact.

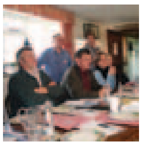
Effective KE is crucial to the success of the Living With Environmental Change (LWEC) Partnership, which aims to "ensure that decision-makers in government, business and society have the foresight, knowledge and tools needed to mitigate, adapt to and benefit from climate change."

By establishing a two-way flow of knowledge between researchers and potential users of their research, and ensuring a clear, mutual understanding of needs and priorities, LWEC initiatives will have a more meaningful impact on decisions, actions and behaviours in the years ahead.

These Guidelines have been developed specifically to aid the KE process across all activities endorsed by the LWEC Partnership. While not prescriptive, they nevertheless aim to inform and inspire, comprising an extensive reservoir of ideas, tips and suggestions on how KE can be most effective, and are reinforced by a range of further information and real-life illustrative case studies.

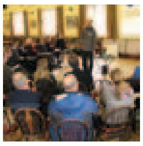
The Guidelines are divided into the following eight components, each of which represents a key stage in a successful KE process:


Target


Design


Engage


Facilitate


Share


Impact


Sustain


Evaluate

Although the Guidelines are primarily aimed at people taking decisions at a programme level, it is hoped that they will provide useful ideas and principles for anyone involved in KE and complement guidance available from other sources (e.g. Research Councils UK). Using them will help researchers and research users to develop an understanding of each other's needs and capacities, and enable them to exchange reasonable, meaningful questions and responses with each other.

Fundamentally, KE is the process of ensuring that the right insights are conveyed to the right people both in the right way and at the right time. These Guidelines are designed to help you to make it happen.

The Guidelines are also available online at http://www.lwec.org.uk/ke-guidelines where additional case studies and Q&A features are included.

1. Target

Right from the start of your research programme, it is essential to develop a clear view of what you need to achieve in terms of KE[1] and to put an appropriate structure in place to realise your aims:

- **Goal setting**

  Be clear and realistic about what your research programme aims to achieve, with respect to its high-level, broader impact as well as in purely scientific terms.[2]

- **Stakeholder identification**

  Pinpoint who the key users/stakeholders are and consider how these various groups/individuals are likely to benefit from (or be affected by) your research. You can, for instance, harness tried and tested stakeholder mapping and analysis techniques to help this process.[3]

- **Programme governance**

  When establishing a management group for your programme, ensure an appropriate balance of researchers and relevant users (i.e. avoid 'tokenism'). Use this opportunity to gain a clearer overall picture of the key needs and priorities of potential users of your research and of other stakeholders; this information will be of enormous value in enabling you to optimise and refine the KE objectives you set.

- **KE Co-ordinator**

  Identify and appoint a KE Co-ordinator for your programme who is either a dedicated KE specialist or someone in the management team with the appropriate credentials (e.g. someone with strong facilitation skills, a good understanding of impact and good relationships with potential research users). Let the LWEC Directorate know who this person is.

Case Study – Involving Stakeholders in Programme Governance

*Enabling stakeholders to play an active role in programme governance can maximise the impact of your research. **Professor Dan Laffoley**, Chair of the International Ocean Acidification Reference User Group, outlines the crucial contribution this Group is making to efforts to confront ocean acidification, the 'evil twin' of climate change.*

"Ocean acidification has only really been on researchers' radar for seven or eight years, but its potential seriousness means there's no time to lose in getting to grips with the challenges it presents.

We simply can't afford not to take the views and needs of policy-makers and industry fully into account.

That means dispensing with the traditional academic model of involving stakeholders in an intermittent, unstructured way and perhaps finding out only after research has been completed that all the right questions maybe weren't being asked in the right context in the first place. A priority of the ocean acidification community has been to get all interested parties to engage with each other and talk the same language from day one, and especially to secure stakeholder input to help shape the research agenda.

The Reference User Group is the key vehicle for doing this. Initially set up as part of an EU initiative, it now also embraces national programmes such as the UK Ocean Acidification Research Programme. Its 30-plus members are drawn from government, industry, conservation groups and the academic/scientific community in Europe and the US. An Annual Meeting is supplemented by email contact, plus bilateral meetings and exchanges with a smaller core of our most active and enthusiastic members.

As well as a forum for open discussion, the Group provides the perfect platform for sharing perspectives stemming from data generated by research projects.

A core task has been identifying the right people to participate in the Group and engaging with some sectors that maritime researchers haven't closely interacted with in the past. It's been vital to convey clearly how becoming part of the Group can benefit these sectors and to use the Group to build a closer relationship with them. Another ongoing challenge is to keep member organisations fully engaged even when ocean acidification 'champions' within them have moved on.

The Group generates all kinds of spin-off benefits too. In-kind contributions from members have over recent years included the use of a ship to help transport and deploy experiments. The Group also played a major role in producing the guide 'Ocean Acidification: The Facts', with members ensuring that this publication addressed the right questions in an effective format, avoiding 'science speak'.

Without doubt, the Group is making a real difference in helping to meet the urgent need for effective communication of new knowledge in this fast-developing field."

- **Training needs**

  Pinpoint who, within your research team, needs training to develop the necessary motivation, skills and expertise to ensure that ongoing KE between researchers and users/stakeholders really is achieved.

- **Project proposals**

  As your programme develops, ensure that an assessment criterion for project proposals submitted to your research programme is the extent to which the needs and priorities of research users will be addressed.[4] A two-stage selection process can be used to help refine proposals from a KE perspective.[5]

2. Design

Develop a detailed, well-tailored KE plan that can deliver your goals and is fully embedded within the overall research programme:

- **Strategy formulation**

  Devise an overarching KE strategy and associated action plan that will be monitored and reported on alongside other aspects of programme planning and management.[6] Putting in place such a strategy will create clear expectations in terms of what the minimum KE requirements are, with respect to user engagement, dissemination mechanisms etc. (See Note 6 for a detailed list of items that a strategy can cover and examples of existing KE strategies.) For activities funded by the Research Councils, a KE strategy will help to direct, inform and facilitate individual projects' 'pathways to impact' plans.

- **Resource allocation**

  For an average research programme, allocate a minimum of 5% of overall funds to KE activities.[7] (NB: this KE funding is over and above what will be awarded via individual project 'pathways to impact' plans.) For some programmes, though, and especially those with a significant 'applied' element, a considerably larger percentage may be appropriate. When calculating the level of funding needed, it is vital not to underestimate the time and effort required for engaging with stakeholders and relationship-building. Also continue to explore opportunities to secure additional funding for KE activities.

- **Co-design**

  Encouraging stakeholder advice and input on the design of your programme, either at the outset or at appropriate points during its course, will help ensure not just that the eventual findings will be of real-world benefit but also that they are conveyed in a manner most likely to encourage take-up.

- **Sandpits**

  Sandpits and similar forums can be used to help build collaborations with users/stakeholders and other researchers in the co-design of new research programmes.

- **Building-in flexibility**

  Wherever possible, design KE plans so that they incorporate the flexibility to adjust to emerging needs and priorities of research users and other stakeholders, as well as to changing circumstances.[8] Splitting funding across different phases of a programme can help you to respond better to evolving KE needs.

- **Reserve budget**

  If possible, keep some resource in reserve so that you can respond to any new questions and needs that emerge as engagement with users/stakeholders continues. For instance, there may be an urgent and unforeseen need to interpret and communicate new knowledge generated by your research. Having adequate resources available will help incentivise your researchers to do this.

- **Thinking innovatively**

  Do not be afraid to experiment with novel approaches to KE – this can be vital in enabling your research to stand out from the crowd and appeal to new audiences. However, when developing your plan, it is essential to take into account the funding you have available as well as the likely preferences of the stakeholders you are engaging with.

KE Q&A – Shaping Programmes with Stakeholder Input

The AVOID research programme provides key advice to the UK public sector on avoiding dangerous climate change brought about by greenhouse gas emissions. ***Dr Maria Noguer****, the programme's Knowledge Integrator, explains how developing a clear understanding of stakeholders' knowledge needs from the outset has underpinned the success of the initiative.*

Q: How important has it been for AVOID to establish mechanisms enabling research users to tell you what they need from the programme?

A: Absolutely fundamental. Our aim is to inform policy decisions and equip government with up-to-date scientific evidence reinforcing the UK's negotiating position at Conference of the Parties (CoP) events held under the United Nations Framework Convention on Climate Change. The key, then, is to deliver the information that policy-makers require and in the form they need it. Timescales are crucial too. We have to produce deliverables for specific CoP events but sometimes there may be an urgent, ad-hoc need for a particular piece of information and the turn-round time may be very tight. It's essential we respond effectively in those situations too, so we must have mechanisms in place that enable swift, clear communication of stakeholder requirements.

Q: At what point in AVOID's development did you start engaging with stakeholders and canvassing their opinions?

A: Right from the start. We included key government representatives on the AVOID Steering Group and also used a combination of a survey and telephone interviews to gather input from around 50 individuals. The raw data generated was carefully analysed to produce structured findings that we could use to help firm up specific research objectives for AVOID.

Q: What did you do to ensure a good response rate to the survey?

A: We made it available in both written and online formats. We also physically phoned up around ten individuals whose views we considered it essential to gather and we filled in the survey with them to make the process easier.

Q: How do you ensure close co-operation with primary stakeholders on an ongoing basis?

A: As well as conducting knowledge integration discussions with them, probably the most important step has been the appointment of a dedicated Programme Officer within DECC whose remit is to work with AVOID and maintain a strong link with the programme. That's proved invaluable.

Q: How have you responded to your stakeholders' requirements in terms of the way you communicate the results of your research to them?

A: We've listened very carefully to exactly what they want and we tailor our outputs to their individual needs. As well as issuing reports, holding seminars and providing one-to-one briefings, we produce brochures and concise 'key points' flyers which are supplemented with email bulletins containing less time-critical information. We compile our distribution lists for these outputs in close co-operation with each of our stakeholders. We also produce presentation slides that all of our stakeholders can use.

Q: What would be a good example of the way your proactive approach to stakeholder engagement has really paid dividends?

A: The Copenhagen Accord, which was 'taken note of' at the 15th CoP in 2009, recognised that climate change is one of the greatest challenges today and that actions should be taken to keep any temperature increases below 2°C. Within the Accord, several countries submitted emission reduction pledges. But our stakeholders wanted to know whether the emission reduction targets submitted by countries would actually be sufficient to stay below a 2°C increase. So AVOID 'did the maths' and revealed that the actions weren't extensive enough. This was a vital finding that would inform the UK position at subsequent CoP meetings. Our ability to provide the right information in the right format at the right time was a direct result of the close relationship and deep understanding established between the programme and its stakeholders.

3. Engage

To achieve effective KE, it is critical to find ways of establishing a dialogue, building relationships, developing collaborations and creating a culture of trust and shared purpose with potential research users and other stakeholders:

- **Balanced representation**

When designing and implementing your suite of specific KE activities, ensure that the needs and views of **all** likely research users are systematically represented and include those users in decisions about what your programme needs to achieve. This will enhance not only the impact but also the legitimacy of your research programme by clearly demonstrating that you value stakeholders' views at every point in the process. (See also 'Stakeholder identification'on p.2 and the Case Study on p.3.)

- **Stakeholder motivation**

Pinpoint what specific issues and concerns motivate stakeholders as this can help you to devise and tailor specific activities that will encourage their ongoing engagement in both the KE process and the research programme as a whole.

- **Using 'knowledge brokers'**

The use of 'knowledge brokers' as intermediaries, drawn either from the research community or from your stakeholders, can make a major contribution to the development of effective communications between you and key target groups and to the cultivation of a close, positive and enduring relationship with them.[9] Their role is to facilitate interactions between the research and research user communities and to put research results into context, using language that can readily be understood by research users and other stakeholders.

- **Involving Civil Society Organisations (CSOs)**

CSOs such as Non-Governmental Organisations (NGOs) can play a key role as intermediaries between you and research users in government, business and elsewhere. These CSOs often have good outreach and dissemination mechanisms already in place that can be utilised to help you achieve your KE objectives.

- **Integration into research teams**

Encourage research users to join research teams as co-investigators or to sit on advisory panels.

- **Range of knowledge**

Ensure you understand, respect and critically evaluate the contribution that other disciplines

Case Study – Understanding and Harnessing Stakeholder Motivation

Mobilising stakeholders to make key contributions can be fundamental to the success of LWEC initiatives. The challenge for the Demonstration Test Catchment programme, exploring the scope for new farming practices to cut pollution of rivers and groundwater, was to pinpoint how farmers might be motivated not just to support the initiative but actually to participate directly. ***Bob Harris*** *of Defra explains how analysing the motivations of different types of farmer helped bring them on board.*

"Farmers tend to be quite conservative in outlook. They can be reticent when it comes to embracing potential innovations, getting involved in government-backed initiatives and working with the academic community. But securing their buy-in was essential if the programme was to meet its objectives. We needed access to farmland so we could set up long-term water monitoring equipment. But we also wanted to provide a number of farmers with test kits so they themselves could measure nitrate and other pollutant levels on their land and keep a detailed record.

The key was to develop a clear understanding of the pressures and priorities facing farmers in the three catchment areas we were targeting.

Then we could pinpoint how our programme might contribute to what they saw as their vital interests. We had to go to them with a picture of how our initiative would not simply benefit agriculture in general but also address their individual, specific needs.

It soon became obvious that we must tailor our message for each region. In Cumbria, for example, the agricultural community is typified by small livestock farms which have often been in the same family for generations. We had to show that our programme would aid farmers' stewardship of the land by helping them understand and ultimately mitigate the impact of their operations on the environment.

But in East Anglia, we adjusted our approach. Here, the industry is dominated by big arable farms run by agri-businesses with a very sophisticated commercial outlook. Underpinning their ability to operate profitably is their compliance with regulatory frameworks. So we had to convince them that our programme would help them improve the local environment at no detriment to their overall business.

It's fair to say that differentiating our message like this was absolutely critical to securing the farmer involvement we needed.

What's more, to ensure our credibility, we had to get it 'right first time' in terms of how we actually delivered those messages. In Cumbria, for instance, we used an intermediary with excellent local contacts who could build relationships and establish trust. We're now about halfway through our five-year programme. It's been great to see how the farmers we're working with have embraced it.

They really 'get' what's in it for them – and that's a direct result of our determination to truly understand what drives them."

and types of knowledge (such as local knowledge) can make to the KE process, beyond those most obviously and directly relevant to your programme and its potential impacts. Take steps to engage with representatives of these disciplines and knowledge types at an early stage in your programme.

- **Engaging in dialogue**

  Developing a constructive, productive dialogue between researchers and research users is fundamental to establishing a secure platform for KE. The key is to identify and implement appropriate mechanisms capable of providing a non-hierarchical 'level playing field' where different parties can interact on an inclusive, collegiate basis and feel able to exchange opinions and information frankly and thoroughly. A combination of one-to-one and group-level dialogue, harnessing a variety of specific mechanisms, is likely to be needed in a majority of programmes.

- **Ethical implications**

  However you choose to engage with research users, give careful consideration to what the ethical implications may be. For example, what might be the ramifications in terms of intellectual property rights, the recording/attribution of comments or the potential for conflicts of interest?

4. Facilitate

As your programme proceeds, it is important to look for and take advantage of opportunities to assist and strengthen stakeholder engagement and involvement, and to enhance the whole KE process:

- **Collaborative mindset**

Promoting productive collaboration and effective listening between researchers and users/stakeholders can establish a common purpose, facilitate two-way learning and ensure the continued involvement of users/stakeholders in the research process. Working closely with stakeholders may also enable you to promote KE by building on successful networks/processes they already have in place. In addition, establishing connections with other programmes and activities can enable significant findings and important information to be shared more widely.

- **Methods of communication**

Encourage suggestions from research users and other stakeholders regarding the best ways of communicating with them, as this will help you to pinpoint the most effective formats and channels for exchanging information with specific groups.[10] Furthermore, communication materials developed with the involvement of stakeholders are more likely to achieve the right tone and pitch and therefore meet the needs of the target audience. Similarly, the 'reach' of communication materials can increase significantly if stakeholders help to disseminate them.

- **Targeting and language**

Ensure that all communication materials are well-targeted at the intended user(s) and are written/presented in an accessible way.[11] Wherever possible, take care that the language you use is straightforward and jargon-free, and that everyone clearly understands all terminology used. Publications aimed at policy-makers and/

Case Study – Nurturing a Spirit of Collaboration

Encouraging different stakeholder groups to work together and reach compromises can benefit from imaginative thinking and even the innovative use of technology. ***Dr Tim O'Higgins****, Project Manager of the KnowSeas initiative, relates how a novel approach to conflict resolution helped to break down barriers between vested interests in the field of tidal energy.*

"Deciding where to site renewable energy installations can often be contentious. Developers, communities and local industries may all have very different agendas. With a lack of obvious common ground, it can be hard for them to understand one another's viewpoints, priorities and concerns. Under the banner of KnowSeas (Knowledge-based Sustainable Management for Europe's Seas), we decided to look for a new way of addressing the problem. The context was the identification of tidal energy sites off the Mull of Kintyre where developers could potentially locate devices whilst taking the concerns of local fishermen and the tourist industry into account.

Could we provide an environment where different parties would have to work together and in a lighter atmosphere than a town hall meeting or round-table exchange?

Our solution was to trial a novel device – an interactive 'touch table'. A giant map was projected onto the top and different sections were highlighted as participants touched them to indicate places vital to their activities and interests. Sites could then be 'traded' until a compromise was arrived at, with different outcomes awarded a sustainability score using bespoke computer software. This 'game-ification' of a delicate topic proved a huge success.

The fact that different parties had to sit down and learn how to use the touch table together got them thinking as a team rather than as divergent interest groups.

Moreover, it was fun to use – which made a huge difference to the whole character of the discussion – and ensured that everyone could visualise much better what is obviously a sensitive and controversial issue. The spirit of co-operation that soon developed really facilitated the trading of marine spaces and helped promote genuine understanding of each other's positions. We've now written similar use of a touch table into a number of other projects where stakeholder engagement is needed, including a forthcoming conservation-related project in the Moray Firth involving stakeholders from the renewables, fishing, tourism and broader energy sectors.

I can't overemphasise the impact this kind of approach can have in fostering a spirit of collaboration that makes project goals easier to achieve."

or businesses and written in 'plain English' can be effective in highlighting the impacts of research, both during the programme and when it has been completed. Copies of communication materials can be sent to the LWEC Directorate for further dissemination.

- **Interpreting research**

  Involve a cross-section of stakeholders to help draw out the key policy and practice implications of your research. This can be highly productive not just at individual project level but also across all projects supported by a programme. Producing synthesis reports and organising targeted workshops can both be effective ways of achieving cross-programme results.

- **Professional communicators**

  Professional communicators can help to design quality publications, multimedia outputs and non-written materials (e.g. tools) which are better targeted and accessible to key audiences. Their skills may also enhance those of a KE Co-ordinator (see p.2) in face-to-face communications to ensure a sufficiently effective process that achieves a genuine two-way exchange of knowledge. Furthermore, through their professional networks/activities, greater impact may be possible. It might therefore be worth setting aside a realistic budget allocation for professional help.

5. Share

Harnessing specific mechanisms to ensure a two-way flow of knowledge, skills and new ideas will underpin KE as your programme gathers pace:

- **Programme events**

  Create a 'community' of researchers and stakeholders by organising regular events that build relationships and aid information-sharing and the creation of new knowledge together. Ensuring that the same people consistently attend these events will help facilitate this process. When planning an event, make sure you understand what will make participants feel comfortable, secure and creative, what will reinforce their trust in the process and how you can deliver an environment where ideas can be challenged constructively.

- **Targeted workshops**

  Well-focused workshops can provide the perfect medium for sharing key information with stakeholders – for example, where there is a clear policy question or an industrial issue on which your programme has produced significant new evidence. Keep workshops (and meetings in general) as small as possible; where larger workshops are unavoidable, ensure plenty of the work is done by small groups of participants.

- **Good facilitation**

  Employing a professional facilitator (or a member of your team who has undertaken recognised facilitation training) can maximise the effectiveness of an event or workshop.

- **Town meetings**

  Town meetings and similar forums can be used to help you build collaborations not only with users/stakeholders but also with other researchers.

- **Informal interaction**

  During formal meetings, create opportunities for researchers and users/stakeholders to interact less formally as well – for example, by ensuring that breaks are long enough, by including activities where people can work together in small groups or perhaps by engineering opportunities for those involved to talk with each other en route to a project site etc.

- **'Remote' contact**

  Harness technologies and media such as Skype, video/teleconferencing, social networking and secure shared websites to provide forums for ongoing, low-cost interaction with research users and other stakeholders, in order to supplement regular face-to-face meetings. This is especially important when dealing with organisations/individuals located in other countries.

Case Study – The Value of Non-Written Material

Sharing information and engaging with stakeholders in innovative and creative ways can add an extra dimension to KE activities. The Flood, Vulnerability and Resilience Study, for example, devised a giant game of 'Flood Snakes and Ladders' to highlight the major challenges facing flooded residents. ***Dr Beccy Whittle*** *of Lancaster University describes how this novel solution provided a perfect platform for raising awareness and promoting a deeper understanding of the difficult issues involved.*

"For flooded householders, it's only after the news crews have gone home that the struggle really starts. Coping with the physical, financial and emotional impacts of flood recovery can be a long haul. We recognised that, if our study of the effects of the 2007 Hull floods was to have lasting value, we had to hit on a way of conveying those impacts to those involved in disaster recovery and emergency planning as effectively and realistically as possible. Clearly, creating genuine empathy and understanding would need more than long academic reports or workshops dominated by PowerPoint presentations and traditional Q&A sessions.

We wanted to highlight real-life experiences in an entertaining, hands-on way that stimulated discussion and made a permanent impression.

The idea of producing the game was inspired by one of the study participants joking that the ups and downs of recovering from a flood was like a game of snakes and ladders – you think you're making progress and then you hit an obstacle that can really set you back. In our game, 30 tiles are placed on the floor and the players roll a giant dice. The tile they land on presents them with an authentic post-flood scenario – perhaps something to do with clean-up, insurance or finding alternative accommodation – and they move forward or back depending on whether the scenario is positive or negative.

Playing the game certainly helps you to see the impact of flooding through a resident's eyes. The pilot version has been used as a training tool by a number of organisations, which have gained important insights into the experience of flood recovery. But, with the help of funding from the Cabinet Office and EPSRC, we've now developed a downloadable version to reach a much wider pool of potential users. It's proving that non-written material really can add the 'wow' factor to any KE programme.

The game has already been tried out by the Cabinet Office, local authorities, insurers and the British Damage Management Association.

A simplified version has proved a great success in schools and the game is also sparking similar ideas that we can apply to other projects. For instance, we've designed a special 'flood suitcase' containing a range of teaching and learning resources to help young people explore the reality of flood recovery.

Of course, the snakes and ladders concept could easily be tailored to other disaster scenarios as well as to wider issues relating to climate change."

- **Making connections through LWEC**

  Collaborating with other LWEC activities as well as across projects in an individual programme can enable significant findings and important information to be shared more widely.

- **Harnessing LWEC**

  Use LWEC events, LWEC Fellows and the LWEC website to share good practice in KE with users/stakeholders and with other researchers. Make the most of communication materials and training packages produced by LWEC Partners to help you convey your scientific findings to policy-makers.

- **Trade journals and specialist media**

  Trade journals and a whole range of non-mainstream media potentially provide a useful channel for conveying information to industry, so developing contacts and building links with such publications can be a good investment of your time.

- **Non-written outputs**

  Demonstrate new techniques, decision-support tools and other non-written research outputs by taking them direct to potential users or showcasing them at appropriate events.

6. Impact

Focus on delivering tangible results that are of real value to as many of your programme's research users and stakeholders as possible:

- **'Quick wins'**

  Delivering a number of useful outcomes as soon as practical (but without compromising the rigour and integrity of your research) will help you gain the respect and secure the ongoing support of stakeholders, enabling your programme to achieve more in the long term. Such outputs might include: synthesis reports, briefings, access to useful data, models and expertise that users did not have before.

- **Key 'influencers'**

  Identify key 'influencers' who are well-connected and have the ability to disseminate research findings widely. Plan how you can work with them to maximise the impact of your research.

- **Placements**

  Explore the scope for project leaders and others to undertake placements, fellowships and work shadowing with institutions and organisations likely to use your programme's research outputs and where there is a strong likelihood that KE may lead to beneficial impacts.[12]

- **Funding needs**

  Anticipate whether you may need specific funding for initiatives designed to interpret, synthesise and communicate findings from your programme as a whole or from its component activities.[13] Such initiatives often add enormous value to research outputs but need to be resourced appropriately. New calls for proposals focusing on this type of activity, ideally already identified in your KE strategy, can be worked up and taken forward at key points during your research programme.

- **LWEC objectives**

  Your research programme could achieve greater impact through LWEC by meeting key needs of business and/or society, as identified in the LWEC Partnership's 'six challenges', as well as by answering policy questions and contributing to broader LWEC initiatives such as Climate Change Impact Report Cards.[14]

- **Good timing**

  Some research users (especially policy-makers and regulators) may need to receive information and/or advice from your programme to coincide with key points in the policy/legislation development process.[15] In this context, it is useful to plan in advance how you can make meaningful contributions to this process on timescales of (i) days/weeks, (ii) months and (iii) years. Getting the timing of KE right is also crucial to funders, particularly when a potentially controversial area of research is being developed.

KE Q&A – The Benefits of Work Placements

Placements, fellowships and work shadowing can strengthen research programmes in all kinds of ways, not least by helping to ensure that they effectively meet research users' needs. ***Dr Carly Stevens*** *recalls how, as a research scientist with The Open University, she undertook a five-month placement with Defra working on its Atmosphere and Local Environment (ALE) programme – to the benefit of both organisations.*

Q: How did the placement come about?

A: I responded to an advert distributed via NERC. Defra wanted someone to work in-house with their ALE team's Atmospheric Evidence Group, helping to evaluate the impact of air pollution on ecosystems. It looked interesting – my area of research specialism is nitrogen deposition and the effect it has on plants. Furthermore, Defra is a key funder of my research so this seemed an excellent opportunity to forge closer ties with them and to work on a programme which, through the policy decisions it informs, feeds directly into the 'real world'. The Open University were extremely supportive too. Delivering impact is very high on their agenda.

Q: What exactly did the placement involve?

A: Between October 2011 and March 2012, I spent alternate weeks up at Defra in London. My main task was to produce an internal report assessing the extent to which past ALE research had helped Defra meet its air pollution policy goals, as well as setting out recommendations on how future research could contribute to the achievement of those goals most effectively. Defra are now taking a number of the recommendations forward.

Q: What did Defra think an 'outsider' could offer that one of their own employees couldn't?

A: Basically, independence and a fresh perspective free from preconceptions. I've never been funded by ALE and so hadn't previously had any feed into the programme whatsoever. That meant I could evaluate past research completely objectively and provide a totally unbiased view of future needs. In fact, Defra learned a lot about themselves from the whole process. My role involved interfacing and building relationships with people right across the Department. As a result, I could see scientific linkages between different parts of Defra that perhaps weren't so obvious to an insider.

Q: What did you personally learn from the experience?

A: Before my placement, I was quite naïve in terms of how the policy process actually works. If I spoke to a Government Department to convey some research findings to them, I used to think "right, that's done – that'll feed straight into a policy impact." Now I'm much more aware of just how complex policy formulation is and the different steps and stages it has to go through, and particularly of its evidence needs with respect to both content and form. I can see how evidence has to be framed and presented if it's to attract attention and stimulate interest. It's vital to recognise that Government Departments are dealing with colossal volumes of information on a daily basis, so it really helps if what you submit is clear, relevant and thought-provoking.

Q: How important was it to be in a position to forge close relationships with individual Defra staff?

A: It was essential. Actually being up there at Defra made all the difference in ensuring my report was as insightful as possible. It made me see that you can't develop a comprehensive understanding of an organisation and the way it works without putting those personal, face-to-face links in place. I've also been able to use my improved understanding of the process through which science turns into policy to benefit The Open University and my current employer, Lancaster University. Placements clearly have huge potential to reinforce the two-way bridge that allows knowledge and understanding to flow between academia and government. I really did find the whole experience hugely enjoyable and highly rewarding.

7. Sustain

Take measures that will ensure engagement and impact can be sustained beyond the life of the immediate research programme/project:

- **Determine needs**

  Decide which aspect(s) of KE (e.g. stakeholder interaction, networks, social learning) need to be sustained for the duration of the programme/project and beyond. Ensure that your strategic planning and implementation both reflect this requirement.

- **'Legacy' arrangements**

  Put mechanisms in place that will enable the interpretation and communication of the knowledge generated by the programme/project to continue, even when the research phase has finished.[16]

- **Ongoing co-ordination**

  Consider employing KE Co-ordinators and others who are in similar roles for an appropriate period (e.g. a year) after your research programme is complete.

Case Study – Leaving a Legacy

Research initiatives will more easily maximise their impact if KE processes can continue after the research phase has been completed – and perhaps even after the whole initiative has drawn to an end. ***Dr Jo House*** *of the University of Bristol describes how the QUEST (Quantifying and Understanding the Earth System) programme* made sure it left an influential legacy following its conclusion in autumn 2011.*

"The fundamental aim of QUEST was to pull together many different strands of science and so aid understanding of global environmental change. Starting in 2006, it ran for five years and supported a multitude of mostly UK-based research projects, with a focus on three principal areas: modelling into the future, interpreting palaeoclimatic data and understanding human impacts on the global environment.

As with many major research programmes, some of the projects ran literally right up to the very end of QUEST. It was essential to set up mechanisms that would allow us to feed relevant outputs through into Intergovernmental Panel on Climate Change (IPCC) reports, for example. Other key post-programme aims included organising the 'finale' event and producing a book that would bring all of QUEST's primary findings together in one, accessible place.

In fact, so much activity was needed that QUEST's resource for KE had to be ramped up towards the end of the programme, continuing after it ended.

This included taking on an additional liaison officer within the core QUEST team. As well as supplementing staffing levels, though, it was also critical to keep existing team members together. For instance, my five-year contract as Science and Policy Officer, which included stakeholder liaison as one of its main functions, was extended by a year beyond the life of the programme.

This continuity of personnel was vital to maximising the impact and value of QUEST's research.

Unless we'd been able to maintain the experience and expertise we'd built up, plus of course the relationships we'd developed with researchers and research users alike, it would have been much harder for QUEST to achieve its KE goals. In particular, we're delighted that the book 'Understanding the Earth System' was published in August 2012. We believe it will be of huge help to policy-makers and students, as well as to scientists not directly involved in the field of climate change.

Gearing up KE activities towards the official end of QUEST and continuing them afterwards hasn't just proved useful – it's been crucial to securing the programme's legacy."

* NB: this NERC programme was not an LWEC initiative.

8. Evaluate

Monitor your KE activities and their impact, learn lessons from your experiences and use these lessons to refine future programmes/projects:

- **Opportunities for reflection**

  Facilitate regular reflection both by researchers and by users/stakeholders on what has (or perhaps what has not) proved effective in terms of KE and enable everyone to share their conclusions with each other.[17]

- **Impact evaluation methods**

  Use tried and tested impact evaluation methods to shed light on which KE processes have proved effective.[18]

- **Project-level evaluation**

  Make sure that projects funded by your programme are required to evaluate their KE activities' effectiveness and to report back the findings to you regularly, drawing on both qualitative and quantitative data. One potentially useful approach is to develop a suite of indicators specific to your programme that can be used to monitor the success of individual KE activities. Overall, project-level reporting data can help to identify (i) KE mechanisms that appear to be particularly successful and (ii) projects that are either doing well or falling short with respect to KE. Such findings can be used to target assistance where it is needed.

- **Stakeholder feedback**

  Conduct surveys or put other mechanisms in place to secure feedback from stakeholders which can inform your evaluation of your programme's KE activities.

- **Peer network**

  Develop a network of 'critical friends' and/or mentors who can provide objective insights and analysis into the effectiveness of KE activities and the way those activities have been implemented.[19]

- **Case studies**

  Produce case studies highlighting how and where outputs from your research programme have been used by policy-makers, businesses, the general public etc. Remember to inform the LWEC Directorate that these have been produced and indicate if any similar material has been produced by funders of your research. Case studies of successful KE processes can also be submitted to LWEC as potential hotlinks for inclusion in the online version of these KE Guidelines.[20]

Case Study – Reporting and Assessing KE

Evaluating KE at project level provides vital insights not just into the outcomes achieved but also into which processes worked well and which ones proved less productive. ***Jeremy Phillipson*** *of Newcastle University recounts how an innovative but simple tool dubbed the Stakeholder Impact Analysis Matrix (SIAM) has helped the Relu Programme to generate evaluation data of both short and long-term value.*

"The individual research projects within Relu have engaged with several thousand stakeholders in total. Because the whole KE philosophy goes to the heart of what the programme is all about, it was essential to develop a way of tracking stakeholders' involvement in the research and pinpointing what they brought to the work and what they took away from it. But we needed to come up with a method that wouldn't be too onerous for anyone involved and wouldn't produce complicated data that was too time-consuming to unravel. SIAM was the solution we arrived at.

To each project's annual reporting form, we simply added a table to capture data designed to reveal the KE effects produced by each stakeholder relationship.

For every stakeholder, the project's Principal Investigator was asked to provide information on: the exact nature of the stakeholder's interaction with and contribution to the project; the amount of time they put into it; how the stakeholder improved the project's relevance and scientific quality; and finally the impact of the research on the stakeholder's knowledge and understanding, and its ultimate effect on policy and practice.

In this way, SIAM has generated an extensive database of information that can be mined to provide project-specific and cross-programme insights.

For example, analysis has revealed how the role of public sector stakeholders tends to differ significantly from those in the private sector. Whereas the former tend to make a key contribution in helping to shape research objectives, it's generally the latter who are at the forefront of executing the research itself.

Of course, SIAM is also an excellent stakeholder mapping tool and could, in years ahead, allow accurate evaluation of the Relu Programme's long-term impact by providing an 'audit trail' of encounters and interactions between stakeholders and researchers.

We're still refining SIAM but we're convinced both of its value and of its potential to be adapted for use by other research programmes."

Notes

1. The LWEC partnership aims to develop a community of researchers and research users who value the interactions between each other and who seek to maximise the environmental, societal and economic value derived from LWEC research. To achieve this requires the development of a culture in which researchers regard user/stakeholder engagement as a central and integral element of the research process. Similarly, research users connected with LWEC need to be able to consider their relationships with LWEC researchers as a key mechanism for generating and accessing the information and understanding necessary for them to take an evidence-based approach to policy/decision-making.

   Research Council initiatives to develop the skills necessary for researchers to be effective in KE activities include:

   - NERC's KE funding schemes that support co-operative training, people and knowledge flow and networks.
   - ESRC's schemes for supporting and developing skills/capacity in KE.
   - In addition, Research Councils UK has a Knowledge Transfer Portal that lists schemes to support secondments and placements between the research base and other organisations (see www.rcuk.ac.uk/kei/ktportal/Pages/PeopleExchange.aspx).

2. NERC, for example, has issued specific guidance on objective setting by programmes, highlighting the need to:

   - Discuss the balance of basic, strategic and applied objectives, which will help determine the level and nature of user involvement.
   - Set SMART (specific, measurable, achievable, relevant and time-bound) targets and objectives, including user-focused objectives.
   - Ensure the programme's Executive Board regularly review the objectives, e.g. to ensure the user-focused objectives are not lost sight of.
   - Set targets for user-focused outputs of the programme (e.g. number of collaborations with the private/public/third sector) to help secure user 'buy-in'.

3. Detailed guidance on stakeholder mapping/analysis is available from a range of sources (e.g. NERC, the Relu Programme, Defra). Key points made by NERC, for example, include the need to:

   - Brainstorm all stakeholders with a potential interest/involvement in your programme.
   - Identify 'key' stakeholders to be considered for a higher level of consultation and involvement.
   - Identify relevant individuals or groups of individuals within each organisation and what types of output different stakeholders will need.
   - Survey all potential research users to find out how they would like programme outputs to be presented and disseminated.

   There are also a wide variety of techniques that can be employed, such as matrix mapping, log frames and logic models.

4. LWEC's principles of co-design/co-production/co-delivery and focus on research that addresses key decision-making issues around environmental change need to be reflected in the reviewing and selecting of project proposals, particularly when considering what constitutes 'excellence with impact'. For example, when 'radical interdisciplinarity' is needed and where there is a strong focus on developing solutions to messy, real-life problems, careful thought should be given to peer review and project selection processes, the peer community involved and the evaluation criteria.

5. In a number of programmes, a two-stage selection process has proved effective in enabling the refinement of research project proposals. For example:

   - In the UK Ocean Acidification Research Programme, outline bids were first sieved and final bids were then requested from a sub-set of first round applicants, who were required to attend a workshop prior to making full bids. The workshop provided an opportunity for the funding partners to say what they wanted out of the programme and so help ensure that proposals would deliver the requirements.
   - The Relu Programme has used a two-stage process in some funding calls. In the first stage, outline proposals (and more recently 'concept notes') were reviewed by an assessment panel, with feedback then given to those shortlisted to go forward to the second stage to enable them to improve their proposals.

6. There are many 'good practice' examples of such strategies and plans prepared for existing LWEC programmes. (NB: these vary in

emphasis depending on the precise purpose of each programme, e.g. the Arctic Research Programme places significant emphasis on public engagement.) For instance:

- Arctic Research Programme for the UK: Communication, Engagement & Knowledge Exchange – A Strategy 2010-2016: www.nerc.ac.uk/research/programmes/arctic/documents/arctic-strategy.pdf
- UK Ocean Acidification Research Programme Knowledge Exchange Plan: http://www.lwec.org.uk/sites/default/files/Ocean_Acidification.pdf
- Biodiversity and Ecosystem Service Sustainability (BESS) Communication, Engagement and Knowledge Exchange Strategy 2011-2016: www.nerc-bess.net/documents/BESS_comms_strategy.pdf

A KE strategy needs to address the following areas and to be periodically updated:

- Aims and expected outcomes.
- Stakeholder analysis.
- Implementation plan describing in detail how each objective and expected outcome will be achieved and how different research users and stakeholders will be engaged throughout the programme, considering the needs/preferences of different stakeholder groups.
- Establishment of responsibilities for KE (i.e. consider who will be tasked with achieving each outcome described in the implementation plan and when you expect each outcome to be achieved).
- Allocation of appropriate funding to KE at programme and project level.
- KE links that can be established with other LWEC activities.
- The desired KE culture and skills needed for the programme and how they will be achieved.
- Knowledge management arrangements to support effective access to, and sharing of, knowledge and expertise.
- Evaluation procedures to be used during and after completion of the programme or project as part of a learning cycle.
- Branding – some programmes have found it useful to think explicitly about this in order to help foster relationships and communicate research outcomes more effectively with stakeholders.

KE strategies for individual programmes should also describe the contribution the programme will make across LWEC's six strategic challenges (climate, ecosystem, health, infrastructure, resources and societal; see www.lwec.org.uk/challenges) both in general terms and specifically in terms of meeting user needs.

7. Since a key aim of LWEC activities is to ensure impact of the research in the user communities they serve, sufficient resources need to be allocated to KE that enable uptake of research through sustained engagement and interventions. NERC provides a guideline of 5% of programme budget to be reserved for KE, compared with DFID's guideline of 10%.

Activities to be covered by the KE funds may include:

- Staff time to manage KE activities, undertake the role of knowledge broker etc.
- Workshops and other networking events.
- Development and active maintenance of communication channels such as websites etc.
- Staff exchange schemes between research teams and research user organisations.
- Schemes where those who have previously managed KE projects mentor those with less experience.
- Integration/interpretation of research across projects/programmes to answer cross-cutting user needs.
- Preparation of reports, briefing notes etc. aimed at specific user groups.

Preparation of a KE strategy should include estimation of the associated costs and decisions on what funding should be reserved at programme and at project level. In order to ensure that projects allocate sufficient funds to KE, this may be emphasised in calls for proposals and may be a significant factor in proposals' evaluation.

8. To be able to identify and respond to new user needs, regular contact needs to be maintained between research initiatives and the relevant user communities, as well as between programme and project levels. Specific mechanisms to achieve this include:

- Building effective networks of connections across research and user communities. This is particularly important for emerging policy areas or business sectors in which innovation is fast moving, where connections between researchers and policy-makers, for example, may not exist. A particular challenge is the rapid turnover of staff, requiring a proactive approach to managing the relationship and renewing connections.
- Ensuring project funding models reward researchers for being responsive to user needs (e.g. in terms of advice and answers to questions). Potential models include the allocation of a percentage of the research budget to provide such support, or retaining funds centrally which can be bid for as needs arise.

9. The required knowledge brokering capacity may be established:

- Within the programme/activity management team.
- As a role undertaken by members of individual research teams.
- Within 'user' organisations (i.e. as key points of contact for engagement).
- By exchange of staff between research teams and 'user' organisations, e.g. the Relu Programme's work shadowing and visiting fellowships schemes – see www.relu.ac.uk/gettinginvolved/
- By making use of existing bodies and initiatives, e.g. the Technology Strategy Board's Knowledge Transfer Networks – see https://connect.innovateuk.org/

In practice, several or all of these approaches may be used within an individual programme.

Important skills/activities of knowledge brokers include:

- Clear communication.
- Understanding of the cultures of both the research and decision-making environments.
- Ability to generate trust and be credible.
- Facilitation, mediation and negotiation abilities.
- Ability to find and assess relevant research in a variety of formats.
- Entrepreneurial abilities (networking, problem solving, innovating).

The above guidance has been sourced from: Lomas, J., 2007. The In-between World of Knowledge Brokering. British Medical Journal, Vol. 334, pp.129-132.

10. Some channels of communication may be essentially passive (i.e. taking the form of a dissemination medium) rather than representing active KE. The following are just some examples of such media, which can nevertheless play an important role in communicating information:

- Short films, e.g. the UK Ocean Acidification Research Programme's 12-minute film 'Ocean Acidification: Connecting Science, Industry, Policy and Public' (see www.youtube.com/watch?v=_BPS8ctVW2s).
- Twitter, e.g. a guide to using Twitter produced by Relu's Sustainable Uplands Project is available at http://www.lwec.org.uk/news/2011/august/get-tweeting-lwec-researchers-publish-guide-twitter
- Slideshare, which can act as a useful means of posting PowerPoint presentations to the web and sharing them with stakeholders (e.g. see www.slideshare.net/lecmsr/sustainable-uplands-results-presentation-4496281).
- Scribd, which can be used to share project documents, publications and reports with stakeholders (e.g. see www.scribd.com/doc/59776981/Sustainable-Uplands-Newsletter-Summer-2011).
- YouTube and Vimeo, websites where project videos can be uploaded.
- Games, e.g. a Relu project produced RUFopoly, a board game illustrating issues relating to the rural-urban fringe.
- Publications, books and Policy Notes.

It is important to emphasise, however, that other more intrinsically interactive channels (e.g. workshops, breakfast clubs, Q&A sessions) can also play a key role in KE. Moreover, it is vital to recognise that, in themselves, activities do not constitute impact unless careful consideration is given to what difference they will make and what will change as a result of them.

11. NERC's Urban Regeneration and the Environment (URGENT) Programme, for example, produced a user friendly digest of research outcomes particularly targeted at local authority environmental health, planning and technical/engineering departments and including:

- Web-based environmental information systems for planners.
- Information on maintaining biodiversity in urban environments.
- A cost-effective method of scanning and mapping sites to assist the risk-based management of contaminated land.
- New guidelines to reduce damage to archaeologically sensitive areas during regeneration and redevelopment.
- Information on use of trees in urban areas to improve air quality.
- A new computer system to predict when and where a road will freeze, saving local authorities money on unnecessary salting.
- Information on river contamination and pollution removal.

Some of these have informed local authority policies and practice and/or led to spin-out companies or further research supported by local authorities themselves.

12. The Relu Programme, for instance, has a work shadowing scheme in place (see www.relu.ac.uk/funding/WorkShadowsVisitingFellows/workshadowing.htm). See also the third bullet point in Note 1 above.

13. It is important to consider the potential value of integrating findings generated across a number of projects. The implications of any one piece of new knowledge may well not be significant to a stakeholder: stakeholders generally respond best to bodies of evidence and lines of argument, with the strength of a knowledge community counting more than the voice of a single researcher. The following are examples of effective initiatives to achieve integration and interpretation of knowledge arising across projects and programmes:

    - ESRC's 'evidence briefings', integrating research findings across ESRC's research portfolio and interpreting it to address key policy issues (available at www.esrc.ac.uk/publications/evidence-briefings/index.aspx).
    - The Relu Programme's 'briefing papers', integrating findings from across the programme to address key policy issues (available at www.relu.ac.uk/news/briefings.htm). Relu has also organised workshops and events linking across projects and involving stakeholders to evaluate emerging findings from the programme's research.
    - The Changing Water Cycle programme has established cross-theme working groups comprising researchers and users to help integration across the programme as well as the delivery of high-level science goals. Funds have been set aside, which the working groups can bid into, for integration and synthesis of research results as they are generated over the life of the programme. A science management team appointed to run the programme (including the working groups) has a resource for facilitating KE.

14. LWEC is currently developing these report cards for climate change impacts along the lines of those developed by the Marine Climate Change Impacts Partnership (see www.mccip.org.uk/annual-report-card.aspx).

15. Policy-makers' (and, indeed, others') needs for advice/inputs on short to medium timescales may broadly be distinguished as follows:

    - Less than one week (e.g. a question arising from a Minister).
    - One week to six months, typically requiring a short study to generate new information or synthesise/interpret existing information. Lead-in time is generally a few weeks.

    Responses may be required orally (particularly in response to the more urgent questions), as a short report or briefing note, or in the form of a meeting or workshop where issues can be explored and an understanding of the policy implications can be established jointly between researchers and policy-makers. Researchers working on LWEC activities may be the preferred source of such advice because they are working at the cutting edge of policy-relevant topics.

    In addition to this responsive mode of interaction, it may also be useful for researchers working on LWEC activities to take a more proactive role in identifying new findings arising from their research which policy-makers should be aware of. To fulfil this role effectively will require researchers to have a good awareness of the policy context to which their research relates, and for there to be effective channels of communication to transmit their messages to the relevant policy people.

16. For example, Land and Water Australia's approach to extracting continuing value from knowledge assets is outlined in their 2005 publication 'Managing Information and Knowledge for Adoption Outcomes' available at lwa.gov.au/files/products/land-and-water-australia-corporate/pr050969/pr050969.pdf

17. Examples of LWEC activity reviews of KE experience include:
    - 'Common Knowledge? An Exploration of Knowledge Transfer' – a Relu Programme briefing paper reviewing the programme's KE experience and approaches in the broader context of KE in other programmes (available via www.relu.ac.uk/news/briefings.htm).
    - 'Telling Stories: Accounting for Knowledge Exchange' – a Relu Programme briefing paper on its KE experience and approaches, including its engagement with a wide range of stakeholders (available via www.relu.ac.uk/news/briefings.htm).
    - 'Adventures in Science' – a Relu Programme briefing paper on interdisciplinarity and KE in the programme (available via www.relu.ac.uk/news/briefings.htm).

18. The LWEC Directorate recommends resources developed by the Relu Programme. LWEC Land Use Fellow Jeremy Phillipson is happy to share these to help others develop a robust evaluation procedure. The Programme's briefing 'Telling Stories: Accounting for Knowledge Exchange' (available via www.relu.ac.uk/news/briefings) describes how the programme captures and evaluates the impacts of its research projects. The programme has also developed the SIAM (Stakeholder Impact Analysis Matrix) tool to track the involvement of stakeholders in Relu Programme research, to see what they bring to it and what they take away. (See p.17 for more about this tool.)

19. The development of the LWEC KE Guidelines brought together a network of researchers and people from LWEC partner organisations, all of whom had some responsibility for or involvement in KE. Many contributors of case studies and other materials to these Guidelines have also provided contact details and profiles in the 'People' section of the LWEC website and are willing to be contacted for further advice/guidance. The aims of the emerging LWEC KE Community are to provide opportunities for learning from each other and to continually improve KE practice for greater impact.

20. NERC's Science Impacts Database is a publicly accessible, searchable repository of case studies showing the policy, economic, social and practical impacts of NERC's science investments (see sid.nerc.ac.uk/).

    LWEC is always keen to capture stories for its website (see www.lwec.org.uk/stories); contact LWEC if you have one for inclusion.

* * * * *

General guidance available from the Research Councils and their funded programmes includes the following:

- Research Councils UK's Knowledge Transfer Portal provides a gateway to Research Councils' activities and schemes in knowledge transfer (see www.rcuk.ac.uk/kei/ktportal/Pages/PeopleExchange.aspx).
- ESRC's 'impact toolkit' provides information for research project managers on developing an impact strategy, promoting KE, public engagement and communicating effectively with stakeholders (see www.esrc.ac.uk/funding-and-guidance/tools-and-resources/impact-toolkit/index.aspx).
- NERC's 'Science into Policy' booklet describes good practice in informing policy-making (see www.nerc.ac.uk/publications/corporate/documents/science-into-policy.pdf).
- The Relu Programme's approach to KE and stakeholder engagement is presented in 'Common Knowledge? An Exploration of Knowledge Transfer' (see www.relu.ac.uk/news/briefings.htm).
- The Sustainable Urban Environment Programme's 'ISSUES Guide to KT' is designed to help researchers understand the methods behind creating impact beyond academia and the reasons why KE should be an important consideration at all stages of a research project (see www.urbansustainabilityexchange.org.uk/ISSUESGuidanceNotes.html).
- NERC guidance on preparing 'pathways to impact' is available at www.nerc.ac.uk/funding/application/pathwaystoimpact.asp

Abbreviations

DECC: The Department of Energy and Climate Change

Defra: The Department for Environment, Food and Rural Affairs

DFID: The Department for International Development

EPSRC: The Engineering and Physical Sciences Research Council

ESRC: The Economic and Social Research Council

LWEC: Living With Environmental Change

NERC: The Natural Environment Research Council

Relu: Rural Economy and Land Use

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