
Beyond tools: building learning organisations to adapt to a changing climate

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Executive summary

The focus of this VCCCAR Visiting Fellowship was participation in the project 'Implementing tools to increase adaptive capacity in the community and natural resources management sectors'. This project aimed to improve understanding of the adaptation capabilities and needs of three types of government service providers and funded agencies (catchment management authorities, community sector organisations and primary care partnerships). The intention was to draw on my experience of working at the UK Climate Impacts Program (UKCIP) and with projects in Europe to inform the development of this project and the way it might support adaptation efforts in Victoria.

UKCIP was a small organisation, varying in size over its life from 2 to a maximum of about 25 people. Given such limited capacity there was a tension between trying to address the need for tailored adaptation support and the capacity to deliver it. One response was to provide widespread support through downloadable tools and other web resources. However, it was quickly discovered that downloading a tool only gets you so far. Similarly, having access to accurate climate data and information about future climate projections was also seen as the obvious place to start in responding to a changing climate. However, it soon became clear that even with access to accurate, reliable, salient information there could still be no assumption that decision makers would take action to adapt and there was frequently a gap between the quite high general awareness of climate change within an organisation (and an understanding of how it could affect their core business) and the implementation of actions to respond to it. This raises key questions about availability of usable information and extent of agreement on potential responses to climate risks.

To be usable, information should relate to existing decision making processes and the key priorities of the organisation. It should also be locally relevant. In discussions with Victorian organisations, people wanted to know how to translate more general information about climate change into useful messages for everyday practice and service delivery. It is clearly important to start with current concerns and overlay on these the likely impacts of changing climate. Most future climate impacts are often not yet seen as urgent or important and there is a need for better coordination of users, demonstration projects, activities that bridge the gap between providers and users, and demonstration of how climate information can improve decision making.

Successful adaptation depends on being able to 'learn within the unknowable' (Flood, 1999) and this report was initially going to be based on the 'five braided strands' model for exploring systems of interest in terms of their ability to support social learning: reflection and reflexivity; systems orientation and thinking; integration and synthesis; negotiation and collaboration; and participation and engagement. It soon became obvious that this approach was too ambitious and the focus shifted to understanding aspects of the learning system, such as the creation of 'learning organisations' and networks to support learning. Other aspects that are critical in creating learning organisations for effective adaptation include building networks of people, setting up knowledge systems (that go beyond 'knowledge transfer') and creating opportunities for reflexive or 'double loop' learning practices and thinking about what makes up 'usable' information for a particular decision. Language about engaging stakeholders in adaptation processes has shifted over the last 20 years from 'knowledge transfer' (indicating a movement in a single direction) to 'knowledge exchange' implying a two-way flow between academic, policy and practitioner or public realms. The exchange concept can be expanded to 'knowledge discovery' and 'cogeneration' of new knowledge not previously known by any of the collaborators as a result of the interaction. In these situations, academic knowledge is not privileged over other types of knowing. This approach to knowledge discovery and cogeneration will require creative ways to maximise the use of available expertise, experience and knowledge.

In this model, more climate knowledge in itself is not enough to make climate change adaptation work. This knowledge needs to be accessible for those who need it most, through carefully designed yet flexible, iterative learning-reflection that is tailored to real day-to-day risks, that allows experimentation in practice, and that offers tangible and short-term results. Boundary organisations, like UKCIP, can provide the role of translating raw data and scientific knowledge, communicating it to

different groups and building arrangements for 'co-generation'. Such functions require people with good relational skills (facilitation, trust building, network creating) who understand how the different functions work together and can bring these necessary skills into play during multi-stakeholder discussions. This will require new organisational approaches that involve holistic (rather than partial or linear) thinking, the ability to work across agency boundaries, effectively engage stakeholders and citizens in understanding the problem and in identifying possible solutions, taking multiple perspectives and recognising that such boundaries are often fuzzy. Policy development and practice will need to keep thinking and action in dynamic tension and accept (and embrace) the absence of certainty. In addressing these complex system interactions, the manager shifts from trying to tightly manage unmanageable situations to being aware of 'attractors' and 'barriers' to encourage desired, and discourage undesired, behaviour.

Creating an effective learning culture for adaptation involves actively seeking new ideas and other ways of working, welcoming dissonant information that does not fit with current practice and thinking, retaining institutional learning and knowledge, and the creation of, and support for, 'informal spaces' to experiment and innovate through processes of dialogue that enhance collaboration rather than debate and argument. Learning organisations work to engage the hearts and minds of employees in the process of productive change that is designed to achieve results they and their stakeholders genuinely care about.

1. Introduction

The main focus of my VCCCAR Visiting Fellowship was participation in the initial stage of the project 'Implementing tools to increase adaptive capacity in the community and natural resources management sectors' (referred to here as the Implementing Adaptation project). The main aim of this project is to gain a better understanding of the adaptation capabilities and needs of three types of government service providers and funded agencies (catchment management authorities, community sector organisations and primary care partnerships). The second stage of this project, now underway, is to facilitate the implementation and testing of tools and methodologies for climate change adaptation planning. Building on existing literature and my involvement in the early stages of this project, particularly interviews with community sector organisations and primary care partnerships and my experience of working at UK Climate Impacts Programme in this report I offer some reflections on what is needed to support organisations to be adapting well.

The original aim of my fellowship report, devised as I arrived at VCCCAR, was to assess the potential impact of climate change on government service delivery, to assess adaptation information needs of service providers and provide recommendations for building resilience and self-reliance and capacity to adapt to climate change in Victorian agencies.

Given the framing of adaptation as a 'wicked' (Rittel and Weber, 1973) or 'diabolical' (Garnaut, 2008) policy problem in that there is not only little agreement about what the problem actually is, and still less about how to effectively respond and where important decisions need to be made with imperfect knowledge. Adaptation is often presented as a process of 'learning into the unknown' (Flood, 1999) passing through stages of experience, reflection, conceptualisation, and planning in an iterative cycle. While there are many overlaps with other areas of knowledge, such as planning, risk management, business continuity, and disaster reduction, for many organisations adaptation is a new challenge and it has some characteristics that make it hard to tackle; uncertainty, complexity, potential for very significant consequences and urgency. This paper presents learning from experience and theory about what makes organisations better able to steer their way through the adaptation process, identify opportunities, access resources and expertise and create effective partnerships.

My original intention was to build on existing work on social learning for climate adaptation in the Victorian context (Martin et al, 2009) as given the level of uncertainty in the scientific information and the requirement for cooperation between many different groups in order to define effective responses any adaptation response is necessarily context specific and there can be no 'one size fits all' solution or, yet, best practice to follow. Building up the capacity to learn effectively across the system of interest into a changing future is thus proposed as a critical capacity to develop. The approach used by Martin et al, (2009) is based on the 'five braided strands' framework developed by Keen, et al (2005) for exploring different aspects of the system of interest in terms of its ability to support social learning. The strands were distilled at a workshop of environmental managers (including policy makers) as being the aspects that lead to successful social learning in practice. The five strands are:

1. *Reflection and reflexivity*: Openness to learning on many levels (e.g. improving knowledge or skills, developing capacity for learning); willingness to challenge assumptions; making opportunities for giving and receiving feedback; attention to safety and good facilitation of spaces for learning; commitment to honesty; trust-building.
2. *Systems orientation and systems thinking*: Understanding the whole system, its history and how it changes with time; noticing points of intervention to improve the situation; noticing who communicates with who; identifying gaps and areas where you 'don't know' or are unclear of what is happening; considering the perspective of others in the system; creating visual maps to share understanding with others and to formulate new questions; let go of the illusion of control and certainty.
3. *Integration and synthesis*: Seeing ways to bring the disparate aspects together into a single entity both horizontally across different roles and disciplines and vertically across different

scales from local to state; supporting 'glue' tasks and people that play a bridging role; developing responses that address the richness and complexity of the whole; reconciling different interpretations.

4. *Negotiation and collaboration*: Consideration of how different drivers, motivations and concerns of those involved are identified and explored; consideration of how the process is facilitated, how conflict is addressed and how issues of power and control are made visible and challenged; encouraging dialogue over debate; making sense of and valuing different inputs (academic, scientific, legal, experiential, local, opinion, values); nurturing good communication skills and values such as respect, trust and goodwill.
5. *Participation and engagement*: questioning what types of participation are promoted (e.g. coercion, consultation or co-learning?) and who designs and controls this; considering what formal and informal opportunities there are for participation and who is invited in who is missing.

Having participated in stage one of the Implementing Adaptation project, and having undertaken a number of interviews with primary care partnerships and community service organisations about their experience of managing existing weather variability and how this might change given the likely trends projected due to climate change I decided to abandon the '5 Braided Strands' framing as being too detailed for the purposes of this report and opted for a similar but 'looser' framing. Thus, in answer to the question 'what is needed to support organisations, such as community sector organisations and primary care partnerships to be adapting well to a changing climate?' I will divide my responses into two sections relating to:

- Data, information and knowledge management
- Skills for making sense and decision making

A third section on the influence of structures in the wider environment (covering aspects of the whole systems, the history of existing structures and how the adaptation is framed and funded that provide the environment in which adaptation processes are implemented) is also very relevant to the success of adaptation but due to shortage of space and time will not be explored further in this paper.

2. Data, information and knowledge management

Having access to accurate climate data and information about future climate projections is often seen as the obvious place to start when considering how to respond to a changing climate. It seems logical that being aware of the known risks and having an ability to anticipate unknown risks that might arise in the future is necessary for formulating an effective response. However, doing this well assumes a number of abilities and access to resources that may be hard to come by in practice. For example, for people and organisations to be able to accurately identify threats (current and future), assign appropriate levels of risk to them, create realistic plans that cope with uncertainties in the data and ambiguity in how changes impact decisions of concern requires access to usable information that is suitable for the types of decision-making processes they are undertaking. In order to respond effectively they may also need to be flexible in the way they respond and diversify their skills, knowledge, resources and assets in order to maintain existing functions as well as capitalizing on any emerging opportunities in ways that build resilience.

This throws up a number of questions, for example:

- How do people define 'usable' information?
- Is usable information readily available?
- Are monitoring systems in place, if not, is a monitoring system feasible?
- Is there agreement among the relevant people of what an acceptable response might be?
- How are 'unknown' risks identified?
- How are risks arising from combinations of stressors identified e.g. power failure and major flooding?

In relation to information needs, a number of things emerged from the interviews I was involved in:

- People did not want an 'info dump' of generic information but a more tailored resource
- To be 'usable' information should be:
 - related to existing decision making processes
 - be locally relevant
 - link directly to key priorities of the organisation e.g. chronic health issues, increasing elderly population, isolation, homelessness
- People wanted to know how to translate more general messages about how the climate is changing into messages for service delivery to answer 'so what?' questions about what climate change means in practice
- People questioned what information and expertise it was necessary to have in-house capacity for and what could be sourced elsewhere as required
- People were interested to know what sources of information could be trusted
- Although there was a general sense of willingness to bring in adaptation into the work but many felt that they currently did not have the resources to do this well
- Beyond the provision of information there was the desire to translate information into activity that made sense and felt worthwhile
- There was also a desire to link to others doing the same thing and have opportunities for learning, joint advocacy, joint working given this is not something you can solve as an isolated organisation
- Also to identify if there were opportunities to influence the wider picture through addressing funding, policy or other structures.

2.1 Usable information

The following factors have been identified by users of climate information to explain what is meant by 'usability' of information (UKCIP 2011):

- Easily downloadable (otherwise described as 'accessible')
- Appropriate to the problem in hand e.g. does it contain the information people want – the distribution of wet and dry days rather than a monthly average. (including information about the limitations of the data)
- Useful - it solves or illuminates the problem in some way.

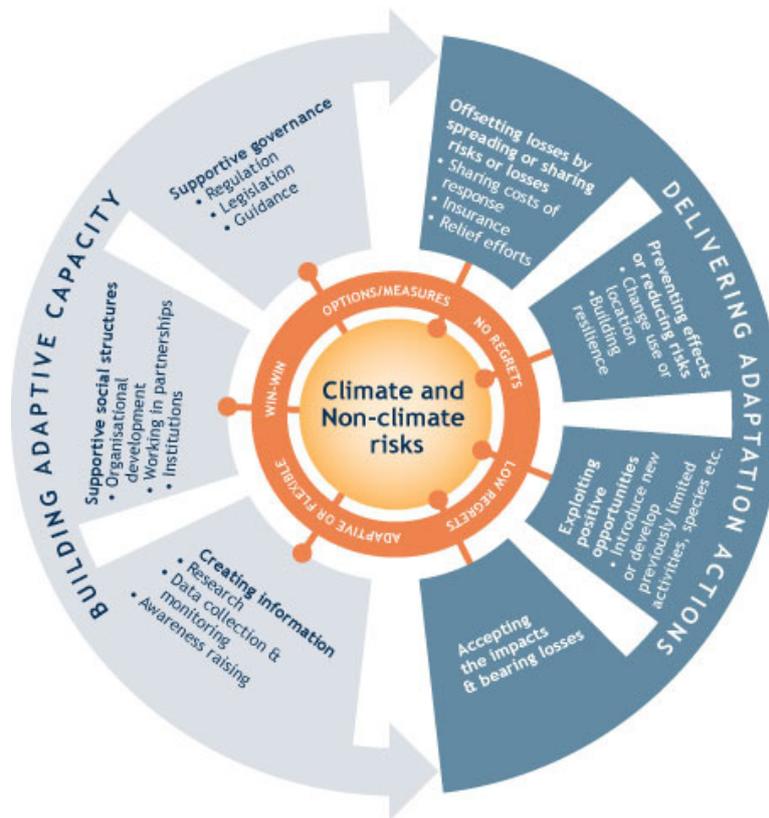
In addition, Cash et al, (2003) identified three characteristics of usable information:

- Salience – can it be used to help people make decisions?
- Credibility – do you trust the evidence upon which it is based?
- Legitimacy - has it taken different views and perspectives into account in an unbiased way?

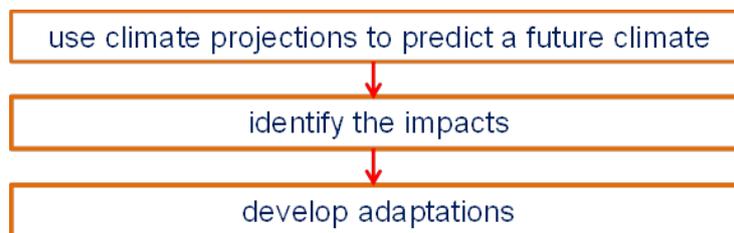
It is clearly important to start with what concerns people now, to understand their current drivers, targets, priorities and constraints as they see it and how the likely impacts of changing climate overlays onto this picture. Guidance that tells people what they 'should' be doing will not be helpful if no clear link can be made to how things exist now and how to make a bridge between 'how things should be' with 'how things are now'. Opportunities for spending time with users help to get a better appreciation of the kind of decisions that are being made and the constraints of time, resources etc. being experienced e.g. through an information provider shadowing an 'end user' for a day.

UKCIP was set up to help organisations to identify and manage the possible risks and opportunities presented by a changing climate and through such forward thinking to plan for changes rather than simply react to them. Through this work with organisations it became obvious that there you could divide adaptation responses into two main types:

- **Building adaptive capacity** – creating the information (research, data collecting and monitoring, awareness raising), supportive social structures (organisational development, working in partnership, institutions), and supportive governance (regulations, legislations, and guidance) that are needed as a foundation for delivering adaptation actions; or
- **Delivering adaptation actions** – actions that help to reduce vulnerability to climate risks, or to exploit opportunities.



At the early days of UKCIP there was an assumption that decision-makers would take action to adapt if they had access to accurate, reliable, salient information however a gap was frequently found to exist between an often quite high general awareness in an organisation that the climate is changing and that such change would affect the core business of the organisation and the lack of any actual action taken to respond. This phenomenon has been referred to by others as the ‘adaptation bottleneck’ (Burton, 2002; Vogel et al. 2007; Preston and Stafford-Smith, 2009). The original approach to thinking about adaptation was to use a linear ‘predict, optimise and relax’ (to quote Lenny Smith) approach i.e.



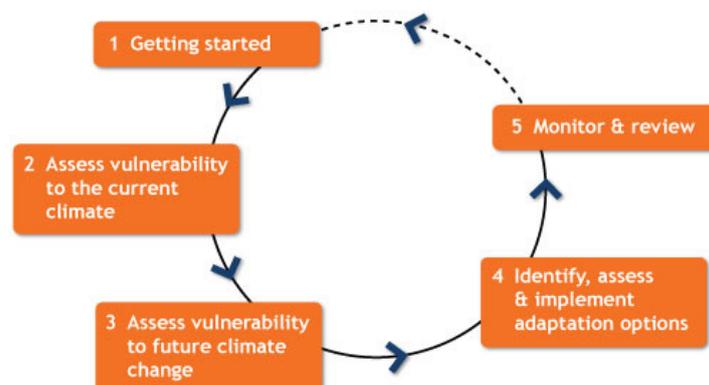
Here the approach is led by physical science model developers and the focus is on getting the climate science and projections ‘right’, making the assumption that we are well adapted to climate variability encountered at the present time. In this framing uncertainty in the data is a big barrier and there may be a tendency for decision and policy makers to hold off taking action until ‘better’ climate information is available.

As this approach was clearly unsatisfactory there was a shift to seeing adaptation as a process of ‘assess, adjust and review’ (to quote Lenny Smith again) in which there were a number of stages:

- Scoping: where are you now? Where do you want to be?
- Setting specific objectives: If this was really successful what would change?
- Motivations and drivers: Why are you doing this?
- Blockers and constraints: What is getting in the way?
- Sustaining: What do you need to make progress?

- Evaluation: What does it mean to be ‘adapting well’? What does successful adaptation look like? How can you assess or measure it? How will you learn from progress?

This new approach, although still not without its problems (do people really make decisions like this in practice?) was taken on as central to UKCIP’s approach through its risk and uncertainty decision making framework and the Adaptation Wizard. It had the advantages that it is led by decision makers, you start by assessing and managing current risks before looking at future changes, uncertainty can be made explicit and thus addressed more easily, the effects of different futures can be explored and it had immediate benefits for decisions being made now.



2.2 Climate services

In November 2011 UKCIP held a two day workshop to bring together users and researchers interested in developing a common understanding of the value and scope of ‘climate services’ – defined as ‘the information and expertise/knowledge to support /inform decision and policy making processes’ (UKCIP 2011). Climate services go beyond descriptions of future climates to explore what is required to support good (sometimes called ‘climate smart’) decision making for adaptation. It involves questioning how information is developed, what services are needed, how information should be presented, how to improve the relevance of climate services to decisions, how best to support co-creation, and understand user perspectives, supporting user needs through provision of info at different spatial and temporal scales. One participant used a technical metaphor to describe the different aspects of climate services needed to support organisations to adapt well:

- *Hardware*: the technical climate data
- *Software*: knowledge about how to use the climate data and integrate it with other types of data to make decisions (e.g. the relational skills to do this well, understanding of what types of engagement are needed, what needs to change in order to make use of it)
- *Orgware*: the systems in place for supporting, sharing and changing the technical input over time, e.g. how do people access further support? What networks exist?

This highlights the need to invest in creating the kind of information that users need in a way that they can access it e.g. if users want information about the likely number of frost free days and all that is available is monthly averages the information, however accurate, will not be usable. For an organisation to ask questions about what the most reliable approach to creating service delivery that is ‘climate proof’ over a range of years requires co-creation with other types of knowledge and opening up the channels of communication between users and producers. To ensure this is genuinely two-way requires the breaking down of existing administrative (and other) boundaries and opportunity to give serious feedback. This could be partly a role for the ‘purveyors’ of climate information but it must be broader than this.

Users at the workshop felt that there was a big gap between the kind of climate information currently being provided and the needs of users and a sense that there is often no real effective communication between users and providers nor is even much understanding about what types of climate information would be useful, usable and valuable for decision makers given the spectrum of

services that could be provided from generic (observations, forecasts and future scenarios) to bespoke services tailored to specific needs. Users also felt that they would like a better sense of what was available and where to go for credible and reliable climate information. Some suggested that there should be some form of regulation or quality assurance process for climate data and ideally approved sources easy to access in one place. To bring users more closely into the process requires addressing language barriers that exist between providers and users, making fund available to support capacity building and stakeholder engagement and shifting the focus of attention from communications and dissemination to co-production of knowledge. Given the relatively low priority of climate considerations in many decision making processes and the lack of policy or regulatory drivers for users to consider climate change in decisions at the moment there is limited pull from users. Climate impacts are often not yet seen as urgent or important. There is thus a need for better coordination of users, demonstration projects, activities that bridge the gap between providers and users and demonstrate how existing and new climate info can improve decision making.

2.3 Knowledge management – moving from knowledge transfer to knowledge discovery

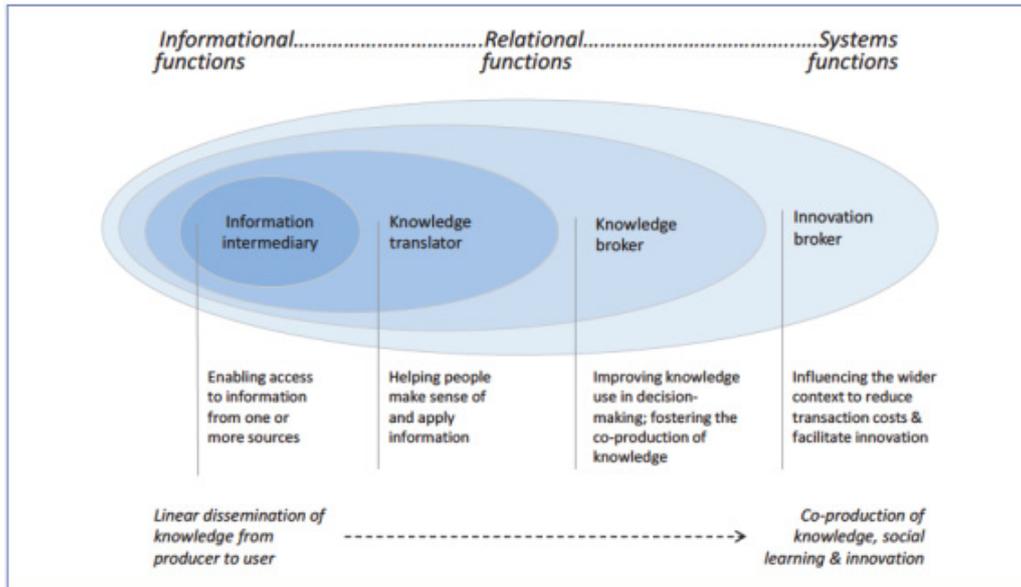
Snowden (2002) describes three ages of knowledge management. During the first age, before 1995, knowledge was perceived as coming in discrete packages that needed only to be channelled to project managers or training programs. The second age acknowledged that a significant amount of knowledge exists in tacit form (Polanyi, 1983) and that this knowledge is highly personal and thus difficult to formalise or share with others. Knowledge was still regarded as a thing to be transmitted but the job of the knowledge manager was now to help draw out tacit knowledge (Nonaka and Takeuchi, 1995). The third age is knowledge management which embraces the idea of learning as being more than the acquisition of information and knowledge but implying the creation of new understanding and insight through more holistic reflection, dialogue and analysis (see Pasteur & Scott-Villiers (2004) for review of literature in this area). It is thus more about moving beyond the acquisition of knowledge to include the relationships in which knowledge is generated. This suggests an expanded view of knowledge management – not as merely a means of getting discrete packages of knowledge to flow efficiently around an organisation, but as a means of continuously questioning:

- *Content*: what do staff members need and want to learn about? What sorts of things do they take into account when learning?
- *Narrative*: how is it being learned, applied and shared and who with?
- *Context*: what is the environment for learning and how is it affecting what is being learned? (Snowden, 2002)

In this interpretation, knowledge seen as both a thing and a flow, a constantly emerging phenomenon (Stacey, 2001), requiring the manager to concentrate not only on knowledge content, but also on the part played by relationships.

Over recent years, language about engaging stakeholders in adaptation processes has shifted from 'knowledge transfer' (indicating a movement in a single direction) to 'knowledge exchange' implying a two-way flow; and further, to recognise broader aspects of the generation and sharing of knowledge between academic, policy and practitioner or public realms to even 'knowledge discovery' and 'cogeneration of knowledge which suggests the creation of new knowledge not previously known by any of the collaborators as a result of the interaction.' Other widely used terms to capture a range of activities include 'knowledge mobilisation', 'knowledge translation' and 'knowledge brokerage.' Recent work has brought these together under the provisional label K*, to express the fluid nature of the terms. The conceptual framework of K* shows a nested set of activities (see figure below), moving outwards from those of 'information intermediaries' and 'knowledge translators' to those of 'knowledge brokers' and 'innovation brokers'.

Expanding our understanding of K* (UNU Concept paper, 2012)



The K spectrum. Adapted from Fisher (2012) and reproduced in Harvey et al. (2012). This K* concept paper and the Harvey et al. (2012) paper were written simultaneously.*

Source: Shaxson L et al (2012) Expanding our understanding of K*: concept paper and case studies: ODI, London <http://www.odi.org.uk/>

How are such a shifts achieved? It seems that where ‘knowledge discovery’ has become possible, the distinctions between ‘researcher’, ‘stakeholder’, ‘expert’ and ‘practitioner’ and ‘theoretical knowledge’ or ‘applied knowledge’ becomes less distinct and less important. Instead, creative ways to maximise the available expertise, experience and knowledge are utilised and everyone involved is seen as having valuable knowledge to contribute and all are open to learning from others. Academic knowledge is not privileged over other types of knowing, especially if that discourages contributions from people with a more hands-on understanding of the working of the system of concern but who are not familiar with the academic jargon being used. Donald Schön, in his book *The Reflective Practitioner* (1983), compares the differences between the role of ‘expert’ and ‘reflective practitioner’. It seems that for adaptation researchers (and others in the system) need to take on a reflective practitioner stance, as is summarised in the table below.

Expert	Reflective practitioner
I am presumed to know, and must claim to do so, regardless of my own uncertainty	I am presumed to know, but I am not the only one in the situation to have relevant and important knowledge. My uncertainties may be a source of learning for me and for them.
Keep my distance from the client, and hold onto the expert’s role. Give the client a sense of my expertise, but convey a feeling of warmth and sympathy as a “sweetener”.	Seek out connections to the client’s thoughts and feelings. Allow his respect for my knowledge to emerge from his discovery of it in the situation.
Look for deference and status in the client’s response to my professional persona.	Look for the sense of freedom and of real connection to the client, as a consequence of no longer needing to maintain a professional façade.

2.4 Boundary work and boundary organisations

Linking different networks and creating opportunities for new interactions are important when dealing with uncertainty and change (Olsson et al, 2006). They are also critical factors for learning and nurturing integrated adaptive responses to change (Stubbs and Lemon 2001) and facilitate flexible learning-based management (Tompkins and Adger, 2004). This could be through boundary organisations or ‘infomediaries’ who can translate the raw data, communicate it to different groups and mediate the flow of information (Cash et al, 2003).

Boundary organisations, such as UKCIP, were set up to play just such roles.

Many people in Europe see UKCIP as a role model of a boundary organisation that promotes bottom-up approaches, stimulates local initiatives and searches for pragmatic solutions. A recent trend, particularly noticeable in the UK, is that successful programmes such as UKCIP have been redefining themselves continually by adapting to their surroundings and by seeking to function as an intermediary between science, policy and society. They are no longer the same organisations that were set up originally to create awareness of potential climate change impacts.

Swart et al (2009)

Boundary organisations are continually changing as external priorities and drivers shift, new work areas or stakeholders are identified and existing ones change priority. The boundary organisation also exerts a counter pressure on the external system, shaping it to a greater or lesser extent. Having the ability to pick up changes from the external environment, the capacity to determine the implications of such changes and make connections across our work and embed internal changes made in response, is clearly a useful role for supporting knowledge flows for adaptation.

3. Skills for making sense of adaptation and decision making

More climate knowledge in itself is not enough to make climate change adaptation work. This knowledge needs to be accessible for those who need it most, through carefully designed yet flexible, iterative learning-reflection that is tailored to real day-to-day risks, that allows experimentation in practice, and that offers tangible and short-term results. Learning by shock is neither an empowering nor an ethically defensible pathway.

Tschakert and Dietrich (2010)

[K]nowledge is the act of conversing, and learning occurs when ways of talking and therefore patterns of relationship, change...The knowledge assets of an organisation, then, lie in the pattern of relationships between its members and are destroyed when those relational patterns are destroyed.

Stacey (2001)

3.1 K* implies investment in relational functions

One of the main implications of the shift in thinking about knowledge management for adaptation from knowledge transfer to co-production with users is that this brings with it a new set of functions i.e.

- **Informational functions:** creating, collecting, codifying, storing, communicating ideas and info over time and between different groups to make it accessible and useful
- **Relational functions:** Improving relationships between various actors and around an issue to enable co-production of knowledge and genuine dialogue and taking into account power dynamics between those involved
- **Systems functions:** working around those systems to create change (possibly on multiple functions simultaneously) to ensure that there is a good institutional environment for sustainable innovation
(Shaxon, 2012)

To do well such functions require people with good relational skills (facilitation, trust building, network creating) who understand the how the different functions work together and can bring the necessary skills into play during multi-stakeholder discussions. If this is managed poorly people may lose confidence and trust in the process and withdraw.

3.2 The implications of wickedness

A paper prepared for the Australian Government Public Service Commission (APSC, 2007) describes the key characteristics of wicked problems such as adaptation to climate change from a policy perspective very well:

- *Wicked problems are difficult to clearly define:* The nature and extent of the problem depends on who has been asked as different stakeholders have different versions of what the problem is. Each version has an element of truth—no one version is complete or verifiably right or wrong.
- *Wicked problems have many interdependencies and are often multi-causal:* There are often internally conflicting goals or objectives within the broader wicked problem. It is the interdependencies, multiple causes and internally conflicting goals of wicked problems that make them hard to clearly define. The disagreement among stakeholders often reflects the different emphasis they place on the various causal factors. Successfully addressing wicked policy problems usually involves a range of coordinated and interrelated responses, given their multi-causal nature; it also often involves trade-offs between conflicting goals.
- *Attempts to address wicked problems often lead to unforeseen consequences:* Due to the complexity of the system, measures introduced to address the problem lead to unforeseen consequences elsewhere. Some of these consequences may well be deleterious.

- *Wicked problems usually have no clear solution:* Since there is no definitive, stable problem there is often no definitive solution to wicked problems. Problem-solving often ends when deadlines are met, or as dictated by other resource constraints rather than when the 'correct' solution is identified. Solutions to wicked problems are not verifiably right or wrong but rather better or worse or good enough.
- *Wicked problems are socially complex:* A conclusion of the literature concerning wicked problems is that it is the social complexity of wicked problems, rather than their technical complexity, that overwhelms most current problem-solving and project management approaches. Solutions to wicked problems usually involve coordinated action by a range of stakeholders, including organisations (government agencies at the federal, state and local levels), non profit organisations, private businesses and individuals.

The implication of a 'wicked problem' framing of adaptation is that it requires:

- holistic, not partial or linear thinking
- innovative and flexible approaches with a focus on creating a 'learning organisation'
- the ability to work across agency boundaries
- effectively engaging stakeholders and citizens in understanding the problem and in identifying possible solutions
- additional core skills e.g. communication, big picture thinking and influencing skills and the ability to work cooperatively
- tolerating uncertainty and accepting the need for a long-term focus, no quick fixes, solutions may need further policy change or adjustment.

Thus both the shift in approaches to knowledge management and the framing of adaptation as a wicked problem emphasise the need for processes of adaptation to be learning processes for those involved and relational skills such as facilitation and trust building as well as the development of networks and communities of practice to share experience and support innovation. Darwin *et al*, (2002) describe a number of principles for looking at complexity and wicked problems and its implications for organisations:

1. Encourage democracy
2. Facilitate multiple perspectives
3. Recognise fuzzy boundaries
4. Keep thinking and action in dynamic tension
5. Value process and put trust in process
6. Allow for and encourage proactive emergence
7. Facilitate learning
8. Accept (embrace) the absence of certainty and foundations.

These principles require a shift in power structures. Snowden (2005), notes that in complex systems the manager shifts from trying to tightly manage (unmanageable) situations to being aware of 'attractors' and 'barriers' to encourage desired, and discourage undesired, behaviour. The manager thus learns to empower others, to encourage them to contribute, to suspend judgement and create opportunities for dialogue (Isaacs, 1999). Fowler, (1997) describes shifts in power structures that are necessary to achieve this and the challenge this provokes to our organisations and to us as individuals: 'it is not just a question of applying new techniques and procedures, but of reversing many aspects of organisational culture which lie at the heart of assumptions and behaviour'.

3.3 Learning into the unknown

[L]earning our way into a mysterious future calls for continuous revisioning of what might be going on, what we are doing and achieving and the way we are doing it.

Flood (1999)

In the adaptation literature there is little disagreement that learning is a good and necessary aspect of adapting to a changing climate yet relatively little effort is put into understanding what should be being learnt, by whom and how this should happen. Concepts, assumptions and approaches to learning have been applied in 'vague and uncritical ways' (Armitage *et al*, 2008) and there is a need for greater specificity of learning goals, clarity about ethical issues relating to participation and what it means to be open to learning. All organisations learn and some do it well and consciously and others are not really aware of how they are approaching learning and could probably improve.

The kind of aspects of adaptation processes that might be useful to learn about include:

- Current climate variability and climate trends - including how they influence existing priorities and other stressors
- Roles and responsibilities for taking action
- The existence of collaborations and networks in the current system
- How to intervene in a system
- How to measure the success of any interventions
- How the wider system acts to support or constrain action
- How effective your learning processes are

[T]he mind is not a vessel to be filled but a fire to be kindled
Plutarch

All knowledge is constructed and the knower is an intimate part of the known.
Belenky et al., 1986

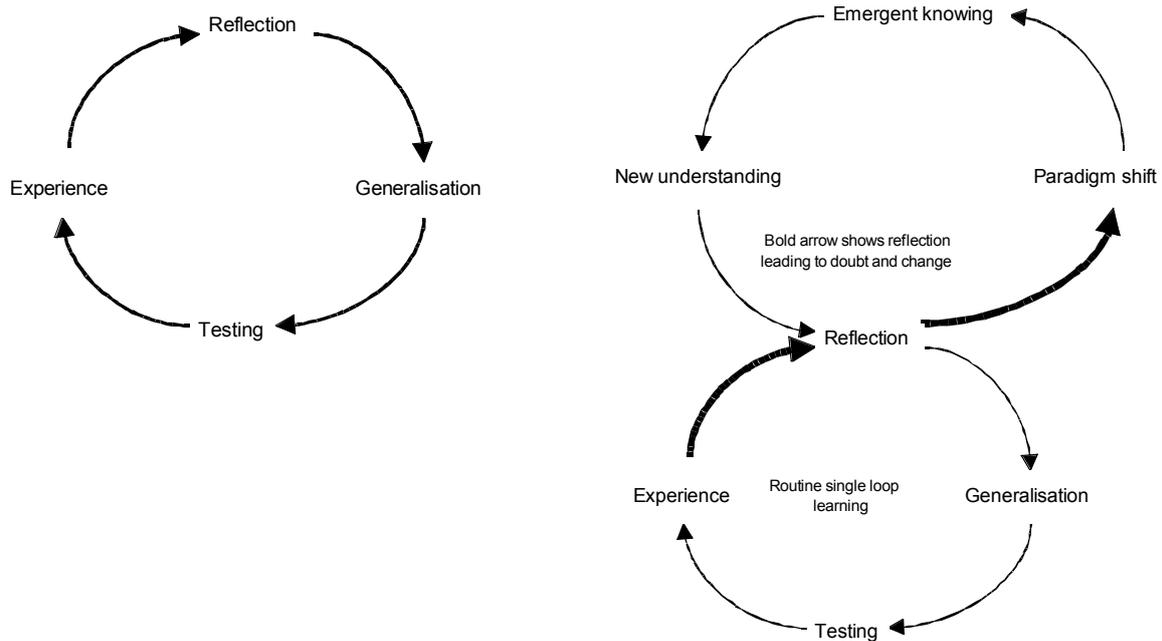


Image source:<http://ch301.cm.utexas.edu/learn/>Credit: John Rowley

Paolo Freire referred to the 'banking model' of education in which the teacher deposits knowledge in the empty brain-vaults of the student (picture 1). In the second picture the group of people are apparently looking at the same image but are interpreting what they are seeing differently. This illustrates how it is often not possible to separate the 'knower' from the 'knowing' and the implications of this are that by knowing yourself better you see how you influence you own knowing and sense making. It also emphasises the importance of sharing perspectives on an issue to understand how others are seeing it and come to a common understanding of how to move forward.

3.4 Single and double learning loops

Learning in adults was described by Kolb as cycles of concrete experience, observation and reflection, abstract conceptualisation or generalisation and active testing which leads back in to a new cycle of learning (Kolb & Fry, 1975). In 'single loop' learning an individual (or organisation) becomes increasingly skilled in an activity through the transfer of knowledge and skills and immediate problem solving that can generate improvements to existing practice and procedures. In 'double loop' learning a paradigm shift in understanding due to some new experience or new and dissonant information occurs that leads to a questioning of the current mental models and assumptions of how the system is operating allowing you to challenge the underlying assumptions and principles upon which practice and procedures are based potentially opening up new and fruitful areas for exploration.



Single loop learning

Double loop learning

Source: Brockbank and McGill (2007)

Carpenter et al. (2001), building on the 'adaptive cycle' work of Gunderson and Holling (2002), interpret social-ecological resilience as:

1. the amount of change the system can undergo and still retain the same structure and functions
2. the degree to which it can reorganise
3. the degree to which the system can build capacity for learning and adaptation.

Although single loop learning is necessary for many situations where skills are to be learnt it is clear that the capacity for double loop learning is required to support systems to go beyond 'business as usual' and create systems capable of transformation that are resilient to as yet unknown future.

3.5 Organisational learning culture for adaptation

As adaptation is considered an iterative learning process, it can be argued that adaptation can best be approached by an organisation that can respond intelligently, flexibly and in a manner that is open to change and that includes testing ideas and methods. Indicative attributes of an organisation with an effective learning culture for adaptation include (Lonsdale, 2010):

- Actively seeking new ideas and other ways of working, including examples from outside the organisation

- Dissonant information that does not fit with current practice and thinking and experience is not seen as taboo but welcomed and actively explored
- The creation of and support for 'informal space' to experiment and innovate and that processes of dialogue are supported that enhance collaboration rather than debate and argument that may exacerbate conflict
- Support is provided for processes of learning and enquiry e.g. action learning sets, learning histories, appreciative enquiry at all levels of the organisation
- 'Mistakes' are seen as an opportunity to learn
- Ethos of professional development and providing support for individuals that act as champions or agents of change
- Practice of actively examining accepted ways of doing things and creating novel management systems to facilitate adaptation
- Willingness to explore new and innovative adaptation options
- Ability to retain institutional learning and knowledge.

Moving from a 'predict and provide' approach to enquiry-based, learning enables you to question your mental maps and challenge your underlying assumptions of what is happening and what needs to change (Senge, 1990). A key change that occurs in making this shift in approach is the need to invest in building relationships and creating opportunities for dialogue between the relevant groups. Processes of learning, running effective spaces for sharing multiple perspectives, trusting the process etc. all depend on the quality of the relationships between the individuals in the system. Effective dialogue requires learning through sharing information, knowledge and experience that is not always easy to achieve in practice. Cuppen et al (2006) identified a range of 'blockers' to the process including:

- Blockers caused by power or perceived power relationships – ranging from pecking order to real or perceived disenfranchisement
- Blockers caused by language or lack of understanding – ranging from use of disciplinary jargon to access to 'black boxed' technologies
- Blockers caused by attitude – we are predisposed to agree with certain individuals or even types of individuals regardless of what they say.

The role of the facilitator becomes important here as someone who can, from a neutral position encourage and support processes of engagement and dialogue (Blackmore, 2010).

3.6 Reflective practice

Reflective practice is 'the capacity to reflect on action so as to engage in a process of continuous learning', which, according to the originator of the term, is 'one of the defining characteristics of professional practice'. We need the help and support of others to be able to see our blind spots and dismantle our defences sufficiently to be able to assimilate what we need from the feedback we get from the group. The feedback of new and supportive information and the subsequent 'holding' while it can be clarified and tested is perhaps the greatest function of an effective group. Support in a group comes through owning your response to another's issue and by providing authentic and accurate feedback (Houston, 2004). To really learn you need to be able to question more deeply your assumptions. Giving advice can discourage rapport and even build dependence and discourages going deeper and should be challenged. The group can support an individual by inquiring (questioning, giving encouragement to go deeper) and challenging the individual when they think they are not being authentic.

Learning for adaptation requires suspension of the need to be an expert to seeing academic knowledge as partial and just one piece of the jigsaw along with other types of knowing. To get to deeper levels may need dissonance and unlearning existing understanding. Genuine enquiry can be

difficult for academics who are often trained to look for the flaws in others arguments rather than 'listen clearly, without judgement'.

The most difficult subjects can be explained to the most slow-witted man if he has not formed any idea of them already; but the simplest thing cannot be made clear to the most intelligent man if he is firmly persuaded that he knows already, without a shadow of doubt, what is laid before him.

Tolstoy

It becomes necessary to learn to suspend certainty (or cultivate uncertainty, Staemmler), to ask genuine questions about why things are the way they are and the good reasons for that and genuinely listen to the responses. There may be many barriers to this in organisations. I once kept a record of observations of my colleagues (and myself) over a month to look at ways in which useful enquiry are routinely quashed. Here are some of my observations:

- People not really listening – not giving space to others, interrupting, picking up on odd words, finishing sentences for the other
- People relating others experience too quickly to their own and again a feeling they are not really listening
- Wanting to be 'clever' and have a solution, to fix the other and give advice
- Feedback being more about the self than the other with no time allowed for clarification or letting it sink in and be assimilated
- No space or capacity to talk about the way that the team is communicating even though it is significantly influencing the groups capacity to achieve its purpose but huge focus on task
- 'Political responses' – appearing superficially to answer a question set but actually deflecting it to avoid potential discomfort
- Creating taboo, 'that question is not worth answering', 'we don't talk about these things here'
- Boredom and irritation as there is no 'buy in' to the process initially or clarity about how the purpose will be achieved.

Liz Goold in her paper on learning in development NGOs (Goold, 2006), adds to this in her discussion of barriers to achieving second order learning in task groups:

- Bias for action: time is filled up with 'urgent' tasks allowing little time for reflection
- Presence of undiscussables: poor handling of anxiety and fear resulting in defensiveness that is 'anti-learning'
- Norms that promote taking positions over listening, respecting difference, emergence, and co-creation of knowledge
- Working with power: not allowing existing power relations to be discussed and questioned
- Not learning to unlearn and coping with 'not knowing'
- Funding constraints: funding is tied to specific projects that focus on first order learning because planning and operational tools focus on the operational level and do not enable innovative learning initiatives. we are judged solely by our ability to achieve these predetermined outcomes.

Goold then offers the image of the learning organisation as 'tending the organic garden' which offers a very different environment for learning in which although you cannot predict what will happen you can probably help things along and create conditions that are more conducive to learning. Accept that things are not in our control but where we do the best we can, at any given moment and even when we bring all our collective intelligence to bear, things may still not turn out the way we thought.

This way of seeing the learning organisation requires us to be more humble, accepting of 'failure' and compassionate of mistakes (including our own).

To conclude this section, if learning for adaptation is only reactive and arises from 'shocks', the learning is likely to be inadequate and unnecessarily stressful (Tschakert & Dietrich, 2010). There is a clear case for more consciously learning from experience of adaptation practice that is easy to grasp and yet commonly overlooked or seen as 'nice to have' rather than essential. If learning is seen as an important part of adaptation it should be possible for those involved to have an open discussion about how a learning approach can be brought in to organisational or network practice e.g. asking 'what are the barriers to learning in this organisation/network?' or 'if learning is important what does this mean for how we operate?'. Changes to support an environment that is more conducive to learning can be small e.g. the way meetings are run, how work is evaluated or the way office spaces are set up, or larger things e.g. how opportunities to collaborate are set up, how strategies for future work are created, how 'successful adaptation' is defined, and how funding is sought.

3.7 Trust building

An idealised learning organisation "engages employees' hearts and minds in a continuous, harmonious, productive change, designed to achieve results they genuinely care about, and that the organisations stakeholders want" (Hitt, W.D. 1995, Nayak, Garvin, Maira & Bragar 1995). Such an ideal is hard to achieve without having significant amounts of trust between those engaged in the process that enables them to reflect openly and honestly about what is happening in the system, especially when individuals come from different parts of the system. The real value of networks is often from the informal rather than the formal interactions that occur and the development of trust between individuals that creates openness and opportunities to go beyond 'defensive' routines and enquire openly and honestly without distorting information.

4. Concluding remarks

One of the motivations for compiling this paper was to think through some the aspects of adaption that cannot easily be captured by a 'tool' or adaptation guidance. UKCIP's role over the 15 years of its existence was to support organisations to adapt through one to one working and sharing the lessons learned from this in guidance, tools and case examples. UKCIP was a small organisation varying in size from 2 to a maximum of about 25 people. Given such limited capacity it seems logical to try to provide tools that could be downloaded and other web resources such as webinars and guidance. Despite the availability of these free resources feedback suggests that downloading a tool only gets you so far. This paper attempted to offer some thought on other aspects that require attention such as building networks of people addressing the same issue, setting up knowledge management systems that go beyond 'knowledge transfer', creating opportunities for double loop learning and thinking about what makes up 'usable' information for a particular decision, that are not so neatly captured in a tool. If they are necessary for effective adaptation how can they be resourced? If relationships are important how can they be better supported? Such questions may not fit so neatly with existing management processes and funding mechanisms as they cut across disciplines, organisations and hierarchies but they are essential questions to be finding answers to if processes of adaptation are to be capable of identifying resilient responses as we travel into an unknown future.

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