Attributes of Well-Adapting Organisations

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Section 1 The nature of the adaptation problem

Humans, it is said, have always adapted, to climatic and environmental change, albeit with variable degrees of success. What is novel at the start of the 21st Century is that we have scientific evidence which indicates we are at risk of experiencing levels of climatic change unprecedented (in rate and magnitude) in modern human history. The availability of this information as well as the potential for significant, detrimental consequences have switched approaches to adaptation from being unconscious and reactive to premeditated and proactive. This, in turn, has focussed attention on the way adaptation processes operate, raising questions how well we have adapted to the current climate and how proactive or planned adaptation is best framed.

In an era of accountability and with the requirement to demonstrate value for money, the question of what constitutes 'good' adaptation is being asked, although this is hard to answer at the present time. Over the next decades, this question will become easier to answer, assuming there is good data on the performance and outcomes of adaptation processes. However, there is pressure to develop indicators of performance for adaptation now and to understand what attributes of an organisation or network makes it well adapted. There are some obvious dangers of trying to oversimplify a complex situation and in doing this identify indicators that distract or miss the point. Creating real change in organisations is a complex business and takes time. In Section 2 we explore frameworks that not only identify attributes (or pathways) that assist the organisation in adapting well but are also able to clearly articulate what it means to be achieving different levels along a progression from 'starting' to 'accomplishment'. Some key common and recurring themes are identified in the framings explored in Section 2 but few of these framings are sufficiently developed to support a process of change that incorporates both incremental and transformative change. Section 3 offers an introduction to the theoretical underpinnings to different types of change in organisations.

To be adapted to a constant climate is to be adapted to both the average climatic conditions, and to the weather associated with that climate, including extreme events. Even in a stationary climate, it is necessary to make a judgement about how much adaptation is required; whether it is better to manage every eventuality, or accept some level of damage. This judgement, if done well, requires knowledge of both the actual and likely risks and of the acceptability of different outcomes. Even in this simple situation, there are elements of uncertainty in the knowledge required.

In the real world, there is a chain of uncertainty that can build throughout the process of adaptation to climate change:

- Uncertainty in the description of the current climate;
- Uncertainty in future emissions of greenhouse gases;
- Uncertainty in the course of future climate change;
- Uncertainty in the impacts arising from that change;
- Uncertainty in the actions required to manage those impacts.

Even if adaptation is rooted within the achievement of current goals, there is a similar chain of uncertainty:

- Uncertainty in the description of current goals;
- Uncertainty in the sensitivity of current goals and processes;
- Uncertainty in the effects of climate and other future changes;
- Uncertainty in the actions required to manage those effects,

Much conceptualisation of adaptation assumes normalisation. Thus, in a system the internal response to an externally driven climate impact is to try to return the system to the original situation so there is no change in the *status quo*. At some point, however, there is likely to be a physical, or perhaps social and economic, limit to this, requiring a completely different response that may challenge strongly held beliefs or require fundamental goals to be reappraised. For example, in a community threatened by sea level rise, gradually improving the defensive dykes allows a "*business as usual*" response which delivers good risk management up to the point where either the continued improvement required becomes too expensive or technically impossible.

Acceptance that '*business as usual'* is no longer able to deal with the problem allows the possibility to reframe how the problem is seen. This has the potential to open up new and innovative ideas and new forms of engagement and collaboration between organisations. Thus incremental adaptation gives way to a transformative adaptation. The different types of change are further explored in Section 3. The ability to manage the process of change well is critical. Accepting that old ways of doing things are insufficient can be challenging, especially when a lot has been invested in the old thinking, both on a personal level and in terms of infrastructure.

For many organisations adaptation is a new challenge. While there are many overlaps with other areas of knowledge, such as planning, risk management, business continuity, and disaster reduction, it has some characteristics that make it hard to tackle; uncertainty, complexity, potential for very significant consequences and urgency. Consequently adaptation can be considered a *wicked* (as opposed to *tame*) issue where important decisions need to be made with imperfect knowledge. From this perspective it is helpful to view adaptation as a learning process that uses the stages of experience, reflection, conceptualisation, and planning in an iterative cycle. Again, these concepts are explored further in Section 3.

Given these characteristics of wicked problems and climate change adaptation in particular, some organisations are likely to be better equipped to steer their way through the adaptation process than others. Instead of describing what course of action delivers good adaptation, this report describes the attributes of an organisation that make it well-placed to identify opportunities, muster resources, capture expertise, create partnerships and opportunities for dialogue and manage and monitor the processes required to undertake those actions. In short, these are the attributes of an organisation that enable it to have a high adaptive capacity. Lists of attributes on their own are of limited use especially as many of the concepts used, though sounding good, have many potential interpretations and do

not give sufficient specific detail to explain how they might be used. It is also important to note that the majority of these frameworks have been developed through experience. This is the best, though possibly hardest way to learn about adaptation. Many of the attributes that sound unarguable on paper ('the organisation should engage all stakeholders') may be fantastically difficult to do well if the team is inexperienced and does not understand the more subtle nuances of power in the group or who has access to information etc.

Framings of adaptation, such as PACT (No 1) that introduce the idea of discrete levels of an attribute and that allow the user to identify where they currently are, their ultimate goal, where they would like to be at some defined time in the future and get practical guidance on what it might take to achieve this are clearly far more useful that a list of attributes that simply states that the 'following seem to be useful' without sufficient detail to explain how that might be. With PACT it is possible to not simply see how you measure up now but also how you might improve in to the future giving the information you need to make the next steps. It is a deliberate attempt to facilitate cultural and other rapid change by giving a language for it, by allowing people to see that their assumptions are not the only possible assumptions. And, given that change is inevitable it is this support for a continuous process of experience and reflection that is of most value.

The following sections introduce the reader to recent literature on framings of adaptive capacity (Section 2), provide an introduction to literature on key aspects of the supporting theories e.g. organisational change theory and learning theory (Section 3), present a reflection on UKCIP's experience of building the adaptive capacity of organisations over the last 12 years (Section 4) and provide guidance on the use of attributes in practice and with a recommendation for next steps (Section 5), followed by references in the final section (Section 6).

Section 2 Key attributes of organisational adaptive capacity: A literature review

2.1 Introduction

The following section introduces seventeen recent studies and framings of adaptive capacity and focuses specifically on what is said about aspects that enable an organisation (or occasionally another unit of exploration e.g. a national adaptation plan or a network) to be 'well adapting'. All the framings address adaptive capacity in the context of climate change with the exception of 'Ten traits of adaptive organisations' (No 13) which explores traits that make a business able to deal with rapidly changing environments. All the framings offer insights into what it means to be 'well-adapting' as an organisation and a range of different types of framings have been included. Table 2.1 provides an overview of this range and the intended scope of each of the framings.

The framings explored are not always easy to directly compare as they vary greatly in the level of detail provided and the purpose for which they were developed (e.g. a simple list to introduce concepts of organisational change, a tool for benchmarking and identifying progress, a policy assessment tool, and academic explorations of specific concepts in organisational learning etc.). A template approach was used to provide a common structure to enable comparison across common themes (motivation for the work, practical uses, key attributes identified etc.) but due to the differing amounts of material available in each case some caution should be taken in this as, in some cases, a huge amount of information was consolidated into a relatively simple template. Guidance on where to get further information is given in references at the end of each example.

A summary and discussion of the most commonly cited attributes follows.

2.2 Commonly cited attributes

In this section the themes most often identified are explored to understand how they are discussed in the different framings. As previously stated there is a range of depth in the different examples so some go little beyond quite simple statements e.g. '*it is important to work in partnerships'* or '*leadership should be engaged from the outset'*. Others provide significantly more detail as to what is meant by such statements and some of the flavour of this detail is captured here although this is not intended to be an exhaustive portrayal of the wealth of information available in the framings.

2.2.1 Access to resources

Access to adequate resources and their mobilisation for adaptation was directly mentioned in almost all of the framings looked at. For some the term 'resources' seemed to relate mostly to financial and manpower resources but in others (e.g. (Framing No.3, No.10 and No.8) other resources were mentioned as being necessary for example '*stocks of human and social capital'*, '*adequate resources (human, natural, financial, social)'.* Some key skills e.g. 'trust building', 'facilitation skills' and 'vision' were also mentioned as being important skills and there is a clear overlap with other areas such as leadership here.

2.2.2 Leadership

The fundamental importance of engaged leadership was brought out in many of the framings. Getting 'buy-in from the top' (Framing No.2) was seen as key for unlocking resources for adaptation, creating a vision (*visionary leadership – clear goals and resourcing key individuals'* (Framing No. 11), '*vision – clear sense of where you are going and why'* (Framing No. 13) '*looking forward, taking measurements that align with future goals'* (Framing No. 13)) and identifying priorities for action in line with the goals of the organisation ('*discerning what is relevant and important'* (Framing No.2) '*assigning special importance to special issues, areas and populations'* (Framing No. 9)). The importance of the leaders ability to discern what is important in a mass of information and other drivers was also picked up in Framing No. 10, as '*the ability to manage the risks and the information and know what is credible and trustworthy'*.

Other attributes identified as being important for leadership were ability to see the '*big picture – awareness of the wider context'* (Framing No. 7), '*fair governance, equity, responsiveness, accountability'* (Framing No. 8) and '*collaborative, entrepreneurial, visionary'* (Framing No. 8). Framing No 2 explicitly mentions work on leadership and what makes a good leader for adaptation and the theory behind this is summarised in section 2. This thinking on the qualities of leadership is also brought into the theoretical framework of Framing 1.

2.2.3 Learning

The majority of the framings made some reference to the need for learning although, as for the other attributes, the amount of detail given about how this was being interpreted varied immensely. Some relatively simple statements were made e.g. the need for *'investment in continuous learning'* (Framing No. 13) and the availability of *'spaces for learning'* (Framing, No. 2). Others mentioned the management of learning within the organisation. For example, *'organisational learning requires flexible structures and processes and mainstreaming of climate change into codes of practice'* (Framing, No. 11) and identifying the need for '*iterative decision-making'* (Framing No. 7) and an approach of *'implement, monitor, evaluate'* (Framing No. 6).

How this would be done, and the skills required to do this was partly covered in the resources section above and some framings explore this in some detail e.g. *'proactive and participatory co-learning approach to ensure learning in critical areas'* (Framing, No. 6). The need to learn from direct experience was picked up in several of the framings e.g. *'learning together from practice'* (Framing No. 2). Understanding what it is that needs to be learnt (skills, information, processes etc) and who needs to be learning them was explored in some depth in some of the framings (Framings No. 1, 2, 5, 7).

Higher levels of learning enable the possibility for transformative change. What is meant by this is explored in some detail in Section 3 in relation to single and double loop learning. This is possible when an organisation becomes aware that a business-as-usual approach is no longer going to be sufficient and the grounding assumptions on which the organisation operates no longer hold true or become limiting in some way. Accepting this can be quite challenging and there may be huge resistance to such fundamental change within the

organisation. Much of the literature in organisational change is about how to deal with such resistance. Some of the framings identify aspects of this higher level learning e.g. '*there is an open culture – can challenge the business model and improve it'* (Framing No.13), *'well adapting organisations learn how to change to adapt and learn how to adapt to change'* (Framing No. 12). There are '*spaces for both single and double-loop learning – are we doing things right and are we doing the right things?'* (Framing No. 5) and people in the organisation '*find ways to reflexively reframe and redefine goals as new knowledge, experience and value judgements emerge'* (Framing No. 12). Identifying the need to get better at learning ('learning how to learn') in and organisation demonstrates a very high level of learning and this was directly addressed in Framings No.1 and 12 e.g. the organisation '*asks*: '*what new institutions can be created or are appropriate*?' *to ensure learning feedbacks* (Framing No. 12).

2.2.4 Working with others

This attribute was explicitly mentioned in the majority of the framings and implied in others. Beyond it being recognised as generally a 'good thing' and that adaptation cannot be solved 'in silos' (Framing No2) other aspects of working with others explore in more detail who specifically should be engaged, at what parts of the process, how this should be done and thus what skills are required in order to build the necessary adaptive capacity.

Who should be engaged includes, amongst others, '*partnerships and boundary organisations'* (Framing No.2), '*drivers, regulators and implementers'* (Framing No.4), '*Local Strategic Partnership organisations*' (Framing No.17). Details of how this should be done varied considerably between the different framings with some identifying the key stages where working with others was important '*engagement in prioritisation processes and reviews'* (Framing, No. 9), '*engaging key stakeholders at the outset to maximise adoption of recommendations'* (Framing, No. 6) and others making more general observations e.g. '*multi-partner working with networks sharing information, pooling resources and taking concerted action'* (Framing, No. 11), '*transparent and participatory multi-stakeholder processes*' (Framing, No 9) and '*opening up of informal spaces'* to encourage '*diverse social relationships'* (Framing, No.5).

The skills required to do this well were mentioned in a few framings. For example: '*the ability to act collectively*' (Framing, No.3); '*skills for collaboration (dialogue building, design of inclusive meetings, facilitation skills*' (Framing, No. 2); '*the coordination of the different languages and expectations of institutions and agents involved*' (Framing, No 12). This latter framing also warned that '*failure to reconcile perceptions of different framings may impede action'*.

2.2.5 Access to information

The importance of access to information to inform decisions about adaptation was mentioned in most framings. A number of different types of information were mentioned: '*information on hazards and the socio-economic system'* (Framing No. 3); '*understanding vulnerability, downscaling of the scientific knowledge and assessments to the regional and local level'* (Framing No.12) and the need to '*know you enemy'* by gathering data on *'climate hazards, socio-economic information and vulnerability assessments'* (Framing No. 6). I

many one of the first steps in the adaptation process is '*a thorough assessment – an iterative examination of the available data on vulnerability, adaptation practice and climate sensitivity'* (Framing No. 9).

Other framings explore this in more depth and discuss what makes information 'usable' (Framing No.1 and 2) to different users suggesting that rather than lack of information people can feel overwhelmed by the amount available but lack confidence in discerning what is trustworthy. Thus the role of people and organisation that can tailor the information to specific users becomes important.

Linked to this is knowing when you need to go outside the organisation to bring in extra information, knowledge and wisdom at particular moments. A '*strong in house technical expertise'* (Framing No.4) may be important and sufficient in many cases but it is also important to know how to get '*access to expertise and knowing when it is needed'* (Framing No. 1 and 10) and '*knowing when to seek external input'* (Framing No.13).

Linking to the next paragraph on 'awareness' some of the framings identified the importance of '*spaces to translate information'* (Framing No. 2) so that it becomes relevant to the organisation. This means in addition to access to the latest scientific findings there is a process for grounding this in the organisation through asking questions about 'so what does this mean for how we operate?'.

2.2.6 Awareness

As just noted, it is important to have an '*awareness of what climate change means in relation to the organisation'* (Framing No. 7) to get an '*accurate understanding of exposure and local implications and what can be done'* (Framing No.10) and that '*this encompasses a range of factors'* (Framing No.4). In addition this organisational understanding gives you '*awareness of the hooks and entry points'* (Framing No. 2) that enable you to bring consideration of adaptation into the operation of the organisation. Some simpler framings may still assume that provision of information alone is enough to change behaviour. This is not backed up by evidence as organisational processes can be quite resistant to new information. This stage of grounding the new information and making sense of what it means for the organisation is thus critical.

2.2.7 Communications

The importance of '*effective internal communications'* were mentioned in several framings e.g. Framing No.s 4, 7 and 13 as this allows '*everyone understands the priorities*' (Framing No.13). Such communication could be undertaken in a number of ways e.g. '*guidance for practitioners – practical information for operational staff'* (Framing No. 11). Others mentioned that external communications were just as important '*effective communications internally and externally – demonstrating actions, risks and opportunities'* (Framing No. 11) including '*education and outreach'* (Framing No.6).

2.2.8 Agents of Change or Champions

These individuals are considered key to the process of getting action on adaptation in organisations in some framings e.g. *'climate change champions should be clearly visible and supported'* (Framing No. 11 also Framing 2 and 7), *'giving individuals the power to take action'* (Framing No.7). Framing No1 explores the role of champions, as one of the 9 pathways, in some detail.

2.2.9 Motivation

A fundamental aspect of adaptive capacity is having the '*willingness to adapt'* (Framing No.3) which is particularly important for leadership but also for anyone in a position to take decisions requiring high levels of adaptive capacity (e.g. ones that have long time horizons or are susceptible to 'lock-in'). Understanding the motivations of others becomes important in the process of adaptation requiring the '*skills to understand and manage different motives'* (Framing No.12). A barrier to adaptation results from a '*lack of motivation'* which clearly needs to be worked through if progress is to be made.

2.2.10 Management processes

Like all good organisational management processes there need to be a '*balance of leadership and management and not just at the top, to enable day to day control and predictability'* (Framing No. 13). Thus what was said in the framings on the management of well adapting organisations is similar in many respects to the management of any well run organisation e.g. there should be '*transparent regulatory processes with clear time horizons'* (Framing No.4), *'good coordination to avoid duplication and gaps'* (Framing No. 9)

and '*low regret adaptive management'* (Framing No. 11).

Some organisations emphasised the importance of mainstreaming adaptation into existing structures e.g. *'incorporate adaptation into existing planning frameworks'* (Framing No.6) or '*mainstream into broader strategies'* (Framing No. 12). '*Management through risk management processes'* (Framing No.4) was suggested as important in some framings *'risk and vulnerability assessments and prioritisation processes'* (Framing No.11 and 7) and that as part of this it was important to have *'access to risk spreading mechanisms'* (Framing No. 10).

Management processes were also mentioned that specifically deal with the anticipated changes and uncertainty implied in adaptation to climate change, for example, '*allowing a degree of flexibility in strategic decision making'* (Framing No. 4), allowing a '*balance between informal and formal institutions'* (Framing No.5) and '*allowing room for autonomous change – space to improvise, act according to plan and continuous access to information'* (Framing No. 8). Dealing with such changes demands the '*requirement to be flexible – no 'one size fits all' solutions and the solutions are unique to each context'* (Framing No. 9) and ultimately '*clarifying new roles and responsibilities in new institutional arrangements'* (Framing No. 12). Finally, a '*flat organisational structure enables faster change as all can be empowered'* (Framing No. 13).

2.2.11 Monitoring and evaluation

This is clearly linked to the aspect of 'learning' and the question of what is learned and who needs to be learning it. Evaluation and monitoring can be undertaken internally in the organisation as part of the learning and reflection cycle. External evaluations might be undertaken by, for example, funders or peers wishing to learn lessons about what is working. In either case, in order to learn useful lessons, *'climate change objectives clearly stated and reviewed regularly'* (Framing No. 11). And that in addition to *'monitoring and reporting progress'* (Framing No. 11) there should be a *'regular review of assumptions'* (Framing No. 13) (implying second order learning and the possibility of transformational change). Learning from practical experience is a good approach for adaptation so the suggestion to do this to *'put your house in order'* (Framing No. 6) before advising others is appropriate.

Table 2.1 Comparison of framings of adaptive capacity explored in Section 2

	Name	Type	Scope	Information about the theoretical basis	Type of changes described	Guidance provided	Self-assessment	Facilitated assessment
1	PACT: Performance Acceleration through Capacity Building	tool for assessment	Can be used to review an organisation's performance to identify what is holding back progress on climate change, and suggest ways performance could be improved.	available	incremental and transformative	yes, detailed	available	available
2	Learning from Adaptation in practice (ADAM)	ideas based on experience	Identifies key drivers for change, what supports effective adaptation decision-making in different institutional settings, what barriers to learning and information sharing exist, and how individuals and organisations interact in ways that either enhance or impede this.	available	incremental and transformative	n/r	n/r	n/r
3	Adaptation Policy Framework (UNDP)	guidance on adaptation	Guidance on incorporating adaptation concerns into local, sector-specific and national development planning processes i.e. not aimed at the organisational level but identifies transferable themes that have relevance at this scale.	available	mostly incremental	yes	n/r	n/r
4	Learning to Adapt: Organisational Adaptation to Climate Change Impacts	academic paper building on direct experience	Explores which factors determine adaptation to climate change on the basis of what is known about how organisations learn.	available	mostly incremental	n/r	n/r	n/r
5	Adaptive capacity and social learning: *using the shadow system*	academic paper building on direct	Develops a language and model for examining relational spaces as places of learning and adaptation within organizations and explores the role of	available	incremental and transformative	n/r	n/r	n/r

		experience, conceptual model	the shadow system.					
6	Case Studies of Adaptive Capacity: Systems approach to Regional Climate Change Adaptation Strategies	tool for assessment	The case studies focused on elucidating 3 regional cross-cutting barriers to adaptation so they might be better managed and provide a benchmark for future progress.	available	incremental and some transformative	yes	yes	yes
7	Characteristics of well adapting organisations – internal UKCIP work	list of attributes	The list of characteristics comes out of work done by UKCIP in 2009 and incorporates the views of staff from the Environmental Change Institute (ECI) and UKCIP.	not provided	mostly incremental some references to transformational	n/r	n/r	n/r
8	Adaptive Capacity Wheel	tool for policy assessment	To examine an institution's strengths, weaknesses and opportunities for improvement. Adaptive Capacity Wheel shows the inherent capacity of an institution to respond to change.	under development	incremental and transformative	yes, some	under development	under development
9	The National Adaptive Capacity Framework: *Key institutional functions for a changing climate*	tool	Identifies a fundamental set of national level functions that all countries will need to perform if they are to be adapting effectively over time.	some provided	mostly incremental	yes, some	yes	no
10	Eight determinants of Adaptive Capacity	academic paper/list	To assess the potential contribution of various adaptation options to improving systems coping capacities by focusing on the underlying determinants of adaptive capacity.	available	mostly incremental	n/r	n/r	n/r
11	Hallmarks of a well adapting organisations	list of attributes	An inventory which provides a practical basis for reviewing the priorities and progress on adaptation capacity building within public and private sector organisations.	not provided	incremental and some transformative	n/r	n/r	n/r
12	The Climate Learning	academic paper	The *climate learning ladder* offers a way to structure policy analysis,	available	incremental and transformative	n/r	n/r	n/r

	Ladder	based on experience/ conceptual model	support reflection and identify critical decisions to support climate adaptation.					
13	Ten Traits of Adaptive Organisations (KPMG)	list of attributes	There are a number of ways that organisations can adapt effectively to changing circumstances. Ten traits are given that are common in organizations that are adaptive and therefore more likely to survive.	not provided	incremental and transformative	n/r	n/r	n/r
14	UKCIP's Principles of Good Adaptation	list of principles	A set of principles that has evolved through practice and identifies the aspects of the adaptation process characteristic of those processes that have led to good adaptation.	not provided	n/r	n/r	n/r	n/r
15	An indicative list of Ten Questions on Adaptation (RCEP)	list of questions	The Royal Commission on Environmental Pollution, in their 2010 report on Adapting Institutions to Climate Change, offered a list of ten questions organisations might use to start thinking about adaptation.	not provided	incremental and transformative	n/r	n/r	n/r
16	The National Audit Office: *Adapting to Climate Change: a review for the Environmental Audit Committee*	tool for assessment	An overview of government policy on adapting to climate change incorporating Departments self-assessment of their current capacity to assess and manage climate change risks.	not provided	mostly incremental	yes	available	d/k
17	Planning to Adapt to Climate Change National Indicator 188	tool for assessment	A way to identify progress and assist in embedding the management of climate risks and opportunities across all levels of services, plans and estates in local authorities.	not provided	incremental	yes	available	available

2.3 List of studies:

1	PACT: Performance Acceleration through Capacity-building Tool
Motivation/ hook for the work	PACT was developed by Alexander Ballard Ltd with Hampshire County Council (HCC). The tool arose from research on change management for the EU-funded ESPACE project. This work highlighted the issue that information and awareness on climate change issues does not necessarily lead to action. This research identified a number of principles underlying effective change by organisations on climate change issues.
Scope	PACT is a theory of organization around the adaptation challenge and not only a theory of organisations. The PACT tool can be used to review an organisation's performance against 9 pathways, based on these principles. PACT reviewers use the tool to identify which pathways are holding back progress on climate change within the organisation, and suggests ways in which performance could be improved. Although developed primarily in the adaptation context, PACT equally applies to the mitigation agenda. Indeed the challenge of strategic adaptation is seen to overlap significantly with that of strategic mitigation. The PACT framework identifies six clear stages of development when organisations take on the challenge of climate change. These are called response levels (RLs) rather than stages as the idea is to consolidate each level before learning to respond from the next one up. Thus few organisations are able to act successfully from RL5 without having a strong grounding at RLs 3 and 4. The distinction between levels is both grounded in theory and validated through practice. For example, the **multi-level perspective** on industry transitions of Frank Geels et al. Through this framework, RLs 2 and 3 are characteristic of 'within regime' change, RL4 is characteristic of 'niche experimentation' (or 'breakthrough projects') and RL5 is conceptualised as regime transformation. RL6 would be conceptualised at the landscape level. RL4 and 5 are very much concerned with the issue of **socio-technical lock in** as described by Gregory Unruh and recently mentioned as relevant by the Royal Commission on Environmental Pollution. A crucial insight is that lock-in or **path dependency** does allow occasional windows of opportunity (normally around capital expenditure) but that these open and close very quickly implying that having the capacity in place ahead of a gap is essential to achieve high levels of adaptive capacity. Much of the core theory behind PACT developed from a critique of approaches to emergence (Shaw, P. (2002), Stacey, R. (2001), which seemed to ignore the concrete and physical dimensions of change and significantly to underplay the danger of path dependency and 'lock in' in

	many cases. There is clearly no point in adopting an edge of chaos approach just after lock-in has begun, and the time space for intervention is normally extremely short so capacity to exercise capacity has to be developed ahead of time. RL 1. **Core business focused.** Organisations with a short-term focus, e.g. some SMEs, do not see that the issue has much relevance to them at all. But all organisations, no matter how committed, need to be able to keep the show on the road in a rapidly changing world. [impact on climate change: Can easily 'lock-in' high energy or poorly adapted choices, making resistance to current or future action more likely.] RL 2. **Stakeholder responsive.** Many organisations recognise the need to understand and comply with a complex and rapidly changing set of rules, regulations and financial instruments, while keeping up to date with customers' needs and corporate policy. [impact on climate change RL 3. **Efficient management.** As organisations progress, they begin to get a grip on operations, to quantify and prioritise issues, put in place common sense and effective management programmes for improvement. This often leads to much better ability to manage costs. impact on climate change RL 4. **Breakthrough projects.** As understanding develops, organisations begin to see the need to learn fast about strategic threats and to identify options for responding to them. They identify creative innovations and put in place the conditions for a strategic response. impact on climate change RL 5. **Strategic resilience.** As understanding of major threats develops, and as options begin to be identified, the organisation becomes more able to put in place programmes to ensure its resilience in what is likely to be a very different and fast-changing future. impact on climate change RL 6**. The champion organisation.** All these steps will help society respond to climate change, as well as protect the organisation's own interests, but some organisations choose to go further and seek to lead wider social change to slow and reverse climate change itself. impact on climate change. As there are so few examples of this available this is the least developed level from a conceptual perspective. Not every organisation needs to act from the highest response levels, but bodies that take substantial decisions which will affect communities, services and estates over decades – e.g. local authorities, national government and major companies in strategic industries – do need the

	ability to work from the higher levels when needed, as well as the systems to provide solid activity at lower response levels on a day to day basis. The PACT tool helps an organisation (or organisation around a decision) to see where and how to develop different levels of response through gathering and organising information about nine organisational 'pathways' – complementary capacities (comparable to 'competencies' at an individual level) which need to improve together if change is to take place.
How the work was done	As part of the EU-funded ESPACE project ('European Spatial Planning: Adapting to Climate Events' 2003-8). Alexander Ballard and HCC undertook work on change management starting with an in-depth review of the environment and behaviour literature and of various theories of change into the sociological fields of risk, behaviour and cultural theory which highlighted that information and awareness of climate change issues alone does not necessarily lead to action. The research focused on what else is needed for local authorities to support change within their own and partner organisations. The PACT. That emerged from this work was then piloted with a range of ESPACE partners, including the Dutch Ministry of Spatial Planning, HCC, Kent County Council and the Environment Agency. The tool is constantly being used and adapted and adding to the existing database being developed with information about its application. A self-assessment version is currently being piloted in the South East of England and in the Climate Change Risk Assessment (CCRA) to review specific sectors. The full, original PACT process required a significant time, resource, and expertise (on the part of both the reviewer and the organisation being reviewed) so the self-assessment approach is far more accessible and, recent experience from the pilot suggests, still extremely useful in identifying what is going well and what needs to be attended to as a priority. Much more information is available on the background theory used, the evidence base and guidance on how to apply it.
Attributes identified	The theory of complementarities (Pettigrew et al, 2004 (building on work by Kurt Lewin)) and also learning from behavioural change theories suggests that for effective change processes a number of interlocking factors need to be addressed together. Improvements thus need to be targeted across a group of complementary areas in parallel. Ignoring a lagging factor may make things worse. In the PACT framework these are: **a) Awareness.** The ability to realise what climate change means for the organisation's viability, for the viability of its work, for society and for the planet, now and into the future. **b) Agency.** The capacity to spot, prioritise and develop opportunities for meaningful and timely action in response to information about climate change. **c) Leadership.** The extent to which a formal leadership team can identify

	a vision in relation to climate change and can engage with, support and legitimise its implementation. **d) Agents of Change.** The capacity to identify, develop, empower and support a group or "ecosystem" of champions at different levels so that they can be effective agents of change. **e) Working together.** The capacity to involve, respect the needs of, communicate with, learn from, and act in collaborative partnerships with internal and external groups. **f) Learning.** The extent to which the organisation can learn from experience and use what it learns to improve procedures, strategies and mission. (This is a particularly important pathway because it helps identify anything specific to a particular organisation and its context that needs attention to unblock change). **g) Managing operations.** The embedding of procedures to get to grips with climate change in a systematic way. These develop as the organisation's ambitions and competencies grow. **h) Programme scope and coherence.** How far projects sit within an overall programme for action that is suited to the scope of what the organisation is trying to achieve and updated in the light of what is learned – where to build on success or to address constraints. **i) Using Expertise.** The capacity to recognise, access and deploy the necessary skills, understanding and technical and change expertise to make the biggest difference.
Practical application	PACT was piloted with a range of EU partners in the final year of the ESPACE project, and it has also been applied to NI188 performance in a further pilot funded by LRAP. This pilot involves four contrasting district councils within Hampshire, and one medium-sized business. The PACT review has already stimulated action within these organisations and has identified ways in which their climate change adaptation performance can be improved. It has also encouraged good two-tier working, and has identified strengths and weaknesses across Hampshire's Local Strategic Partnership. The PACT framing also forms a core part of the adaptive capacity work of the National Climate Change Risk Assessment (CCRA). **Example of different response level responses for the pathway 'Working Together'** 'Working together' is more than is commonly understood by stakeholder engagement. It is the extent to which the organisation can form effective internal and external alliances and strategic partnerships so that the whole can achieve more than the sum of the parts. However, we also take account of how well it can use "normal" stakeholder engagement processes to build relationships of strong awareness and agency through sharing learning and experience. **Why is this important?** Working in groups with others is the biggest single predictor of change on environmental issues. Moreover, stepping

	outside the "business as usual" comfort zone involves taking on fresh challenges and steep learning curves, removing barriers that increasingly cannot be handled in isolation. There is therefore a need to form strong alliances with others in order to share relevant expertise and remove barriers in the way of progress. At **RL2**, organisations do discuss climate change with key stakeholders – e.g., clients, legislators – if they request it. If required to do so, they will engage with other groups. An organisation working at **RL3** typically sees stakeholders as people – inside or outside the organisation – who can affect, or are affected by, what it does. It follows good practice in identifying, communicating with and involving stakeholders before taking decisions. At **RL4**, people recognise that working creatively together with stakeholders for a period requires building considerable trust – e.g. by working transparently with conflicting agendas and striving for win : win outcomes. Many participants need help to understand what climate change means for them and to identify options, so support is given to enable them to contribute at a high level. Organisations working at **RL5** recognise that long term strategic responses to climate change require the development of networks of organisations with the capacity to work on them. Most organisations are nowhere near having that that capacity yet – in public or private sectors. There is a need to start from a realistic assessment of each stakeholder's current capacity and to tailor engagement at a level that can be handled realistically. So partnership and capacity building need to take place together – a challenging mix.
Concluding thoughts	The change matrix rests on basic assumptions: • Organisations' responses to issues such as climate change follow a predictable process as they become more competent on the issue; an organisation that responds to climate change *only* by changing the light bulbs is demonstrating a less developed response than one that is able to change the design of its products or services to be resilient to climate change. • Development across a set of core 'pathways' is needed if progress is to be possible. It is not enough to *decide* to behave at a more advanced level; this needs to be enacted through operational procedures, managerial awareness, external engagement processes, etc. • Since the pathways are mutually reinforcing, breakthroughs in one area will be constrained unless others are developed as well. In other words, the pathways are 'complementary' – all are needed and if any is weak, outcomes will be very disappointing. If development in any of these lags behind the others, overall progress will likely be

	harmed and might stop altogether. • While it is in principle impossible to identify every pathway, a good number of generic ones can be identified and managed. Others that are relevant only in a specific situation can be identified and addressed if the pathways themselves include appropriate processes to do that.
References	Ballard, D.I., Reason, P and Coleman, G. (2010), *Using the AQAL Framework to accelerate responses to climate change*, Journal of Integral Theory and Practice, 5(1) pp 1-xx (in press) Ballard, D.I. (2007). Developing strategic capacity to respond to climate change, *Organisations and People* Nov Vol 14 no 4 pp15-23 Geels F. (2005), *Technological Transitions and System Innovation*: a co-evolutionary and socio-technical analysis, Edward Elgar Publishing. Pettigrew, A.M., Whittington, R., Melin, L., Sanchez-Runde, C., van den Bisch, F.A.J., Ruigrok, W., (Eds) . (2004) Innovative forms of organizing; international perspectives. London, UK, Sage Publications. Reason, P.W., Coleman, G., Ballard, D.I., Williams, M., Gearty, M., Bond, C., Seeley, C., et al (2009). *Insider voices: Human Dimensions of low carbon technology*. Report for EPSRC and ESRC. Centre for Action Research in Professional Practice, University of Bath, UK. Available at: www.bath.ac.uk/management/news_events/events/lowcarbon/insider.html (accessed April 2010) Shaw, P. (2002), *Changing conversations in organisations: a complexity approach to change*, Routledge Stacey, R. (2001) *Complex Responsive Processes in Organisations: Learning and knowledge creation*, Complexity and Emergence in Organisations Series, Routledge.

2	**Adaptive Capacity – learning from adaptation in practice**
Motivation for the work	This work was done as part of the EU 6th Framework project Adaptation and Mitigation Strategies: Supporting European Climate Policy (ADAM).
Scope	The team took a learning approach to understand how organizations were making use of information about climate changes and translating it in to action. The research team sought to uncover information on the key drivers for change, what supports effective adaptation decision-making in different institutional settings (as well as what barriers to learning and information sharing exist), and how individuals and organisations interact in ways that either enhance or impede this. Using an iterative approach the research team were able to identify emerging ideas and themes that may not have been obvious at the start.
How the work was done	This part of the ADAM project developed 13 adaptation 'learning

	examples'. Engagement in the learning examples was originally perceived as a process involving several cycles of learning: starting with a definition of the research questions, planning the stakeholder engagement process, engaging then reflecting on the responses before developing new questions to delve deeper into existing issues or to explore new ones through further rounds of engagement.
Attributes identified	A number of aspects that are relevant to supporting adaptation were identified in the adaptive capacity work for the ADAM project: 1. **Access to usable information**: tailored to different end users available in an accessible format at the appropriate level of detail and authoritative and trustworthy. 2. **Ability to discern what is relevant and important**: provision of information alone is not enough to get action on adaptation and some complained of 'information overload'. What was missing was the skills to discern how to make sense of the information, what to trust and then how to translate this into appropriate action. 3. **Learning together and from practice**: as people gained a more sophisticated understanding of the adaptation issue their information needs changed. As well as solid scientific information and generic advice there was a greater demand for examples of how to adapt, a desire for peer-peer learning, appreciation for the need to learn across departments and sectors and between hierarchies in organisations. Understanding what good learning means, who needs to be involved, what it means to be learning well and how to embed learning processes within the organisation is vital if greatest value is to be gained from experience. 4. **Spaces for learning**: Access to scientific information in a user-friendly format, though important, is only one piece of the jigsaw. Interviewees were also keen to stress that they needed time and space to reflect on the evidence and make sense of it, as well as being able to interact with others in a mutual exchange of information, knowledge and experience (particularly important due to the distribution of the costs and benefits of climate impacts and adaptation). Opportunities to try out new approaches were also appreciated. 5. **Developing skills needed to support effective collaboration and dialogue**: Adaptation requires a collaborative response but getting real connections with people with different perspectives requires trust so people can be open to exploring the differences with their viewpoint and how others see the situation. There may be a lot invested in holding onto one way of seeing the situation and a fear that being open to others may mean that some lose out, especially where resources are scarce. This may need high levels of facilitation in order to build connections and provide a balance of safety and challenge.

	6. **Role of partnerships and bridging or boundary organisations**: being part of formal or informal partnerships is important to achieving higher levels of adaptive behaviour as without the challenge and support of others an individual organisation will only have a partial view of the situation and only be able to make changes to its own practice rather than understand and influence the wider field. 7. **Role of key individuals or 'champions':** Effective change, to some extent, comes down to the enthusiasm of individuals in positions of influence. An organisation with CEO that wants to drive the adaptation agenda forward because they can see the potential consequences of not taking it seriously, is in a very different position to one in which a small group of concerned individuals, are trying to promote the issue and, without the time or space to make a clear case the message is getting confused with the mitigation agenda. Such champions are not always in obvious leadership positions but they have the ability to straddle boundaries, bring new information and make connections. 8. **Awareness of potential hooks or points of entry:** Making the most of opportunities that arise to push forward the adaptation agenda. **9. Leadership:** Getting 'buy-in' from the top was mentioned by many as being critical to getting action on adaptation to ensure that resources are allocated to it and that strategies are appropriate and adequate. To do this well leaders within the organisation need to have a proportionate understanding of the issue in relation to the other issues the organisation in dealing with, see where win-wins are possible with other issues and spot opportunities, processes and decisions where adaptation an be embedded in the organisation. A good leader in dealing with adaptation to climate change (acknowledging that this issue is not in isolation from all the other issues they will be dealing with in managing the day-to day aspects of the organisation and paying attention to the future) thus needs to recognise the nature of the problem (complex, uncertain, non linear), be able to see the issue from multiple perspectives, and be open to more enquiry-based and learning approaches to progressing the organisation.

Ideas for practical application	The report highlights some examples that illustrate these aspects well and gives some suggestions for practitioners, researchers and policy makers concerned with adaptation to climate change.
Concluding thoughts	The authors note that multi-dimensional nature of the climate change issue was a significant challenge to overcome. Not only does adaptation response differ by sector and organisation, a variety of other institutional factors combine to influence the process of adaptation (from initial risk perception through to the implementation of measures on the ground). Overall, research findings suggest that there are several key stages to adaptation as a process. Although it is recognised that there may be other alternatives for conceptualising and framing this process it is felt by the authors that the discrete stages of risk perception, willingness to respond, building local adaptive capacity, learning to adapt, and sustaining activity in the longer term provide a useful 'roadmap' for understanding where organisations are in their progress towards building adaptive capacity and ultimately resilience to the impacts of a changing climate.
References	Lonsdale, K. and McEvoy, D. (2009) Final report D‐A1.4b: Final report on policy analysis and adaptive capacity, EU ADAM project. McEvoy D., K. Lonsdale & P. Matczak (2008) *Adaptation and mainstreaming of EU climate change policy* CEPS policy briefing note for the European Commission, Brussels.

3	**UNDP's Adaptation Policy Framework (APF) for Climate Change**
Motivation/hook for the work	The development of the APF was motivated because the rapidly evolving process of adaptation policy lacked a clear road map. The Guidebook is intended to fill the gap, offering practical guidance on adaptation to climate change. While a substantial amount of literature exists on climate change impacts there is relatively little information on adaptation policy and strategies.
Scope	The UNDP Global Environment Facility with help from the Swiss, Canadian and Dutch Governments, developed the APF as an innovative set of guidance for the development and implementation of adaptation strategies. The major objective of the work is to assist in the process of incorporating adaptation concerns into local, sector-specific and national development planning processes. The APF is thus not aimed at the organisational level but identifies transferable themes that have relevance at this scale.

	The APF guidance is supported by a series of 9 technical papers each of which explores a specific aspect of the adaptation process and provides specific practical guidance with annexes offering tools and methodologies.
How the work was done	The framework, technical papers and user guidance was developed by an expert group of lead authors with and extensive group of contributing authors and over 250 reviewer from over 60 countries. A number of case studies were also developed.
Attributes identified	The following key components of adaptive capacity were highlighted: • Information on the nature and evolution of the climate hazard faced – both from historical records and from scenarios of the future • Information on socio-economic systems, both past and possible future evolution is important. To be viable, adaptation strategies have to be feasible so an understanding of likely cultural and political contexts is important. • Resources including financial capital and social capital (e.g. strong institutional structures, transparent decision-making systems, formal and informal networks that promote collective action), human resources (e.g. labour, skills, knowledge and expertise) and natural resources (e.g. land, water, biodiversity, raw materials). • Willingness to adapt amongst those affected and a degree of consensus regarding what types of actions are appropriate. Adaptive capacity can be undermined by a refusal to accept the risks associated with climate change or by a refusal by key actors to accept responsibility. This can be for ideological reasons or as a consequence of vested interests. Large scale structural economic factors and prevailing ideologies therefore play a vital role in determining what adaptation action is feasible. • Ability to act collectively and resolve conflicts – factors heavily influenced by the government. Guidelines for effective engagement with stakeholders are also provided: **Clarity:** Clarify the objectives and goals of the engagement and evaluate the appropriateness of the techniques. Work towards agreement on defining the problem, acknowledging differences in people's perception. Be realistic about what can be achieved given the constraints of time and money, the available expertise and the political realities. Communicate clearly in all phases of the engagement; this strategy should include access to and presentation of all relevant information. Short-term interests inevitably take over when resources are scarce. **Understanding of related processes**: Be clear about how the engagement fits in with official decision-making processes. Will the engagement process feed into and inform these other processes effectively? It is important to identify people, groups and structures that

	can provide support to achieve any actions identified through the engagement process. **Management of information:** Having access to information (and the ability to make sense of it) is a form of power. Some groups will need to be persuaded of the benefits of both sharing information and developing a more holistic understanding of the issues. Information should be provided in an accessible way, without using complex concepts and jargon. Communication and decision-making are not purely rational processes – people's feelings, attitudes and the ways in which they process information must be taken into account. It may be necessary to present information in different ways, e.g., as values or moral opinions, scientific facts or personal experience. Explain the objectives and goals of the process in advance, as well as what participants will be required to do. **Support and capacity development:** Some groups may need training or other support to educate them to the level of other stakeholders. Examples include information that enables them to contribute to the discussions and data on likely impacts for their area or sector. **Transparency**: Stakeholder groups should be identified in an open and transparent manner. From these groups, participants should also be invited in an open manner. **Trust building:** Stakeholder processes may bring together groups with opposing views – and with them, possibly a lack of trust. If the leaders can assure all participants that, in the engagement process, every participant's view is valued and respected, the people should feel reassured that their opinions will be heard, and they will be more likely to listen to others. **Time for the process**: Lack of time is given as one of the most common constraints of many engagement processes. Since considerable time is required to develop the process, build partnerships and strengthen networks among stakeholders; raise awareness and build trust, and effective stakeholder engagement will take more time than conventional processes. **Feedback and flexibility**: Participatory processes can be very flexible. If one technique is not working, another can be used or the questions changed to obtain the required information. This flexibility must be planned, and time must be allowed to get feedback on the effectiveness of the process. Are the right questions being asked? Is everyone contributing fully? If not, what are the obstacles and what could be improved? The analysis and synthesis of the outputs should be presented to stakeholders before general dissemination. Any conflicts of interest should be stated explicitly. This demonstrates a respect for differences.
Ideas for	The APF users guidebook was aimed at technical analysts, climate

practical application	project coordinators and developers and climate change policy makers. The authors suggest that it can be used to promote dialogue amongst local communities, policy makers and the private sector regarding adaptation and the prospects for including it into national development priorities.
Concluding thoughts	• Adaptation to short term climate variability and extreme events is included as a basis for reducing vulnerability to longer term climate change • Adaptation policy and measures are assessed in a developmental context (shift away from project focus to integration of adaptation in policy and planning processes) • Adaptation occurs at different levels of society, including at the local level: links national level policy making with proactive bottom-up risk management approaches • Both the strategy and the process by which adaptation is implemented are equally important: the APF places a strong emphasis on the engagement of stakeholders who are seen as instrumental in driving each stage of the adaptation process.
References	Lim, B., Spanger-Siegfried. E., Burton, I., Malone E., Huq, S. (Eds) *Adaptation Policy Frameworks for Climate Change*, pp. 266. Cambridge, UK: Cambridge University Press, November 2004. Conde, C. and Lonsdale, K., (2005) *Engaging Stakeholders in the Adaptation Process*, Technical Paper 2 of the Adaptation Policy Framework Brooks, N. and Adger, W.N. (2005), *Assessing and enhancing adaptive capacity*, Technical Paper 7 of the Adaptation Policy Framework All available at: http://www.undp.org/climatechange/adapt/apf.html Accessed 15 April 2010

4	**Learning to Adapt: Organisational Adaptation to Climate Change Impacts**
Motivation for the work	Much adaptation literature up to this work (completed in 2004) had focused on climatic stimuli and their impacts. This work takes the perspective of the organisation with the climatic stimuli as one of many drivers for change being experienced by the organisation.
Scope	The work looks at how organisations respond to the direct and indirect impacts of climate change. The authors believe that issues of perception, interpretation, problem solving and decision-making are central to determining whether and how adaptation amongst social agents takes place. The central aim of the work was to explore which factors determine adaptation to climate change on the basis of what we know about how organisations learn.
How the work	Through case studies in the building sector and water industry

was done	(interviews and workshops) developed over a 2 year period. The building sector case studies included 2 housing associations (providing housing for low-income and vulnerable social groups) a large national commercial developer, and 2 more specialised regional developers. The water sector case study 2 large water and sewerage companies and 2 water only companies. In both case studies each organisation was chosen as they were regarded as market leaders in their approach to innovation and had demonstrated an interest in environmental issues.
Attributes identified	**Building sector:** *Internal characteristics of adaptive capacity* • **A thorough and flexible risk management process**. In many cases, climate change will be an additional risk factor, which may affect the ability to carry out other organisational functions. Effective adaptation would require integration of climatic considerations into existing risk management processes. • **Strong in-house technical expertise:** this facilitates the process of evaluating, choosing and implementing technological adaptation options. It reduces reliance on specialist consultants. • **Effective internal communication:** to raise awareness within the company about potential impacts of climate change, dissemination of information about emerging issues (e.g. the vulnerability of a certain technique) and appropriate responses to the problem. *Internal characteristics of adaptive capacity* • **Good external relationships:** with actors that drive the adaptation process. This will increase the time available to prepare for changes. • **Good relationships with actors implementing adaptation**: for example specialist consultants, designers, suppliers and contractors. **Water Sector**: *Internal characteristics of adaptive capacity* • **degree of flexibility** within the organisation's strategic decision making process. Flexibility has been well reported in the literature to be a fundamental characteristic of an effective adaptation strategy and it is clear that an organisation with a degree of flexibility built into processes such as risk management, should develop more effectively in light of climate change. • **awareness of climate change**: encompasses a range of factors, from an understanding of how climate change could affect business to an appreciation of monitoring options and internal indicators of change within their network. Links with the science base and with industry research organisations were identified to be an important mechanism for communicating science to management. Likewise,

	communication within the company between technical and strategic management levels was identified as a highly important characteristic of an adaptive organisation. • **The existing resource situation of the organization:** where an organisation is encountering resource pressures under present climate its adaptation space is likely to be somewhat limited and subsequently may constrain the level and nature of future adaptations. However, it should be noted that an organisation facing resource pressures at the present time may indeed develop its adaptive capacity further at an earlier stage due to existing circumstances alerting decision makers to future climate related risks. *External aspects of adaptive capacity* • **sound relationship with the water industry regulators** (Environment Agency and the Office of Water Services): deemed essential for any successful adaptation process. Related to this, involvement in the regulatory process concerning abstraction licenses for example, and the degree to which they are given the opportunity to express their views concerning key matters. • **transparent regulatory processes with clear time horizons:** for effective planning and risk management procedures. The decisions that regulators make are clearly fundamental to that organisation's adaptive capacity. The factors that influence these decisions are also important external controls. Thus, government policy, the economic climate and environmental objectives within Europe will all subsequently influence the adaptation options and adaptation strategy that a water company chooses.
Ideas for practical application	The authors suggest that the conceptual framework developed in the work and the concept of 'adaptation space' could be used to analyse current and possible future patterns of climate change adaptation in other sectors. Other researchers have used the framework to explore the 'adaptation space' in other contexts e.g. in the water sector in Stockholm
Key messages/key learning	In the companies studied, we conclude that adaptation is a process characterised as: • motivated by both direct and indirect signals; • based on both internal capabilities of the firm, as well as the regulatory, market and climatic context within which it operates; • involving poorly-defined choices between complex sets of measures, often made up of chains of adjustments that may involve several actors; • including the implementation of both anticipatory and reactive measures; • involving a variety of risk management strategies, including risk

	bearing, risk sharing, risk shifting and risk avoiding. Although organisations have available to them a potentially wide set of opportunities to adapt, their ability to implement them is severely constrained by a range of factors (e.g. lack of incentives, scientific uncertainty, regulatory and market context) if confronted with a climate change scenario, interviewees (including employees who work for the same company) expressed very different views about whether, how and to what extent these could affect their business companies are responding very differently to climate-related challenges, demonstrating that adaptation decisions involve an element of strategy (shaped, for example, by the organisation's attitudes to risk, its organisational culture and capabilities). Many British companies will be affected by climate change indirectly, rather than directly through weather condition, for example through changing customer demand or new requirements from the financial sector. These indirect effects are very difficult to anticipate or assess because they tend to result from a range of dynamic, interdependent and often unpredictable responses to climate change. This has implications for how adaptation processes are likely to unfold , and draws attention to the importance of uncertainty, indirect signals to adapt and processes of co-adaptation (with respect to non-climate drivers of organisational change.
References	Berkhout, F., Hertin, J. and Gann, D.M. (2006) Learning to adapt: organisational adaptation to climate change impacts, Climatic Change, 78:135-156 Berkhout, F. and Hertin, J. (2004) Methodological issues in identifying adaptive capacity of organisations, *Global Environmental Change* Berkhout, F., Hertin, J. and Arnell, N.W. (2004), Business and climate change:measuring and enhancing adaptive capacity, Tyndall Centre Technical report 11 Rudberg, P.M. (2010), *Furthering the understanding of the Adaptation Space of Organisations: a case study of adaptation to climate change and waste water in the Stockholm region*, Stockholm Environment Institute MISTRA-SWECIA working paper No 4. Available at http://sei-international.org/?p=publications

5	**Adaptive capacity and social learning: *using the shadow system***
Motivation for the work	The need to build adaptive capacity to climate change into project and policy planning is rapidly becoming a core concern. In the UK for example, public sector agencies need to both adapt their own goals and practices to take account of climate change, whilst also shaping the

	enabling environment to support the adaptive capacity of private, public and civil sector actors and individuals operating within their spheres of influence. Research on adaptation has tended to focus on describing, categorizing or analysing adaptive actions. Here the authors propose stepping back from this and looking at how adaptive capacity evolves within organizations and specifically to understand how learning for adaptation could be facilitated by opening informal and unmanaged space
Scope	This work sees adaptive capacity as arising out of social learning embedded in social relationships. The work develops a language and model for examining relational spaces as places of learning and adaptation within organizations and explores the role of the shadow system, (the space of informal interaction that lies outside of but interacts with formal institutions and relationships (Stacey (1996)).
How the work was done	Literature review and interviews conducted with key informants from the Environment Agency, the Welsh Assembly and Grasshoppers a dairy farmers group.
Attributes identified	Residual uncertainty means that crisis management must prepare the ground for the unimagined as well as planning for the unexpected. Resilient organisations which can cope with the unimagined are likely to have: • encouraged members to develop diverse social relationships and • to allow the opening of informal space beyond corporate control for individuals or sub-groups within organisations to freely experiment, copy, communicate, learn and reflect on their actions. • a balance between formal (and informal) institutions that support official organisational aims and practices on the one hand and informal institutions that give legitimacy to alternative behaviour on the other is (but how to get the perfect balance?). In complexity theory, this balance has been called the 'edge of chaos', an ideal state lying at the boundary between stability and instability, regularity and randomness. This place of bounded instability allows novelty to emerge, but in a form that is at least potentially positive and with a sense of continuity to earlier innovation. • Spaces for both single and double loop learning (asking both: are we doing things right? and are we doing the right things (involving questioning assumptions)?). There is a reluctance to do this in organisations as people tend to be risk averse and want to avoid confrontation and public discussion of sensitive issues. The increasing drive for efficiency and 'proving value' within organisations, and the tendency for centralised and top-down contingency planning and decision-making are in danger of restricting incentives for experimentation, reducing flexibility and capacity to adapt under the uncertainty of climate change.

	The empirical observations made in this study support theoretical arguments for the contribution of relational qualities such as trust, learning and information exchange in building adaptive capacity. They also caution that social networks or communities of practice will always exclude some and should not be seen as a panacea
Ideas for practical application	Questions for organisational management: • can informal social relationships be embraced inside public sector organisations or are there intolerable conflicts between the informal social relationships of adaptive capacity and needs for transparency and vertical accountability? • to what extent might contingency planning to manage risk compromise or complement efforts to build adaptive capacity to manage uncertainty? • at a practical level what tools exist to facilitate the building and maintaining of constructive social capital and social learning?
Key messages/key learning	Six kinds of adaptive action: • Learning to learn (deutero-learning) – learning to operate with ongoing adaptation. • Learning from experience (single/double loop learning) – reflecting on the merits of improving what is being done or doing something new. • Managing resources - to improve adaptive capacity. • Institutional modification - attempts to change the social context, for example by realigning their connections of social capital or by challenging or supporting particular institutions. This can also include lobbying on the behalf of a policy coalition. • Individual action on the environment - material adaptations. • Collective action on the environment – including group reappraisal of past actions, reflection on the use of resources, and changing institutions Adaptive capacity needs to be seen alongside contingency planning as the two sides of proactive risk management, so that crisis management can prepare for the unimagined as well as planning for the unexpected. [NB The concepts of deutero-learning and 'edge of chaos' approaches are also addressed in PACT, particularly at RL4. In PACT processes of emergence (e.g. as described by Stacey, 2001) are sometimes of great importance and that the times when it will be can often be predicted (often to do with capital expenditure or similar), albeit imperfectly.]
References	Pelling, M. and High, C. (2005) *Social Learning and Adaptation to Climate Chang*e Benfield Hazard Research Centre, Disaster Studies Working Paper 11 Stacey, R. (1996) *Complexity and Creativity in Organisations*, Berrett-Koehler, San Fransisco, CA

6	Case Studies of Adaptive Capacity: Systems approach to Regional Climate Change Adaptation Strategies
Motivation for the work	This case study work forms part of a wider study undertaken by the Australian Government Department of Climate Change (DCC) National Adaptation Program, the Sydney Coastal Councils Group (SCCG) and CSIRO Climate Adaptation Flagship in collaboration with the University of the Sunshine Coast. This 2 year study was one of 5 funded though the DCC Integrated Assessment of Settlements Sub-Program
Scope	The case studies focused on elucidating the three regional cross-cutting barriers to climate change adaptation (communities, planning and infrastructure) which were identified in the second phase of the project through 15 climate change workshops with Member Councils of the Sydney Coastal Councils Group (SCCG). The purpose of the case studies was to: • deepen understanding of key barriers; • inform the feasibility of future strategies to better manage the barriers; • provide a benchmark of Council response to the barriers that may form the basis for an ongoing monitoring and evaluation framework; provide recommendations to improve the adaptive capacity of regional Local Governments to manage priority climate change issues.
How the work was done	Three of the SCCG Member Councils (Leichhardt, Mosman and Sutherland Shire) were selected for the case studies based upon a range of criteria. Thirty-three semi-structured interviews with representatives from the three Councils (consisting of elected representatives, senior managers, middle managers, and operational staff) were conducted in April and May 2008. The interviews were recorded and transcribed verbatim. Data were coded in relation to: • Councils' current responsibilities for adapting to climate change; • contextual, structural, procedural, and outcomes considerations with regards to the three regional cross-cutting barriers (community, planning and infrastructure); • preferred Council climate change adaptation roles and responsibilities; • what Councils needed to do differently to achieve their climate change adaptation goals; and • respondents' expectations of this project Qualitative analysis of responses collected during the interviews was

	used to identify the key adaptive capacity issues facing SCCG Councils with respect to adapting to climate change. In addition, information collected during the 15 climate change workshops, particularly with respect to identified barriers and opportunities for adaptation, was also incorporated.
Attributes identified	Came up with 6 adaptation streams for increasing the adaptive capacity of Local Government 1. **Know your enemy**: enhancing understanding regarding existing and future climate hazards and social and ecological vulnerability 2. **Plan for Change**: incorporating climate change into existing and novel Local Government planning frameworks 3. **Get smart**: implementing education and outreach programmes to increase the knowledge of the Council and the broader community with respect to climate change, vulnerability and adaptation 4. **Act, watch and learn**: implementing monitoring and evaluation and reporting measures for Local Government to track outcomes with respect to policies and measures associated with climate adaptation 5. **Put the house in order**: developing internal and external institutional arrangements that build adaptive capacity within and across Councils and other levels of government 6. **Money talks**: enhancing revenue streams to Councils to assist in financing adaptation and cost sharing mechanisms to spread the burden among multiple tiers of government
Ideas for practical application	The following framework is offered as way to think through barriers to adaptation. The authors suggest that this framework can be used in conjunction with the adaptation pathways as a diagnostic to identify adaptive capacity interventions and to inform the feasibility of adaptive capacity and adaptation interventions. • **Context:** refers to the factors that influence the framing or characterisation of the problems and opportunities associated with climate change (e.g., social, economic, environmental, institutional and technological factors), which influence the rationality underlying a policy or other form of response. • **Structure** refers to the formal rules including legislative and policy mechanisms; as well as, formal institutional relationships for climate change adaptation. • **Process** refers to the operationalisation of formal and informal rules to address climate change adaptation through strategies and activities (e.g., resourcing, education, and capital works).

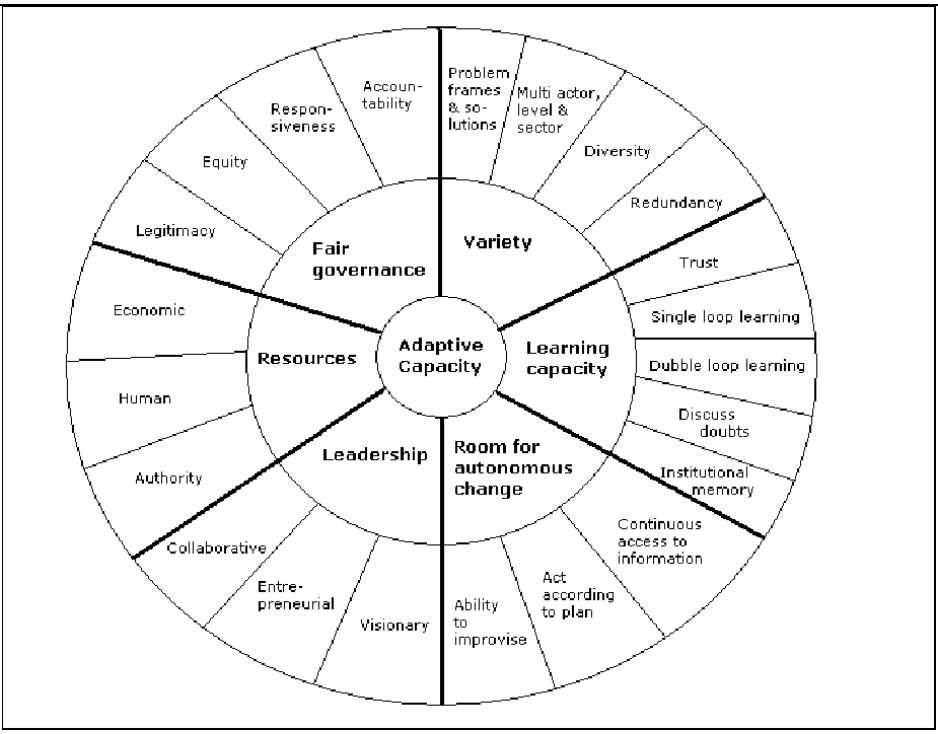
	• **Outcomes** refers to the impacts that are achieved, both anticipated and unanticipated, in relation to climate change adaptation. Outcomes also include both on-ground changes; as well as, enabling outcomes (i.e., outcomes that enable future on-ground changes such as more knowledge about how the climate change adaptation system functions). **Source: adapted from Bellamy et al. (2005)** The report describes criteria for evaluating the different adaptation streams and options to assist with prioritisation processes: • Which component of the above framework is being targeted (context, structure, process or outcome) • The cost to the council or pursuing that stream or option • The speed of implementation • The need for cooperation (just the councils or in collaboration?) • Codependency on other adaptation policies • Learning by doing – the amount of learning that is likely to result • Vulnerability reduction- directly or indirectly
Concluding thoughts	Adaptive capacity is enhanced through learning, the authors contend, thus a proactive and participatory, co-learning approach is needed to ensure that learning occurs in the critical areas of all social systems that are affected by climate change. Engaging key stakeholders at the outset of the research programme aims to maximise the adoption of research findings into decision making systems of key stakeholders. As a result, the authors suggest the following five research stages to contribute to the understanding of adaptive capacity within a broader integrated assessment: 1. Identifying relevant socio-economic patterns and trends; 2. System conceptualisation – identifying the perceived and likely vulnerabilities of each sector to climate change as well as the major and most likely adaptations to climate change; 3. Identifying the key attributes and determinants of, as well as threats to adaptive capacity; 4. Refining sectoral level understanding of and ability to manage adaptive capacity through institutional and empirical data analyses; and 5. Designing cost effective strategies to enhance adaptive capacity that include institutionalised monitoring, evaluation and learning.
References	Smith, T. (2008) Systems Approach to Regional Climate Change Adaptation Strategies in Metropolises: Phase 3 *Case Studies of Adaptive Capacity: Systems approach to Regional Climate change Adaptation Strategies,* October 2008, Australian Government Department of Climate Change Reports available at

	(accessed 16th April 2010): *http://www.sydneycoastalcouncils.com.au/system-approach-to-regional-climate-change-adaptation-strategies-in-metropolises/index.php*

7	**Characteristics of well adapting organisations** ***internal work by UKCIP***
Motivation for the work	UKCIP's role is to support organisations to be well adapting. It thus seemed important to explore what this means within the organisation, to draw out the wealth of knowledge and experience within UKCIP (and ECI) and assess whether this new understanding changes how UKCIP operates in the future. What does it mean to be 'well adapting'? What are the characteristics that make up an organisation that is adapting well?
Scope	The list of characteristics comes out of work done by UKCIP in 2009 and incorporates the views of staff from the Environmental Change Institute (ECI) and UKCIP.
How the work was done	This work comprises a series of exercises and conversations that took place in UKCIP in 2009 as part of a reflection on UKCIP's goal and strategy development.
Attributes identified	**Awareness of climate change in relation to the organisation** Climate change is seen as relevant to the organisation and there is understanding of the effect of likely impacts and current vulnerability. **Learning from experience** Adaptation is seen as a process of learning and the organisation has a reflective outlook and encourages learning from experience at various levels (learning could be of facts, skills, evaluation of action, for innovation etc) to improve future practice. **Organisational Culture** Open to change and willingness to test ideas. Able to benefit from informal structures in the organisation that support creative thinking, innovation and exploration of resistance to change at the personal and organisational level. [NB in PACT this would be typical of organizations capable of working at response levels 4 and above.] **Access to Resources** Understanding of the likely resource implications (cost, skills, time) and adequate resourcing (despite uncertainty) and ability to budget for longer time periods with some flexibility for 'rainy days' **Power to take action** Ability to recognise and support committed individuals who can identify and seize opportunities where significant steps can be made to support adaptation e.g. consideration of adaptation in key decisions with long term impact (e.g. approving plans for building a new estate) and also

	motivate others to take adaptation seriously and consider it in their work and with those they can influence. **Leadership** Senior leadership is engaged, can see how climate adaptation is necessary for the continued health of the organisation and are thus actively supporting implementation initiatives. **Key Individuals** There are visible, knowledgeable and resourced individuals who are motivated to taking action on adaptation and who can enthuse others to take meaningful action. **Action** Adaptation actions can be taken to explore possible ways forward without too many constraints to demonstrate 'best practice' or value for money (which is not available at this early stage). Such 'experimental' projects enable the organisation to explore new and innovative approaches. **Working with others** Sensitive to and able to value the needs, values and concerns of others engaged in related aspects of adaptation and to work on common goals as supportive part of the wider community/sector. **Internal communications** Able to effectively communicate risks, opportunities and options for adaptation, engage key players and develop effective dialogue internally on priorities and next steps. **Strategy** Adaptation is seen as an integral part of all long term business plans, is systematically integrated into strategies and seen as an important consideration in big (high consequence, high cost) decisions. **Operations** Strategy level decisions are translated effectively to the operational level with participation from the operational level and training made available to support changes. **Decision making** Decision making is done in an 'iterative' learning approach that incorporated 'new knowledge' and involves all levels including the 'coal face'. Decisions can be made despite uncertainty. **Access to information/knowledge** Scientifically based workable guidance is available and there are opportunities to make sense of the information and contextualise it (what does this mean for us?) to develop usable knowledge for adaptation decisions **Big Picture** There is a realistic understanding of the wider context and existing

	constraints (legal, technical political, economic, demographic etc.) and a curiosity about which constraints are rigid and which can be shifted within the scope of the enquiry. **Risk assessment** Understanding of how what is known about current and futures climate risks could affect operations and willingness to explore alternative strategies to reduce and manage risk on an ongoing basis. **Networks and joint activities** Effective and functioning networks exist that support collective action, discussion, sharing of experience and learning between individuals and groups for the achievement of adaptation goals. **Measurement/evaluation** It is possible to develop shared ideas of what successful adaptation looks like for the organisation and determine effective indicators for evaluating it and developing targets.
Ideas for practical application	The list was used in a second exercise to categorise the characteristics into the following groupings. Is this characteristic something that UKCIP a) already does well; b) should improve c) should develop or d) should never do?
Concluding thoughts	Undertaking this exercise enabled us to have discussions about a range of issues that are core to our work that had not been explored in a structured way before. It was useful to recognise that there was a lot of consensus about what characteristics make up a well adapting organisation and that many of them were simply good organisational practice for any event rather than specific to climate change.
References	For more information see: Lonsdale (2009), *Beyond the tools survey: exploring what it means to be well adapting*, internal UKCIP document ,

8	**Adaptive Capacity Wheel**
Motivation/ hook for the work	National adaptation plans are now being developed and eventually this will lead to adaptation at an institutional level. Institutions can act to both enhance and hamper the adaptive capacity of a society. This work asks '*What characteristics make an institution more or less helpful for development and implementation of adaptation strategies?'*
Scope	The purpose of the Adaptive Capacity Wheel is to examine an institution in terms of its strengths and weaknesses and opportunities for improvement. Adaptive Capacity Wheel shows the inherent capacity of an institution to respond to change. *Adaptive capacity* is defined as: • the extent to which institutions enable actors to adapt to climate change and • the extent to which the institutions themselves can be changed by actors in order to adapt to climate change.
How the work was done	The Adaptive Capacity Wheel, an analytical framework to assess the adaptive capacity of institutions was developed from existing literature. It consists of six dimensions which are operationalised into 22 criteria. The framework was applied to formal institutions in a content analysis. Using the wheel an overview was made of all relevant documents concerning climate adaptation in the Netherlands in general and concerning the four sectors of agriculture, nature, water and spatial planning.
Attributes identified	

<table>
<tr><td>Ideas for practical application</td><td>The wheel can be used to assess policies using a scale e.g.
The colour-scheme for the scoring of the Adaptive Capacity wheel
<table>
<tr><th>green</th><th>lime</th><th>light yellow</th><th>light orange</th><th>red</th><th>white</th></tr>
<tr><td>Institutional structure enhances adaptive capacity for adaptation</td><td>The structure exists, and could but is not (yet fully) applied to adaptation</td><td>Neutral score (positive nor negative effect expected)</td><td>Gap that needs to be filled to counteract negative effect on adaptive capacity</td><td>Institutional structure obstructs adaptive capacity for adaptation</td><td>Unknown (no information available to apply a score)</td></tr>
</table></td></tr>
<tr><td>Concluding thoughts</td><td>Advantages of the framework are:
• It is a first effort to provide a comprehensive (but not limitative) list of criteria for assessing adaptive capacity provided by institutions;
• Applying the criteria in a systematic way shows which sectors need attention, and where a specific policy or law can be improved to enhance adaptive capacity;
• It can be used as a tool for learning between sectors on how institutions can be built in order to provide more adaptive capacity;
• It provides some first hints in which respect Dutch institutions seem to be developed well (e.g. learning) and in which respects there seems to be a gap in Dutch institutions (e.g. authority).

Weaknesses,
• Not based on ‘hard measurement’
• There is no proof that a maximum score on each of the 22 criteria will lead to better adaptation to climate change. As the framework has a number of assumptions that need to be tested. The most crucial assumptions are that institutions can enhance adaptive capacity, and that our 22 criteria are able to capture the most relevant aspects of adaptive institutions and that is possible/useful to aggregate scores, because there are tensions between criteria, and we have little information about the mechanisms that may link them up.

Other thoughts from application of the wheel:
• Adaptation to climate change may be easiest in an institutional void –a situation where institutions are absent.
• institutions may follow adaptation automatically, and that there is no need to assess adaptive capacity beforehand.
• The authors suggest that the Wheel should only be used as a tool to facilitate discussions on existing institutions in relation to climate adaptation.
• Sometimes dimensions and criteria seem to contradict each other, which is not surprising, because this reflects existing paradoxes in the governance of society.</td></tr>
</table>

References	Klostermann, J., Gupta, J., Termeer, K., Meijerink, S., van den Brink, M., Nooteboom, S., Jong, P., Bergsma, E. and Biesbroek, R. (2009) *How to assess the adaptive capacity of legislation and policies* Paper for the 2009 Amsterdam Conference on the Human Dimensions of Global Environmental Change 'Earth System Governance. People. Places and the Planet.', 2-4 December 2009, Amsterdam

9	**The National Adaptive Capacity Framework:** ***Key institutional functions for a changing climate***
Motivation/hook for the work	The recognition of the need that all nations have to create plans to enable them to be well adapting to climate change and that although the actual plans will differ significantly between countries there is value in identifying common 'adaptation functions'.
Scope	The National Adaptive Capacity Framework identifies a fundamental set of national level functions that all countries will need to perform if they are to be adapting effectively over time. Adaptation is considered to be an 'organic process' as it will inevitably grow and evolve in unexpected ways and be developed by different countries in different ways. The relationships between adaptation actors (business, government agencies, NGOs etc) is viewed as an 'adaptation system' (with reference to ecological systems). Despite the differences all national adaptation systems will have to perform similar functions if adaptation is to be effective. The key question considered is '*what am I able to do to help me adapt*?'
How the work was done	The NAC was developed by the World Resources Institute in consultation with a wide range of adaptation experts and stakeholders.
Attributes identified	As well as the principles of adaptation (see below: concluding thoughts) the NAC identifies 5 adaptation 'functions' namely" • **Assessment:** the process of examining the available information and using it to guide decision-making. To be well adapting these need to be iterative, include vulnerability assessments, climate impacts, adaptation practice and the climate sensitivity of development activities • **Prioritisation**: assigning special importance to certain issues, areas, sectors or populations. To be effective such prioritisation processes need to be transparent, engage a wide range of stakeholders and be reviewed as circumstances change. • **Coordination**: to avoid duplication or gaps. This may be horizontal e.g. among ministries, vertical e.g. among sub-national groups or inter-sectoral e.g. partnerships between government, business, civil society • **Information management**: analysing and disseminating relevant, accurate information and knowledge to support adaptation e.g. for raising awareness or building capacity to act • **Climate risk reduction**: a distinct process for identifying specific

	risks, evaluating options and selecting and implementing risk reduction measures
Ideas for practical application	The framework can be used to assess how well functions are being performed in order to identify opportunities and priorities for building adaptive capacity and implementing key activities. It is aimed at planners (planning commissions, bureaucrats, consultants); evaluators (parliamentarians, academics, consultants) and advocates (civil society groups wishing to promote awareness of adaptation)
Concluding thoughts	The NAC refers to a number of important principles of adaptation namely: • **Adaptation is a capacity building process**: adaptation requires commitment to action over decades, not just quick fixes. • **Adaptation requires a 'learning by doing' approach**: action cannot be delayed due to uncertainties in the scientific information, capacities that support experimentation and effective learning from action are required • **Effective adaptation depends on multi-stakeholder processes that are participatory and transparent**: this cannot be solved in silos so attention must be paid to ensuring that all the necessary players are brought in in an effective and timely manner • **The need to 'start where you are'**: there are a number of possible starting points (e.g. top down and bottom up and all can provide a good basis for and effective plan) and • **The requirement to be flexible :** there is no one size fits all solution, each country will craft a unique process for adaptation planning that is relevant to the national priorities, resources and skills available
References	WRI (2009), *The National Adaptive Capacity Framework: key institutional functions for a changing climate*, Pilot Draft, World Resources Institute. Further information available at: www.wri.org

10	**Eight determinants of Adaptive Capacity**
Motivation/hook for the work	The work was done in order to develop a practical method for evaluating systems abilities to handle external stress.
Scope	The method was designed to assess the potential contributions of various adaptation options to improving systems coping capacities by focusing attention directly on the underlying determinants of adaptive capacity.
How the work was done	An artificial application was used to describe the development of the method and to illustrate how it might be applied. Some empirical evidence is given in the reference below to underscore the significance of the determinants of adaptive capacity in determining vulnerability;

	these are the determinants upon which the method is constructed. The method was then applied directly to expert judgments of six different adaptations that could reduce vulnerability in the Netherlands to increased flooding along the Rhine River.
Attributes identified	**1. The range of feasible technological options for adaptation** 2. **The availability of resources and their distribution:** Are they are available to those needing to make decisions about adaptation? 3. **The structure of critical institutions and their ability to solve conflicts between stakeholders:** In the Dutch example the government can act in a very autocratic manner with respect to water management but have tend to be trusted by the public. *4.* **The stocks of human and social capital:** This includes education and personal security. For example, the authors assert in the paper '*Dutch water engineers are the best in the world'.* Also, The Netherlands is a consensus oriented society where collective need counterbalances the need of the individual. 5. **Access to risk spreading mechanisms**: e.g. access to insurance, compensation and charity. 6. **The ability of decision makers to manage risks and information:** Their ability to determine what information is credible and trustworthy, the credibility of the resulting decisions, access to expertise, where necessary and trust in decision makers themselves within society. 7. **The public's perceived attribution of the source of the stress**: Their awareness of climate change as an issue and belief that it is a man-made phenomenon. 8. **The significance of the exposure to its local manifestations**: Having an accurate understanding of the implications of climate impacts at a local level and what can be done to adapt well.
Ideas for practical application	The authors suggest that the method developed should be sufficiently flexible to accommodate diverse applications whose contexts are location specific and path dependent without imposing the straightjacket constraints of a 'one size fits all' approach. The method should produce unitless indicators that can be employed to judge the relative vulnerabilities of diverse systems to multiple stresses and to their potential interactions.
Concluding thoughts	The authors note that many of these variable cannot be quantified and many of the component functions can only be quantitatively described
References	Yohe, G.W. and R.S.J. Tol (2002), '*Indicators for Social and Economic Coping Capacity – Moving Towards a Working Definition of Adaptive Capacity*', Global Environmental Change, 12 (1), 25-40. (Q20) Yohe, G.W. and R.S.J. Tol (2007), *The weakest link hypothesis for adaptive capacity: An empirical test,* Global Environmental Change, Volume 17, Issue 2, Pages 218-227

11	Hallmarks of a well adapting organisations
Motivation/hook for the work	The work was done as part of a high-level review impacts research relevant to WWF's global network of Priority Places. Asks the question: 'What do organisations that are adapting to climate change look like?'
Scope	Recognises that adaptation is highly context and scale dependent so an organisation might not necessarily exhibit all these features. However, the inventory provides a practical basis for reviewing the priorities and progress on adaptation capacity building within public and private sector organisations.
How the work was done	Examples are drawn from a survey of statutory regulations, guiding principles and organisational documents shaping current practice, with particular emphasis on the water and conservation sectors of industrialised nations.
Attributes identified	The presence of following hallmarks are suggested as providing an indication of an organisation's capacity to adapt: • **Visionary leadership:** Climate change champions are clearly visible, setting goals, advocating and resourcing initiatives on climate change adaptation; • **Objective setting:** Climate change adaptation objectives are clearly stated in corporate strategies and regularly reviewed as part of a broader strategic framework; • **Organisational learning**: Flexible structures and processes are in place to assist organisational learning, upskilling of teams, and mainstreaming of adaptation within codes of practice; • **Monitoring and reporting progress**: Progress in adapting is monitored and reported against clearly defined targets; • **Risk and vulnerability assessment:** Comprehensive risk and vulnerability assessments are being undertaken for priority activities and areas of business; • **Guidance for practitioners**: Scientifically-based, workable guidance and training on adaptation is being put in place for operational staff; • **Low–regret adaptive management**: Adaptation pathways are being guided by precautionary principles that deliver "low regret" anticipatory measures in the face of deep uncertainty; • **Multi-partner working**: networks are in place that are sharing information, pooling resources and taking concerted action to realise complementary adaptation goals; • **Effective communication**: with internal and external audiences in raising awareness of climate risks and opportunities, realising behavioural changes, and demonstrating adaptation in action.

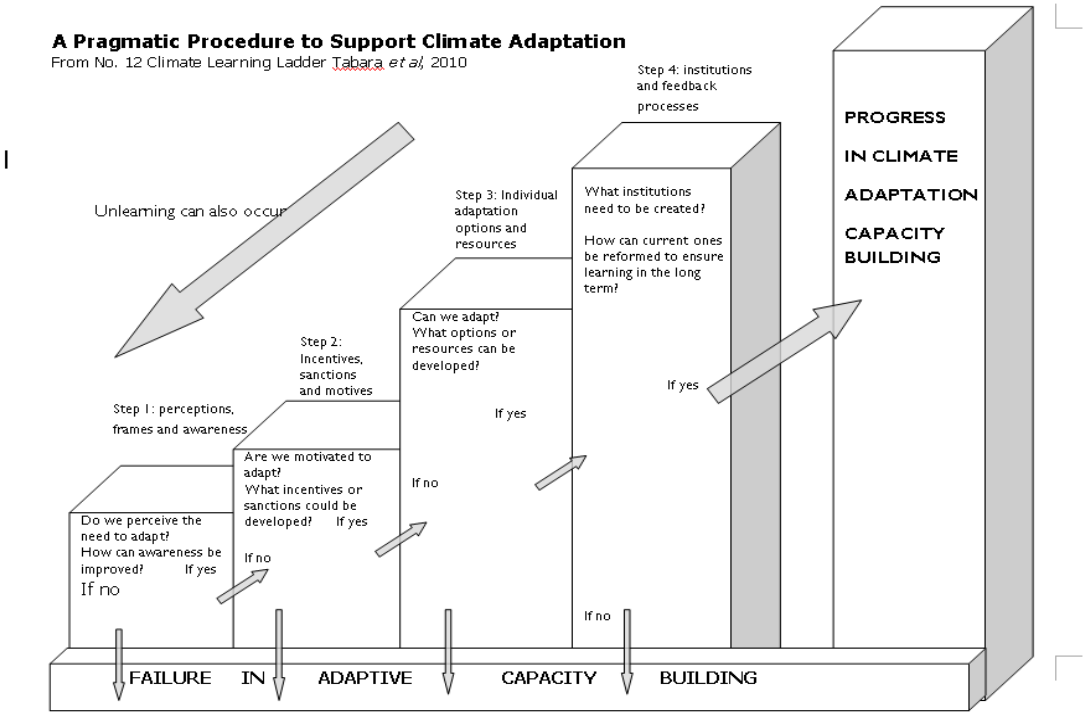
Ideas for practical application	The authors suggest that these hallmarks can be used to provoke debate and review priorities and progress on institutional capacity building. Any obstacles, knowledge gaps, potential synergies and incentives identified could then be addresses by an organisational adaptation strategy.
Concluding thoughts	Climate change is already impacting some systems, sectors and regions so adaptation is needed regardless of progress on mitigation. Although scientific knowledge is improving there is still much uncertainty and robust adaptation decisions will need to be taken especially where tipping points are approaching fast, inevitably narrowing the range of possible options and the urgency of anticipatory action.
References	Wilby, R. and Vaughan, K., (2010) *Hallmarks of organisations that are adapting to climate change*, Water and Environment Journal, in press.(published online Mar 2010) Wilby, R. (2008), *Towards a Climate Smart WWF: Hallmarks of an adapting organisation*, WWF-UK internal report.

12	**The Climate Learning Ladder** ***A Pragmatic Procedure to Support Climate Adaptation, Environmental Policy and Governance***
Scope	The authors offer a new pragmatic procedure called the *climate learning ladder* to structure policy analysis, support reflection and identify critical decisions to support climate adaptation.
How the work was done	This tool is the result of the reflexive learning process that occurred while developing innovative appraisal methods in the Alxa League of Inner Mongolia, China, and in the Guadiana river basin in the European Union. Building capacities to cope with climate change requires going beyond simply providing more knowledge on climate impacts to policy makers. Instead, climate adaptation can be understood as a multi-step social process in which individuals and organizations need to learn how to: (1) manage different framings of the issues at stake while raising awareness of climate risks and opportunities, (2) understand different motives for, and generate adequate incentives or sanctions to ensure, action, (3) develop feasible options and resources for individual and collective transformation and collaboration and (4) institutionalize new rights, responsibilities and feedback learning processes for climate adaptation in the long term. These four dimensions are then presented as a hypothetical 'ladder' in

	a chain of conditions that the authors propose are crucial for adaptive climate capacity building. The four steps represent a series of different research questions and policy arenas that need to be considered in order to reflect on how to successfully develop such climate learning capacities in the long term. 'Unlearning', or 'moving down the climate ladder', may also occur wherever agents and institutions lose the knowledge and capacities acquired over time to cope with climate risks.
Attributes identified	***1- Perceptions, frames and awareness***. The first condition for making any strategy aimed at dealing with a given issue is to perceive the need or opportunity for doing so. Thus, the first questions to be asked here are whether agents perceive the need to adapt to climate change, and what the opportunities and constraints are to improve climate adaptation awareness. Policy analysts and practitioners interested in exploring and/or improving awareness of climate change risks and opportunities may need to ask how different agents frame the issues at stake, whether different perceptions can be reconciled or improved on the basis of new scientific insights. Failure to reconcile such perceptions may impede action. The understanding of vulnerabilities and the downscaling of scientific knowledge and assessments to the regional or local level may not merely be a question of providing facts and figures to local and regional authorities. Rather, the challenge is to integrate the different organizational languages, views and expectations of the responsible institutions and agents involved, regarding climate adaptation. ***2- Incentives, sanctions and motives.*** People may be aware of particular problems but lack sufficient motivation to deal with them. Understanding the multiple motives that drive different agents is crucial to articulate collective action. Thus in this step we ask whether agents are sufficiently motivated to adapt to climate change, and what types of incentive or sanction can be developed to support effective action. Different incentives will have different effects on efficiency, equity and power relationships. The governance of climate change is therefore a question of how to manage different motives, expectations and moral norms as well as power relationships. ***3- Individual adaptation options and resources.*** As a third step in the process of climate capacity building, analysts and policy makers can benefit from thinking through how to provide feasible options and resources to individuals and organizations to adapt to climate change. Questions arise here as to whether individual climate adaptation options are possible, what forms of individual transformations can be developed, what new technologies may be implemented and what new networks can be promoted.

	Specifically, and to become effective and meaningful, climate options need to be mainstreamed into broader strategies of sustainable development and seen by individuals to be opportunities to improve their own personal conditions in many other areas. Among other questions, we asked what types of resource had been or could be mobilized to support climate adaptation, for what purposes and by whom. ***4- Institutions and feedback processes***. The only way to secure sustained collective action is to develop new institutional arrangements or modify the existing ones in ways that clarify different rights and responsibilities of both individuals and organizations. Thus, as a final step in the process of using the ladder as a heuristic tool for research and policy reflection, one needs to ask what the current state of development of climate adaptation institutions is, what new institutional arrangements can be created or how the existing ones can be modified so as to ensure learning feedbacks and adaptation in the long term. While we have depicted this reflexive learning process about what is needed for climate capacity building as a sequence of conditions related to particular questions and decisions, it is obvious that, once institutions are created, they may also contribute positively to the whole process of climate learning or, negatively, unlearning. Institutions may actively contribute to, or impede, awareness, develop or prevent the implementation of new incentives or sanctions, and create new options and resources or divert them to other purposes. Indeed, learning occurs as a result of iterative, rather than linear, processes. This is why, from this social learning perspective, agents working in institutions involved in climate adaptation need to find ways of reflexively reframing and redefining their original goals as new information, knowledge, experiences and value judgments emerge from different sources. In other words, institutions need to 'learn how to change to adapt and learn how to adapt to change'
Ideas for practical application	The authors have used this framework to facilitate dialogue with regional climate policy makers and stakeholders from the Andalusian government and Guadiana river basin (between Spain and Portugal) in the context of the EU project ADAM (www.adamproject.eu). They found that the climate ladder tool works effectively to communicate complex issues regarding climate change issues among different stakeholders and that progress in learning and building integrated climate governance capacities cannot be done by working at one single level, scale, or policy domain but that interaction between groups with different interests, responsibilities and types of knowledge is needed.

Key messages/key learning	The ladder is best understood visually and it reproduced at the end of this report.
References	*The Climate Learning Ladder. A Pragmatic Procedure to Support Climate Adaptation*, Environmental Policy and Governance, 20 (1-11, 2010) J. David Tàbara, Xingang Dai, Gensuo Jia, Darryn McEvoy, Henry Neufeldt, Anna Serra, Saskia Werners and Jennifer J. West



13	**Ten Traits of Adaptive Organisations**
Motivation/hook for the work	To answer the following question '*Some organizations prosper through continuous change while others do not. What is it that sets the two groups apart*?'
Scope	Organisations (specifically businesses in this case) must continuously adapt to changing circumstances in order to survive. Such change can happen rapidly, especially in the business world, and frequently requires an immediate response if the business is to survive.
How the work was done	The list of traits was compiled by the organisational management consultancy, KPMG and is based on their work with Canadian private companies. They acknowledge that there are a number of ways that organisations can adapt effectively to changing circumstances but have observed ten traits that are common in organizations that are adaptive and therefore more likely to survive.
Attributes identified	1. **Vision**: Vision provides a sense of direction and inspiration, as well as a framework for decision-making. Adaptive organizations have a clear sense of where they are going and why. More importantly, they

	regularly re-examine their vision to ensure that the vision is revised should encompassing changes occur. A strong visioning process provides a case for change which helps marshal the organization and foster the development of adaptive attributes or initiatives. 2. **Balance of leadership and management**: Leadership provides the direction and motivation that supports change and adaptation. Leadership is not confined to those in the top level of a business's organization chart; leadership can be found throughout an organization. Leadership is exhibited by all who encourage others to accept, support and even embrace new behaviours. Management provides control and predictability. While necessary to the successful day-to-day operation of a business, management can be a barrier to change. A balance of these seemingly opposed behaviours is necessary for long term success. 3. **Flat organizational structure**: Flat organizations minimize the bureaucracy that is often an impediment to change in multi-layered organizational structures. In successful flat organizations, all employees are empowered to get the job done. Reaction to changing environments is made on the front lines, resulting in faster organizational adaptation. 4. **Open culture**: Adaptive organizations have an open culture that rewards and encourages innovation. These organizations regularly challenge their business model and develop continuous improvement initiatives that support organizational evolution. One high-profile example of an open culture is Google, where engineers are encouraged to spend up to twenty per cent of their time on innovative projects. 5. **External input**: Adaptive organizations regularly seek input from value chain partners and outside advisers to help them gain an early appreciation of the external changes that will impact their business. Valuable lessons can be learned from customers who are coming to terms with their own changing environments. Objective points-of-view will also provide unique insights that can contribute to the development of alternative courses of action. 6. **Forward-looking measurements**: What gets measured has a direct influence on organizational behaviour. Organizations that focus exclusively on historical measures can find themselves rooted in the past. Forward-looking measures, such as trends in sales to new customers or from new products, focus on results that are predictive of change and adaptability. Adaptive organizations develop measurement parameters that align with their vision and focus organizational energy on priorities that will influence the future of the business. To enhance alignment, compensation is often tied to forward looking measures.

	7. **Investment in continuous learning**: Adaptive organizations invest heavily in continuous learning. These organizations seek out opportunities for employees to develop new skills and rigorously build internal capabilities to help support the ongoing evolution of the business. 8. **Effective internal communications**: Effective, efficient communication is a crucial ingredient in implementing change. Communication is an art and does not stop with memos, voicemails and internal meetings. Real communication must be infectious, viral and repetitious to be effective. Adaptive organizations tend to have leaders who are good communicators and who invest heavily in the internal communications process, ensuring that everyone in the organization understands priorities, direction and vision. 9. **Strong business model**: Adaptive organizations almost always have a strong business model, albeit one that is not cast in stone. They continuously strive to enhance their position in the value chain, seeking to adapt their business model to best deliver added value, leading to profitable results. Ironically, organizations with low profitability require change the most, but will struggle to find the resources necessary to invest in responses to their changing environment. 10. **Regular review of assumptions**: Adaptive organizations challenge their business assumptions at least once a year, often quarterly. Regular reviews of key performance indicators and the competitive business environment can help determine if critical assumptions are no longer valid, leading to timely changes in approach and investment.
Ideas for practical application	The authors suggest assessing a business's adaptability by rating the extent to which the traits listed above are descriptive of the organisation. They suggest that focusing on these key attributes of adaptive organisations will help to develop and embed an adaptive culture that will help organisations thrive in an ever-changing environment.
Key messages/key learning	The list produced here is not specific to changes brought about by a changing climate but is provided here due to the similarity of many of the traits with attributes identifies though work on organisations adapting to climate change.
References	http://www.kpmg.ca/en/services/enterprise/issuesGrowthTenTraits.html accessed 14th April 2010

14	**UKCIP's Principles of Good Adaptation**
Motivation/hook for the work	Despite the difficulties associated with defining a particular adaptation measure as being good, acceptable, or successful, there are principles of

	good adaptation that can be used to inform the selection process. One such set of principles has evolved through practice and identifies the following aspects of the adaptation process as being characteristic of those processes that have led to good adaptation.
How the work was done	The principles were developed as part of the Risk Uncertainty and Decision-making Framework in 2003, and were modified in 2008.
Attributes identified	• **Work in partnership** – identify and engage your community and ensure they are well informed**.** • **Understand risks and thresholds**, including associated uncertainties. • **Frame and communicate SMART* objectives/outcomes** before starting out. • **Manage climate and non-climate risks using a balanced approach** – assess and implement your approach to adaptation in the context of overall sustainability and development objectives that includes managing climate and non-climate risks. • **Focus on actions to manage priority climate risks** – identify key climate risks and opportunities and focus on actions to manage these. • **Address risks associated with today's climate variability and extremes** as a starting point towards taking anticipatory actions to address risks and opportunities associated with longer-term climate change. • **Use adaptive management to cope with uncertainty** – recognise the value of a phased approach to cope with uncertainty. • **Recognise the value of no/low regrets and win-win adaptation options** in terms of cost-effectiveness and multiple benefits. • **Avoid actions that foreclose or limit future adaptations** or restrict adaptive actions of others. • **Review the continued effectiveness of adaptation decisions** by adopting a continuous improvement approach that also includes monitoring and re-evaluations of risks. * *SMART objectives – specific, measurable, achievable, results-oriented, and time-bound objectives.*
Ideas for practical application	These principles are offered as a check for selecting adaptation actions
Key messages/key learning	Combines some principles of good general management with some more specifically aimed at a risk assessment process
References	Willows and Connell, 2003

	http://www.ukcip.org.uk/index.php?option=com_content&task=view&id=78&Itemid=194 accessed 14th April 2010

15	**An indicative list of Ten Questions on Adaptation**
Motivation/hook for the work	The Royal Commission on Environmental Pollution, in their 2010 report on Adapting Institutions to Climate Change, offered a list of ten questions which they hoped organisations might use to start their consideration of the need for adaptation.
Attributes identified	1. have you identified the possible range of impacts of climate change on the activities and responsibilities of your institution or business, and their timescales 2. Do you understand the nature of, and the limitations in, the climate projections in UKCP09? 3. Do you understand that adaptation to climate change is an open-ended process, not a single action that will solve your problems or reduce your risks? 4. Have you framed the questions and issues to be addressed adequately, so as to avoid tackling the wrong problem, or making matters worse? Do you understand how the risks posed by climate change interact with, and might change, the other risks your organisation has to respond to? 5. Have you identified options for adaptation, and devised flexible plans and strategies that can deal with uncertainty? 6. Are you embedding consideration of adaptation into your core business? Is there the right accountability for actions at the most senior levels of your organisation? 7. Are the objectives and aims of your organisation fit for purpose in a changing world? Are you aware of the powers and duties affecting your organisation? 8. Who are the significant other stakeholders (including members of the public) with whom you need to interact to deliver adaptation? Are there barriers (perceived or real) that might make collaboration difficult? How do you plan to negotiate these barriers? 9. Do you have mechanisms in place to listen and respond to alternative views on the ways of dealing with climate change, new ways of thinking, and ways of evaluating the success of past actions in relation to climate change?

	10. Do your organisations planning and investment cycles allow for new insights and information about climate change to be taken into account?
Ideas for practical application	The RCEP expressed the hope that "these questions will stimulate those who have not yet begun to face that challenge of adapting to climate change to do so".
References	Royal Commission on Environmental Pollution (2010)

16	**The National Audit Office:** ***Adapting to Climate Change: a review for the Environmental Audit Committee***
Motivation/hook for the work	This work by the National Audit Office was undertaken in response to a request from the Environmental Audit Committee to provide an overview of government policy on adapting to climate change.
Scope	Includes the implications of the Climate Change Act 2008, the cross-government Adapting to Climate Change Programme, and progress across government Departments in identifying and managing risks from future climate change impacts. As adaptation is a devolved issue, the work covers government policy in England and the UK for reserved matters, not the work of the national authorities in Wales, Scotland or Northern Ireland in regard to their devolved functions. Also, it covers government policy on domestic climate change adaptation, rather than action internationally to help developing nations adapt to climate change.
How the work was done	This review examined publicly available documentation, undertook interviews with officials from the ACC Programme, and asked Departments to undertake a self-assessment of their current capacity to assess and manage climate change risks, using a model based on principles of effective risk management developed by HM Treasury.
Attributes identified	Departments were asked to score themselves against five levels of progress: 1. Getting started 2. Awareness and understanding; 3. implementation planned and in progress; 4. implemented in all key areas and finally, 5. embedded and improving. The areas covered are as follows: • **Leadership –** the extent to which senior departmental management support and promote assessment and management of climate change risks;

	• **Policy and strategy** – the clarity of their departmental strategy for assessing and managing climate change risks; • **People** – the extent to which departmental staff are equipped and supported to manage climate change risks; • **Partnerships** – the development of arrangements for managing climate change risks with other organisations such as sponsored bodies, private finance contractual partners, suppliers, local/regional government, and other Departments; and • **Processes** – the extent to which Departments have implemented effective processes to deal with climate change risks in areas such as impact assessments, policy making, programme management and operations (e.g. estates management and procurement).
Ideas for practical application	The report details how the framework was applied across Government Departments in a self-assessment exercise. In addition to key informant interviews this can provide a useful guide to levels of activity and understanding.
Concluding thoughts	Some form of validation of the self-assessment would be useful in order to check responses and provide useful feedback for the Departments and tailored guidance for appropriate next steps.
References	NAO, (2009), Adapting to Climate Change,: a review for the Environmental Audit Committee, available at: http://www.nao.org.uk/publications/0809/adapting_to_climate_change.aspx accessed April 2010 HM Treasury's Risk Assessment Framework (HM Treasury (2004) Risk Management Assessment Framework: A tool for Departments).

17	**Planning to Adapt to Climate Change** **National Indicator 188**
Motivation/hook for the work	The motivation for developing this indicator was to have a way to identify progress and assist in embedding the management of climate risks and opportunities across all levels of services, plans and estates.
Scope	National Indicator 188 (NI 188) is designed to help local authorities assess and address the risks and opportunities presented by a changing climate, as well as provide a tool for measuring preparedness. The indicator is one of 198 making up the National Indicator Set, part of the Local Government Performance Framework introduced in 2008. It has a three-year life span, from April 2008 to March 2011. As a process rather than outcome indicator NI188 both recognises that our understanding of the adaptation agenda is not yet sufficient to specify outcomes, but also that climate impacts are local and it is impossible to have a generic

	outcome indicator at the moment which is applicable to all areas. The indicator attempts to gauge progress of a local area in: • assessing the risks and opportunities comprehensively across the area; • taking action in any identified priority areas; • developing an adaptation strategy and action plan, which should set out an assessment of the risks and identify where the priority areas are, what action is being taken to address these, and how risks will be continually assessed and monitored in the future; and • implementing, assessing and monitoring the actions on an ongoing basis. Adapting to climate change will be a continuous process, therefore Defra is not looking for a local authority to have completed the process by the end of the period. Work may not progress sequentially at the same speed for all aspects of the programme, or for all areas of risk. NI188 seeks to be sufficiently flexible to accommodate this variety and range of responses.
Attributes identified	In the assessment matrix the following aspects of the adaptation process are identified and progress is measured in relation to them. The guidance with NI188 identifies actions that are indicative of progress in each of these aspects for the different levels (0 to 4). For example, some of the attributes for the different aspects chosen are: **Leadership** • Lead people are identified to manage the process. • There is good internal communication • There is a public commitment to adaptation • Resources are allocated • Encouragement and support for LSP partners to collaborate • Adaptation is mainstreamed across the organisation **Partnership** • Identified where expertise lies with in the partnership e.g. on developing risk assessments • Develop approaches with a view to similar approaches being used by the LSP partners • Supporting the LSP and partner organisations in managing changing climate risks across the wider local authority area. • sharing LA experiences and examples of adopting a risk-based approach to adapting to a changing climate with LSP partners **Assessing current situation** • From both risk and vulnerability perspectives • Development of baseline information • Undertaking an LCLIP (UKCIP, 2009a) or similar • Comprehensive assessment undertaken for local authority and partners

	Assessing future situation • In relation to what is known about climate changes • Developing expertise in using climate information e.g. UKCP09 • Using tools e.g. BACLIAT (UKCIP, 2009b) or similar • A prioritization process is undertake to identify key risks **Developing an approach** • Identifying appropriate responses • Prioritization using e.g. CBA or similar **Action plan** • Development of a comprehensive plan of action • Identifying quick wins for LA and LSP partners • Identifying opportunities to mainstream adaptation action in to normal business **Implementation** • Evidence of taking the necessary action in the local authority and in the LSP for both delivering adaptation options and building adaptive capacity • Ensuring continuity of service across the whole authority • For high level (4) this has to be implemented comprehensively across the local authority **Monitor and review** • Presence of robust systems of monitoring and review • Updating plans in the light of changing circumstances and new evidence
Ideas for practical application	The data for National Indicator 188 (NI188) is provided through self assessment by the local authority and local strategic partnerships (LSP). Local authorities report the level of preparedness they have reached against the levels of performance, graded 0 to 4. A higher number represents further progress made in planning to adapt. Each authority will have set their targets for the level to be reached by the end of Year One, Year Two and Year Three. The levels are: Level 0 Getting started Level 1 Public commitment and impacts assessment Level 2 Comprehensive risk assessment Level 3 Comprehensive action plan Level 4 Implementation, monitoring and continuous review To help local authorities respond, the Adapting to Climate Change Programme team, Government Offices, the Nottingham Declaration Partnership, the Local Government Association, Environment Agency, UKCIP and others, provide support for local authorities and their partners in Local Strategic Partnerships through the Local and Regional Adaptation Partnership (LRAP).
Concluding	Evidence suggests that NI188 has significantly increased the level of

thoughts	commitment of local authorities to taking action on adaptation even for those that had not identified it as a key indicator. A recent review of the use of NI188 by local authorities (Davis, 2009) identified that completing the self-assessment was considered a useful process but that a stronger steer was required for local authorities to understand how to justify levels of achievement. A 'light touch' external scrutiny or feedback process would enable them to have a more consistent approach to self-assessment.
References	Davis, A (2009) National Indicator (Ni) 188: Year 1 Review And Analysis, In House Policy Consultancy (IHPC). Available at: http://www.defra.gov.uk/corporate/about/with/localgov/indicators/ni188.htm accessed April 2010 LRAP, (2010) Adapting to Climate Change, Guidance Notes for NI188, available at: http://www.defra.gov.uk/corporate/about/with/localgov/indicators/ni188.htm accessed April 2010

Section 3 Organisational change and learning theory for adaptation: selected theory of relevance to building organisational adaptive capacity

3.1 Introduction

The following section gives a 'taster' of the organisational change and learning literature and describes how it can be used to support understanding of how change happens in organisations and thus what will enable them to adapt well. The choice of what to include was influenced by the time constraints for this piece of work and a focus on theories that distinguish transformational as opposed to incremental change. Needless to say, there is much more to be said. Many works have been omitted or explained only briefly. It is offered as an introduction and guidance on where to go for further exploration of the fields is given in the references in Section 6.

3.2 Exploring framings of climate change

That climate change can be viewed from a number of different perspectives has been apparent for some time (Hulme, (2009)). These perspectives are fundamental in shaping the way people understand the world and can to a large extent, account for the fact that people come to very different conclusions based on the same basic evidence. The importance of such frames in shaping how people approach climate change, and other complex issues, is often poorly dealt with in decision making, with the issue often remaining tacit and unexamined, although this is partially dependent on the individual and the institutional culture.

Explicit consideration of the frames in use and the exploration of alternative perspectives to augment the analysis is a desirable part of any adaptation planning process. Approaches exist which can be used to examine how a given approach to adaptation has been framed. A good example is de Boer., *et al* (in press) which provides two simple matrices. The first provides a way of distinguishing between framings based on what the authors' term 'goal orientation' and 'perceptual distance' (see Table 3.1 below). Perceptual distance describes categories with long-term broad categories at one end of the spectrum, and short-term narrow categories at the other. Goal orientation is defined as the promotion of a desirable outcome or the prevention of an undesirable one. The combination of these factors suggests four broad categories. Examples include a combination of proximal (perceptual distance) and prevention (goal orientation) as typified by Al Gore's cautionary film 'An Inconvenient Truth' (see Table 3.2). An alternative framing based on a proximal (perceptual distance) and promotion (goal orientation) such as adopted by many SMEs is that adaptation is about appropriate investment to improve near-term competitiveness. The authors argue that since none of the frames is better than the others, with each having strengths and weaknesses, introducing a contrasting frame to the dominant one may be helpful in opening up the process of decision making.

Goal orientation and focus / Perceptual distance	Promotion orientation	Prevention orientation
Distal view (long-term, broad categories)	Using broad categories to represent general features and focusing on gaining positive outcomes (hits)	Using broad categories to represent general features and focusing on avoiding negative outcomes (errors)
Proximal view (short-term, narrow categories)	Using narrow categories to represent contextualized features and focusing on gaining positive outcomes (hits)	Using narrow categories to represent contextualized features and focusing on avoiding negative outcomes (errors)

Table 3.1 Two strategic contrasts combined (from de Boer *et al*, (in press))

Goal orientation and focus / Perceptual distance	Promotion orientation	Prevention orientation
Distal view (long-term, broad categories)	*Social progress frame* Defines the issue as improving quality of life or harmony with nature *Middle way frame* Puts the emphasis on finding a possible compromise position between polarized views **Example: Plan to reconcile adaptation and mitigation**	*Morality/ethics* frame Defines the issue in terms of right or wrong; respecting or crossing limits *Pandora's box frame* Defines the issue as a call for precaution in face of possible impacts or catastrophe **Example: Al Gore's movie: An inconvenient truth**
Proximal view (short-term, narrow categories)	*Economic development frame* Defines the issue as investment that improves competitiveness *Conflict/strategy frame* Defines the issue as a game among elites, a battle of personalities or groups **Example: climate proof city**	*Scientific uncertainty frame* Defines the issue as a matter of what is known versus unknown *Public accountability frame* Defines the issue as responsible use or abuse of science in decision-making **Example: sea level discussion**

Table 3.2. Science-related frames grouped into four strategic contrasts, with examples about climate issues (from de Boer *et al*, (in press))

A second matrix has been developed to clarify the frames which are 'built in' or inherent in decision tools. Decision makers are considered to perceive certainty or uncertainty regarding causation and certainty or uncertainty regarding outcome preference in combination providing four categories of decision type. The authors map suitable methods and tools onto these categories and classify them as computation, compromise, judgement and inspiration. They then go on to suggest the sorts of institutional structures which are required to deliver these methods. The relationship between the implicit framing, the decision tools suitable for

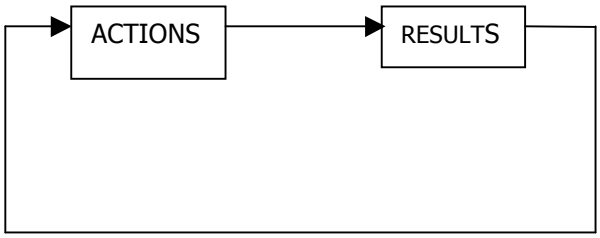
the task and the institutional structures required to deliver theses is a critical point of clarity. The four categories of decision are not named but, as an example, where both the science and the decision preference are perceived to be well known, the actors are likely to choose relatively straightforward computational tools. Whereas where both the science and the decision preferences are perceived to be uncertain there is a tendency towards delay and inaction and very different tools are required such as "rich picture" drawing. Wickedness (see Section 3.4 below) places the actor in the distal, prevention, or sometimes distal, promotion category and in the uncertainty around science and decision preference category.

3.3 Transformation v incremental change

Much work on adaptation throughout the process, from initial problem framing, engagement of others, to solution searching and evaluation, addresses only incremental change. That is, change that may increase efficiency but does not fundamentally question the assumptions underlying the activity or purpose of the organisation. This may be fine for most circumstances but certain types of decisions that, for example, have long lasting implications, potential for high consequence impacts, high vulnerability to certain climate impacts etc. may require second or third order thinking to be able to identify robust pathways in the light of an uncertain future. Although a number of the frameworks reviewed in Section 2 pick out the need for second order or 'double loop' learning, the authors suggest that only the PACT framework addresses this distinction, and the process involved in transformation, with the necessary clarity and depth to be usable. PACT also brings in third order learning, which is implicit at response level 5, as the pursuit of 'resilience' depends on the answer to the question, '*what is it that really matters to us*?'. The following section uses work by Bateson, (1973), Argyris & Schön (1978), Senge *et al*, (2005) and Bast (2010) to explain the different levels of learning. This is key to understanding processes of transformation in individuals, groups and organisations.

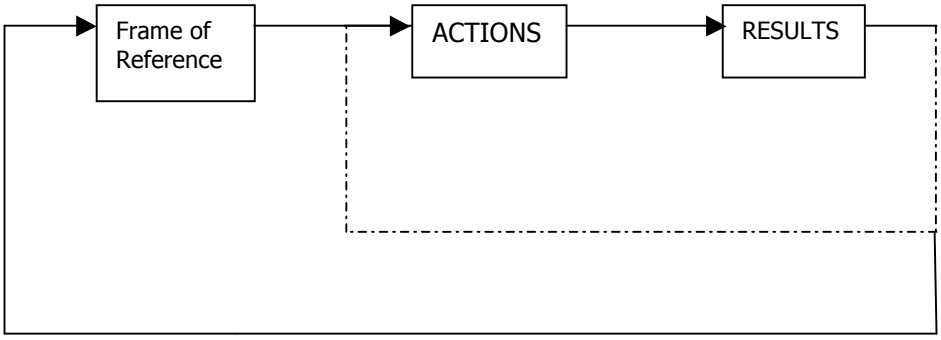
3.3.1 'Incremental' change (also known as 'first-order', or 'single loop')

This refers to solving problems or improving skills in a 'business-as-usual' mode i.e. without examining or challenging underlying beliefs and assumptions.



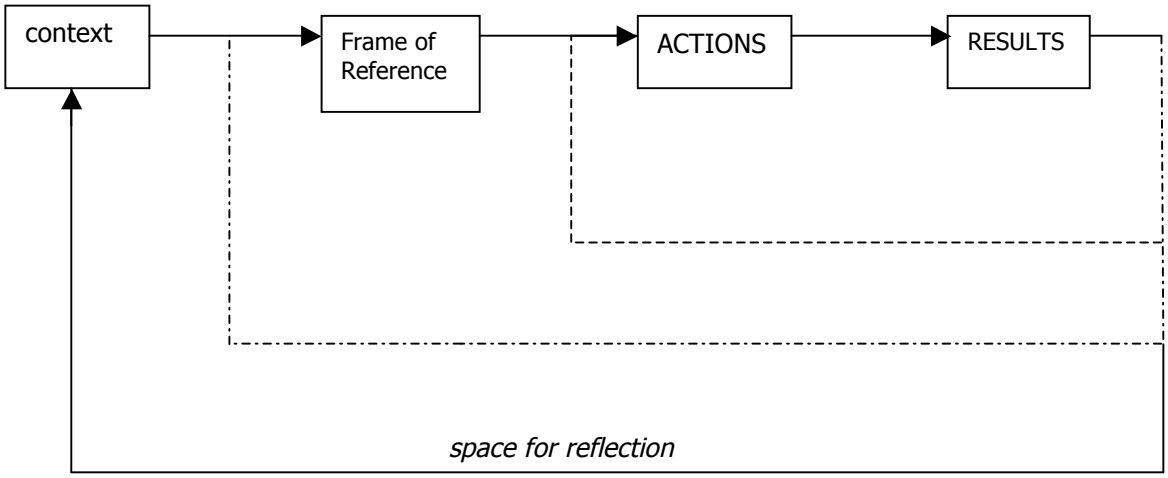
3.3.2 'Reframing', 'second-order' or 'double loop change'

This requires questioning current perspectives or frames of reference, and thus usually leads to doing something different. This level of learning often builds on single-loop or incremental learning, but goes beyond it encouraging people to be more open and increasingly self-aware and to ask questions such as: "*What's going on here*? *What patterns can we see*?" *How do our actions impact the system*?



3.3.3 Transformational or triple loop change

Allowing space for second-order change creates a shift in the way that people in organisations see the world. All patterns and systems may come into question allowing gradual or sudden changes to occur with the potential for transformation through creating a shift in the context the organisation operates within.



3.4 Managing wicked problems

Traditional management approaches are not sufficient to deal with highly uncertain and complex situations particularly, as with adaptation to climate change, those with the potential to have a significant impact (*e.g.* see Funtowicz & Ravetz 1991, Gallopín 1999). Rittel and Webber (1973) made a distinction between the 'tame' problems of natural science and the 'inherently wicked' problems of public policy, the '*wickedness*' arising out of the difficulty inherent in '*efforts to delineate their boundaries and to identify their causes, and thus to expose their problematic nature. The planner who works with open systems is caught up in the ambiguity of their causal webs'* (Rittel and Webber, 1973). Darwin *et al* (2002) developed the idea of '*tame'* and '*wicked'* further suggesting that problems exist on a spectrum and that while traditional 'rationalist' approaches work well at the tame end they

are increasingly less effective as you move towards the '*wild*' and '*wicked*' end (Darwin, Johnson and McAuley, 2002):

tame ⟶ tricky ⟶ wild ⟶ wicked

In essence, the argument is that linear management approaches may be appropriate when the problems are 'tame' but new approaches are required when having to deal with wild and wicked problems i.e. moving beyond a 'predict and provide' paradigm. Adaptation is an example of an 'unbounded problem' described by Chapman (2002) as a problem where:

- there is no clear agreement about what exactly the problem is;
- there is uncertainty and ambiguity as to how improvements might be made;
- the problem has no limits in terms of the time and resources it could absorb.

Unbounded or wicked problems, require a different approach to planning and implementing solutions that recognises (rather than ignores) disagreement and uncertainty between different groups affected. This requires a process of dialogue where the actors involved can listen to, and understand, the perspectives of others. There is much that can be learned from complexity theory in this context. Government and policy processes, have traditionally made decisions using theory based more on certainty, rationality and predictability (Eyben, 2005). However whilst this approach might be suitable for 'tame' problems, it is highly unlikely to be appropriate in the context of adapting to an uncertain future climate. Unfortunately most of the framings described in Section 2 are not sufficiently sophisticated to effectively manage complexity and tend towards approaches more suitable for tame problems. PACT, however, was deliberately designed to help develop a learning architecture in organisations that can incorporate emergence-based learning, and even direct resources towards where and when that is most likely to be effective.

A paper prepared for the Australian Government Public Service Commission describes the key characteristics of wicked problems from a policy perspective very well (see Box 1)

Box 1: Characteristics of wicked problems: a public policy perspective

Source: Tackling Wicked Problems: a public policy perspective (2007), Australian Government, Australian Public Service Commission, available at: http://www.apsc.gov.au/publications07/wickedproblems.pdf (accessed April, 2010)

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. Dues 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 are often not stable. Frequently, a wicked problem and the constraints or evidence involved in understanding the problem (e.g. legislation, scientific evidence, resources, political alliances), are evolving at the same time that policy makers are trying to address the policy problem. Policy makers have to focus on a moving target.

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. In some cases, such as the challenge of illicit drug use, the problem may never be completely solved. To pursue approaches based on 'solving' or 'fixing' may cause policy makers to act on unwarranted and unsafe assumptions and create unrealistic expectations. In such cases, it may be more useful to consider how such problems can be managed best.

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.

Wicked problems hardly ever sit conveniently within the responsibility of any one

This paper also suggests practical ways to deal with wicked problems in a policy context, noting that though this is an 'evolving art' the following aspects are important:

- ***holistic, not partial or linear thinking*.** i.e. grasping the big picture, including the interrelationships between the full range of causal factors underlying the wicked problem. There is a danger in handling wicked issues too narrowly. Traditional approaches also tend to underestimate the social complexity. A true understanding of the problem generally requires the perspective of multiple organisations and stakeholders and that any package of measures identified as a possible solution usually requires the involvement, commitment and coordination of multiple organisations and stakeholders to be delivered effectively.
- ***innovative and flexible approaches*.** The public sector needs more systematic approaches to social innovation and needs to become more adaptive and flexible in dealing with wicked problems. This could be through investing resources in innovation similar to private sector research and development (R&D), blurring the traditional distinction between policy development and programme implementation to make it easier to modify policies in the light of experience about what works and what doesn't, and focusing on creating learning organisations.
- ***the ability to work across agency boundaries***. Tackling wicked problems is beyond the capacity of any one organisation. This makes successful working across agency boundaries increasingly important. This includes working in a devolved way with the community and commercial sectors.
- ***effectively engaging stakeholders and citizens in understanding the problem and in identifying possible solution*s**. Because wicked problems are often imperfectly understood it is important that they are widely discussed by all relevant stakeholders in order to ensure a full understanding of their complexity and interconnections. If a resolution of a wicked issue requires changes in the way people behave, these changes cannot readily be imposed on people. Behaviours are more conducive to change if issues are widely understood, discussed and owned by the people whose behaviour is being targeted for change.
- ***additional core skills***. The need to work across organisational boundaries and engage with stakeholders highlights some of the core skills required by policy and programme managers tackling wicked problems—communication, big picture thinking and influencing skills and the ability to work cooperatively. Traditionally, more weight has been placed on high-level analytical, conceptual and writing skills and traditional project management skills. While these skills are still fundamental parts of the policy toolkit, they are not sufficient. A multi-disciplinary team approach is a practical way to garner all the required skills and knowledge for tackling wicked problems.
- ***a better understanding of behavioural change by policy makers***. This needs to be core policy knowledge because behavioural change is at the heart of many wicked problems and influencing human behaviour can be very complex. The traditional policy tools such as legislation, punishments and regulations, taxes and subsidies will generally form a core part of the overall strategy to achieve widespread, sustainable behavioural change. However, their effectiveness can be limited without some additional tools and understanding of how better to engage citizens in cooperative behavioural change.

- ***a comprehensive focus and/or strategy*.** Successfully addressing wicked policy problems usually involves a range of coordinated and interrelated responses given their multi-causal nature and that they generally require sustained effort and/or resources to make headway.
- ***tolerating uncertainty and accepting the need for a long-term focus*.** Successfully tackling wicked problems requires a broad acceptance and understanding, including from governments and Ministers, that there are no quick fixes and that levels of uncertainty around the solutions to wicked problems need to be tolerated. Successfully addressing such problems takes time and resources and adopting innovative approaches may result in the occasional failure or need for policy change or adjustment.

It is clear that these attributes of policy making that deal well with wicked problems apply equally well at the organisational level for adapting well to climate change. Darwin *et al*, (2002) describe a number of principles for looking at complexity and wicked problems and its implications for organisations. These are outlined below:

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

All these 'principles' require a fundamental 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). Someone who was attracted to the position of a manager in a hierarchical system is unlikely to embrace such a shift in organisational mindset comfortably. 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'.*

Management through minimal control requires a considerable leap of faith for most organisations, especially those that pride themselves on professional standards, accreditation etc. Those with power often prefer to make rules and impose controls that inhibit, rather than encourage creativity and diversity in the decision making process (Chambers, 2005). Agile project management (APM) was developed in the software industry and is based on complexity thinking, specifically how from simple local rules patterns emerge that are greater than the sum of the parts. In this approach managers become 'adaptive leaders' and rigid strategies are transformed into guiding principles and practices. APM recommends 6 practices for managing projects in complex adaptive

systems. Although the focus is on project management, many of these practices could also be appropriate at the organisational level (Augustine and Woodcock, 2003).

1. Establish a guiding vision and continually reinforce it through words and actions
2. Facilitate collaboration and team work through investing in relationships
3. Simple rules – establish and support the team's set of guiding practices
4. Provide open access to information
5. Light touch – apply just enough control to foster emergent order
6. Agile vigilance - Constantly monitor and adjust

To make this approach operational the questions arising from these principles could be discussed within an organisation and the implications explored. Trying to create a rigid structure for operationalising such principles would, of course, miss the point.

3.5 The requirement for learning

One item that appears consistently in any list of attributes of well adapting organisations is the need to be learning in to an unknowable future (Flood, 1999). Like many other good ideas, while there is an emphasis on learning as a good and necessary thing, relatively little effort is put into understanding what it is that should be being learnt, by whom and how this should happen (Armitage *et al*, 2007). Concepts, assumptions and approaches to learning have been applied in '*vague and uncritical ways'* (*ibid*). There is a need for greater specificity of learning goals, who is involved and ethical issues about participating (or being excluded from participating) and what it means to be open (and vulnerable) to learning.
There are many different ways of characterising what could be learnt. Pasteur (2004) writing about learning in development organisations identified the following categories:

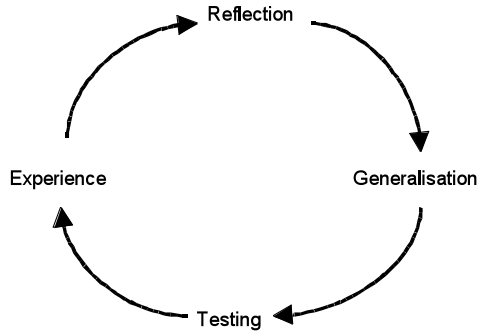
- Facts (knowledge, processes, procedures)
- Skills for learning (such as active listening, suspension (Isaacs, 1999), design of meetings and workshops to enable learning)
- Evaluation (learning from experience, success and failure)
- Innovation (to be creative, designing the future and not just adapting to it)

It is clear that learning is important for climate adaptation but if it done in the absence of a clear understanding of who, how, when, and what learning is intended then it is likely to be 'slow, inconsistent and unpredictable', despite the value placed on it (Armitage, *et al* 2007). Leeuwis & Pyburn (2002) use the metaphor of a *'wheelbarrow full of frogs'* to capture the dynamic, unpredictable nature of an environment in which individuals come together and consider situations from a new vantage point and learn. There may be much learning happening on many different levels but it is hard to hold on to.

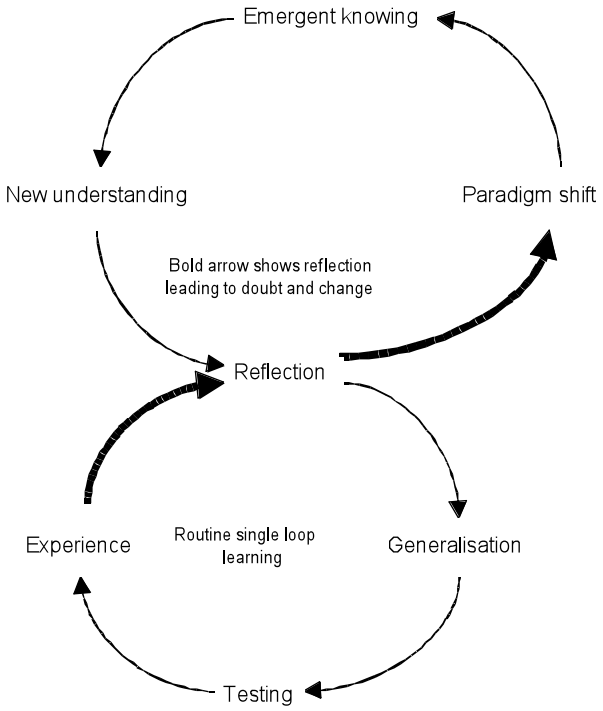
Looking at learning through the lens of complexity thinking it is difficult to disentangle the meaning of any single act from the complex background of our understanding of past events and anticipation of future events. We can only really make sense of our actions after we have acted and observed the consequences and our understanding of the past is continually revised as a result of our acting. Overemphasis on causality and linearity implies that human action is more pre-reflective and rational than it really is (Mowles *et al*, 2008).

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. 'Double loop' learning occurs where there is a paradigm shift in understanding due to some new experience or new and dissonant information that requires one to question ones mental model and assumptions of how the world is. Thinking then shifts to a different level and one can question the questions that are being asked or the assumptions behind them. Are these the right questions? How they could be improved to more clearly understand the issues? This enables you to question your own and others framing of the issue and can start to open up new and fruitful areas for exploration.

Single loop learning



Double loop



Bateson (1973) identifies additional levels (learning how to learn) and even higher levels of abstraction of learning.

'Social' learning is thought to occur through the sharing of knowledge between individuals, groups and organisations in society through interactions, particularly in novel environments and situations where new opportunities and spaces of possibility can be explored. New possibilities in any system emerge not solely from the individual parts or nodes of the network but rather from the connections among them (for a more in depth discussion see Wals, 2007).

Pelling and High (2005) believe that building adaptive capacity within organisations can be enhanced by recognising and working with the informal system made up of personal relationships and held together by cultural norms that cut across formal organisational structures and official rules of conduct. This has long been recognised as an intangible but important aspect of organisational life that enables innovation, information transfer and learning. This could be enabled through supporting social development within organisations. But, the authors ask, is there a conflict between the need for this and the need for transparency and vertical accountability within such formal organisations?

By framing adaptive capacity in relation to social learning it becomes important to step back from identifying the appropriate actions or activities to adapt to impacts of climate change to thinking about how adaptive capacity is evolved and promoted.

Social learning could also be enhanced by rethinking how organisations themselves operate and engage with others. What are their priorities? How are staff expected to spend their time? What is valued and rewarded by the organisation? The stated desires of an organisation, or a piece of work being undertaken by that organisation, is not always in tune with the way it expects its staff to operate and this can be a cause of tension e.g. if staff are expected to make good links with the community but are not given time to do so. It should also be noted that social networks and associations always exclude some so it cannot be considered as a panacea for all and, given the time it takes, cannot be seen as appropriate in all situations.

As social learning for change requires shifts in understanding either as individuals or as groups this type of learning seems to have great potential for exploring the process of adaptation to climate change. No one person has the whole answer, we all have a piece of the truth and there is a pressing need to come up with imaginative solutions.

3.6 The importance of collaboration and dialogue

Without testing in the 'real world', more concepts, tools, and methods and better scientific solutions will only be of academic interest. Solutions need to make sense 'on the ground' if they are to be absorbed and implemented. This highlights the need for 'co-production' of knowledge through collaborative learning between experts and users through processes of action research (Reason & Bradbury (2008), Heron (1999), Revens (1982)). This sounds deceptively simple but working in collaboration is not easy and issues around power, such as who receives the funding in any collaboration (and who has ultimate responsibility for delivery of outputs), who designs and runs meetings and workshops, how are stakeholders engaged in each stage of the project cycle (is it more 'consultation' or real 'co-learning'?) can have a significant impact on how effective the collaboration is in building effective learning rather than reproducing (or even reinforcing) previously held and unhelpful

perceptions[1]. Collaboration in which both sides can address such issues openly requires an investment in building relationships and breaking down previously held perceptions of the other (Harvey, 2007).

Senge (1990) and many others suggest that to work effectively in such complex systems you need to shift from 'predict and provide' thinking to a more enquiry-based, learning approach that enables you to question your mental maps and challenge your underlying assumptions of what is happening and what needs to change. You also need to take others views into account and understand the good reasons why they might be taking a different position.

For such processes to be effective, opportunities for dialogue between the relevant groups must occur. Effective dialogue requires learning through transmission of information, knowledge and experience plus observation, taking into account personal attitudes and organisational constraints. This is not easy to achieve in practice. Cuppen et al, 2006 identified a range of 'blockers' to the process including:

- Blockers caused by power of 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 – subtly different from the first in that here we are looking at politics with a small 'p' – in essence we are predisposed to agree with certain individuals or even types of individuals regardless of what they say. (Cuppen *et al*, (2006)).

Cuppen *et al,* (2006). suggest that it is probably impossible to design processes which overcome all of these institutional blockers at any one moment but say that attention should be given to all three in the design of the overall process.

A key change that occurs in taking a learning approach is the need to invest in building relationships. 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. If people are scared, confused, bored, too busy and so on, the level of the interaction will be reduced. The organisation thus has to ask the question '*if relationships are important, what are the implications for us as an organisation*? (Pasteur & Scott Villiers, (2004)). The role of the facilitator becomes important here as someone who can, from a neutral position (or accepted non neutral position), encourage and support processes of engagement and dialogue.

3.7 Analysing barriers

Complementarities theory (Pettigrew *et al*, (2004)) has been picked up by Ballard and Alexander (2008) & Ballard *et al*, (2010) as being a key piece of theory for those working on adaptation to climate change to assist in understanding the contextual factors that need to be addressed in any major change. At any time one factor can lag behind the others so

[1] For a discussion of how 'managers' view 'scientists' see: Roux *et al*, 2006

attention to this factor can radically improve the situation (up to the point that other factors start to lag behind and limit progress). If a lagging factor is not addressed effectively change in likely to be stifled and limited. Ballard (in Reason *et al*, 2009 and Ballard *et al* (2010)) has gone on to adapt Ken Wilber's 'all quadrants, all levels (AQAL)' framework to provide a way to map out these contextual issues along the dimensions of individual-collective and subjective-objective (Wilber, 2000).

	Subjective factors	**Objective factors**
Individual factors	**Quadrant 1** Personal values, worldview, assumptions etc.	**Quadrant 2** Influence of one's role, sills, knowledge, relationship network etc
Collective factors	**Quadrant 3** Group cultures, shared norms etc	**Quadrant 4** Political, economic, social technological, legal , environmental influences etc.

Ballard in Reason *et al*, (2009) suggests that occasional '*windows of opportunity'* occur when factors in each quadrant align to enable significant change to take place. Part of building good adaptive capacity thus comes from developing an awareness of the factors in each quadrant and how they interact. This is discussed in more detail in Reason *et al,* (2009) and Ballard *et al,* 2010.

3.8 Good leadership for adaptation

What are the characteristics of leadership for this unbounded problem?

To quote David Casey[2]:

> *'the more uncertainty surrounds a problem, the less amenable it is to solution by application of specialised expertise. For example there are no techniques for determining the future...so it is in all organisations. There are mind boggling problems, especially concerned with the future which by their very nature are outside the reach of all know specialisms. For these divergent problems the best we can do is to put together the wisdom, experience, feelings and aspirations of that group of managers charged with running the organisation ... and require them to work as a real tem, sharing all they know and all they are as well.*

[2]D. Casey, Managing Learning in Organisations, OUP, 1993

This suggests that a good leader in dealing with adaptation to climate change (acknowledging that this issue is not in isolation from all the other issues they will be dealing with in managing the day-to- day aspects of the organisation and paying attention to the future) thus needs to recognize the nature of the problem (complex, uncertain, non linear), be able to see the issue from multiple perspectives and be open to more enquiry-based and learning approaches to progressing the organisation.

Rooke & Torbert, (2005) based on work by Susanne Cook-Greuter, used the output of sentence completion surveys with thousands of leaders, to explore what distinguishes different leaders. They suggest that the key factor is their '*action logic*' (the way in which they interpret their surroundings and react when their power or safety is challenged). They were able to identify 7 types of action logic the characteristics of which are given in the following table.

Characteristics of the 7 Action Logics (after Rooke & Torbert, 2005)

Action Logic	Characteristics	Strengths	% of research sample
Opportunist	*Wins any way possible.* Self-oriented; manipulative; "might makes right."	Good in emergencies and sales opportunities.	5%
Diplomat	*Avoids overt conflict.* Wants to belong obeys group norms; rarely rocks the boat.	Good as supportive glue within an office; helps to bring people together.	12%
Expert	*Rules by logic and expertise.* Seeks rational efficiency.	Good as an individual contributor.	38%
Achiever	*Meets strategic goals.* Effectively achieves goals through teams; juggles managerial duties and market demands.	Well suited to managerial roles; action and goal oriented.	30%
Individualist	*Interweaves competing personal and company action logics.* Creates unique structures to resolve gaps between strategy and performance.	Effective in venture and consulting roles.	10%
Strategist	*Generates organizational and personal transformations.* Exercises the power of mutual inquiry, vigilance, and vulnerability for both the short and long term.	Effective as a transformational leader	4%
Alchemist	*Generates social transformations.* Integrates material, spiritual, and societal transformation.	Good at leading society-wide transformations.	1%

From: Rooke, D & Torbert, W. (2005) Seven Transformations of Leadership, *Harvard Business Review*, April 2005. Wilber (2000) extends the ranking.

In this paper the authors assert that given a desire for personal development, leaders can move from one action logic to the next and so may progress towards the rare '*alchemist*' logic, although few achieve this level. The relevance of this for adaptation to climate change is that as you progress up the levels towards alchemist the leaders' action logic becomes better able to deal with uncertainty and multiple perspectives, both key aspects of dealing with a changing climate.

The degree to which the leader needs to be expert in these skills will, of course, depend on the exact context in which she/he is operating. For example, a family shop at the top of a hill in a temperate country may be efficiently run by a leader with '*expert*' action logic but to be successful in the long term large multinationals with core business based on natural resources might require at least '*individualist'* or '*strategist'* action logic to innovate and thrive in a changing climate. There is no doubt that absence of high level leadership is a crucial barrier in adaptation and the importance of good leadership was picked up in the majority of the framings in Section 2 although not many articulated what was meant by this. For PACT however, the characteristics of RL4 require individualist leaders and RL5 require strategist and higher levels of leadership.

Section 4 Key attributes of organisational adaptive capacity – UKCIP experience

4.1 Introduction

UKCIP has been working with organisations (private and public) since its inception in 1997. This work and the accompanying analyses have allowed us to assemble some observations as to what are typical characteristics and the associated attributes of those organisations that enable them to appear to be capable of adapting well. We should note, however, that there are still relatively few organisations that are taking significant action so our analysis is not solely drawing on experience of directly observed action. The following is thus a synthesis of observations and reflections resulting from a focused set of discussions involving a subset of UKCIP staff followed by consultation with a wider group.

We have observed that organisations tend to move through a number of stages as they attempt to adapt to climate change. These stages are common to conventional decision-making processes and are outlined in the UKCIP Adaptation Wizard (UKCIP, 2008) and UKCIP risk and decision-making framework (Willows & Connell, 2003). They can be broadly described as: develop a project plan; assess vulnerability to current climate; assess vulnerability to future climate change; identify, evaluate and select adaptation options; implement, monitor and review adaptation options. Our experience of working directly with organisations has also shown that two types of adaptation response may be recognised. Building Adaptive Capacity (BAC) involves creating the information and conditions (regulatory, institutional, managerial) that are needed before adaptation actions can be undertaken. Delivering Adaptation Actions (DAA) involves taking actions that will help to reduce vulnerability to climate risks or exploit opportunities (West and Gawith, 2005). In practise these form a continuum, but distinguishing them can help to assess progress in preparing for and managing climate risk. Consideration thereof can also provide insights into the characteristics of those organisations that have made more progress than others.

With a few exceptions, the business community in the UK has only recently become aware of the adaptation agenda. Therefore the companies that UKCIP works with tend to be at the beginning of their adaptation journey, concentrating more on identifying and assessing climate risks and adaptation options (typically capacity building activities), than delivery of adaptation actions. This means that from our practical experience we are only able to make comments about the attributes of companies that begin to engage with adaptation rather than those of successful adaptation. Progress amongst local authorities is further developed, particularly as a result of the NI188, and lessons from this experience are also drawn upon.

Many of the identified characteristics and attributes are not necessarily specific to being able to adapt well to changes in climate, but are symptomatic of organisations that can adapt well to any changing pressures and opportunities. An example is an organisation that is, by monitoring changing risks and opportunities to its operations and markets, is able to adjust (characteristics) as a result of various attributes such as its research and monitoring capability, its flexible management structures and supportive policies. Whether that

changing pressure is a result of a changing climate or another driver of change, the characteristics and attributes that promote 'successful' adaptation will often be similar.

The differences that come with climate change relative to other drivers of change acting on organisations relate to the characteristics of climate change and the potential responses. Climate change has an unusual temporal, spatial and pervasive characteristics from most other drivers of change that an organisation faces. In terms of responses, there are expectations (from stakeholders, shareholders, clients, customers, and within the broader community) that the resulting adaptation will not only be effective and efficient, but also equitable and legitimate (Treasury (2009), Adger *et al*, (2005)). Furthermore, how others in the same geographical area or sector respond (or fail to respond) will, in turn affect an organisations ability to respond (either positively or negatively) influencing the nature of any responses and increasing the need to identify and address potential barriers, conflicts and synergies.

As noted above, through its work with organisations, UKCIP understands that some organisations will be delivering adaptation actions, others will be required only to build the adaptive capacity of different sectors, activities and regions. The latter category includes organisations that regulate, represent and support businesses and employees as well as different regional and national government bodies and agencies. The same characteristics and attributes will apply to this type of organisation. It should also be noted, however, that additional to the attributes listed below, an organisation's capability to deliver adaptation action will depend heavily on this other type of organisation as they will be responsible for developing a favourable institutional environment (including regulation, codes, standards, training, industry positions, lobbying, accreditation etc.).

4.2 Areas of Characteristics and attributes

Even a brief view of the literature on organisational behaviour indicates that there are many ways in which to explore organisations and how they operate and, of particular interest here, how they approach change. Each different 'lens' or framing offers part of the truth and also obscures aspects that other lenses might highlight. For the sake of clarity, the authors felt it necessary to assemble attributes of well adapting organisations under a smaller number of headings and the following groupings were chosen in an attempt to provide an element of structure to overlapping themes. It is emphasised, however, that there are other ways in which these groupings could have been made. The extent to which these attributes are necessary to build adaptive capacity will vary greatly between type and size of organisation. For example, most SMEs should expect to be able to adapt without 'regularly addressing climate change adaptation in management team meetings'. It is also stressed that these are not presented in order of priority, and not all factors need to present to result in adaptation action:

- Drivers for adaptation
- Learning Culture
- Leadership
- Organisational Processes and Practices

- Corporate Memory
- Access to Research, Data/Information and Monitoring
- Awareness of Climate Change
- Stakeholders
- Regulations, Standards, Codes and Associated Bodies

4.2.1 Drivers for adaptation

Fundamental to an organisation adapting to climate change is a driver for action. Our experience is that organisations seeking help on how to adapt always have a powerful driver for doing so. In some cases their motivation may arise from an inherent degree of vulnerability to current climatic variability, or exposure to extreme weather in the past (e.g. they might have obvious exposure through large fixed assets, or operate processes strongly linked to weather/ climate losses). In others the motivation is a positive one attached to corporate social responsibility objectives, or a desire to enhance a proud environmental ethic or reputation associated with the organisation (e.g. Midcounties Cooperative, Aedas, Gentoo Green and Nottingham Trent University). For others the key driver is a desire to gain a competitive advantage over those who have yet to engage with the issue. This may relate to exploiting a market opportunity (e.g. the National Association of Cider Makers), or to securing longer term business savings by being better adapted (e.g. reducing future insurance premiums by owning better adapted premises).

Unsurprisingly, our experience suggests further that those with longer term planning horizons (eg. utility companies), or have who have a duty or responsibility to care for national assets (eg. National Trust) are more likely to be able to engage with - or be less daunted by - the time scales associated with future climate change than those operating on much shorter timescales. The National Trust, for example, is a leader on adaptation and recognises the need to adapt in ways that will sustain its conservation purpose and values for as long as possible (National Trust, 2010). Such characteristics evidently facilitate engagement with the adaptation agenda.

Interestingly, many of the organisations with whom we work have already made good progress on climate change mitigation and see adaptation as the next step or missing piece of the puzzle. A common introduction from such organisations may be paraphrased as "we have done a lot of work on mitigation and have that more or less in hand, but we have done little or nothing yet on climate change adaptation, which we recognise to be a gap". While it is presumptuous to state that action on mitigation is a precursor to adaptation action, our experience suggests that engagement with the mitigation agenda can pave the way for action on adaptation.

4.2.1 Learning Culture

A number of characteristics or themes can be described that illustrate what it means to be a good learning organisation. 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. Although, staff in UKCIP have seen some examples of good learning

approaches in organisations they are not necessarily badged as such. Many of the attributes identified below are not based of observations of existing practice but on understanding of organisational change in other areas.

Characteristics of an organisation with a learning culture include:

- The organisation recognises, supports and is able to benefit from formal and informal structures
- The organisation is open to innovation both in terms of the way it is managed and in operational activities.
- The organisation supports creative thinking, innovation and exploration of change from the personal to organisational level, allowing this to contribute to more formal governance and accountability structures.
- The organisation encourages and supports learning from experience at various levels (e.g. through attention to what is being learnt e.g. facts and skills, incorporation of learning from evaluations, support for action learning sets and other enquiry processes, etc.) towards improving practices, policies and programmes.
- The organisation recognises that attention needs to be paid to all stages of the learning cycle (experience, reflection, conceptualisation, and planning implementation) for learning to occur and change to happen.

Indicative attributes include:

- 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 & knowledge

Case study: Learning from international experience - Pixley Berries

Pixley Berries comprises a fruit and hops farm and a fruit pressing station. They have their own range of superfruit cordials as well as selling about half of the fruit to GSK for Ribena. Following a devastating, and unexplained, crop failure in 1998, the farm began to explore the impact of climate change on the blackcurrant crop. The farmer visited farms abroad and investigated varieties that could cope with increasingly hot summers and warmer damper winters. As a result, a re-planting programme was begun, including the Pixley Black – a variety of blackcurrant that produces deep coloured, intensely flavoured juice.

Source: Weathering the storm (2010) WMCCAP

4.2.2 Leadership

To be effective and add legitimacy, leadership at all levels, but particularly senior leadership, should be engaged and endorse that climate adaptation is necessary for the continued health and viability of the organisation. As part of this, organisational leadership should be seen as actively supporting implementation initiatives within the organisation and the broader organisational community.

Visible, knowledgeable, empowered and resourced individuals ("adaptation" champions") can also play an important motivating role within well adapting organisations. To be effective, it is essential that their role is recognised by senior management and given sufficient authority and resources. They also need to be recognised within the organisations informal structures. An "adaptation champion" need not sit within the senior management body, but it is essential that everyone in the organisation recognises their leadership.

Indicative attributes include:

- People in leadership roles are seen to be endorsing the importance of adapting to climate change for the organisation through communications within and outside organisation
- People in leadership roles have a realistic picture of the adaptation challenge, mobilise sufficient resources for the job and take opportunities to increase their awareness of climate change and adaptation through discussion with experts about the state of the science and with operational staff in the organisations about the experience of climate change on operations.
- Climate change adaptation is regularly addressed by the senior management body in meetings and other management bodies in the organisation
- The role of "adaptation champions" is recognised and supported by senior management

4.2.3 Organisational Processes and Practices

The nature of organisational strategies, business plans and operational plans and their associated decision-making processes all influence whether or not an organisation is (or has the potential to be) adapting well.

Well adapting organisations are likely to exhibit the following characteristics:

- Have a shared understanding of what successful adaptation looks like supported by indicators for evaluation and developing targets.

Examples from practice:
US Entergy Corporation have put together a business continuity group specifically to look at broader implications of climate in the context of other serious business threats, including terrorist acts and a potential flu pandemic.

Source: Network for Business Sustainability (2009) Case Studies and Tools: A systematic review of the literature on business adaptation to climate change

On a smaller scale, a SME based in the Midlands made implementation of an emergency response plan part of their adaptation response. This followed a brainstorming session with risk management consultants as a response to the 2007 floods and was accompanied by physical measures including reinforcing retaining walls and improving drainage.

Source: CBI (2009) Future proof: preparing your business for a changing climate

- Systematic integration of adaptation into strategies, business plans and decision-making processes (mainstreaming) as appropriate.

Examples from practice

For example, several Caribbean holiday providers (Sandals, Club Med, SuperClubs, TNT Vacations, and Apple Vacations) have collaborated on an initiative to market the positive aspects of the destination in the face of a changing climate. This includes highlighting measures that have been taken to adapt.

Source: Network for Business Sustainability (2009) Case Studies and Tools: A systematic review of the literature on business adaptation to climate change

- Adaptation is seen as an important consideration in decisions, including high consequence, high cost/benefit decisions. Key decision points are recognised as opportunities for adaptation.
- Adaptation is seen as presenting a business opportunity. As well as new products and services there may be new ways of marketing to increase sales in the face of a changing climate.

Examples from practice
Network Rail has a schedule for enhancement and renewal of their assets. They recognise these points in time as an opportunity for cost effective consideration of climate change and resilience. In the South West two lines were closed for two days in 2005 due to flooding. They have estimated that this could increase to four lines for nine days by 2085 if nothing is done. Network Rail have pledged £160m to improve drainage between 2009 and 2014 and are also working with the Met Office to increase the warning period for heavy rain.

Source: CBI (2009) Future proof: preparing your business for a changing climate

- Decision-making is done using an iterative learning approach that can incorporate new and evolving knowledge and experience
- Decision-making involves 'all' levels and there is good communication between those at the operational level who are on the front line of dealing with the consequences of weather impacts
- Decisions can be made in the face of uncertainty and uncertainty is not used as an excuse for inaction.
- Training is available to support the required changes

For incremental adaptation indicative attributes include:

- An adaptation strategy and plan that includes objectives (based on a decision on what successful adaptation looks like) and targets based on a set of agreed indicators.
- Adaptation objectives and targets are an integral component of business, policy and programme targets (mainstreaming).
- Business plans are consistent and supported by the adaptation strategy and adaptation plans are integrated within business plans (mainstreamed).
- Decision-making criteria include consideration of climate change and its impacts, vulnerabilities and risks.
- When communicating decisions within the organisations, the rationale behind those decisions are communicated (part of engagement), including those that are based on concerns related to climate change.
- This strategy and its objectives and targets are the subject of regular review.

For transformational change there needs to be regular reviews of the assumptions behind current strategies and targets and the authors recommends the PACT framework as a good approach to use.

4.2.4 Corporate Memory

As adaptation is a learning and iterative process, it is important to preserve, have access to, and incorporate knowledge and experience gained during early iterations to inform later iterations. Having a good corporate memory is part of good learning and management systems. Documentation, archival and information management systems, and staff knowledge sharing and transfer systems and policies are critical to promoting and sustaining corporate memory. The lack of these, especially for organisations in which there is high (short-term) staff turnover, can be detrimental to adaptation. For this reason, UKCIP's methods strongly advocate documenting the thinking behind adaptation decision-making (e.g. UKCIP, 2008; Willows and Connell, 2003). It is essential that decisions, and the assumptions behind them, are clearly articulated in a transparent manner so that those coming fresh to issue at a later date can understand, challenge and evaluate those decisions as necessary.

A related issue is that of capturing corporate experience. Because of the cross cutting nature of weather and climate risks and consequences, relevant information may not always be explicitly captured in company records. Having supported organisations in their application of our Local Climate Impacts Profile tool (LCLIP) and the UKCIP Adaptation Wizard, it has become clear that a great deal of rich information exists either "in people's heads" or in company records that may often appear unrelated to the issue at hand. Those able to harness this information will be better placed to assess climate risks and plan how to adapt.

Indicative attributes of an organisation that values corporate memory include:

- Active management of transfers of responsibility (transfers, retirements, reorganisations) to protect and transfer knowledge and experience;
- A culture and supporting systems in which knowledge and experience are shared and not vested in a single position; and
- A culture and supporting systems for creating, archiving, evaluating and using previously obtained knowledge and experiences to inform decisions and policies (development, evaluation and evolution).

4.2.5 Access to Research, Data/Information and Monitoring

An adapting organisation needs to be able to conduct and extract value from research, expertise, data collection and monitoring activities (both from internal and external sources). The scope and nature of these activities depend on the organisational needs and can include theoretical and applied research specific to the organisations business, market research and data, systems/operations monitoring and sector and community data and information. In the context of adaptation to changes in climate, these activities can also include understanding (research and monitoring) associated impacts, vulnerabilities and risks e.g. making use of resources such as the UK Climate Projections 09 (UKCP09) and the wealth of material available on the UKCIP website including the qualitative regional assessments for all the English regions, Wales, Scotland and Northern Ireland and quantitative, sector specific assessments for more than 12 sectors (e.g. built environment, marine, natural environment, health); adaptation options and potential barriers, conflicts and synergies; and the nature of changes in the climate.

To this end, an organisation will need to be able to:

- Be aware of its own needs and capabilities for research, data and expertise
- Be aware of and be able to access as appropriate external research, collections of data, guidance, expertise and monitoring activities
- Be able to identify relevant knowledge and data gaps, and to influence external research, monitoring activities and data collections
- Be able to access research findings and data
- Be able, where appropriate, to carry out its own research, monitoring and maintain collections of relevant data and other information;

- Be able to collect information on its own sensitivities to climate by recording weather- and climate-related incidents, associated costs and impacts, and its own responses to these impacts.
- Be able to understand and interpret research results, data and other information in order to develop useable knowledge and translate that into guidance, policies, programmes and practices

Indicative attributes related to organisations that value research, data/information collections and monitoring include:

- Recognition of the value and roles of science in operational and management decisions, policies and programmes
- A culture of awareness raising on relevant scientific issues throughout the organisation
- Investing in and using science at the appropriate levels
- Staffing that establishes and maintains the capacity within the organisation to access, evaluate and analyse research and maintains the credibility of the organisation as a research user across the source community
- Good relationships with research funding decision-making bodies
- Systems / processes that can extract value from what? the data? (connections to research bodies, data/information collections, and monitoring activities)
- Sustained resources allocated for these activities commensurate with the requirement
- If carrying out, commissioning or influencing research, a recognition that this needs to be driven by the information needs in question.

Examples from practice
The Institution of Mechanical Engineers (IMechE) commissioned two studies into the impacts of climate change on UK engineering and what engineers need to do to adapt. Given that the majority of existing infrastructure will continue to be operational for at least another 100-200 years the IMechE decided to look further than most climate change scenarios. Their report therefore examines changes of the next 1000 years and considers how engineers might help the world to adapt over the next few centuries.

Source: IMechE (2008) Adapting to the Inevitable

4.2.6 Awareness of Climate Change

Awareness of climate change and its implications is a crucial starting point for adaptation and can apply to a sector as well as an individual organisation. For example, the water supply sector is keenly aware of the effect of climate variability and of climate change on the sector's performance, while the electrical transmission and telecommunications sectors have

been slower to appreciate their sensitivity to climate change, even though they have a fair understanding of their current sensitivity to climate extremes.

Well-adapting organisation should have:

- An understanding of the relevance of climate and projected changes for the organisation and the wider field e.g. how it impacts the supply chain, clients, related fields etc.
- An understanding of the resulting impacts, vulnerabilities and risks associated with the current climate for the organisation and the wider field as above that is appropriate to the lifetime of the decisions being made. Past experience of an extreme weather event can be the first step to understanding vulnerability. In many cases adaptation takes the form of reactive measures to an extreme weather event.
- An understanding of the resulting impacts, vulnerabilities and risks associated with the future climate for the organisation and the wider field as above, that is appropriate to the lifetime of decisions being made.

Examples from practice

The Port of Felixtowe used the UKCIP Adaptation Wizard to identify the key climate risks to their operations. Assets at the port have a design life of 35 years and a service life of up 50-60 years, while contracts are managed on much shorter timescales. Therefore, they carried out a climate risk assessment under three separate timescales to make sure that the right adaptation decisions are made at appropriate times.

Source: UKCIP Adaptation Wizard Case Study www.ukcip.org.uk/wizard

- Evidence of considering climate extremes and future climate change in its planning, policies, programmes and operations.
- Disseminated the above information within the organisation, to partners and other stakeholders.
- Promoted awareness and grounding of this awareness across organisational divisions/departments i.e. here is what we know about the impacts and space to

Case Studies: Reactive measures - The Merchants Fish Bar

The Merchant's Fish Bar in Bewdley is a well-established and successful SME. In November 2000 when heavy rains resulted in the worst flooding for over 50 years along the River Severn, the town suffered extensive flooding three times in the space of six weeks. With roads impassable, railway embankments eroded and bridges closed to motor traffic, local businesses were heavily impacted. Merchant's Fish bar was flooded and the equipment in the chip shop damaged beyond repair. Unfortunately their insurance policy excluded flood cover, and the business suffered a significant uninsured loss. As a reaction to this experience, the owner worked to adapt the shop during the refit, to take account of the possible flood risk. New fryers have been set on a hydraulic system, enabling them to be raised above flood level and the fridges are now all made from stainless steel, with the motors set at the top rather than the bottom. All equipment (except for the fryers) can now be removed before flooding occurs. In addition the ducting for the ventilation system has also been sealed to prevent water finding its way in, which will have benefits even in the absence of a flood.

Source: Weathering the storm (2010) WMCCAP

think through what this means for the organisation.

Indicative attributes include:

- The collection of information on weather- and climate-related incidents, associated costs and impacts, and its own responses to these impacts.
- Spaces and opportunities to consider how the impacts of climate change influence the core purpose and operations of the organisation
- The inclusion of climate change and its impacts, vulnerabilities and risks in planning processes and documents, policies, programmes and operational decisions.
- The inclusion of climate change and its impacts, vulnerabilities, risks and response options within organisational external and internal communications
- Communication staff capability to communicate climate change messages and recognition of the need for them to be included in organisational communications.

4.2.7 Working with others

There are two distinct groups that a well adapting organisation needs to engage: internal actors from across the full scope of the organisation; and external actors - constituents, partners, suppliers, customers, clients, regulators, competitors, and spatial and sector neighbours. These groups include those who set the context for activities and those who will be affected by any adaptation decision. Engaging with both groups, provides a richer understanding of risks and response options, and can enhance the effectiveness and efficiency of proposed adaptation actions, including their implementation.

Examples from practice
The National Association of Cider Makers carried out an industry led adaptation study. After brainstorming a long list of potential future impacts, they prioritised the main climate risks for the industry by carrying out a risk assessment. Key to the success of this was that it was carried out in a workshop setting involving people with different but complimentary expertise and experience ranging from orchard farming to cider production and market trends. The report they produced set out a selection of potential adaptation measures for tackling the priority risks identified to help both cider-makers and farmers as they prepare for the future.
Source: NACM (2008) A Changing Climate for Cider

Good engagement of internal actors ensures that all areas of organisational risks are considered, as experienced in our work within Local Authorities and business (e.g. the Port of Felixstowe and Midcounties Cooperative). This approach helps ensure that those impacts that are not immediately apparent or may arise from unanticipated knock-on effects among different impacts or adaptation actions can be more readily identified and managed. Furthermore, internal engagement and buy-in to the adaptation issue is a prerequisite for successful implementation of adaptation measures. UKCIP's experience of coordinating the Adaptation and Resilience to a Changing Climate (and its predecessors Building Knowledge for a Changing Climate and Sustaining Knowledge for a Changing Climate) research partnership is also relevant here as a good example of how funders (3 research councils),

numerous researchers across many research institutions, and practitioners in multiple sectors have been able to come together to address the complex problem of how to adapt the built environment to climate change. More information on how this has been and is being done is available at: http://www.ukcip-arcc.org.uk/

Collaborating with a wider network of relevant external actors enables consideration of wider issues such as equity and legitimacy within the proposed adaptation. Working with others can also increase the effectiveness and efficiency of the proposed adaptation by providing legitimacy to the process; by sharing good practice and by supporting joint actions where shared goals or potential conflicts are identified (both climate change-specific and those related to other pressures and opportunities).

Indicative attributes of an organisation that values working with others include:

- Processes that recognise and actively explore the different values, motivations, interests and roles of actors within adaptation decisions, policies and programmes
- Systems and processes that allow for the identification and engagement of those involved in decisions, policies and programmes
- Documentation that reflects and communicates the results of learning from collaborations and stakeholder engagement (e.g. a reflection of what went well what could be done differently). Sustained resources allocated to building relationships and networks commensurate with the need
- Supporting informal spaces (drink making facilities, comfortable seating areas) within the organisation and externally to build relationships between people across the organisation and enable informal sharing or ideas and knowledge
- Staffing and skill development that includes participatory processes, design of inclusive events and facilitation

Case study: Working in partnership - Anglian Water

Anglian Water have developed a comprehensive adaptation strategy and have taken several adaptation actions including: recruiting a climate specialist, awareness raising, leakage control, promoting sustainable urban drainage, forecasting the effects of sea-level rise and storms on coastal assets and customers, adapting water management plans to take account of climate change and designing new infrastructure to cope with future climate change. They reported that external partnerships both within and outside the industry have been very important in this work. This includes membership of formal water industry bodies, regional based groups or organisations with an interest in climate change such as the regional climate change partnership and also relevant national bodies, such as UKCIP. Personal links have also proven to be important, for example with the Met Office and the Tyndall centre.

Source: http://www.anglianwater.co.uk/corporate-responsibility/our-strategy/mitigate/ and Anglian Water's Climate Change Scientist (pers.comm)

4.2.8 Regulations, Standards, Codes and Associated Bodies

An organisation that is adapting well to climate change will not just be adhering to the raft of existing regulations, standards, and codes under which it operates, but will additionally be aware of the process of updating and testing those regulations, standards, and codes, and will be actively engaged in that updating process. It should be engaging with the regulator, with professional bodies, or with industry standard setters, termed here "Associated Bodies", primarily to provide legitimacy to its own changes, but also to lobby for adaptation-supportive changes and to encourage others to follow its lead.

Characteristics of an organisation that is engaging with regulations, standards, and codes include:

- Awareness of the current relevant regulations, standards, codes and policies
- Awareness of, and engaged with, the processes of maintaining and developing the regulations, standards, codes and policies under which it operates.
- Proactively engaged and able to provide feedback on existing regulations, standards, codes and policies to ensure they are consistent with and supportive of the adaptation agenda and managing wicked problems
- Awareness of the wider environment (and its connectivity and interplay) in which the regulations, standards, codes and policies apply
- Existence of required technical competence
- Openness to exploring and implementing new and novel ideas about how regulations, standards, codes and policies can be used to facilitate adaptation

Indicative attributes include:

- Active engagement with bodies establishing and reviewing regulation, standards, codes and policies
- Recognition of adaptation present within the organisation's programmes, practices and systems of current regulations, standards, codes and policies
- Systems and supportive processes for dissemination of regulations, standards, and codes internally within the organisation.
- Access to technical competence to apply and review regulations, standards, codes and policies
- Resourced data collection and monitoring that is supportive of decisions related to the effectiveness and legitimacy of regulations, standards, codes and policies

Section 5 Use of the attributes as an instrument

5.1 Summarising what enables an organisation to be well adapting

The first consideration is whether the organisation is motivated to take action on adaptation. This is more likely if there a clear driver between the core purpose of the organisation and projected changes due to climate change, whether the organisation has recent, direct experience of weather related impacts and whether the organisation's planning time scales are mid to long term (10+ years). Change is more likely to be incremental if the motivation comes from extrinsic drivers such as compliance with standards, NI188. Transformational change is more likely to come as a result of intrinsic drivers e.g. direct experience of impacts, experience from other areas of challenging basic assumptions, innovative practice etc. The following questions summarise the key areas for building adaptive capacity in an organisation identified in this report.

1. Does the organisation have leadership that understands and promotes adaptation?
2. Does the organisation have access to or know where to access, accurate, usable information and expertise?
3. Is there space to translate the information throughout the organisation?
4. Are novel projects, experiments, opportunities for innovation (and the individuals promoting them) supported?
5. Does the organisation customarily engage with others through collaboration or in partnerships and is attention paid to how this collaboration can be done well and improved as required?
6. Is adaptation integrated into the organisation's processes and practices?
7. Are there regular opportunities for questioning core assumptions of how the organisation works and its core purpose?
8. Does the organisation have a culture of continuous learning? Are there systems in place for the retention of knowledge and experience within the organisation when key individuals leave?

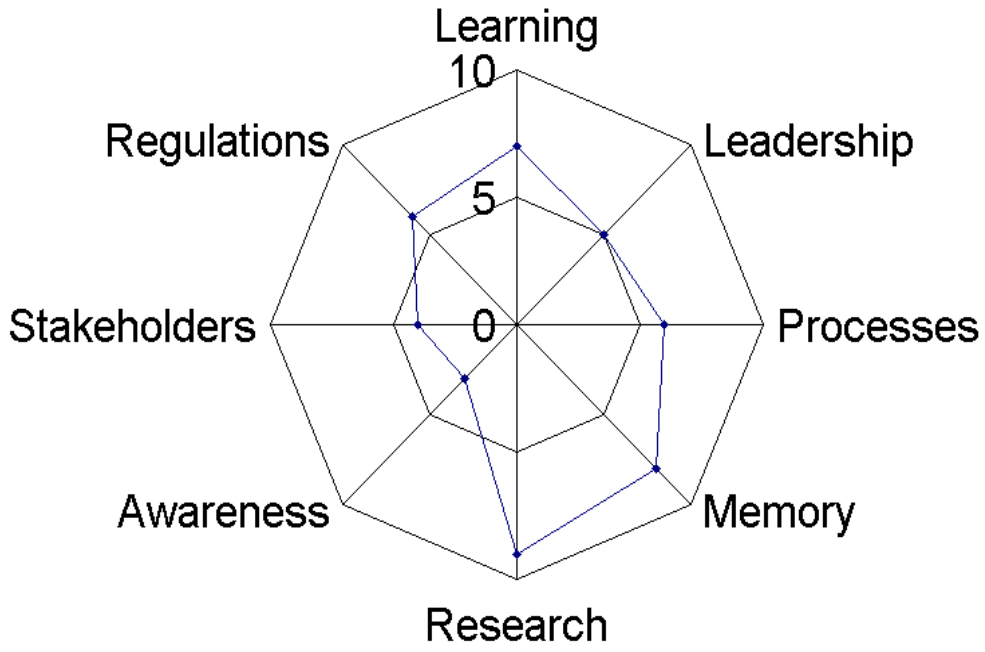
5.2 Identifying well adapting organisations

Any list of characteristics or attributes of a well-adapting or potentially well-adapting organisation can be used to generate a "score" for that organisation but both the process of generating that score and the process of using it needs to be approached with great caution in order to avoid misleading results.

It is possible to score a large number of attributes each of which is assumed to be indicative of adaptive capacity and to process them in different ways. All the scores can be combined into a single measure that can be used as a proxy for adaptive capacity. This is not recommended because in the combination of different scores, all detail is lost and only a single measure of very questionable utility remains due to its oversimplification of a complex issue. Alternatively, all the individual attributes can be displayed, using some visual tool like

the IVM Adaptive Capacity Wheel colour codes to give a non-numerical impression of strong and weak areas. The scores of individual attributes could also be combined into a smaller set of themes or areas, and this smaller set portrayed as a fewer dimensional image. For example, in the case of deciding if an organisation maintains a good corporate memory (4.3.4, above), a characteristic that is believed to contribute to adaptive capacity, evidence will need to be sought that knowledge is preserved following personnel changes, that knowledge is well-shared within the organisation, and that knowledge retention is systematised in some way. Providing evidence of these processes is not a trivial task. Each of these could be scored and combined in a variety of ways to give a measure of corporate memory retention, and this memory retention score can similarly be combined with measures of other dimensions

Another approach might be to take the relevant attributes and allocate a score to each in order that they can be shown in a "radar plot" to identify strong and weak areas; the size of the irregular polygon giving an impression of overall adaptive capacity and the potential for improvement:



Again such a 'scoring' process is not a simple process and both theory (see Section 3) and practice suggests that adaptation does not happen along a continuum but more as a process of punctuated equilibrium. For such a diagrammatic representation to be of practical value and consistency it is important, therefore to be extremely clear about what distinguishes the different levels for each of the attributes used.

In generating an indication of the adaptive capacity of an organisation from a list of attributes, it is important to address the following aspects:

- The questions posed need to be precise enough so they can be applied widely by a range of observers and they can be answered with hard evidence;

- Each question needs unambiguous criteria for determining how good each piece of evidence is;
- A marking system is required that reflects the range and subtlety of possible answers;
- A system is required for combining marks across different dimensions of adaptive capacity. It is not appropriate simply to add all the scores together to give an overall score as this loses the differences between areas of strength and weakness.

Although it is not possible to deliver a numerical score of adaptive capacity and to use it to compare different organisations with each other, or with some acceptable standard the PACT framing has been designed for this purpose and has been shown through practice to be successful in addressing all of the aspects in the list of bullets above.

5.3 Recommendation

It should now be obvious that identifying the absence or presence of attributes from a list is inadequate to give an indication of the adaptive capacity of an organisation. A more sophisticated measure is clearly required that not only identifies unambiguous attributes of the important aspects of organisational adaptive capacity but also maps the range of possible responses with sufficient detail to enable an organisation to map where they are now, identify where they would ultimately like to be, what it would take to get there and the next best steps to take to address this. Given the complexity of the process it is fortunate that in the UK a sufficiently sophisticated tool with a strong conceptual framework has already been co-developed within a large organisation, extensively trialled in many other UK organisations and fine tuned to make it applicable for many organisational types and also for 'organisation' around a particular decision to ensure that for key decisions the necessary adaptive capacity can be identified and built. It is also designed to be capable of ongoing development in response to feedback.

The authors strongly recommend that this tool (PACT framing No1 in Section 2) be examined in detail and that direct feedback is sought from the developers and, importantly, the organisations that have used the tool, including those involved in the recent self-assessment version. This work has already been done and before a new tool is developed it seems sensible to explore what is already available and working well, particularly as it is part of the CCRA work and developed for large-scale use and for scaling to multiple levels.

Section 6 References

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