The problem solution framework

Process guidance for adaptation practitioners

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Contents

Glossary of key terms and phrases

Adaptation In human systems, the process of adjustment to actual or expected climate and its effects, which seeks to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate (IPCC 2012).[1]

Cost-benefit analysis Systematic process for balancing the costs and benefits of a project or action. It usually involves changes in marginal values over time discounted to allow for factors such as the cost of finance, preference for risk, the value of externalities and the cost of opportunity.

Framing The term used to describe key terms of phrases that are used to create meaning for an activity, process or event in adaptation.[2] In practitioner terms, they are the words, images, emotion and messaging used to develop a context for a particular communication.

Impacts Effects on natural and human systems. Impacts generally refer to effects on lives, livelihoods, health, ecosystems, economies, societies, cultures, services and infrastructure due to the interaction of climate changes or hazardous climate events occurring within a specific time period and the vulnerability of an exposed society or system. Impacts are also referred to as consequences and outcomes. The impacts of climate change on geophysical systems, including floods, droughts and sea-level rise, are a subset of impacts called physical impacts.[3]

Intangible values Non-monetary goods, services or assets/liabilities. These include social, cultural and environmental values that contribute to long-term social welfare.

Learning by doing The process of studying a set of actions to determine their impact and whether they are producing the intended outcomes. This is a reflexive process intended to maximise the benefits of acting and learning from these actions.

Linear A direct relationship between one or more variables that remains constant over time. A direct line of response.

Maladaptation The adverse outcomes of adaptation efforts that inadvertently increase vulnerability to climate change. Action that undermines the future ability to adapt by removing opportunities and hampering flexibility is also maladaptive (modified from IPCC 2012).[4]

Resilience The capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure, while also maintaining the capacity for adaptation, learning, and transformation.[5]

Scenarios An enabling tool that can combine both diverse knowledge and potential futures in a way that allows the synthesis of a number of possible options.

Tangible values Direct market values of goods, services or assets/liabilities.

Threshold The level of system change or impact that prompts or merits a changed response. In terms of management, jurisprudence, legislative requirement and performance targets are often applied at critical control points within a system.

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Overview: looking at adaptation through the problem solution framework

In dynamic systems where there is constant change and uncertain outcomes, control is often sought but rarely achieved. The only real way to maintain agency and activity in these situations is through people, process and understanding.

Climate change is a systemic, dynamic issue where new knowledge and conditions are constantly evolving. For individuals, communities and organisations, adapting often means learning how to respond to continuous change in a way that builds resilience and sustains what they value. How this happens at a practical level has proven to be a voyage of discovery for many practitioners, who have been learning by doing as they piece together the bits of the adaptation puzzle.

The problem solution framework was developed by actively working with researchers and climate change practitioners in Australia over a number of years to assist practitioners in making sense of the information they received and how to apply it in their context. What I observed during this time was that successful practitioners in this field often intuitively used innovation techniques, but did not always recognise innovation or understand how it worked. I found that in some cases practitioners were getting stuck in the problem phase and continuing to use problem framing throughout the process, which could cause barriers to action and engagement.

What needed to be understood was the changeover between the problem and solution phases, and which work practices were best suited for the different parts of the adaptation process. I also found in some cases that practitioners were moving into the solution phase without fully understanding the nature of the problem which could lead to unrealistic expectations and poor outcomes.

The other difficulty practitioners were encountering was that many of the risk frameworks being used for the solution phase were linear and did not accommodate innovation or the understanding of social systems, collaboration and change. As a result of this, tools and methods were being overlooked or not used correctly. The level of investment of time and resources necessary to support the innovation needed for adaptation activities was also being underestimated as a result of this.

Missing in practice were **seven key aspects:**

- The recognition of where the changes occur between the problem and solution phases and the different focus and requirements of each phase.
- The recognition of the active role that innovation plays in the process of adaptation and the types of resources and finance needed to support this.

- An overall conceptual process framework that could be used to guide but not dictate how practitioners undertake their work.
- An understanding of the how key components such as developing and integrating new knowledge, communication and change management worked together to support adaptation activities.
- An understanding of how to best manage continuous short- and long-term change, uncertainty and collaboration.
- An understanding of which frameworks would best facilitate the development and use of new knowledge.
- An understanding that many of the tools needed for adaptation are in 'plain sight' and are already used in areas of operations.

Areas of current practice such as development and integration of new knowledge into systems, change management and communication are included in this framework, as they can be used to support and inform adaptation activities (see Figure 1, overleaf). All of these practice areas:

- share common attributes
- are already established in many operational and organisational contexts
- can provide a starting point for practitioners that is familiar, which can be built upon.

Governance is another important aspect of effective adaptation practice because the collaborative actions needed require structures that enable decision making across diverse and often competing agendas. These structures also need to provide oversight that maintains accountability but allows some level of autonomy at lower levels to enable action.

This problem solution framework has been developed with the understanding that adaptation is a process of social change, where reconnecting communities and building resilience is as important as developing and integrating new knowledge and technologies. Both risk and innovation play active roles and can be used for adaptation activities. Risk frameworks and methods are useful for ordering how to identify and assess the problem. Innovation frameworks and methods are useful for managing the risks associated with dynamic situations that have uncertain outcomes and surprises.

Adaptation is not a ticking the box exercise. What is used and how it is used is dependent upon the context it is applied in, the task it is being applied to and who is applying it. It is a process that changes and requires willingness to engage with complexity and disorder to reach a point of understanding of where you are in the process, and what actions might be possible. That is why this framework it is not prescriptive.
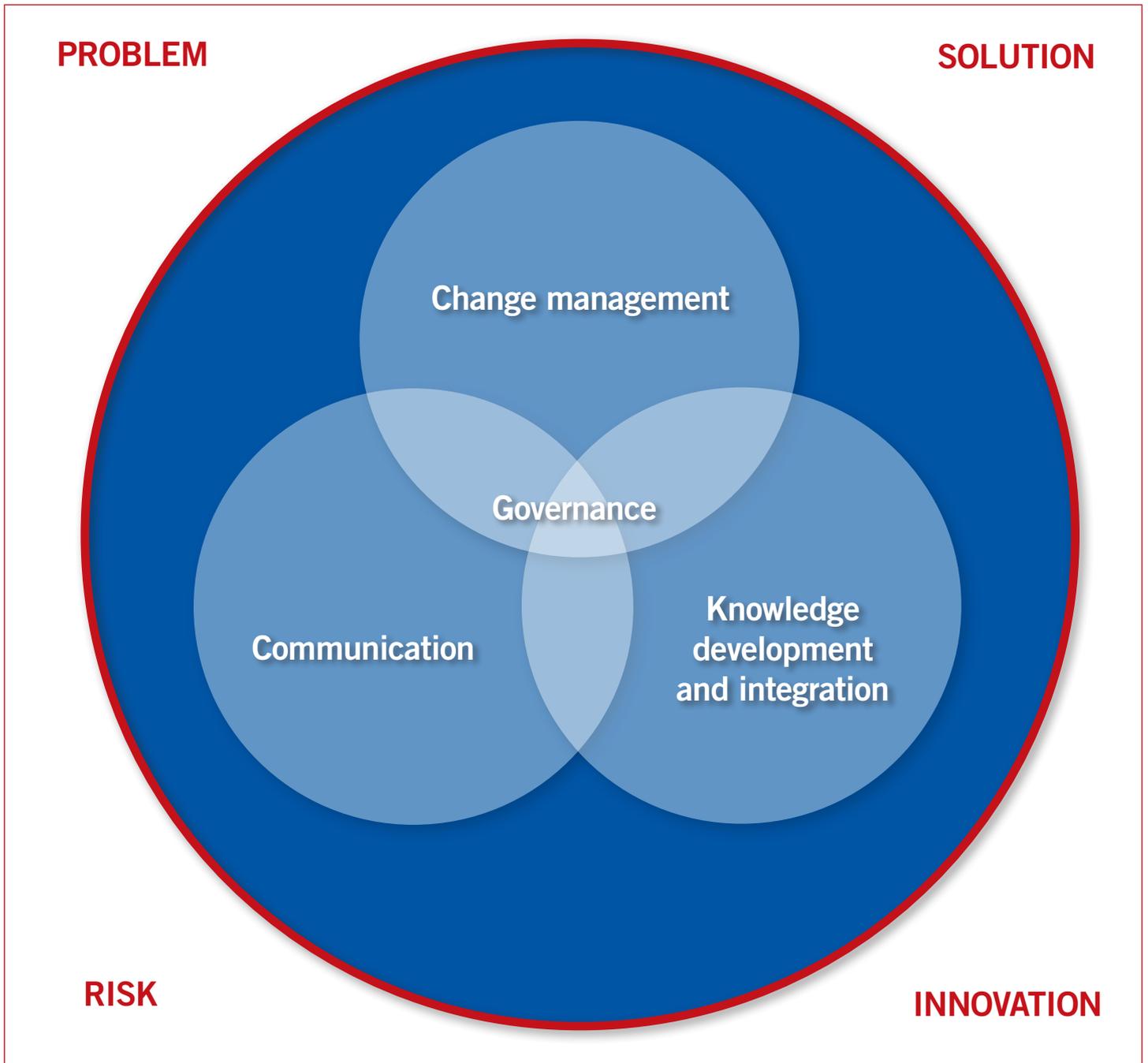
Figure 1 Relationship of the components of the problem solution framework

The aim of the Problem Solution framework is to provide a foundation of understanding for practitioners so they can choose the process pathway they need for the specific task they are undertaking. This way they can plan and implement adaptation actions in their own context, in their own way with the resources they have.

Using this document

This document is designed as a framework to assist understanding of how to manage and implement actions in context of continuous change, where risks and actions are complex and outcomes often are uncertain. Although it uses climate change as the focus, this framework can be applied to assist understanding in any area of practice requiring management of ongoing change and dynamic risk, in current and future contexts.

Understanding adaptation

Celeste Young and Roger Jones

Why do we need to adapt

Climate change is already affecting how we live in Australia through recent climate-related events such as, drought, flood, fire and heat waves. Although the resulting environmental, social and economic costs are increasing across all levels of our communities, understanding how to address this issue effectively is still being developed. Experience of past events can inform a certain level of understanding but is insufficient. New thinking frameworks are needed to deal with unprecedented and potentially rapid changes in future climate risks. The most exposed organisations and communities will need to undertake both short- and long-term planning if they are to prepare for a wide range of potential impacts. Failure to address long-term issues may increase vulnerability and decrease the capacity to cope, raising the cost of responding to impacts when they occur.

What is adaptation?

Even with concerted efforts to reduce greenhouse gases, some climate change cannot be avoided, with most changes to 2040 being locked in. All communities and individuals will need to adapt in some way. If they don't adapt in a planned way, they will have to respond to events as they happen, increasing the likelihood of loss, maladaptive responses and increased vulnerability to future events. Planned adaptation will need to be geographically and sectorally specific, and suited to the context it is to be used in. For example, planned tourism industry responses will be specific to:

- The type of tourism (eg. eco-tourism, cruises, cultural tourism such as galleries, parks, museums)
- Where is it located geographically (eg. national parks, country regions, coastal and marine areas or cities)
- Who the operators are (eg. small or large business operators)
- The types of hazards that may affect them (eg. bushfire, floods, drought, extreme storm events).

Many different definitions of adaptation are in use, most of which revolve around actions and processes. A widely-accepted definition of adaptation accommodating this comes from Smit and Wandel: ' … a process, action or outcome in a system to allow the system to better cope with, manage or adjust to some changing condition, stress, hazard, risk or opportunity'.[1] It is a social process that integrates local knowledge of climate risks with expert knowledge and new technologies to manage the risk of the changing climate in specific contexts.

How is adaptation different to mitigation?

Mitigation and adaptation are two related but different aspects of climate risk management: risk reduction and risk response. Mitigation aims to reduce climate change risk by reducing greenhouse gas concentrations in the atmosphere by lowering emissions and sequestering carbon dioxide. This in turn reduces risks from future impacts. It requires a mix of policy and actions operating within global and national frameworks and quantifiable accounting.

From 1980 to 2012, disaster-related losses amounted to US\$3,800 billion worldwide. Some 87% of these reported disasters (18,200 events), 74% of losses (US\$2,800 billion) and 61% of lives lost (1.4 million in total) were caused by weather extremes.

— World Bank, 2013[2]

In Australia, the cost of natural disasters is projected to increase from \$6.3 billion annually to around \$23 billion per year by 2050.[3] Economic assessments of future impacts associated with rapid change show such events are likely to be more costly than currently anticipated, so this figure is likely to underestimate the real cost.

Changing risks

'The risks associated with environmental changes are often non-linear. Rather, they can blow out, with dramatic step changes.'

— Dangerous Degrees, The Climate Institute (2013)[4]

The main perception of adaptation is that it can be addressed incrementally over time because climate change is gradual and significant impacts will only occur decades into the future. However, recent research indicates that rather than gradual incremental change, the climate changes in a step-like fashion, producing rapid shifts in rainfall regimes or changes in the incidence of extreme events.[5] Clusters of unpredictable extreme events, such as the succession of droughts, fires, storms and floods that affected Australia between 2006 and 2012, were certainly hotter, and may have been wetter (floods) and drier (drought) due to climate change. Similar events occurring in the future have the potential to significantly harm a wide range of economic, social and natural values.[6]

Adaptation is context and geographically specific, working predominantly at local to regional scales involving actions by individuals, communities, businesses and government. Its primary focus is to reduce the negative effect of the current climate impacts and to prepare for future conditions where climate plays a role. It also identifies and pursues opportunities that arise as part of climate change.

Key drivers of adaptation

Adaptation has two key drivers that align with common objectives; adaptation to maintain something such as way of life, a business or a community; or to ensure economic or social growth that is sustainable. The appropriate management of available resources is essential to achieving adaptation outcomes. Both these objectives are dependent upon the organisations that implement them, which be affected by internal and external factors that determine the type of adaptation actions that can be undertaken.

Internal factors that influence adaptation actions include:
- available resources such as skills, knowledge, time and finance
- current strategic directions and planning
- current processes and systems
- operational and institutional frameworks.

External factors that influence adaptation actions include:
- geographical context
- regulatory environment
- surrounding community – density, culture, diversity, etc.
- policy stability and change
- markets
- resource availability.[7]

These factors can act as constraints or enablers depending upon the context and type of adaptation action required. For example, one organisation may have limited financial resources but may have access to a number of volunteers who can assist. The actions they undertake will be tailored to the skills, number and availability of those volunteers. They may also be constrained by policies relating to the use of volunteers and examine working with other organisations that do not have these constraints. For example, Conservation Volunteers Australia carry out conservation and Landcare projects.

Practitioners will need to consider how to work within these constraints but also how to think outside of them and innovate. Thinking outside the constraints allows for creative problem solving that works towards more sustainable outcomes. Resource and capacity constraints, for example, can be overcome at times through multiparty collaborations where parties pool resources to work towards a mutually beneficial outcome. An example is the work undertaken by regional bodies, such as greenhouse action alliances in Victoria, where groups of municipal councils have pooled knowledge and resources to develop regional adaptation plans. These collaborations have enabled less well-resourced councils to undertake adaptation activities that would otherwise not have been possible.

Understanding systems

Adaptation is a systemic issue that affects environmental, social and economic systems (Figure 1.1). Each of these systems is supported by a number of smaller subsystems that in turn interact with each other. It helps to see an individual operation as a system with many interacting parts and also to recognise that each system, whether it be a community, business network or government agency, is part of a larger system. Many of these systems are complex, interconnected and interdependent. For example, in natural systems such as rivers and coastlines that cross jurisdictional boundaries; stakeholders from one area may take action that may have repercussions downstream or further along the coastline, transferring the responsibility for managing any subsequent risks to other jurisdictions.

The interrelated nature of these systems can result in chain reactions that resonate across systems and through subsystems, possibly continuing for long periods after an event.
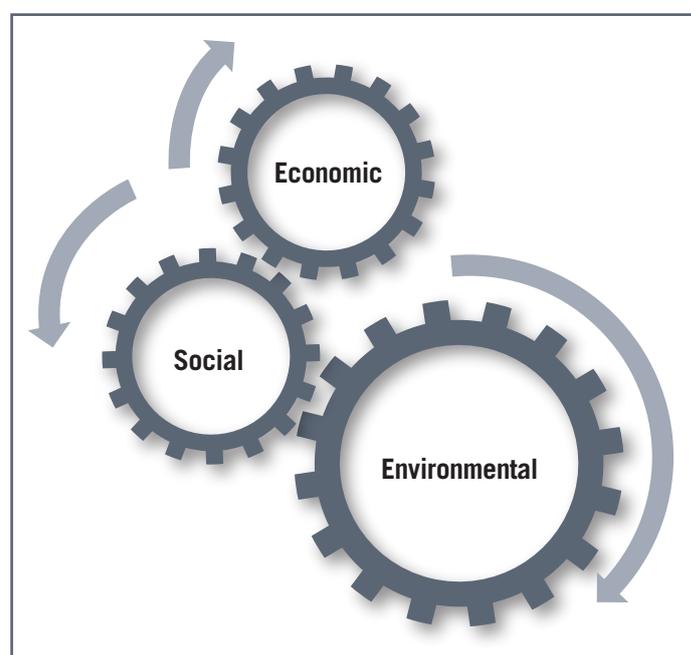
Figure 1.1 Interactive environmental, social and economic systems.

Secondary impacts of events such as flood, fire and drought are often overlooked but can increase vulnerability and reduce resilience to future events. During the drought of 2002–2010, for example, many farmers experienced high debt and reduced farm productivity due to environmental degradation accompanying prolonged dry conditions. Secondary impacts, such as increased mental health issues and reduced social cohesion, also affected many communities.[8] This, in turn, increased the vulnerability of some farmers to accumulating impacts. At an economic level, secondary impacts can be devastating – particularly in regional areas – where small businesses may not have the resilience or strategies to deal with such events. After the fires in Marysville in 2009, for example, 80% of local businesses had failed within 12 months.[9]

Understanding how different components of a system will be impacted by climate change can help organisations plan for future events. For example; in an operational system the chain of impacts across both the internal and external system of the operations can make it easier to make decisions about:

■ How each area is impacted.
■ What the priorities are in a given context.
■ What adaptation options may need to be considered.

For example, a business system has many interacting parts (staff, capital infrastructure, intellectual capacity and culture); and this business system is part of a larger system involving suppliers, logistical supply chains, customers, competitors, and the policy and regulatory environment (Figure 1.2).

Assessing complex systems

A common framework used to assess environmental systems is the Drivers, Pressures, State, Impacts and Response (DPSIR) Framework. This is a ' … systematic indicator selection procedure … '[11], which can encourage and support decision making by ascertaining how a system works, and is affected through mapping cause-and-effect of these components on each other.

The key aspects of this are:

■ **Drivers** – what is driving the system?
■ **Pressures** – what is exerting pressure on which components of the system?
■ **State** – what is the state of the system?
■ **Impacts** – what is the impact on components of the system?
■ **Responses** – what responses are happening in the system and how do they affect the other components?

An illustration of a simple use of the DPSIR framework is shown overleaf (Figure 1.3). This diagram shows possible responses to the affects of increasing impacts of climate change. As each action is taken it will affect each component it directly impacts and also have flow-on effects for other components in the system. For example, the application of regulation and policy and financial incentives can have a direct impact on the

EFFECTS OF CLIMATE ON …

BROADER NETWORK
… public/private electric and water utilities and other infrastructure

VALUE CHAIN
… supplies of natural resources and raw materials

CORE OPERATIONS
physical assets, production processes, or O&M

… disruptions to supply chain

… other inputs into production

… workforce and changing lifestyles

… customers' access to product

… customers and demand for goods and services

…government-supplied services

Figure 1.2 The Risk Disk.[10]

drivers that create the need the for adaptation and can either increase or reduce the pressures, which in turn shape the state of the environment. This in turn can affect the types of impacts experienced which in turn directs the types of responses needed.

The following questions can be useful when applying or thinking through this framework[12]:

■ What is your area of interest? (eg. adaptation, ocean health)

■ What are the boundaries of the area you wish to examine – what needs to be included and what doesn't?

■ What are the boundaries of the system/s you are assessing?

■ What indicators will be most effective for assessing this system?

■ How should these indicators be categorised? (eg. quality, scale, time)

■ How should these indicators be organised across the assessment framework?

■ What are the cause and effect pathways in the framework?

Understanding the surrounding systems, or an aspect of your own operational system, also supports the development of integrated approaches that work within our own natural and social systems to better manage climate impacts and adaptation responses.

Figure 1.3 DPSIR framework showing adaptation responses.

Working with uncertainty

Because the climate is a dynamic and unpredictable system, there will always be a significant level of uncertainty associated with adaptation planning. An acceptance of working with the unknown and incomplete information is necessary, particularly in relation to future projections and policy outcomes. This can be a major barrier to undertaking adaptation.

Differentiating between the types of future uncertainty in the adaptation process will help to see how they can best be managed. Some uncertainties can be managed with new knowledge, some with better understanding of the decision making context, and some with processes that can change and offer more flexible responses to unexpected outcomes. In particular, ongoing monitoring provides early warning of changing conditions. For example, a business may not be able to predict an extreme event such as a heat wave, but it can monitor weather reports and activate response measures if such an event is likely to occur. Table 1.1 outlines key areas of uncertainty and actions.

Management strategies can accommodate ongoing uncertainties by using flexible, reflexive processes throughout the adaptation process. These allow for surprises and change to be assessed and responded to as they arise.

The role of resilience

Building resilience is a growing aspect of Australian climate change policy and planning policies. It is featured at a state policy level, such as the Victorian State Adaptation Plan[13] and State Emergency White Paper[14]. At the federal level, it is the focus of the National Strategy for Disaster Resilience[15] undertaken by COAG and has been incorporated in the Climate Adaptation Outlook Framework[16]. Resilience has also become a key focus of organisations such as Economic Development Australia, who see it as central to sustaining future businesses.[17]

Resilience means different things to different people and as a result, can be a difficult concept to put into operation.

A recent and useful definition adopted by the Arctic Council is: 'The capacity of a social-ecological system (or organisation) to cope with a hazardous event or disturbance, responding or reorganising in ways that maintain its essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation.'[18] Criteri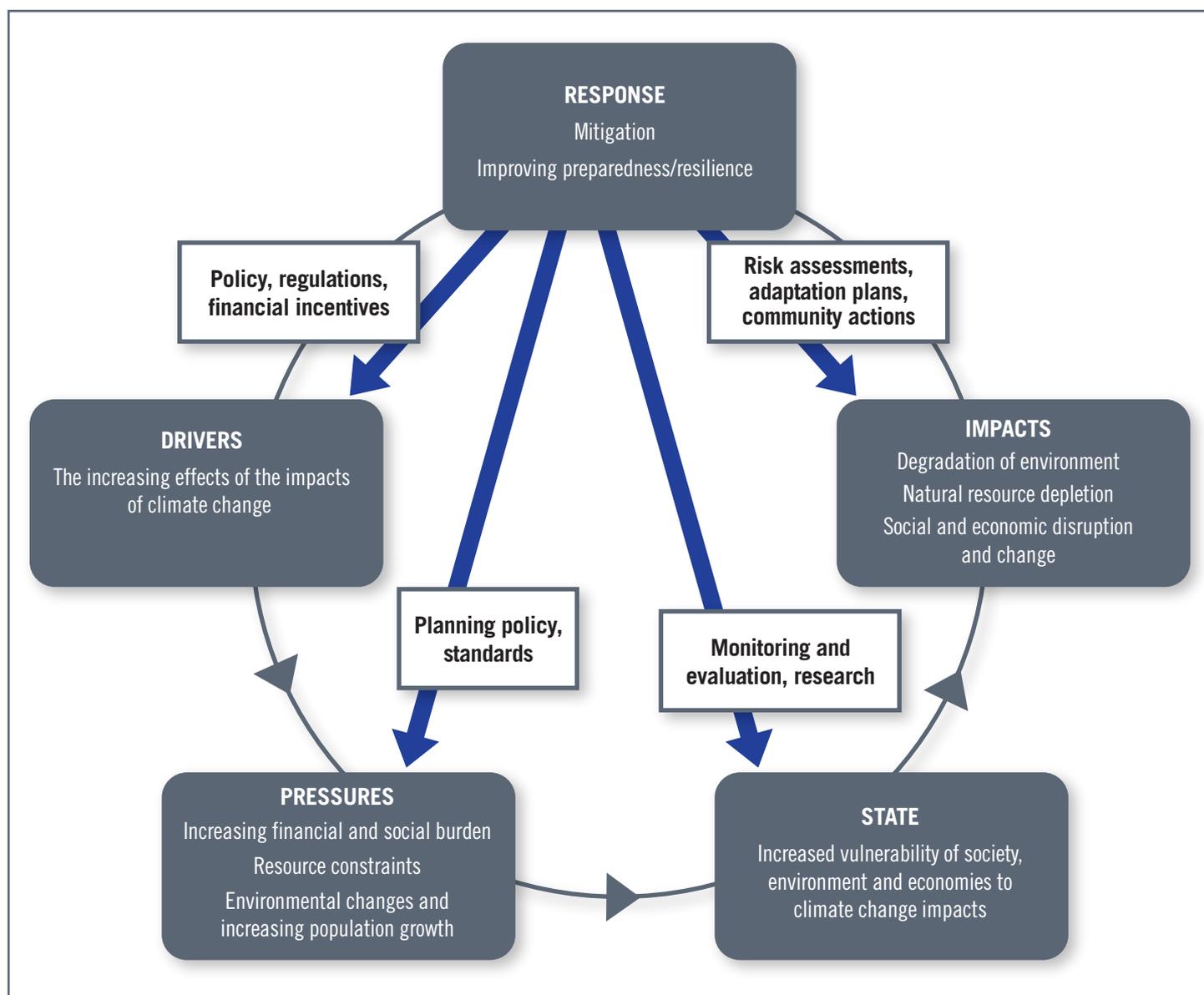a defining resilience are context and task-specific, and it is difficult to come up with a set of measures that can be used to evaluate success or failure.

Understanding when and where changing risks may lead to critical thresholds being exceeded is an essential requirement for managing and maintaining resilience. Exceeding a critical threshold – such as a loss of operations, prohibitive input costs or financial impact due to events – can result in decreased resilience. It is particularly important to be able to identify the signals that precede these thresholds and take action before the threshold is reached.[19]

When approaching resilience, it helps to see it as a continuous task, and organisations should aim to be 'adapting well' to continuous change rather than being 'well adapted' to a particular set of conditions.[20]

Summary

Climate change presents a key risk for our environment, our economies and our communities. For people undertaking adaptation it requires understanding of their internal and external systems, and the relationship and interdependencies between them. It also requires an understanding of mitigation and adaptation activities, and the differences and synergies between these two areas.

Uncertainty is part of the adaptation process that needs to be accommodated and managed in a way that enables effective responses and action. It is also important to identify where opportunities to act exist, and where it is not possible to do so. Resilience to not only climate impacts but also to the changes that will be required as a result of our changing climate, is key to future sustainability being achieved.

Table 1.1 Key areas of uncertainty, agency and actions that can be taken by adaptation practitioners.

KEY AREA OF UNCERTAINTY	AREA OF AGENCY	ACTIONS THAT CAN BE UNDERTAKEN BY PRACTITIONERS
Scientific uncertainty about the nature of future climate risks.	Monitoring and response	Monitor, review and incorporate new information into activities as needed.
Uncertainty regarding actions that have been taken to reduce impact and mitigate risk.	Monitoring and response	Monitor, review and incorporate new information into activities as needed.
Operational (activity-related) uncertainty about innovation and uncertain outcomes of adaptation actions.	Planning and response	Ongoing planning, monitor, review, response and adjustment.
Circumstantial uncertainty relating to surrounding political, economic, social and environmental conditions.	Strategic planning and response	Strategic planning, monitoring, review of new information and incorporation into activities as needed.

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The problem
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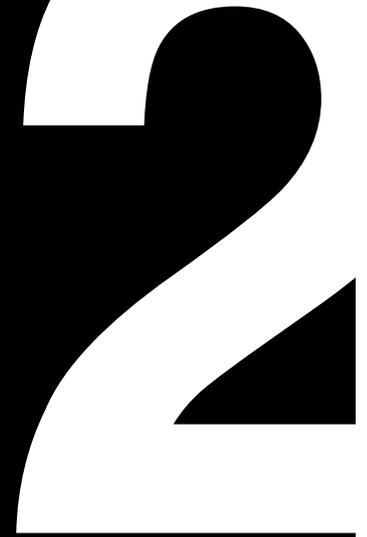
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Background

The problem solution framework was originally designed in 2010 as a process-based conceptual framework to assist decision making and management of adaptation projects through defining the different problem solution components of the adaptation process. Since then, the framework has been developed further and aspects of it refined. This framework draws heavily on observations of adaptation practitioners over a number of years. It also draws on a wider range of practitioner and research knowledge in sustainability, business innovation, emergency management and the arts, where dynamic and unbounded situations are common. These practice areas all have established processes and frameworks that enable outcomes in uncertain situations. They also provide a familiar base from which practitioners can start.

The lack of clarity regarding an overall process for adaptation planning and implementation has confused many practitioners, who are often presented with numerous unfamiliar actions and little insight as to how the overall picture fits together. This was highlighted in work undertaken by VCCCAR to map adaptation processes used by local governments in Victoria, which observed there are multiple starting points and ways of undertaking the process.[1] Adaptation is dynamic and systemic, and therefore cannot be managed through control. It requires flexible, iterative frameworks which allow for reflection and adjustment. The problem solution framework was developed with this in mind. In particular it aims to clarify:

■ The problem and the solution phases and the changeover points between these two phases. (This is important because although both phases overlap and inform each other, each phase requires different approaches, methods and tool application.)

■ The central role that innovation has in the process of adaptation implementation.

■ How areas of current practice, such as developing and integrating new knowledge, communication and change management, can be used to support adaptation activities.

■ Tools selection and application for the different types of adaptation activities.

■ Options for managing continuous change and learning and dynamic risks.

Framing is an important aspect of this framework because how an exercise is framed often dictates what is used and how it is used. The key framing for the whole adaptation process to date has been risk. This has meant that the predominant frameworks and tools that have been used by practitioners have been risk-based. Using this single framing of risk for two very different phases of a process has at times not only been hampering the implementation of the actions themselves, but also the effective use and allocation of resources.

Risk frameworks are useful as a means to understand the problem and develop responses, however they do not always fully address the needs of practitioners during the solution phase. The use of innovation framing and frameworks can help address this issue as innovation frameworks are designed to support social and technological change and transformation. They also offer options for managing dynamic risk where outcomes are uncertain. Innovation combines what is pre-existing with new knowledge and technologies, so it also encourages practitioners to consider other frameworks, systems and tools already in 'plain sight', such as business continuity, ISO standards and quality assurance frameworks that can be used to integrate adaptation into current operations or communities.

Adaptation is also complex because it is context specific and so needs are diverse. This makes it impossible to give a single explicit instruction for undertaking adaptation. That is why this framework points to key components that are necessary for adaptation and orders them into phases and key tasks. This allows practitioners to develop their own instructions through identifying where they are, and understanding the options available to them. This way they maintain ownership of their activities through the choices they make.

Phases of the problem solution framework

Adaptation has two distinctly different phases: a **problem phase** and a **solution phase** (Figure 2.1). These separate phases overlap and inform each other but have different needs in

Figure 2.1 The problem solution phases.

relation to knowledge, communication, methodology and tool use. Although much has been written about the problems and solutions of adaptation, there is little literature in adaptation that shows how this should be applied, or what pathways can be used to navigate through them.

Each phase directs:

■ what framing is used

■ the type of tools used and how they are used

■ the type of uncertainty encountered, and

■ the way communication and knowledge development is undertaken.

Problem phase purpose

The problem phase process is diagnostic and its purpose is to identify what the problem is. This is done by identifying the risks associated with potential climate change impacts and prioritising them. The primary framing that directs the frameworks and tools used is risk. Knowledge during this time is collected and synthesised to enable understanding, ownership and decision making.

Key questions associated with the problem phase are:

■ What is the problem?
■ Who is affected by this problem?
■ Who is responsible for this problem?
■ How are they affected by this problem?
■ What are the priorities?

Solution phase purpose

The purpose of the solution phase is treatment of the problem. This is achieved through the development and implementation of adaptation actions and is the active phase of the process through to the final evaluation of project. The key framing for this phase is innovation. Knowledge collected and synthesised in the problem phase is integrated and used to enable agency to act, learn and improve.

Key questions for the solution phase:

■ What solution has the greatest value for the stakeholders? (Cost-effectiveness, social benefits, preservation.)
■ Who will be undertaking the action?
■ Who is responsible for the action and how are they responsible? (At an individual and agency level.)
■ What resources are available and what is the capacity of the organisation undertaking the action?
■ What are the risks associated with undertaking this action and how should they be managed?

Innovation as part of the process

Risk and innovation inform and direct the type of actions that are being undertaken and how they are undertaken during the different stages of the adaptation process (Figure 2.2).
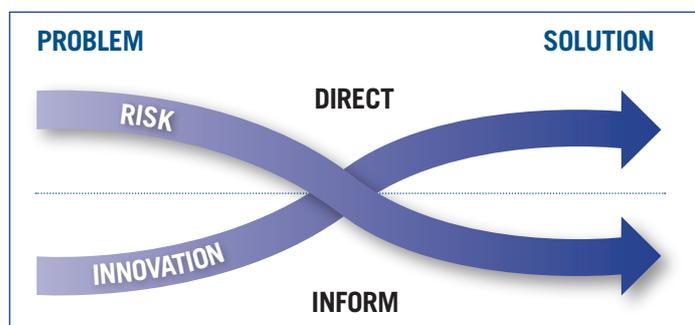
Figure 2.2 Risk and innovation focus during the problem solution process.

In most cases to date, innovation has not been defined within the adaptation process. Detailing this is helpful because it allows for two things:

1. Greater understanding of the different tools and approaches needed during adaptation and their specific use, and
2. Appropriate monitoring and evaluation during these phases.

It can also help better define the type of investment and programs needed to enable adaptation activities, and help identify the type of communication needed and how it can be applied.

Framing

As there are often multiple levels of framing for adaptation activities, dividing these frames into specific levels can help with the identification of available tools and methods (Table 2.1). In the problem phase for example, an organisation may undertake a project focusing on impacts and hazards for a local fire authority and use risk mitigation frameworks. Alternatively, in the solution phase, the action might be to improve community attitudes relating to fire safety and use social and business innovation in a local community.

Table 2.1 Framing levels for adaptation.

Level of framing	Framing*	
Level 1: Adaptation phase	Problem	Solution
Level 2: Focus for activity	Risk	Innovation
Level 3: Context where activity is applied	Location (eg. community, regional, urban) Sector (eg. agriculture, manufacturing, health) Research (eg. social, environmental, economic) Organisation (eg. NGO, government, business, regional body, local agency)	
Level 4: Focus of activity	Vulnerability Resilience Exposure Sensitivity Hazard Impacts	Social Political Economic Institutional Technological Systemic Business Incremental Environmental Operational

* The framing in this table does not encompass all possibilities. Other terms and sub-layers of framing can be applied.

Problem

- Scoping
- Establishment of risk criteria
- Collation, understanding and acceptance of the data

Solution

- Analysis and assimulation of data
- Development of adaptation actions options
- Selection of adaptation actions

Identification of problem

Assessment 1

Assessment 2

Development and implementation of actions

Risk

- Evaluation of adaptation action
- Assessment of action impact on the problem

Innovation

- Development and testing of adaptation action
- Adoption and diffusion of adaptation action (idea)
- Uptake of adaptation action

Figure 2.3 The problem solution process framework.

The process

The four key tasks (Figure 2.3) in the adaptation process are:

1. Collation of risk data.
2. Assessment of risk data. Development and selection of adaptation actions.
3. Development and implementation of adaptation actions.
4. Evaluation of actions.

The two assessment tasks provide the transition points between the problem solution phases.

Assessment Task One has two key purposes:

1. To identify, analyse and prioritise the risk(s), and
2. The development and selection of the adaptation actions.

Assessment Task Two has two key purposes:

1. The assessment of the impact of the action on the problem, and
2. The evaluation of the project undertaken.

As this process can be applied to a specific project or a number of projects at once, there is no specific time for completing this process cycle and some tasks will take longer than others. For example, the building of a dyke will have a different time frame to the development and implementation of a new adaptation process in a business. (For details of this process, see Appendix 2.A.)

Subsequent iterations of the process

As this process is continuous and iterative, it is completed only to be started again. Knowledge is developed and accumulated through each iteration of the cycle, with each process cycle adding a new knowledge layer (see 'New knowledge', p48). This means adding an additional step of knowledge evaluation during the first and second tasks of the cycle after the process cycle has been completed for the first time (Figure 2.4, overleaf). This is to ensure that knowledge being used has not been superseded, and that decisions are being made upon the best available information.

Key questions for this stage are:

- ■ What is the task?
- ■ What information do we have?
- ■ Is there new information that should be included?

Actions that have previously been undertaken may also be evaluated at the end of the adaptation process cycle to provide a complete picture of adaptation actions undertaken before re-entering the risk phase of the cycle. With each new iteration of the cycle, you will be able to gauge progress made or adjustments that may need to be made to your overall adaptation plan and actions. This will assist the scoping of the next exercise(s) that may be undertaken.

- Scoping of project
- Review of knowledge
- Development of risk criteria
- Collation of data

- Assessment of the project impact in relation to the overall adaptation program or other projects
- Assessment of the action on the problem
- Evaluation of the project

Identification of problem

Assessment Task 1

Assessment Task 2

Implementation of action
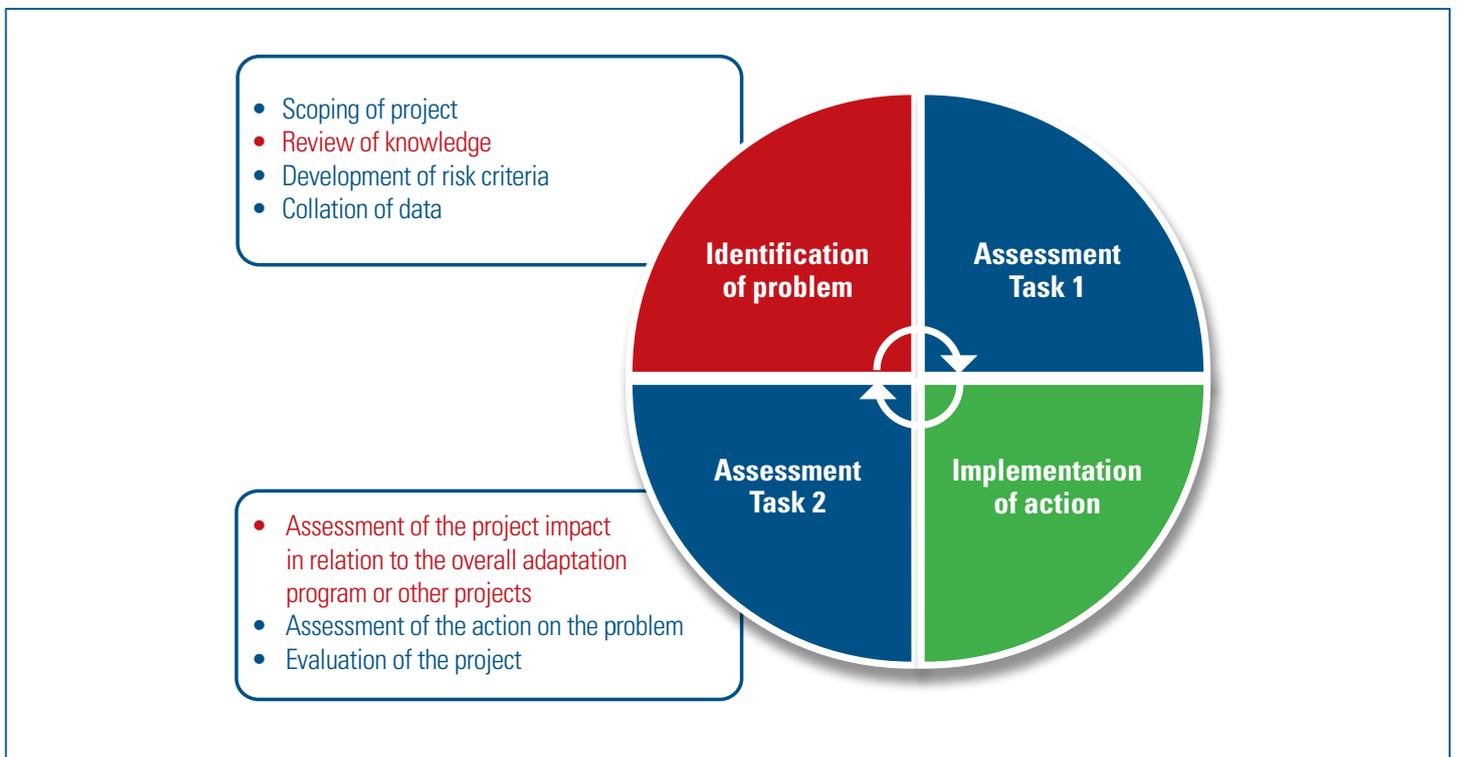
Figure 2.4 Additional steps for subsequent iterations of the problem solution process framework.

Key questions for this stage are:

- How has this project reduced the problem?
- How has it contributed to the adaptation program and other programs within it?
- Has it impacted other programs and do they need adjustment as a result?

Process stages

It is important to note that during the adaptation process that stages may change or not be needed, particularly during the implementation phase. This depends on many factors, including: the maturity of particular actions, what is being undertaken and how it is being undertaken. For example, adoption, diffusion and uptake of an idea may happen simultaneously, or an idea may have undergone diffusion during a previous project and the key purpose becomes uptake of specific actions. Alternatively, an activity based on a risk that has previously been assessed may not need to undertake another assessment, but may wish to re-evaluate and update the previous assessment instead.

Summary

The problem solution framework provides a conceptual approach that can be used to guide practitioners. It provides a foundation that can be built upon as adaptation practice progresses and allows for the addition of new stages and interpretations. In application, it allows for practitioners to choose what is most appropriate for their context and task. Key to this framework is the crossover from the problem to the solution phase and how this directs the framing and the tools that are used and how they are used.

Reference

1   Fuenfgeld, H. (2011). The Navigator, Presentation, Victorian Centre for Climate Change Adaptation Annual Forum, Hilton Hotel Melbourne Australia.

Appendix 2.A: Process steps detail

Scoping the risk assessment

Because climate risks and their impacts are systemic, they are an unbounded problem. Parameters have to be established to bound the issue and ensure tasks being undertaken are achievable. Ways to bound an assessment and define its scope include defining:

- Aspects of risk to be examined (eg. vulnerability, hazards, exposure, sensitivity, resilience or an integrated assessment combining several aspects).
- Geographical area – region, regional, state, national.
- Jurisdictional level – organisational, municipal, state, national.
- Systems area – social, environmental, economic.

The capacity of the group and the resources available to them will also inform the project scope. This is also the point where governance, monitoring and evaluation should be set up for the project (see Appendix 2.B and 2.C).

Risk criteria

Risk criteria can be understood as: 'terms of reference that are used to evaluate the significance or importance of an organisation's risks. They are used to determine whether a specified level of risk is acceptable or tolerable.' The Praxiom Research Group report also notes that: 'They should: reflect an organisation's values, policies, and objectives; be based on its external and internal context; consider the views of stakeholders; and be derived from standards, laws, policies and other requirements.'[†]

Risk criteria allow an organisation to clearly define what level of risk the organisation is prepared to accept for a particular event or activity. It is against these criteria that an identified risk will be evaluated during the risk assessment process to determine what actions are needed. The risk evaluation criteria can be also be developed and refined in later reiterations of the cycle as new risks are identified and analysed. The scale of the criteria is dependent upon the scope that the project group have outlined and can range from macro levels (such as a national assessment) to micro levels (such as a business sector or organisation).

A number of factors need to be considered when establishing risk criteria. These relate to how prepared an organisation is, what it does and how it operates, including:

- The external and internal environment.
- The current risk profile – what risks are currently identified.
- Risk appetite and tolerance levels – how much risk is acceptable and how resilient the organisation is to the risks.
- Accountabilities and responsibilities – who is responsible and how they are responsible.
- Policies, plans, strategies and frameworks and processes that may apply (eg. business continuity plans, ISO frameworks, regional and state adaptation plans).

These form the basis for defining the types of risks that are important to a particular organisation.

Often there are diverse stakeholders involved in forming a criteria, so mapping synergies between these agendas and understanding the values that inform these when developing the final criteria is important.

A number of useful frameworks and guidance materials with clear processes for understanding this are available. A useful resource is the *Deciding for the coast, a guide for decision making for cost-effective adaptation*[††] developed by the South Eastern Council Climate Change Alliance. Materials from emergency services sectors such as the Community Emergency Risk Assessment (CERA)[†††] process developed by the Victorian State Emergency Services are also useful.

Key questions

- What are the boundaries of the project?
- What governance will be needed?
- What monitoring and evaluation is needed?

Key questions

- Who are the key stakeholders involved?
- What agendas are important to stakeholders?
- What is considered an acceptable level of risk for the stakeholders?
- What is common to all stakeholder agendas and policies?
- What can we agree upon?
- What do we want to achieve?

[†] Praxiom Research Group Limited. (2010). Plain English, ISO 13000 2009, http://www.praxiom.com/iso-31000-terms.htm#2.22_Risk_criteria_ (accessed 2 December 2013).

[††] Marsden Jacob Associates. (2012). Deciding for the Coast: A Guide for Decision-Making on Cost Effective Adaptation, http://www.nccarf.edu.au/localgov/examples/deciding-coast-guide-decision-making-cost-effective-adaptation (accessed 13 July 2014).

[†††] Victoria State Emergency Service. (2014). Risk Assessment. http://www.ses.vic.gov.au/prepare/em-planning/risk-assessment (accessed 2 Feburary 2014).

Collation, understanding and acceptance of data

Collation of data is the third task in the problem phase. In some contexts this can require the collation of 'top down' data from experts in areas of research and 'bottom up' local knowledge to provide context specific information. A common method used in this area is to conduct workshops that collect information from key knowledge stakeholders through a guided process (see 'Facilitating workshops', p42). As climate risks are often a new area for stakeholders outside of the sustainability area, communication that is educational is needed to create understanding and acceptance during this phase. Innovation adoption and diffusion methods are particularly useful with this task. It is important to make information relevant to the various stakeholders so they can see how it applies to their context.

Traditionally, many groups have operated in a siloed manner, so thought needs to be given at the beginning of this process as to how to approach and engage with different groups to create understanding, buy-in and ownership. As data collection often requires a whole of agency or multi-agency approach, how to overcome the institutional and organisational structures that may act as barriers should also be considered. Innovation and change management methods can also be useful at this point, as some strategic planning will be necessary to ensure that there is appropriate support and engagement across all tiers of the organisation to provide a foundation for the solution phase.

Analysis of risk data

Information collated in the previous phase is synthesised and analysed. Risks and impacts are then prioritised. In some cases, the completed assessment is reviewed by an appropriate expert to ensure its quality and identify possible gaps in the data or analysis. Methods for synthesising data are still developing, and which one you use will depend upon the type of assessment being undertaken.

Risk prioritisation may require costs to be allocated at this stage, requiring some form of economic analysis. It is worth noting that many current frameworks may underestimate the cost associated with climate impacts due to secondary or flow-on costs not being able to be fully ascertained. Also many intangible (non-monetary) costs are hard to value and so are often not included as a result at this stage. Frameworks are still being developed to quantify these, however it is important to describe all values at risk, even if they cannot be fully costed. (For further details, see Appendix 2.C.)

Development of adaptation action options

The solution phase begins by reflecting on the problem and understanding the priority areas to be addressed. The development of solutions requires a shift in focus to envisioning current and future conditions, and exploring possible solutions.

A number of possible actions are explored during this phase and then assessed. This can be undertaken in different ways and will depend upon the type of risks and impacts identified during the problem phase and the current organisational agendas.

One method that can be used during this step is to present the key risks identified in a workshop situation where a number of key stakeholders work together to develop possible solutions to mitigate risks and manage impacts. The scenarios used during this phase may differ from previous scenarios as they provide projections of the future with different options as a basis to explore potential solutions and the context it will be applied in. Stakeholder involvement is important during this phase as it assists development of solutions that are relevant to the context they are being developed for and helps ensure appropriate buy-in for the option to be actioned.

It is also important during this phase to assess the possible consequences of how potential actions may play out over the long-term to ensure that a short-term solution will not result in maladaptation. For example, a technological solution that treats a risk for a limited time period might result in people ignoring the risk which is still increasing, leaving them more vulnerable as a result.

Key questions

- What information is needed?
- Who are the key information stakeholders?
- Who do we need to involve in this process and why?
- What communication/education is needed to ensure a shared understanding and ownership of the task?
- What is the most appropriate method/s for collecting and collating this information?

Key questions

- What is the most appropriate framework for analysis?
- What are the priority risks and why?
- Who owns these risks?
- Who suffers the impacts?
- What values are at risk?

Key questions

- Who are the key stakeholders needed for this process?
- What and who is at risk?
- How are they at risk?
- What are the possible consequences of this action?
- What are the possible actions that can be undertaken to mitigate or manage this risk?
- What are the benefits/value of this option?

Selection of adaptation actions

Adaptation actions selected will depend upon key factors, including:

- The internal and external constraining factors of the organisation.
- Cost-effectiveness of the actions available.
- The perceived value and benefits of an action.
- Current agendas, policies and regulations.
- The anticipated legacy of an action and how the action undertaken will contribute towards the goal of overall future adaptation.
- What trade-offs need to be made and whether these are acceptable.
- Stakeholders who need to be part of the action over differing time frames.
- How this action can interlink with other projects.

One of the key tasks here is to evaluate what the benefit and value of particular actions offer. Currently a number of different types of frameworks and methods are being used to achieve this, with the most common being cost benefit analysis. This is a useful method for calculating direct monetary costs, but cannot fully value the intangible costs most commonly associated with valuing environmental and social areas.[†] As frameworks are still evolving that are able to cost both intangible and tangible costs, it is important to list these during this phase so they are part of the decision-making process. (For further details see Appendix 2.C).

Values also play a key part in decision making and are often present in current organisational policies and strategies, for example, liveability, equality or prosperity. Identifying these values can help position the project so that it is more likely to be adopted and sustained in the longer term. (For further details see Appendix 2.C.)

Once the action(s) have been selected their potential implementation will need to be scoped, planned and responsibility for the action established. This will often require negotiation and persuasion, as well as an understanding of the political landscape, to be successful. A case for investment may also need to be developed to support the action. Monitoring, evaluation and governance are often different for this stage of the adaptation process because they need to manage the uncertainty associated with implementation without disabling responsive action (see Appendices 2.A and 2.B). Monitoring and evaluation is also important to ensure that lessons are learned during and after the activity is undertaken.

Establishing a shared understanding in relation to expectations relating to the final action(s) selected is also important at this stage. This can help to avoid unrealistic expectations with key stakeholders that may result in conflict and disengagement later in the process.

Development and testing of adaptation actions

Adaptation actions may be as diverse as installing ceiling fans in elderly people's homes, to coastal management to prevent inundation, to a building product such as CSR's hail resistant roofing that was developed in response to extreme weather events.[††]

How adaptation actions are developed and tested will depend on:

- What is being developed and whether it has been developed before.
- What pre-existing systems are in currently in place.
- The geographical and social context the action will be used in.
- Whether a technology already exists and can be adapted and used in a new context.
- Regulation and policies that may apply to an area, for example, electricity distribution innovations.

In some cases it will be impossible to fully test an adaptation action where a new technology is still evolving as its functionality will only be shown when it is used to its full capacity and so ongoing monitoring and assessment may be needed. It is important to ensure that enough time is allocated to this task to allow for adjustment to ensure useability.

Engagement and feedback from end users is pivotal during the testing stage because the long-term application of an action can be compromised without it.

Key questions

- What is the priority?
- Who are the owners of this action?
- What problem is being addressed and who benefits?
- What do we want to achieve?
- What is the cost of this action?
- What is the benefit/value of this action?
- What can be achieved with the current resources and capacity?

[†] Jones, R., Young, C., Handmer, J., Keating, A., Mekala, G. and Sheehan, P. (2013). *Valuing Adaptation Under Rapid Change*. National Climate Change Adaptation Research Facility, Gold Coast, Australia.

Key questions

- What is being tested and why?
- How will this be tested?
- Who are the end users and what are their needs?
- What are the constraints and enablers of actions?
- What criteria will be used for assessment?
- How should it monitored and evaluated?

[††] Young, C. (2012). Meeting notes, VCCCAR Annual Forum Industry Roundtable.

Adoption and diffusion of the adaptation idea

This is essentially a preparation phase where the practitioners and end users work together to ensure there is a shared understanding of the adaptation action and that the conditions for enabling the adaptation action are in place.

Communication during this step needs to engage with its target audience and requires communication frameworks that allow for knowledge exchange and feedback which is actioned throughout the process. (See also 'Communicating adaptation effectively', p36.)

Particular focus needs to be given to framing and communication during this phase and to considering different parties' points of interest and values in relation to the possible benefits of an action.

Capacities such as resources, skills, policy and the operational frameworks for enabling an action, need to be assessed at this point to allow for the identification of barriers and opportunities and strategies developed in relation to these.

Uptake of adaptation action

Getting people to apply this knowledge often requires ongoing support systems and education, particularly when innovation is related to behaviour change. Persistence, allocation of appropriate time, support and resources are important for the effective completion of this phase.

During the uptake of adaptation, the 'adaptation action' may need to be modified to address specific and possibly evolving end-user needs. Again, flexible frameworks and mechanisms to capture feedback and enable active responses are needed for this stage to be effective.

The amount of time and resources needed to achieve these last two stages are often underestimated. With limited budgets it is sometimes preferable to do less better than more, badly.

Assessment of the impact of the action on the problem

This phase can be undertaken in a number of ways, either through in-house monitoring that shows the effectiveness of uptake and response, or it can be independently assessed. In many cases, the full assessment of action(s) on a problem will not be known for some time, so appropriate monitoring and evaluation will need to be ongoing. New technologies may also require ongoing monitoring and evaluation to assess their effectiveness as external or internal circumstances may change over time.

At this point individual projects can be assessed but a coordinated assessment of multiple projects together will help to develop an aggregated overview of the effectiveness of actions to date.

Evaluation of adaptation action

The evaluation stage assesses the effectiveness of the process and its outputs such as reports, data and products. This is evaluated against the key aim and objectives of the project plan and scope.

Evaluation of adaptation actions are often reported through successes, however, because many of these actions are using new (soft and hard) technologies it is also important to evaluate what didn't work and why. These lessons provide useful information to other practitioners in the field who are undertaking similar work and can be used to improve practice of future adaptation projects.

Appendix 2.B: Monitoring and evaluation of projects

Establishing monitoring and evaluation of the process and the activities required within it, is key to ensuring that your project is set-up properly.

Two areas that are generally monitored and evaluated are:

1. The situation – for example, have risks been reduced by this action?
2. Project performance – for example, has this project been cost-effective?

Monitoring is usually undertaken by the project team. This is important as it helps identify changes that may need to be made during the process due to unexpected outcomes.

It is important that process and change are adequately documented. Frameworks need to be flexible and reflexive to enable new knowledge discovered during the process to feed into the actions and outcomes. One way of doing this is to develop feedback mechanisms within pre-existing frameworks to enable responses that are:

- Formal – such as regular reporting processes and audits.
- Informal – such as knowledge sharing meetings where ideas are discussed and problems that emerge can be addressed.

Evaluation can be undertaken either by an external party or a group evaluation, and will depend upon the type of project and how it is undertaken. Evaluation usually occurs at the completion of a particular stage or at the end of a project.

Useful criteria that can help order specific actions needed for evaluation include:[†]

- Relevance – what is the value of the intervention in relation to other primary stakeholders' needs and other regulatory and policy needs?
- Efficiency – does the programme use the resources in the most economical manner to achieve its objectives?
- Effectiveness – is the activity achieving satisfactory results in relation to stated objectives?
- Impact – what are the results of the intervention (eg. intended and unintended, positive and negative)?
- Sustainability – are the activities and their impact likely to continue when external support is withdrawn, and will it be more widely-replicated or adapted?

A number of different types of monitoring and evaluation frameworks can be used depending upon the task and the context of the activity. An overview of frameworks and tools can be found in *Monitoring and evaluation for climate change adaptation: A synthesis of tools, frameworks and approaches* by UKCIP and Seachange.[††]

[†] UNICEF. (2007). *Program Policy and Procedure Manual, Program Operations*.
[††] Bours, D., McGinn, C. and Pringle, P. (2013). Monitoring and evaluation for climate change adaptation: A synthesis of tools, frameworks and approaches. SEA Change, UKCIP, London.

Appendix 2.C: Governance of projects

Governance needs to be suited to the task rather than the task to the governance, and should enable not disable action. It should be driven and shaped to the needs, context and constraints of the organisations involved in the exercise.

The core purpose of governance at an operational level is to enable effective decision making and action of the parties undertaking adaptation and to ensure appropriate accountability during the project. Governance needs to be flexible enough to allow for the working groups to respond effectively to changes and surprises that arise. It needs to avoid arduous processes of review and authorisation whilst still maintaining mechanisms for accountability and quality control. This can be challenging to achieve with large or multiple projects that have different levels of accountability. It is particularly important to have collaborative frameworks that can effectively manage conflict and stakeholder expectations.

Many adaptation projects are undertaken in different phases. For example, an organisation may undertake an impact assessment as a single project, and then look at the formation of possible adaptation actions as a separate project before implementing actions. A number of different approaches can be taken to instigating governance frameworks. Governance can be set up at the beginning of each project or can be developed to oversee a long-term adaptation management program.

Separating the governance tasks of large or multiple projects into specific areas can help simplify and allocate accountability. Examples of the types of tasks that can be allocated and who they might be allocated to are shown in Table 2.2.

Table 2.2 Governance hierarchy and allocation for adaptation projects.

Governance area	Governance task
Political level	Provides the external constraints for the organisation including regulations and policies that may apply
Executive level	Provides overall strategy and terms of reference Project performance oversight Instigation of projects, final approval and sign-off
Project facilitation (enabling agents)	Can be independent of the key organisations Facilitates coordination of the project Ensures equity amongst partners Resolve conflict and issues that arise Ensure clear communication and positive interaction between project members, stakeholders and the executive committee
External advisory agents	Provide quality control of outputs via reviews undertaken during stages of the project as it progresses Provide advice and recommendations to the working group and project manager at intervals during the project Provide expertise that may be not available from the core group
Project management	Appropriate monitoring and evaluation Appropriate day-to-day management of the project Contract management Stakeholder management Performance management
Working group	Defined authority and decision making ability Task focused Structure organised according to the needs of the group Can adjust formation during the project to support an emerging need Address stakeholder needs as they emerge

An example of the types of governance structures being used by the Northern Alliance for Greenhouse Action in Victoria, which facilitates adaptation work, is shown in Figure 2.5.
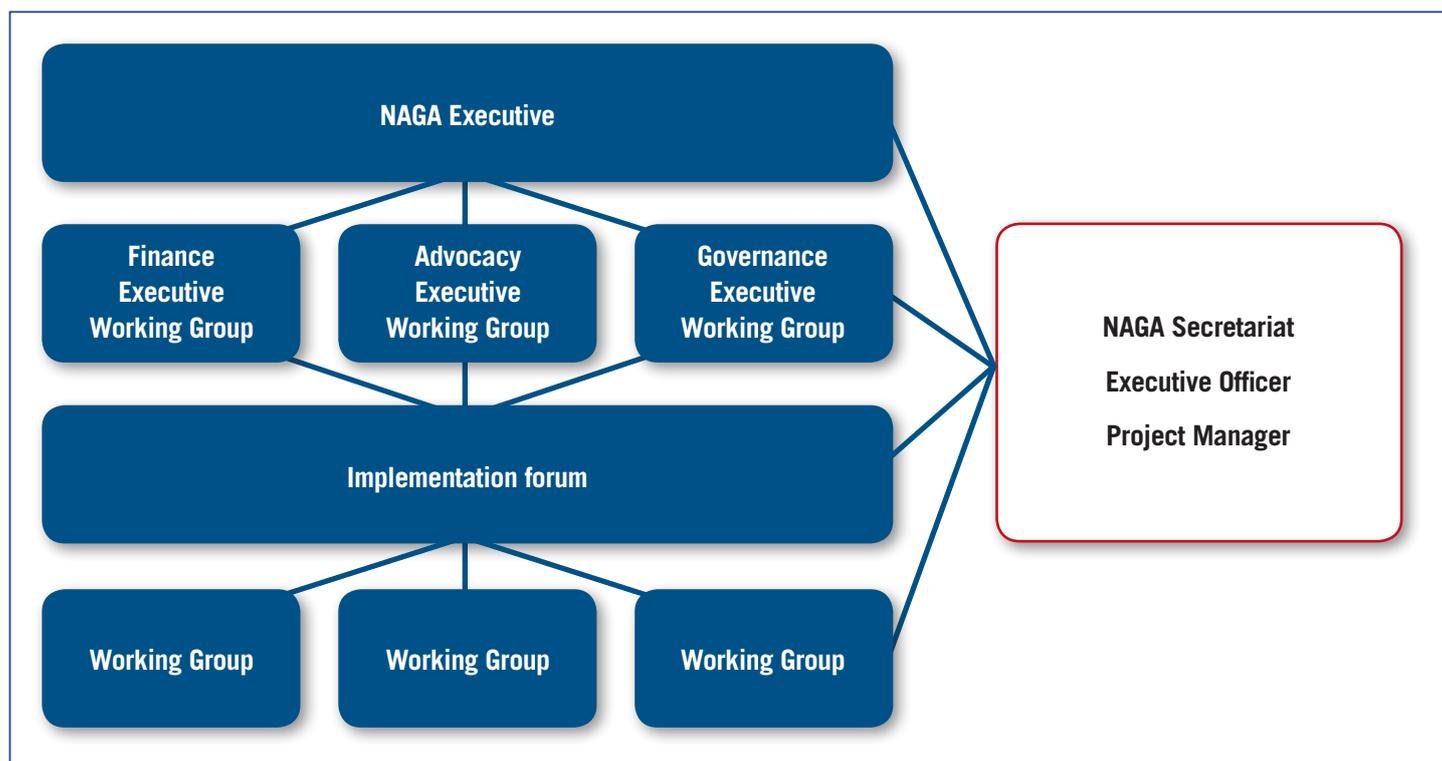
Figure 2.5 Northern Alliance for Greenhouse Action Governance structure, 2013. Source: http://www.naga.org.au/about-us/governance.html

Key challenges to governing these projects include:

■ ensuring working relationships between parties involved are maintained
■ available resources
■ capacity and experience of the organisations in managing multiparty projects
■ conflict management
■ the level of consultation needed to achieve outcomes
■ managing increased time that collaborative projects need within the allocated budget.

In the problem solution process the key purpose of governance in each area is:

Problem phase: governance is primarily concerned with enabling the collation of data with appropriate quality control, and ensuring appropriate analysis and effective communication. This is to develop a common understanding and also to establish ownership of the problem.

Solution phase: governance is primarily concerned with managing the development and implementation of adaptation action and the dynamic risk associated with this. This requires collaborative, flexible frameworks that allow for ongoing monitoring, reflection and adjustment. Emerging issues or unexpected outcomes need to be considered and addressed as they arise, reducing the risk of establishing maladaptive pathways. It will also help to manage expectations during the project, which may change or need to change. Collaborative decision making mechanisms are also enabled by good governance.

Governance for adaptation needs to include:

■ Reflexive frameworks that allow for feedback and adjustments during the process.
■ Collaborative decision-making mechanisms – very rarely will you get a 100 percent agreement in any group, so particular attention needs to be paid at the beginning of projects as to what is considered a majority decision, or equitable trade-off, and who makes these and how.
■ Conflict resolution and mechanisms to manage diverse expectations – in groups with diverse stakeholders you need to be prepared for conflict at some point. Having pre-agreed mechanisms in place can mitigate the risk of these causing the delay or breakdown of projects.
■ Strategic oversight that allows flexibility and autonomy in the working groups to enable work to continue in difficult circumstances, whilst still maintaining accountability and quality.

Appendix 2.D: Ascertaining the value of adaptation

Celeste Young and Roger Jones

'Value is not a logical process because value is not the just about cost, it is also about what we as individuals and communities hold as precious to us.'

— **Participant 'Beyond the Mean' Workshop, 2012**[†]

Understanding how to value adaptation projects is a complex and challenging task for practitioners and a core part of both adaptation assessment phases. Often people forget that economics is a social science and focus on the money and market aspects. However money doesn't move itself. People make decisions, which in turn moves money and creates markets. At the core of economics is people and decision making, and the values they use to do this. These values are important because they define priorities that determine what actions will be undertaken. The question of what is valued and how it is valued often depends on who is valuing it. Although there is much discussion regarding rational decision making, values attributed as rational by one group or institution may not be seen as rational to others.

The task of deciding what values have priority can be a difficult process for adaptation practitioners due to the often competing values that different groups of people or individuals may have. For example, people may value the environmental amenity of an area, however certain aspects of the community may also want to continue to develop and grow which may in turn degrade the environment around them and reduce this amenity.

Many social and environmental values are key to successfully implementing programs but are difficult to measure. Although these cannot easily be given a dollar value, without proper identification there is a risk that they can be lost or undervalued.

There are two key areas of value:

1. Tangible values include direct market values of a good, service or asset/liability, and can be allocated a monetary value, for example the current costs responding to climate impacts.
2. Intangible values include non-monetary goods, services or assets/liabilities, such as social, cultural and environmental items of value that are considered important but cannot be expressed in monetary terms. Some examples are community connectivity, beautiful landscapes and items of cultural importance.

Most economic assessments of adaptation strategies have assessed the dollar value of physical assets such as critical infrastructure or focused on economic sectors such as primary industry and water because these are easier to measure and assess using existing economic tools. In most cases, cost benefit analysis has been the primary tool used. This practice often leads to 'hard' adaptation measures being recommended, as opposed to 'soft' or socially-based strategies.

Yet, many of these so-called soft measures, such as community connectedness, are recognised as important elements of resilience, which supports adaptation. These are a key aspect of planning for and responding to changing extreme events, where magnitude and frequency of these events can be anticipated but not predicted. Key values such a liveable environment may also be at risk because the values that support this, such as enough water and a healthy environment, are often not explicitly valued or owned and therefore can remain unmanaged. As frameworks and methods that are able to value these types of values are still being developed, it is important to ensure that these values are listed and considered during the assessment phases to ensure that they are part of the decision making process.

Cost-effectiveness is an important tool and relates to how effective the money spent on adaptation measures has been. These costs can be contrasted with expected returns (social, environmental and monetary) over the long term.

The valuation points during the adaptation process are the first assessment phase where the values at risk and the costs of impacts are ascertained, and the cost and value of future actions evaluated to enable selection of actions. (It is important during this phase to not only consider the cost of the initial impacts, but where possible, the flow-on impacts to get a more comprehensive understanding of the cost of the risk and the value of the possible actions that can be undertaken.)

In the second assessment phase of the process, cost and value are assessed and evaluated in relation to the adaptation action and the project itself. Cost-effectiveness may be a key part of this.

[†]   Young, C. and Jones, R. (2013). *Beyond the Mean Workshop Report*. Victoria University for the National Centre for Climate Change Adaptation Research Facilty. Gold Coast.

The questions in Table 2.3 can be helpful when thinking through how to ascertain value and cost related to the adaptation process.

Table 2.3 Key questions for assessing value and cost of adaptation projects. Adapted from Jones, R. et al. (2013).[†]

Issues	Considerations Note that all questions can apply to single or multiple situations
Risk	■ What is the current cost of the risk/impact? ■ What is the projected future cost of the risk/impact? ■ Who is currently paying for the risk/impact? ■ Who is paying for management of the risk? ■ Who will pay in the future for the impact? ■ Who should pay in the future for the management of the risk?
Values	■ What values are at risk? ■ Who values them? ■ How are they valued? (What currency/currencies are being used to value – eg. political, social, economic, environmental, fiscal, cultural?) ■ Are there interdependencies between these different values, if so what are these? ■ Will these values be compromised if no action is taken? ■ Who will pay if these values are not maintained? ■ What investment is needed to maintain these values?
Cost	■ What resources are needed to enable the solution? ■ What are the projected costs of the solutions to be developed? ■ What is the cost if we don't undertake this solution?
Benefits	■ What are the benefits? ■ Who will benefit? ■ How will they benefit? ■ What are the co-benefits? ■ Over what time scale can these benefits be realised?
What is the priority for this decision?	■ Value – what value is being preserved by these actions? ■ Cost – is this action cost-effective?

[†] Jones, R., Young, C., Handmer, J., Keating, A., Mekala, G. and Sheehan, P. (2013). *Valuing Adaptation Under Rapid Change*. National Climate Change Adaptation Research Facility, Gold Coast, Australia.

Innovation and adaptation

Celeste Young

The need for innovation

Innovation offers a window of understanding to practitioners as to how adaptation actions can be planned and managed through an established area of theory and practice, which is process-based and provides decision making structures for dynamic situations.

Adaptation and innovation have many similar characteristics, and while they are interconnected, they are different. Climate change adaptation can provide the context to the nature of the activity, and innovation can inform how aspects of this can be undertaken. To date, the main focus for much adaptation has been risk. This has been because the key task has been identifying specific climate risks and developing direct responses to those risks.[1] However, as this area is now established, the focus is moving towards the solution phase where actions are developed and undertaken. In this phase, consequences and outcomes of actions can be unpredictable. This requires different thinking and frameworks that help manage the uncertainties related to the outcomes of these actions, and also respond to the changing environment into which they are being introduced. Innovation is useful in the adaptation context as it is an established area of practice that is designed to minimise these type of risks when undertaking action. It also helps link research to practice, as the application of new knowledge is a key part of the innovation process.

What is innovation?

Innovation can be defined as the development of new values and ways of doing things through the development of solutions that meet emerging or existing needs.[2] This can be achieved in different ways such as the development of new products, processes, services, technologies, or ideas, which are then are taken up by markets, governments and society.[3] Innovation is a key component of change, as it is either responding to or creating change through its implementation. It has been the key driver in many previous changes in society such as the agricultural, industrial and knowledge revolutions. In each case, the adoption and implementation of new technologies has transformed how individuals, organisations and economies operate and think.[4]

Innovations ' … involve invention or discovery … '[5] and can be applied on both the macro and micro scales and are often transformative in their outcomes. Although it uses inventions, innovation is not invention. It is the process through which these inventions obtain value through being integrated and used in society. This process can be incremental or rapid as the result of a trigger event; for example the Grantham communities' relocation after the 2011 floods (see 'Case study: Grantham transformation', p58).

Innovation is often a combination of a number of pre-existing ideas that have been brought together in a new way.[6] It uses synergies between the old and the new, which is why it is so useful for adaptation because it integrates new knowledge into pre-existing systems and knowledge.

Innovation is undertaken with an understanding that uncertainty is a core part of the change process, and that outcomes are unpredictable and the risks associated with that unpredictability need to be managed. This is often achieved through the use of iterative and reflexive frameworks and processes which are part of innovation (see 'Developing and integrating new knowledge', p47).

The most commonly understood type of innovation is market or business related, which can change how a business or organisation works or create new market opportunities for products and services. However, there are numerous types of innovation such as social, environmental or systemic, and other forms that relate to specific areas in policy or business. Because of the scale and breadth of adaptation, many different types of innovation are needed to achieve a society that is well-adapted and resilient to climate change.

Disruptive innovation

Disruptive innovation is type of innovation, which often starts in a niche market, but then moves beyond this market creating new needs and markets as it grows, redefining and transforming areas of industry or society. This is achieved by addressing barriers to uptake in other areas of the market such as cost or lack of skills which allows 'bottom market' consumers access to a product.

An example of this is personal computers, which were initially an expensive product used by highly trained professionals primarily in business or research areas. Due to computers being simplified and greatly improved, as well as reduced in price, they have become a household item.

This is particularly relevant to adaptation as it requires new technologies, some of which will need to be accessible to all levels of society.[7]

Systemic innovation: the big picture

As adaptation is complex needing changes across numerous interrelated systems, systemic innovation is often required. Systemic innovation was originally developed by business as it was recognised that some innovations required changes across the whole business system.[8] This type of social change 'is rarely achieved through a single organisation or sector, but involves a complex interaction of public policy and reforms to legislation, changes to business and community cultures and practices, as well as shifts in consumer attitudes and behaviour'.[9] For example, in the case of solar panels in Australia, policy, education, community engagement and financial mechanisms were needed to enable the early uptake phase to help establish the new market. Aspects of social interaction such as peer effects[†] were also important.[10]

Key aspects of systemic innovation identified by Social Innovation Europe[11] are:

■ it develops following a crisis or period of upheaval
■ new ideas, concepts and paradigms
■ new laws and/or regulations across a broad area
■ coalitions for change of many actors and/or across more than one sector or scale
■ changed market metrics or measurement tools
■ changed power relationships and new types of power structures
■ widespread diffusion of technology and technology development
■ new skills or roles across many actors
■ new institutions
■ widespread changes in behaviour, structures and/or processes.

Because systemic innovation requires extensive collaboration and connection between individual innovations, it can take more time than a single innovation and requires more resources and investment to achieve outcomes.

For adaptation practitioners, this highlights the importance of strategic, collaborative arrangements across diverse interest groups from public, private and community areas to enable and embed innovations. Even if you are not working directly with a group, being aware of other areas of innovation and looking at the opportunities to work with, position or work off other innovations is necessary with adaptation. This is

not always a comfortable process if projects involve diverse stakeholders. Managing these 'uneasy alliances'[12] requires understanding and collaborative mechanisms to negotiate different points of interest and agendas to achieve effective outcomes.

Bottom up: social innovation

Social innovation refers to forms of innovation that are 'social in their needs and means … [creating] greater social capacity to act and be diffused through organisations.'[13] This often begins at the grass roots level and can have a local to global focus. Social innovation is not market-driven (although markets may be created as society changes), but creates social value through action. This is often difficult to measure as much of its value is intangible and hard to quantify. It can also be difficult to measure progress because social innovation often requires behaviour change that may take many years to be effective (eg. effective recycling).

Some innovations, such as feminism, happen over long periods of time and are the result of many individuals working together to achieve a goal. Some are the result of a trigger event, for example the Flood of Ideas[14] – an initiative established following the Queensland floods using a crowd-sourcing approach to identify innovative strategies that make communities more flood resilient. These initiatives can often happen due to a 'lack of will' in other areas towards action and can act as a lever for change.

Social innovation is often implemented using social marketing and is a central part of implementing adaptation. A good guide for social marketing is the Fostering Sustainable Behaviour, Community-based Social Marketing website.[15]

Adoption and diffusion

Adoption and diffusion are different aspects of how new technology is taken up and spread across society. Adoption refers to the key stages that occur between when individuals learn about a new technology to when they adopt or take it up. Diffusion is seen from a group perspective and refers to how grouped individuals then spread this new innovation through society (Figure 3.1, overleaf). These two areas are central to the innovation process.

Everett Rogers, in *Diffusion of Innovations*, defines four key elements as part of diffusion[16]:

■ The innovation or idea, perceived as new by a group (eg. a new product, process or practice).
■ Communication channels – the ways and systems individuals and groups use to pass or the share the idea (eg. social networks, news media, face-to-face, meetings).
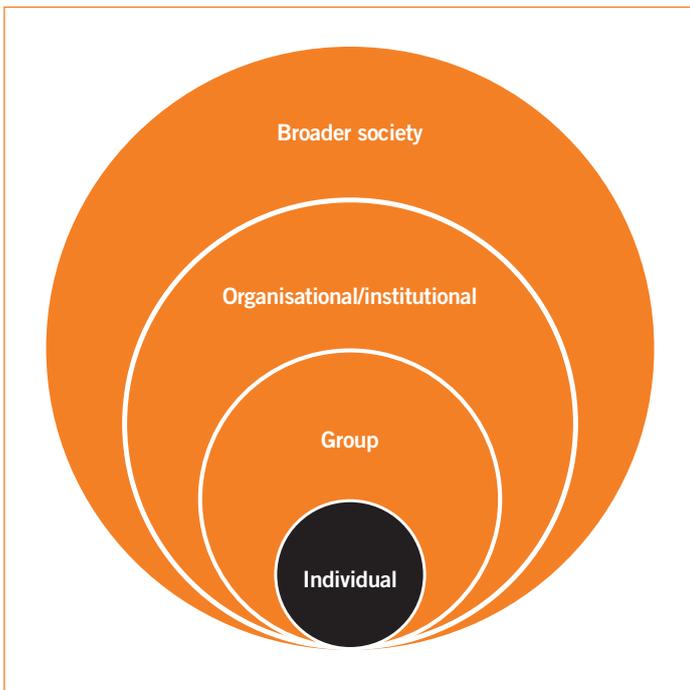
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† Peer effects are the influence of group behaviours and norms have on individual choice (eg. a person may choose to wear certain types of clothes or buy certain products because this is part of being an accepted member of the group).

Figure 3.1 Adoption and diffusion from the individual through society.

- The time frames that the activity takes to achieve (this can be highly variable and range from short- to long-term).
- The social system – the interrelated parts of the group who are working towards the solution (eg. a community or regional alliance).

Rogers also categorises adopters into five categories: innovators, early adopters, early majority, late majority, and laggards. Figure 3.2 indicates the rate at which an innovation is adopted. In relation to planning, it is useful to consider these groups to help determine what sort of mechanisms will be needed to achieve critical mass in the implementation phase to ensure the innovation becomes sustainable. It can also help to identify characteristics of each group and look at what levers can be used to assist the process.

A useful resource for understanding this further is Les Robinson's Summary of Diffusions of Innovations website.[17]
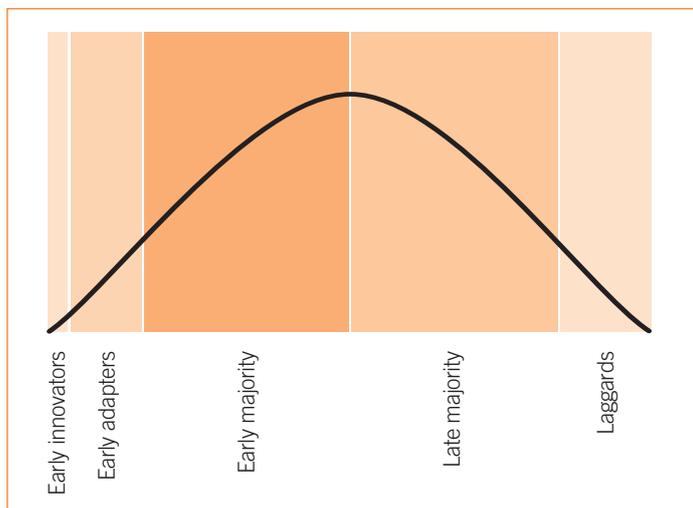
Figure 3.2 Types of adopters during the innovation process.[18]

Underpinning both the diffusion and adoption process is who is making the decisions, why they are making them, and the processes and social systems that surround this. Decisions in innovation can be made across multiple levels of organisations by individuals, by groups and by people in authority acting on behalf of a group.

The following key areas of decision making during the diffusion process have been identified (adapted from Tarde, 1903[19]):

- **First knowledge** – the end user is introduced to the new innovation.
- **Forming an attitude** – the end user decides they are interested and finds out more about the innovation.
- **Decision to adopt or reject** – the end user assesses the information and a decision as to its value and use is made. The innovation is either rejected or accepted.
- **Implementation and use** – the end user decides to use the innovation and tests it to determine its utility.
- **Confirmation of the decision** – the end user confirms whether the innovation is useful or not and continues to use it or rejects it.

Many factors influence these decisions, such as understanding of the innovation, ease of use, whether it is better than a previous product and whether it can be adapted to suit different and changing contexts.

Implementing innovation

In adaptation, adoption of the idea itself and the uptake and use of the idea are often two separate steps. People can adopt an idea because they think it is good, but this does not mean that it will be actively used. Uptake and use of innovation is one of the most challenging steps because it requires a decision to make some kind of an investment.

The context, capacity and capabilities of end users can influence the uptake of an innovation, with some groups requiring support in areas of communication, learning and resources. For example, smaller organisations that are resource and time-poor may require an external organisation to support the innovation process on their behalf (see 'Case study: WholeFarm Planning Services', p52). Alternatively it may require a more incremental approach to innovation, which allows these organisations to act within their means.

Difficulties in implementing new ideas in organisations can indicate that the new innovation either does not suit the organisation's perception of the problem, or that the problem is seen in terms of negative rather than positive outcomes.[20] This points to the importance of active engagement with end users during the innovation process to assist their understanding of how the innovation can be placed and used in their context.

Testing is an important part of innovation development and can be undertaken in a number of ways, depending upon the product and task. One way is to develop pilot programs that implement the innovation on a small scale before it is released for wider use. Testing is important because innovative ideas often do not work when they move from the concept to active use stage, so a process of trial and error is needed. Also, a successful innovation in one context may need to be tested for use in different contexts to gauge its suitability and make any necessary adjustments.

Multiple approaches to enable active use are also often needed. For example, in the case of green roofs, 'programs which have been the most effective have provided a range of interventions over a number of years. Where interventions have relied on a single approach, or have been poorly funded, there have been limited beneficial outcomes'.[21] The most successful programs in this area have required a minimum duration of funding of three to five years.[22]

In the case of adaptation, assessing possible outcomes can help avoid maladaptive actions and dependency pathways that increase vulnerability or inequity. Some innovations will be very useful in the short-term and assist transitions, however further innovation may be needed if a situation changes or another innovation becomes available. This highlights the need for systemic innovation, where areas of innovation are interconnected and respond and inform each other.

Key needs for innovation

Innovation is not easy for many organisations because it is unpredictable and requires creativity and risk-taking, but to not innovate in the face of the changes we face can present an even greater risk. Creating the conditions for innovation requires new types of leadership that facilitate and develop shared visions and commitment. Key needs in relation to creating innovative environments include:

- **Finance and resource allocation** – innovation requires new ways of thinking and acting, and support to establish new markets and behaviours. This can take a number of years (as opposed to months) to achieve, particularly when it requires behaviour change. Multiple approaches to support uptake such as policy, education, financial and market mechanisms are often needed. Long-term programs and policy are needed to enable the development and embedding of innovations in organisations and communities.

- **Development of capacity** in areas such as new skills, resources, systems and frameworks are needed to enable innovation. Communication, resilience to change, development and integration of knowledge are a key part of this.

- **Flexible and iterative frameworks** that allow for surprises and unexpected outcomes to be addressed through responsive rather than reactive decision making.

> '**The biggest risk is not taking any risk … in a world that is changing really quickly, the only strategy that is guaranteed to fail is not taking risks.**'
>
> — Mark Zuckerberg

- **A secure environment** for innovation to be developed and implemented, including adequate resources and support to enable people to be creative and take risks. To fail, as well as succeed, and to be able to learn, progress and develop.

- **Collaboration** and collaborative mechanisms between different stakeholders to ensure the relevance and usability of innovation.

- **Governance** that is flexible enough to allow the active parties to respond effectively to surprises and unexpected outcomes, but that also provides structure and accountability for the activities being undertaken.

- **Change** in how we see and interact with the environment we live in.

- **Understanding** of the social, environmental and operational systems that surround us, and how we can best use these to enable innovation.

Innovation as part of the adaptation process

Innovation has a role in the problem and solution phases of adaptation. In the problem phase, it is implicit and informs what types of activities can be undertaken to enable the diffusion and adoption of new knowledge needed to create understanding and ownership of the problem. This can also be used to enable the data-gathering of risk information.

The solution phase is active and requires the blending of what we have and know with new soft technologies (socially-based technologies, such as new ways of thinking, processes and community structures) and hard technologies (such as engineering solutions). In the solution phase, innovation directs the management of activities, particularly in areas related to the development, diffusion, adoption and uptake of actions and the uncertainty of outcomes associated with this. In this phase, risk informs the process and is managed through using innovation methods and tools that are designed to work with social systems and uncertainty.

Summary

Innovation offers an established process-based area of practice that allows practitioners to actively engage with the future rather than just maintaining the status quo in the face of changing risks. At the core of innovation are social systems and how people respond to new developments and emerging needs. These areas are supported by components of innovation such as change management, communication and the development and integration of new knowledge, which are also central to adaptation.

Innovation can assist in the management of adaptation, particularly in areas of adoption and diffusion of ideas and uptake of solutions. It can also be used to inform the types of methods and tools that can be used in relation to adaptation activities, particularly the management of risks associated with unknown outcomes during implementation. The iterative and reflective processes used in innovation are useful for monitoring and evaluation as well as the management of dynamic situations and can provide an operational basis for programs and projects.

Innovation can also be used to assist planning by creating better understanding of the type of investment resources and policy needed for adaptation programs and the case for why these are needed.

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Adaptation communication

Celeste Young

The context for adaptation communication

> The aim of communication in adaptation is to create respect for the risks and curiosity for the solution. It requires accepting that discomfort is a part of the process which needs to be acknowledged as it happens. Working with, and through, discomfort assists with understanding adaptation and achieving ownership of actions.

People working in climate change often ask why there is such difficulty in motivating action when the science is so clear in its findings. Initially, it was widely assumed that this was a straightforward exercise where, if you gave people sufficient information, they would act on it. However, communication that requires action is not just about dissemination of information, which on its own has been found to be 'insufficient to precipitate interest, attitude formation and behaviour change'[1]. It is something much more complex and interesting, that requires building relationships with the people you are communicating with and including them as part of the communication. It is an area where informal communication is as important as formal – small conversations in a lunch room can have as much impact on a person as a media campaign in 'winning the conversation'[2].

A key part of the communication process is building trust between diverse stakeholders. This requires communicators to interact with their audience in a way that creates shared understanding and agency to act. Although some communications will be short term and serve a particular purpose, communication in adaptation needs to be seen as a long-term activity that is working towards embedding adaptation into our day-to-day lives and enabling change. Listening and responding is essential to adaptation communication; it should be a dialogue not a monologue.

The communication process needs to be supported by frameworks and methods that work with rather than at target groups. The process of defining what information is needed and what will be the most effective way of communicating is consultative, where the key stakeholders are part of the process. This is also an important part of generating and integrating new knowledge. (See also 'Developing and integrating new knowledge', p48.)

Above all, practitioners should focus on making sense of adaptation for audiences by encouraging and supporting dialogue, building engagement and developing trust.

The challenge for communication

Adaptation is not always a comfortable subject for audiences because, although it may be needed, it is not necessarily something that is wanted (Table 4.1).

Table 4.1 Comparison of climate change attributes with widely held preferences for the types of decision making people prefer.[3]

What climate change is	What most people want
Complex	Simplicity
An evolving field and cannot be solely based upon historical evidence	Things they know and have experienced
Innovative – not every solution will work	Solutions that work
Time consuming to address effectively	Quick fixes
Difficult	Things to be easy
Uncertain	Security
Requires large scale social change	Things to stay the same
Questions	Answers

This conflict means that communication can be challenging. Understanding the social context of how people, think and feel, and what motivates them to act is crucial to being able to overcome this. Practitioners need to be prepared for unexpected responses to some communication particularly in relation to areas that might provoke fear or grief. (See also 'Areas of resistance', p59.)

Framing

It is important to identify what your audience's point of interest is and then look at how to frame adaptation information in a way that is accessible and relevant to them.

Framing is the term used to describe key terms or phrases that are used to create meaning for an activity, process or event in adaptation.[4] They are the words, images, emotion and messaging used to develop the context for a particular communication. Currently, adaptation has numerous different framings being used by practitioners.[5] This has also been found to be the case in innovation.[6] This is partly because both adaptation and innovation are context and task-specific, so that multiple languages (eg. business, community, policy) can be used for the same task in a different field. For example, climate-resilient buildings can be classified as adaptation as could farmers who are changing how and what they farm to accommodate changing environmental conditions. In both cases, they could also be framed as innovation or business, or product improvement.

Framing in adaptation communication needs to be shaped around the audience's point of interest and what values are most important to them. For example, if you are speaking with someone who runs a company, you may choose to use innovation and risk terms, and use protection of business as a key focus to start a conversation. Alternatively, if you are communicating with a community, then you may frame it around a particular area of interest such as resilience, and use insurance and homes as a key focus.

Communication and fear

On a radio health show a few years ago, a doctor described how one health practitioner had spoken in graphic detail to a diabetes patient about how his leg would have to be cut off and he would die of a heart attack if he didn't start eating properly and stop smoking. The patient responded by going outside and lighting up a cigarette.

Communicators need to aware that some of the information provided can be confronting and can stimulate both rational and irrational fear responses and anxiety. Fear is a basic human response to a threat, so it is important to understand what is at stake for the listener. The type of response climate change communication can solicit depends on the context of the situation, how much control someone might feel in this situation and their pre-existing ways of thinking. In adaptation, fear can be a response not only to actual loss or damage but also perceived fear of a future loss or damage which sometimes manifests as grief (see 'Areas of resistance, p59).

Much of the communication to date has focused primarily on the problem, which has led to a proliferation of 'fear or catastrophic framing'[7]. Although fear can initially attract attention to climate-related issues, it has also been shown to 'distance and disempower'[8] individuals. Used carefully, fear can provide motivation in some situations, if it is coupled with constructive information and factors such as available resources and knowledge that can assist in reducing the sense of danger.[9] This is something that is understood in areas such as the health sector, which is why health communication campaigns are often accompanied by support activities.

An example of this is the Slip, Slop, Slap campaign (or Sunsmart as it is now known), which was started in 1981 by the Cancer Council in Australia to reduce incidents of skin cancer.[10] It is a long-term campaign where media communication is supported by educational programs, community activities and a range of products. This combination of engagement activities has successfully raised awareness and changed behaviour in relation to sun tanning and the need for skin protection.

Well-placed and appropriate use of humour in communication can also help to convey difficult messages and encourage engagement. For example, the recent Prepare Act Survive campaign run by the Rural Fire Services in NSW to motivate people in high risk areas to develop bushfire plans.[11]

Communicating adaptation effectively

Adaptation communication is about people and how they think, feel and respond to the world around them. The least important thing is what you think. The most important thing is what the people you are communicating with think, and how they think about it.

Effective communication in the adaptation field is a process of engagement that starts at the beginning of the communication process – a framework that includes the source of the knowledge and ends with usefulness and ownership. As adaptation knowledge is constantly changing, communication requires ongoing consultation, monitoring, assessment and reinvention – as illustrated in Figure 4.1.
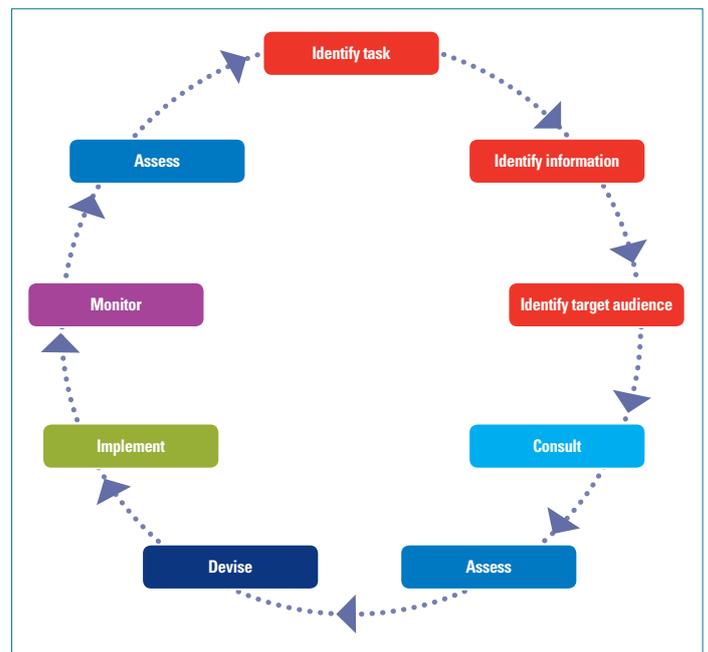
Figure 4.1 The communication cycle.

Communication in adaptation can serve a number of different purposes so it is important to start by understanding the task of the communication you are undertaking. For example, is it to create understanding, decisions and/or action? Once the task is identified the purpose becomes clearer. This helps the identification of the language, mode of delivery and context which are the building blocks for establishing the listening framework for how people will hear what you are saying.

Because communication depends on what you are communicating and to whom, understanding your target audience helps place the communication into a specific context and gives you a starting point. So starting with the basic components that people use to shape an outcome can help (Figure 4.2, overleaf).
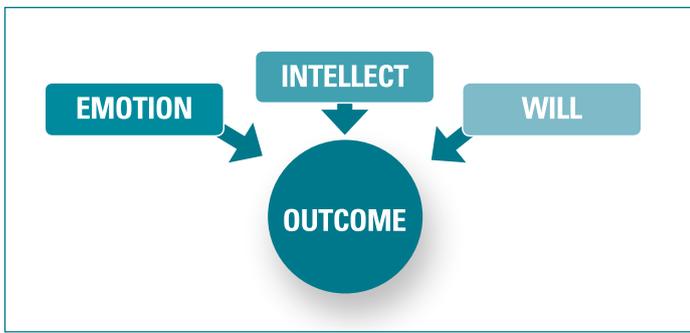
Figure 4.2 Human components used to shape adaptation outcomes.

Stepping through the following questions can be useful to clarifying who your audience is and what their specific needs are, what they value and what their key point of interest is.

Emotion: how do you want these people to feel?
■ What could this information mean to this person and how could it make them feel?
■ How do you want them to feel?
■ What are the cultural and social contexts that determine how this should be spoken about?

Intellect: what do you want these people to understand?
■ What do they know?
■ What do they want to know?
■ What do they need to know?
■ What language do they use?
■ What is their point of interest?
■ How do these people communicate?

Will: what will motivate these people?
■ What can these people do?
■ What do these people want to do?
■ What do these people need to achieve this action/outcome?
■ What is their capacity to achieve this?

A good example of this is Wagga Wagga Council who wanted to create a document that outlined what the community wanted now. They also wanted it to be a strategic plan to define how they wanted to grow in the future, which could also act as a guide to achieving these goals. To do this, they needed to engage with something that was central to their community so they developed a series of communication activities using two imaginary children, Oscar and Ruby (the most common baby names used in the area in 2011)[12]. They felt that these two children were the perfect vehicle for representing 'who we are now and who we will be in the future' as they allowed the community to think outside of themselves through a lens of what was most important to them and related to them on an emotional, intellectual and motivational level.

Language

As communication of adaptation is a social process, its success relies upon the ability of communicators to translate between all the different languages, social tiers and agendas to create a common language and purpose. Language needs to be specifically tailored to each audience. Often you will find that people will have different ideas or don't know what a term or a word means. It is often necessary to define the terms you are using upfront to establish common understandings. Three factors that will dictate what type of language your audience uses:

■ Their chosen profession. Each profession has its own language so try and ensure that you use terms that are meaningful for the group.

■ Their cultural background. Cultural background will often define how they hear the information and dictate responses. It is particularly important to be aware of cultural sensitivities to climate change and to seek solutions to issues with the target audience, and the way they communicate. Identifying how people communicate can help you decide which medium is going to be most effective for transferring your information.

■ How they communicate. Most people have a primary sense that they communicate through (Figure 4.3). Identifying this can help practitioners decide which medium is going to be most effective for the communication tasks.

AURAL	Radio, skype, telephone
KINETIC	Experiential learning, peer-to-peer communication
WRITTEN	Books, articles, websites, Twitter, Facebook
VISUAL	Film, pictures, photographs
EMOTIONAL	Art, trusted people
ORAL	Focus groups, presentations

Figure 4.3 Different ways of communicating and some of the media.

These media can also be used creatively to enhance materials produced and support experiential learning in a way that allows for collaborative visions and communications to be developed and shared among diverse stakeholders.

Most audiences will have a limit to what they are able to understand at each point in time, so disaggregating the knowledge into smaller bits can be useful as it allows them to absorb and build knowledge without becoming overwhelmed. It is also important to give them knowledge that is relevant and applicable to their context as obtuse information can cause disengagement.

Embedding communication into systems

Each particular group you address will have a specific communication system, whether it is at a micro level such as a family, or a larger level such as a large organisation or a community. It is usually more effective to use pre-existing communication systems than to impose a foreign one. Adding in adaptation to these systems allows for it to become part of normal activities and it is more likely to be sustained in the long term as a result.

When starting this process it is helpful to identify who disseminates information. How this is done and who makes decisions is key.

Questions that can assist this process are:
- Who is responsible for making decisions?
- Who is responsible for disseminating information and how?
- What is the most commonly used form of communication medium (eg. verbal, written, internet, informal) and how is it used?

It can also be useful to undertake a basic assessment that identifies the central form of communication used in a particular environment. Figure 4.4 is an example of this process in a manufacturing environment for a behaviour change program called SSS. This was then supported by an operational process that used a number of feedback loops and different forms of communication, such as newsletters and subsequent updates which were integrated into the business operational processes to achieve active outcomes (see Appendix 4.A). The process was used to create a whole of business approach based on a communication system (see Appendix 4.A).
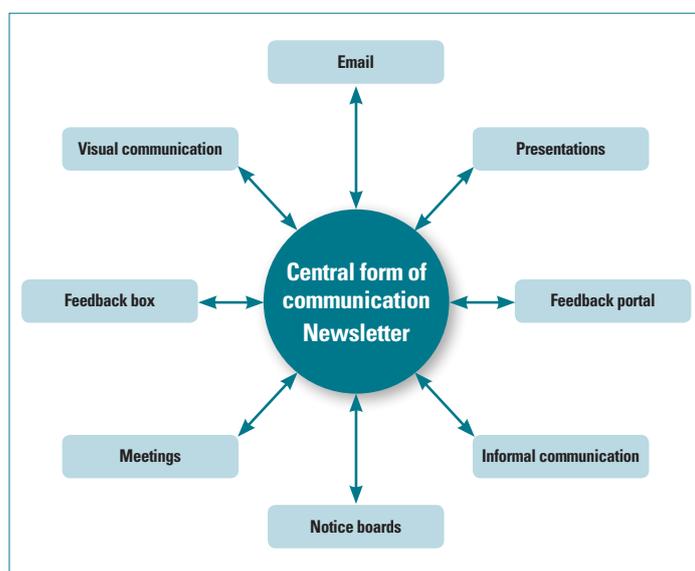
Figure 4.4 Basic assessment of a manufacturing communication system.

The use of art in communication

Because adaptation communication is complex and needs to convey information that is beyond current experience, the use of different types of art can be very useful for developing understanding. Art can also convey complex ideas in a way that audiences can connect with, allowing them to experience the concepts of adaptation and process it in their own personal context. Art has been a key part of social movements throughout history, helping to drive social acceptance of change by challenging current states and visualising new options.

The use of photographs or illustrations is already a key aspect of many forms of communication. However, communicators are increasingly using more diverse art forms such as theatre or animation to communicate aspects of adaptation. An example is the animation climate dogs[13], developed by the Department of Environment and Primary Industries in Victoria, to assist farmers with understanding the modes of climate variability they were experiencing. Another example is a company who used an artist to draw a map of research findings of climate impacts as a way of communicating climate change with their employees.

Use of art can also assist experiential learning to create understanding through interaction. A good example of this is Witness King Tides[14], a program run by Green Cross Australia, a not-for-profit organisation in Brisbane. This program asks people to photograph king tides and submit them. These photographs are then uploaded to their website and placed on a map. This was done to help people see and experience what sea level rise might look like in the future and to think about how to prepare for it now.

Art also has a specific purpose in relation to difficult emotions that people may feel as a result of climate change, as it can provide a space for fear, grief and trauma to be explored and expressed safely. For example, Platform Youth Theatre, a community-based organisation in Melbourne, developed a play called *Enough* after it consulted its members and found that climate change was a key area of concern for them and was causing a sense of futility and anxiety. The play allowed them to voice their concerns and anger in a way that was empowering for the group and audience.

Tools

The purpose of the communication task will dictate not only how you communicate, but also the tools and methods you use. The five key purposes for communication are to:

■ create understanding
■ enable decisions
■ support and motivate action
■ develop knowledge
■ educate.

With the advancement of technology-based tools, there are a number of interesting options for practitioners to use, such as apps, websites, webinars, Twitter and Facebook, just to name a few. These can all be very useful and can serve a purpose of not only educating, but also facilitating learning and research through interaction. A good example of this is an app called ClimateWatch[15] developed by Earthwatch, a citizen-science organisation in based in Melbourne. This app allows people to record animal and plant sightings – this information is then uploaded via the app into a central data bank where it is collated and analysed.

However, it is worth noting that most communicators I have spoken with over the years emphasise that face-to-face communication is still a most important aspect of adaptation communication. This is because personal interaction is often needed to clarify new information as audiences may interpret it differently or not understand its relevance to their own agendas. Face-to-face interaction is also important because establishing trust is key to sustaining and enabling adaptation activities.

Selection of communication tools will depend upon what tools are available and used by the target group. Embedding adaptation into processes – whether you are a business or a community – is key for long-term sustainability of communication. This way of communication can reinforce actions through regular prompting using the day-to-day communication channels and systems. (See Appendix 4.A for business example.)

Communication as part of the adaptation process

In the **problem** phase, the purpose is to understand the problem and create awareness of this. Communication in this phase will need to engage, educate and inform. The primary goal is to work towards developing shared understandings and ownership of the problem. Inclusive language is very important. Communicating through an appropriate context ensures that information is relevant to the audience. Adoption and diffusion methods can also be useful for assisting use and uptake of knowledge.

In the **solution** phase, the purpose is to develop the solution and implement it. This requires communication that enables and supports action. Considering aspects of innovation and the specific communication needs associated with adoption, diffusion and uptake of actions can be useful during this phase and assist with the development of communication structures.

Active and inclusive language is important during this stage. For example, you may choose simple but active words such as prepare and protect which allows for a number of actions to be discussed.

As practitioners move into the solution phase, it is also crucial to understand the change of focus needed so participants don't get 'stuck' in the problem phase. The communication needs to promote the active thinking needed to work towards the solution rather than focusing communication upon the problem.

Making sense of research

Research is central to adaptation because it provides information that supports understanding and decision making. Research has specific ways of communicating so it is often necessary to translate research findings in a way that they can be more easily understood by non-scientific audiences.

One barrier to practitioners understanding researchers is language. Research language often differs considerably to normal everyday language. Many words used by scientists have specific definitions that are different to those commonly understood by non-scientists. For example, uncertainty is often heard by non-scientists as scientists being unsure of the scientific facts whereas to scientists it can be a measurement to ascertain the level of confidence in a finding.

Selecting and translating the relevant parts of research so that they can be understood by a target audience is important. Many people will not read long research reports and require summary reports and smaller communications that summarise key points. This allows for the target audience to decide which information is useful and to seek out further information if they are interested in doing so.

Scientific and technical jargon can confuse and disengage people. They need communication methods that make technical findings more accessible. These can include:

■ narratives that give the information context
■ infographics which can make data more accessible
■ common phrasing that is used by the target audience to replace technical terms
■ clear explanations of charts or diagrams used so audiences understand what they mean.

An example of why this is important are the latest projections of global mean global warming in the IPCC Fifth Assessment Report.[16] These look very similar to the previous projections in the Fourth Assessment Report[17] but were constructed in a very different manner, using different greenhouse emission scenarios. These were shown to some practitioners who initially assumed that they served the same function as the previous scenarios because they looked the same. When they were provided with the explanation of what the charts meant they became confused as it was highly technical and there was no clear explanation as to how these scenarios had been changed between successive reports. This type of communication can be a barrier to policy understanding and the take-up of scientific information.

Key considerations when translating research are:

■ identify the key points

■ use appropriate imagery to assist with interpretation of data, charts and tables

■ maintain the integrity of findings

■ place it in a context, format and a language that the target audience will understand.

The role of narratives

Narratives are a core part of how we as humans communicate. They help us make sense of ourselves and the world around us, and shape and direct our actions. How each narrative is told and perceived is very much dependent upon the cultural, institutional and personal narratives of the teller and the listener. Although much of climate change has been articulated through an environmental lens, responding to climate change is primarily a social issue; it is about how we as humans interact with the world we live in and the consequences of this. This is why climate change narratives are complex, because they go to the heart of how we live our lives and the need to change.

Narratives are a key tool for communicating adaptation and are particularly important in relation to the problem-solution process. Adaptation narratives can take on many forms and can be visual, aural, oral or written.

Due to the variety of tasks involved in the adaptation process, a number of different types of narratives can be used in adaptation including[18]:

■ scientific

■ institutional

■ collaborative

■ political

■ community

■ personal

■ cultural.

Identifying current adaptation narratives can help inform what drives prevailing perceptions and attitudes. For example, certain media and institutional narratives may devalue or confuse aspects of climate change science. If identified, counter-strategies to these narratives can be developed to help reduce the barriers they create.

Narratives can also be used to ascertain core values of institutions, organisations and individuals. For example, an organisation may see itself as innovative and have built its corporate story around this. This tells you that the organisation values innovation and can give you a starting point to adaptation discussions. It is also important in these cases to also ascertain the stated narratives (what is said) that outline what an organisation thinks about itself and the realised narratives (what is done) that show how an organisation behaves, as these may differ.

Narratives can also help us to envisage and understand more fully a world that we don't yet occupy in a way that can empower us into taking the actions we need to take.

Case study: Pelican Expeditions

Natalie Davey, Managing Director of Saltwater Projects and a founding member of the Pelican Expedition team, described their 15-year project as one of 'deep collaboration' that started with five people and now engages communities along the east coast of Australia. The primary purpose of setting up Pelican Expeditions was to inspire and create greater understanding using marine science of the importance of the sea in the earth's ecosystems.

'Ecology is such a complex story and the sea adds another layer of complexity because people can't see it and they don't trust it. We decided to engage people through experiential learning and the boat was the tool we used to do that.' Their projects provide an opportunity for scientists and coastal people to exchange knowledge and build collaborative narratives around the how the sea is changing and what it means to their communities.

The development of collaborative narratives is also important for adaptation. Although the research sector has been the primary knowledge source for understanding why changes are happening, most observations of how this is happening and the practical responses needed are generated at a more local level. Collaborative narratives that combine these different kinds of knowledge are the key to effective communication, as they provide a framework for different groups of people to assess the problem and develop adaptation actions. They also assist dialogues between different parties to build a shared understanding.

The knowledge of what adaptation is and how it is practiced, is evolving. This means that narratives and associated dialogues need to be 'live' and updated as new understandings and practices emerge. Although this iterative approach to communication is not new, the use of it in adaptation is variable and still being developed in some areas.

Problem phase narratives

The purpose of problem-phase narratives is to develop a shared understanding of the problem in a way that increases its understanding. Narratives need to incorporate the knowledge of risks in the world as it is now and how it may be in the future. An example of this is the Melbourne's Urban Forest program run by the City of Melbourne in Victoria, who are working with the community to build a shared narrative as to how they secure the future of the city's trees.[19] This type of exercise often needs to work both from a bottom-up and top-down perspective. Communication also needs to be carefully developed to ensure it encourages engagement and doesn't cause fatigue or disempowerment. It needs to be relevant to the context, be easily understood and resonate with the intended audience.

Solution phase narratives

The purpose of solution phase narratives is to support and enable action. These narratives require the development of visions that show the future we wish to inhabit and the solutions that provide the possibility for this to be achieved. Understanding how narratives need to change to maintain motivation throughout this phase is important. As action is context-specific, 'local narratives' are particularly important as they contain pieces of knowledge that can help successfully embed adaptation actions. These narratives need to be developed into a collaborative narrative that reflects the multiple visions of the stakeholders involved.

Using scenarios

Due to the diverse stakeholders involved in the adaptation process and the need for decision making across multiple agendas, scenarios are a particularly useful tool, not only in communication, but also in the generation of new knowledge. How they are used and why, needs to be clearly outlined to create greater understanding rather than more confusion. Scenarios are essentially an enabling tool that can combine both diverse knowledge and potential futures in a way that allows the synthesis of a number of possible options.

They can also allow for aspects of 'wicked problems'[†], such as adaptation, to be teased out in a collaborative way. This is often achieved by exploring multiple situations that are unknown or have not yet been experienced to assist decision making in areas of uncertainty. They are not a predictive tool that will inform what the future will be, but one that uses credible knowledge to show what the future might be.[20] Use of scenarios by sectors, such as the military and business, is well established and is generally used to gain understanding to develop strategies to manage risk and assist planning and action of possible future events.

Some of the many different types of scenarios that can be used include:

- Experiential scenarios where participants 'act out' a particular storyline to gain greater understanding of how they would respond in certain situations.
- Scientific scenarios which are often used in workshops as a way of understanding past, current and future trends in climate. These can be presented in many formats, visual, aural or written, and are often developed using scientific models.
- Gaming-based scenarios where issues are explored or examined through a structured game (eg. war games).
- Issues-based scenarios where a specific issue will be focused on and examined through a number of lenses.

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†   Wicked problems are problems that are difficult to define, and have no clear solution or single cause. They have many interdependencies, and interventions will often have unintended consequences and require significant behavioural change.

With adaptation, it is important to explore a number of possible outcomes, which means that most exercises need to use multiple scenarios. This allows for the examination of the most likely to the least likely outcomes, helping to identify a comprehensive scope of possibilities.

For example, the mapping of synergies across diverse scenarios can assist decision making in relation to where to focus, and how to allocate resources and prioritise risks. You may find in a particular region at 2, 4 and 6 degrees Celsius increases in temperature, water security is common to all scenarios, so you may decide to instigate actions in this area first. Or if you are considering building a levee in a flood area, estimating maximum flood heights with increases in temperature of 2, 4 and 6 degrees Celsius can allow minimum to maximum levee heights to be assessed. Actions that are suitable for a wide range of outcomes are said to be robust.

During the adaptation process, scenarios are often used during the **problem** phase as a means of gaining greater insight and shared understanding of possible futures, usually by quantifying associated climate change risks and impacts. Scenarios can also be used during this phase to map risk synergies across a number of different scenarios to see which risks predominate.

In the **solution** phase, scenarios are often used to create shared understandings and visions in relation to the possible pathways forward as part of visualisation exercises. This is achieved by getting the stakeholders to think into the scenarios, which often contain possible key risks and impacts, to develop solution options through creative thinking. This is important for implementation, as it allows for a vision to be developed by groups of people using the scenarios as a focus point for the collection and integration of different ideas and needs.

Scenarios in the workshop process

Scenarios are often used during workshops in the adaptation process. This can be uncomfortable for some participants because it requires that they engage with the 'messiness' of the process and address ideas that may be different to their own. This is an important part of learning and assimilating new knowledge, so it is 'good discomfort'. The process starts with divergence of ideas and through exploration, ends in a convergence of ideas (Table 4.2).

Table 4.2 Basic components of a scenario process.

Beginning scenario exercise (Divergence of ideas)	During the scenario exercise (Exploration of ideas)	Completing scenario exercise (Convergence of ideas)
Uncertain	Investigation	Clarification
Multiple perspectives	Analysis	New learnings
Confusing	Visualisation	New perspectives
Unrestrained ideas	Clarification	Insight

Facilitating workshops

Due to the collaborative nature of adaptation, workshops are often undertaken at key stages of the process to gather knowledge and develop solutions. This is often a task given to communicators.

Adaptation workshops need to be carefully planned, as the issues that they explore are often dynamic and aspects will be unknown or new to many participants and may cause discomfort. They require a clear structure to be effective; otherwise participants can become 'lost' in the process. There are a number of different ways of undertaking these workshops, ranging from workshops held over several days or intensive 'hothouse' workshops over a short period of time. To achieve a good outcome, it helps to use a facilitator who is experienced in the type of workshop you want to conduct, but also has a working knowledge in the topic area.

Different approaches to workshops in each phase are required. In the problem phase, the key aim of workshops is to collate knowledge or gain and share understanding of the problem. It is important in these workshops to ensure a balanced and sufficient diversity of stakeholders to avoid biased outcomes; and also to consider how information collected during the workshop can be translated effectively and used.

In the solution phase, the key aim is to develop solutions and to facilitate creativity and, if possible, to reach consensus about solutions. These workshops will often develop collaborative visions. They also require a commitment to following through actions from the workshops to ensure that ideas generated move from concept into reality. Documenting workshop findings or outcomes is pivotal to this outcome.

Workshop selection

The type of workshop selected and the methods used depend on the workshop purpose, how many people are attending, the type of people attending and their level of experience with adaptation. For example, if the key purpose is to share and collate data on impacts at a local scale, this will require a scenario workshop with key stakeholders and experts that allow for the exploration of current and possible future risks and impacts. However, if you are developing a solution to a planning issue you may need a more creative workshop process, such as a design charette where key stakeholders develop the plan with designers using a creative process to capture the 'vision, values and ideas of a community.'[21]

Workshop formats in use that can be used for adaptation include:
- conference style
- café style
- open space
- strategic planning
- community summits.

Useful resources when selecting workshops are The Change Management Toolbook[22] and the International Association for Public Participation[23].

Depending on the workshop you are running, it can help to have hosts allocated to groups to facilitate the exercises. Hosts are skilled participants who can help translate and clarify areas of potential confusion.

Some workshop may also use provocateurs, whose role it is to ensure that people do not fall into familiar ways of thinking. They do this by injecting questions or provoking conversations to move them into more unfamiliar areas.

Key considerations

Key considerations when developing a workshop include:
- **Establish the purpose of the workshop.** Deciding the workshop purpose is the first task. Organisers should identify the key purpose, for example, is it to collect information, educate, share information or build networks? Identifying the key questions and issues for the workshop helps determine what type of workshop is needed and who your key stakeholders might be.
- **Select the workshop format most suited to participants' needs and workshop purpose.** A number of workshop formats can be used in adaptation. The selection of these depends on the key purpose of your workshop and who is attending. For example, in a peer to peer learning workshop where you want to encourage people to share openly and learn from each other, open space or cafe style formats may be chosen.
- **Development of credible and accessible scenarios that can be justified under scrutiny.** Scenarios used during this process have to be plausible and relevant to the task to be effective. The use of scenario experts to develop these is important, otherwise an interesting exercise will only be offered, not a tool that can be effectively be used to inform or make decisions.
- **Provision of a clear context for exercises to be undertaken.** Workshop participants should arrive at the workshop ready for the conversation you want them to have and a clear idea what is to be discussed and why. This is often achieved by producing a context or discussion paper provided to the participants beforehand. A context paper provides the framework and parameters for the discussion, and will often contain specific information and questions that 'set the scene' for the conversation to be had. A discussion paper may be more general and is intended to provide a stimulus for conversation. It is important that any material provided for workshops is provided in an appropriate format and language for the participants.
- **Selection and setting up of the venue.** The venue you select is important because it sets the scene for the workshop, the moment that participants enter the room, or even before, influencing who will attend. The venue needs to be accessible and appropriate for your participants. For example, a workshop for industry leaders requires a conference style venue, not a community hall. Relevant and topical visual images can also create interest as people enter the workshop space.

- **Framing the workshop exercises.** Workshop framing is key to gaining effective engagement from the onset of a workshop as it provides the foundation for subsequent conversations and activities. It often has a level of interaction so that participants are active rather than passive in their participation. The most common way of framing is done through expert presentations to set the scene and stimulate conversations with space for feedback and questions. In some cases, a series of warm-up exercises may be used to provoke the participants into the thinking space needed. A framing exercise should allow for participants to clarify any queries they may have to ensure that participants are all on the same page before the main exercises begin. It is important to ensure that your speakers and exercises are appropriate for your audience.

- **Providing a known context.** As adaptation is often the exploration of ideas placed in the future, it can help to introduce the key theme or issues in a known context first. This allows for participants to apply the ideas to a familiar context so they feel enabled to contribute further to the conversation. For example, in looking at how to manage future fire risk, you could start by asking participants to examine the current fire risks in the context they operate in and the challenges and barriers associated with this before providing them with future climate scenarios with heightened risks.

- **Exploration through divergence of ideas.** The exploration of ideas depends on the key workshop purpose. Exercises that allow for exploration around that purpose ensure that both uncertainty and opportunity can be explored in problem and/or solution-based contexts. For example, a scenario exercise could explore ways to reduce carbon use and include an exercise where participants are given a carbon budget and asked how they would allocate it over a period of time. An adaptation example might use water or other resources allocations. Alternatively, participants could be presented with a number of different options (or collectively select these), then be asked to develop these options further.

- **Consolidation and synthesis of ideas.** The consolidation and synthesis of ideas is the final part of a workshop where key ideas, themes and actions are decided. This is often done through commentators or comments from participants who provide observations from the day. This is often followed by a group discussion where any final thoughts can be articulated.

- **Documentation of ideas.** It is important to document ideas and key findings from workshops in order to effectively capture and share the knowledge generated. This is often achieved through a report that is circulated to the group a few weeks after the workshop. It is really important to have good note takers who are able to capture proceedings so that they can be effectively synthesised. This task can be helped by developing templates for exercises, to not only guide the exercise, but also allow for clearer interpretation of workshop findings.

- **The right facilitator.** Selecting the right facilitator for any workshop is critical as they create the social and intellectual environment for workshop activities and keep participants on track and engaged. A facilitator's style is important. They need to have approaches and methods suitable for the mix of participants, so the participants feel they want to participate even if the process is uncomfortable. An inappropriate facilitator can leave participants unsatisfied or even prompt them to leave. For example, in community workshops, an overly formal facilitator may intimidate participants or in high level business workshops, a too-casual facilitator may make people feel they are being disrespected. Select the facilitator to suit the audience – don't expect the audience to suit the facilitator.

Summary

Adaptation communication is a broad field because communication must engage, enable learning and empower its audience if it is to be effective. It is also an interactive task that requires actively listening and responding to an audience. Consideration needs to be given to the context the communication is taking place in, and what other factors can affect how communication will be heard and understood. Framing is particularly important for all communication.

A number of tools are available for communicators to use; how these are used will be depend on the audience, the task and the purpose of the communication. What is most important to remember for communicators is that communication is not simply about dissemination of information; it is an interaction between people that requires collaboration, understanding and patience to achieve the desired outcome.

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Appendix 4.A: Communication integration into operational process

```
┌─────────────────┐
│      Start      │
└─────────────────┘
         │
         ▼
┌─────────────────┐
│ Establish status│
│ of usage        │
│ Energy/water/   │
│ recycling       │
└─────────────────┘
         │
         ▼
┌─────────────────┐
│ Research methods│
│ of reduction of │
│ particular module│
└─────────────────┘
         │
         ▼
┌─────────────────┐
│ Establish       │
│ strategies and  │
│ put together    │
│ SSS updates     │
└─────────────────┘
         │
         ▼
┌─────────────────┐
│ Put visual      │
│ imagery around  │
│ yard            │
└─────────────────┘
         │
         ▼
```

| Launch module in newsletter | → | Presentations | → | SSS update | → | Put on SSS notice boards |

No (from Is module complete? to SSS update)

Is module complete? (decision)

— **Yes** → Assessment of current use of resource

Update to be released every two weeks until module completion

Yes (Put on SSS notice boards → back to SSS update top)

Discuss in departmental meetings/Toolbox → Feedback

Assessment of current use of resource
↓
Put up new visual image of latest image usage versus previous
↓
Release findings in SSS update
↓
End

Feedback
↓
Feedback compiled and discussed with SHE
↓
Feedback to be actioned (decision) — **Yes** → Engage relevant stakeholders to activate feedback
↓ **No**
Notify person(s) involved of the outcome
↓
End

Appendix 4.B: Key points for communicators

- **Use language that is meaningful to your audience.** Use terminology and phrasing that is understood and common to your audience. Where you cannot do this, ensure that clear and simple explanations of terms and words are provided. Avoid using jargon or highly-technical language and terminology.

- **Keep information simple.** You need to convey the facts in a way that is accessible to your audience without simplifying it to the point where the message is lost. Try to respond to and ask questions rather than over explain information. Don't ignore or downplay the complexities of the issues or seriousness of the risks being presented.

- **Explain don't embellish.** Allow the facts to speak for themselves. Embellishing facts or placing strong emotional overlays can cause people to focus on what they feel and confuse the issue you are trying to communicate.

- **Make it relevant.** Use imagery and narratives that can help the audience relate to the problem in their context. For example, if it is a community context you would use inclusive language and images of people and places, whereas in a business context you would use neutral language and commercial images.

- **Maintain integrity of the research and data.** Research and data should not be adjusted or presented out of context to support a particular agenda. This is likely to lead to poor decision making and confuse understanding of the problem. It can also potentially lead to maladaptive responses, and increased costs and risk.

- **Collaborative dialogue.** Adaptation requires input and buy-in from the beginning of the process, ensuring that you have mechanisms in place where you can create the communication through collaborative mechanisms is important.

- **Allow for feedback and response.** Because this information may confuse or concern some people, all communication should allow for some form of feedback or response throughout the process to avoid creating unintended resistance, confusion or disengagement. Active listening is a key part of this, and communicators need to work with different points of view.

- **Use change and innovation understandings to inform the type of communication needed.** Change and innovation processes are a core part of adaptation, and understanding how these work particularly in areas such as diffusion, adoption and uptake of new technologies and knowledge are needed. (See also 'Adoption and diffusion', p30.)

- **Let the pictures do the talking.** Images are useful for assisting with understanding, they can also be used to emphasise key aspects of information. Images need to be carefully selected as some images such as smokestacks[†] can demotivate. Images are also useful in complex documents as they create a different space in the document where the reader can 'rest' and consolidate what they have read.

- **Manage expectations.** Be careful not to create unrealistic expectations as they can cause distrust and resistance when they are not met. For example, phrases like 'adaptation is easy' create the expectation that is should be easy and is not always the case. Some aspects of adaptation may be easy for some people but not for others.

- **Less is more.** Adaptation is a big issue, so don't try and have the whole conversation at one time. Often it is better to breakup the different aspects of adaptation into smaller pieces so the audience can absorb this properly before moving to the next area.

- **Trust, acknowledgement and respect.** People will not listen or respond to people they don't respect, trust or receive acknowledgement from. Using trusted communication sources and people to pass on information generally leads to much better outcomes[††]. Identify key communicators and communication hubs when you start and work with them to communicate.

- **Communication needs to be tailored towards end user needs and points of interest.** Adaptation is only one aspect of most individuals' and organisations' agendas. Finding out their point of interest can provide the key to starting an initial conversation which can then be built on. It also needs to be framed in a way that is accessible and relevant to the audience.

- **Understand pre-existing communication systems used by end users and work with these.** The resulting communication is likely to be better received and more sustainable.

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Developing and integrating new knowledge

Celeste Young

New knowledge

Developing new knowledge and integrating it into systems is the core of innovation and adaptation, and is often what drives action and understanding in this area. To date, many organisations have started this process without fully understanding what type of journey they were about to embark on. As one practitioner commented: 'We thought it would be a quick exercise. One year later we realised it wasn't.' It is an exercise that requires thinking and planning, as the pathway is not defined and it can change as you progress.

In adaptation, knowledge building can be seen as a layering process where each time the adaptation process is undertaken, additional layers of knowledge are developed, increasing the overall knowledge available. At the beginning of a new activity there is an opportunity to reach further afield and engage new participants in the process, who inform the process and expand this knowledge pool (Figure 5.1).
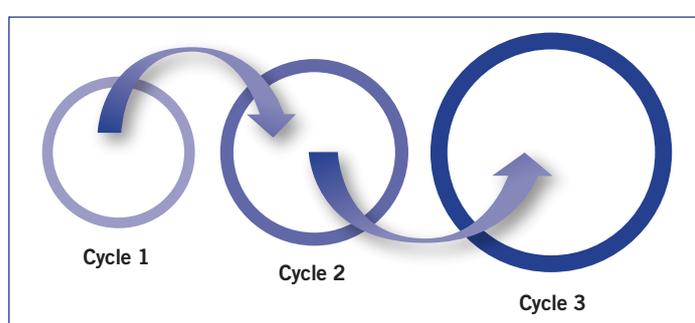

Figure 5.1 Knowledge growth across adaptation process cycles.

How knowledge is developed and communicated has a direct impact on how effectively adaptation is understood, perceived, valued and responded to. It needs to be developed in context of the systems it is used with, the institutions it is used in, and the people it is used by.

The development and integration of knowledge into adaptation systems has three stages for practitioners (adapted from Sterling)[1]:

1. The collation of old and new knowledge to understand a problem, or aspects of a problem, in a new way.
2. Adapting this knowledge in relation to the context it is to be applied in.
3. The active use of this knowledge to develop context-specific solutions.

Diverse sources of knowledge are needed for this process, including from individuals, networks, institutions and organisations, communities and research. This can be confronting to some people due to the top-down, bottom-up nature of adaptation, which often challenges the traditional notion of expert knowledge. This is because key parts of knowledge relevant to adaptation lie in many different areas and levels of society.

Because climate change is dynamic and new understandings are emerging, information in this area is being continuously developed. The amount of information available can be overwhelming for some practitioners, especially if it needs to be translated into language suitable for end users. Ascertaining what good quality adaptation is, is also difficult because measures are still being developed. As a result, bodies that facilitate knowledge-sharing by providing context-specific information from a known and trusted source are proving essential for the adaptation process. Some of the agencies currently undertaking this work include local networks, knowledge hubs and boundary organisations such as the Local Government Alliances, industry peak bodies and community organisations.

Not all knowledge networks will serve the same purpose; some will be temporary and serve a specific need, whereas others will be long term and serve a continual purpose. For example, where a particular need is identified, such as a new skill in a certain area, a group may form to facilitate this until that skill is established. For a practitioner whose core role serves a long-term need, it is more useful to be part of an ongoing group to ensure that they can access and contribute to new developments. Finding the most appropriate knowledge sources and networks is important for organisations and communities, as this helps consolidate resources and enables a more effective and timely flow of information.

Transmissive and transformative knowledge development

To date much of the knowledge generation in adaptation has been undertaken by researchers. This knowledge has then been transferred in a *transmissive* and linear fashion where knowledge is provided through a top-down model by recognised 'experts' (Figure 5.2).
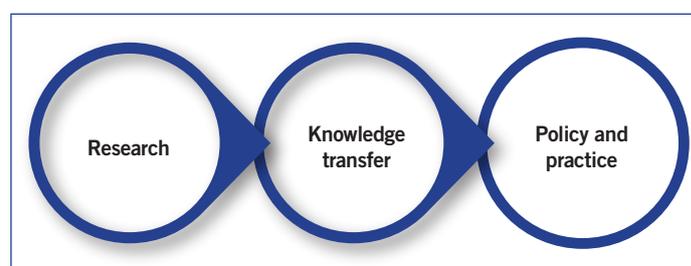
Figure 5.2 Adapted from *The linear technology-transfer view of how K* would link research to policy and practice.*[2]

Knowledge generated during the adaptation process needs to be informed by, as well as inform, key stakeholders.

It is now broadly recognised that this method has not created the engagement needed for active adaptation responses. Because adaptation is context specific, dynamic and continuous, it requires a transformative approach to knowledge generation, where information is constructed during the process through participative practice. This enables an exchange where expert research knowledge is exchanged with expert practice to create new knowledge.

Key aspects of developing transformative knowledge generation are not new and often include (adapted from Hocking, et al., 2006)[3]:

- **Reflective practice:** supporting critical reflection on practice as an ongoing process. This requires iterative frameworks where feedback loops allow for new learnings to be incorporated.
- **Evaluating and testing prior experience:** testing practice and consideration of experience and prior knowledge, both from local (bottom up) and expert (top down) knowledge sources.
- **Collaboration:** collaborative mechanisms that enable knowledge building and combine different agendas and values to develop shared and new understandings.
- **Valuing different types of knowledge and ways of seeing knowledge:** mechanisms that support understanding and acceptance of the value of different types of knowledge and ways of understanding knowledge are needed to enable adaptation activities.
- **Connecting knowledge:** recognising and building on the linkages and synergies between different levels and types of understanding from a range of disciplines.
- **Valuing prior knowledge:** actively valuing and respecting existing knowledge of all stakeholders.
- **Valuing process and context:** valuing, respecting and understanding pre-existing processes, and contexts that different stakeholders work within and how these affect their understanding of adaptation and ability to adapt.

This type of sharing or exchange of knowledge requires iterative frameworks that facilitate two-way dialogues to enable responsive feedback and exchanges between the key parties involved (see Figure 5.3).
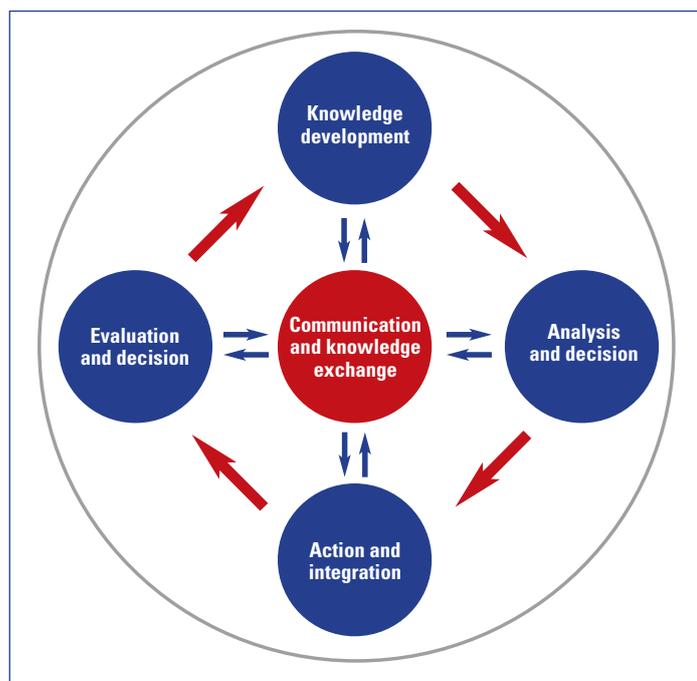

Figure 5.3 Knowledge development and exchange framework.

Knowledge development needs to be informed by, as well as inform, the key participants in the process. This is particularly important for adaptation due to the need to apply this knowledge to certain contexts and the need to blend different types of knowledge together in a way so it can be actively used. It requires nomadic thinking which allows people to move through new situations and work with the unknown and unexpected while still maintaining a direction. This type of thinking is:

- collaborative
- reflective and responsive
- innovative and curious
- flexible and open to change.

It is important to avoid fortress thinking which creates defences and anchors responses into what is known. This style of thinking often manifests in siloed structures that use linear processes and is resistant to the uptake of new knowledge.

Double-loop learning and adaptation

When developing a healthy knowledge culture, the role of double-loop learning – introduced by Chris Argyris – is useful to consider. In *How to Learn* (1991), he proposed that the thinking frameworks people can operate in, can limit their ability to effectively resolve different or new issues, as action is not ' … a function of how people feel. It is a reflection of how they think.'[4] He separated organisational learning into single- and double-loop learning. Single-loop learning was seen as the acquisition of knowledge and its application to solving real world problems by 'correcting the errors in an external environment'. He observed that in many cases there was no reflection on how the process had been undertaken by the people undertaking it and that this could result in defensive responses that blocked deeper organisational learning. He proposed that a more open approach was needed for deep level organisational learning where participants reflected on their practice and thinking frameworks, to enable lessons to be learned from failure as well as success. He called this double-loop learning.

The concept of double-loop learning is useful in adaptation because the risks are changing in nature and historical evidence or experience, although useful in some contexts, is not able to fully inform possible future actions. Established ways of thinking and operating can act as barriers and need to be identified and reflected upon to allow the development of new practices and ways of thinking. This reflexive approach – where people are central to the process – can help the development of an organisational culture, which is more able to adapt and respond to new needs as they emerge in a way that leads to greater resilience to continuous change.

Developing knowledge communities and networks

Knowledge communities and networks are a central part of developing and building new knowledge. In adaptation, the continuous and uncertain nature of activities, and the diversity of knowledge needed, make these knowledge communities important. They can provide support for practitioners and assist the development of skills in this area.

As adaptation requires innovation, activities will not always go according to plan. The establishment of trust and safe spaces where parties have 'honest conversations' is a key part of knowledge communities.[5] Problems being experienced and aspects of activities that are not working or working in unexpected ways need to be discussed and addressed. If this is not done, the situation is likely to compound, causing a much larger problem later. These spaces need to encourage reflection, be supportive and develop new ways of thinking through problems to find useful solutions or alternative strategies. An example of this is Council Connections[6], which was developed as a series of peer-to-peer learning workshops in Victoria by a group of Local Government Alliances to facilitate knowledge sharing.

One way this is manifesting in adaptation is through the development of communities of practice. These communities are groups that support learning amongst practitioners who are active in different fields (eg. public, private, community and research sectors). This knowledge can include different tools, methods, observations or research related to that area. These types of approaches also have synergies with both innovation and transdisciplinary research needs.

Understanding the levels of engagement within an organisation or community when establishing a community of practice or knowledge community can reveal the level at which that community operates (Table 5.1). This understanding is useful for planning suitable types of activities at specific stages to establish, develop or maintain a knowledge community.

Integrating new knowledge into current systems

Integration of knowledge has two key applications during the adaptation process:

1. The collation of knowledge from different sources is a complex task. It requires education to enable the understanding of what climate risks and impacts are and how they are relevant to parts of the organisation. This is important for effective engagement throughout the entire adaptation process, and also ensure ownership of the risks is established and is integrated into appropriate frameworks. (This should not be confused with the integration of different types of knowledge when it has been collected and is being analysed, which is a technical function and is usually undertaken by an expert.)

2. The integration of new knowledge into pre-existing systems and knowledge to enable action through adoption, diffusion and uptake of knowledge throughout the process.

In the problem phase, different sorts of knowledge are collected. This requires learning amongst stakeholders to enable a shared understanding of what the problem is, and the type of knowledge. Knowledge relating to climate risks and impacts can also start to be integrated at this stage into risk or quality assurance frameworks. Central components that can support this integration of knowledge are learning, change and communication at a social and strategic level.

The solution phase is where knowledge is actively developed and integrated into systems so it can be used within a specific context. Key needs during this phase are learning to enable understanding of how to use this knowledge within both current frameworks and processes, and also new frameworks and processes. It is also important to consider how this knowledge

Table 5.1 Levels of engagement for knowledge communities. Adapted from Corsoa, M. and Giacobbea, M. 2005.[7]

LEVEL	ORGANISATIONAL COMMITMENT	PARTICIPATION OF MEMBERS
Hostility/indifference	The organisation doesn't know the existence of the community or, if it knows, it doesn't recognize its utility. The organisation doesn't provide the community with resources such as time, space or money.	Members perceive the community as irrelevant to their professional interests, so the community is seen as a waste of time. Participation in the activities is limited, there are few interpersonal relations between members, knowledge is not shared and the community's activities are obstructed or boycotted.
Partial support	The organisation recognizes the community provides some useful knowledge management or learning. Some resources are allocated to the community, generally through the budget of the 'closest' organisational unit (division or function), or through the provision of some free resources such as a meeting room.	Members acknowledge the community as something useful to increase their knowledge. Participation occurs at two different level: most members participate passively in the community's activities, observing and listening to what is happening but without participate directly; a limited number are particularly active and conscious of belonging to a community showing reciprocal respect and mutual engagement.
Active support	The organisation recognizes the community as an important and fundamental instrument to supporting learning and managing knowledge. The organisation actively support the community, giving it a separate budget.	Members recognise participation as a major way of increasing their knowledge. Most members are particularly involved in the community's activities, with strong interpersonal relations, reciprocal trust and mutual engagement. Belonging to the community is an important component of members' professional or personal identity.

relates to current knowledge and systems, and how this may change how organisations think and act. Knowledge of political systems at both local and larger scales is particularly relevant at this point as it may constrain or enable what is possible.

Central components that support this phase are change management, innovation and communication at an organisational and strategic level.

Systems and tools

Many of the systems and tools that can be used for integrating adaptation knowledge into activities are 'in plain sight'. For example, although many people in business and industry remain unfamiliar with the basic concept of adaptation, they already use business innovation and other change/transformation processes that are useful for adaptation.

Mainstreaming new adaptation knowledge into organisations and communities effectively requires embedding it into day-to-day activities so adaptation become part of the systems in which they operate, rather than being peripheral. This can also help reduce cost and confusion as adaptation becomes integrated with existing activities.

This type of integration requires an understanding of:
- What systems (social, operational and technical) are currently in place and how they are used.
- What systems (social, operational and technical) can be adapted for use and what new systems are needed.
- What knowledge already exists and can be used.

- How new knowledge and systems may interact with current knowledge and systems.
- Communication and knowledge networks and communities
- Iterative (continuous) and reflexive frameworks and processes that are collaborative.
- Current capacity and capability of the organisation or group.

The key task is to identify which systems can be used to integrate new knowledge and which combination of tools is most suited to the task at hand.[8] Embedding adaptation into current processes is a key part of the mainstreaming process. For example, climate adaptation can be integrated into business continuity or business improvement frameworks. Examples include simple actions such as ensuring adaptation is a regular item on meeting agendas, including climate risks in the risk register or adding it as an item into quality-assurance audits. An example of how knowledge can be embedded into processes using communication can be seen in Appendix 4.A, p45. Some of the current frameworks, methodologies and tools that are particularly useful for the adaptation process are listed in Table 5.2.

It is important to assess current management systems carefully to ensure they are fit for purpose, because some systems such as Enterprise Risk Management systems may 'underestimate climate risks'[9] and assessment tools may need adjustment. Other systems may be totally unsuitable for particular tasks, requiring new systems and frameworks to undertake tasks such as evaluation of climate risks and valuing and costing adaptation.[10] It also helps to identify organisational areas where adaptation knowledge currently exists and where actions are

Table 5.2 Operational frameworks, methodologies and tools that can be used for the adaptation process.

FRAMEWORK	CORE METHODOLOGIES	TOOLS
Problem phase		
Risk frameworks that are applicable depending on context include: ■ vulnerability assessment ■ resilience assessment ■ impact assessment ■ hazard assessment ■ integrated assessment. ISO standards and related risk frameworks Enterprise Risk Management frameworks	Risk management Business improvement Business continuity management Strategic planning Community development Quality assurance OH&S Community development	Risk registers Business improvement and quality assurance processes Stakeholder workshops Scenarios Communication tools: visual, oral, kinetic, sensory Research reports and databases Internal systems such as financial systems, procurement systems Key strategies and policies
Solution phase		
Innovation frameworks that are applicable depending on context include: ■ design-led innovation ■ technology-led innovation ■ social innovation ■ needs-led innovation ■ collaborative innovation frameworks. Quality assurance Business improvement Community development	Research and development Strategic planning (eg. horizon planning) Transformation or change management Risk management Business continuity management Community development OH&S	Scenarios Knowledge networks – formal and informal Group facilitation (eg. open space facilitation, scenarios) stakeholder workshops Business improvement and quality assurance processes Communication tools – visual, oral, kinetic, sensory Iterative processes Risk dispersal techniques (eg. pilot programs) Auditing Mentoring Peer-to-peer learning Organisational structures Research

being undertaken that relate to the adaptation agenda. Finally, it is important to ensure that any operational system introduced can be integrated with current systems for it to be sustainable.

'Strategic objectives help provide the necessary communication, organisational and implementation imperatives where success comes from having strategy become everyone's everyday job.'[11]

Another useful strategy is to integrate adaptation into policy and strategy areas before embedding it in business management systems. This ensures that there is the right support to sustain activities. An example of this is the City of Greater Geelong Adaptation Plan – a fifteen year plan developed by the sustainability section within the council.[12] The group started the process by ensuring that they engaged with strategic stakeholders in their executive and worked with them so that adaptation understanding was adopted and supported. The plan has been endorsed by the council and is now being implemented.

Smaller or poorly-funded organisations will find this a different challenge, as many of them do not have the same resources or time-planning capacity as larger organisations. They often depend on external bodies such as government, boundary organisations or consultants to assist them by providing the services and information they need to integrate adaptation into their systems (see case study below).

Case study: WholeFarm Planning Services

'Small farmers work long hours and so they need assistance to address these issues.'
— John Marriot, Wholefarm Services

WholeFarm Planning Services in Victoria has been running a program with groups of farmers teaching sustainable financial management and actively working with farmers to help them understand the cost of carbon to their operations. They collect information and data regarding their annual emissions as part of their accounting process. This is then collated, synthesised and a report is produced. WholeFarm then works with the farmer to discuss strategic options to reduce the risk of carbon emissions as part of protecting future financial viability. This program has reduced carbon emissions and changed the practices of many participating farmers.

Part of the program's success relates to the support offered. Because the knowledge is being incorporated into accounting by an external body, farmers who are already time poor are able to participate and this activity is seen as adding value rather than creating deficit. The support provided by Wholefarm through a facilitated knowledge sharing group is also a key factor.

Using local knowledge

The use of local knowledge is central to adaptation and the terms of use need to be carefully considered, as it can impact negatively on a project if not clearly understood by participating parties. Ownership of knowledge is an asset in adaptation, and due to the diversity of stakeholders needed for each project, each will have their own knowledge asset that they bring to the project. It also is important to acknowledge that there are many types of 'experts' needed for successful adaptation actions to be completed, and that this knowledge is of equal value.

How key ideas, concepts and methodologies will be used and acknowledged in materials such as reports and research, should be negotiated at the beginning of each project so that all contributors to the project are in agreement when the project commences. Consideration also needs to be given to the cultural, social and commercial aspects of the knowledge shared and produced. This is important because knowledge may be shared in informal spaces where protocols may not be seen to apply. For example, if an indigenous land owner is sharing knowledge that has a traditional basis in a workshop, they may wish to have it communicated in a specific manner so that it does not breach their cultural code of ethics.

It is important to define ownership of intellectual property developed and shared through the project. If this is not negotiated and an agreement obtained up front, it can result in the loss of trust between different parties and the breakdown of working relationships. For example, if someone shares a business practice or insight that they have spent time developing, it should not be used without explicit consent from that party. This should apply to both formal and informal situations where knowledge is shared.

Agreements can be achieved through a number of different mechanisms such as an IP agreement or through a group-devised document that is part of the governance structure and acts as guiding principles for the project.

Appropriate acknowledgement and use of knowledge is also a good way to deepen engagement with the adaptation process, as it can help build a constructive working culture through the provision of positive incentives.

The role of research in generating new knowledge

Research has an important role in adaptation which is not always clearly understood by researchers or practitioners. The key tasks of research in adaptation are to:

- provide information to enable decision making
- document, analyse and inform
- educate
- advise or guide actions.

Research for adaptation can be generated in many ways, but there are two key ways that this happens in adaptation. The first way is research developed in a purely academic setting that may build knowledge, but may not have a direct practical application. This research is peer-reviewed by other researchers as form of quality control. Its key outputs are academic papers, working papers and reports. This work is measured by the status of the journals it is published in and how many times it is cited or used in other research. An example of this is climate research that focuses on the physics of why the climate behaves as it does, and is theory-driven.

For this type of research to be useable in application it needs to be translated into a form of knowledge that is fit for purpose for end users. The translation of this type of research into practical application is complex and requires communication and stakeholder specialists who understand how to ascertain end user needs and communicate effectively with them.

The second way research knowledge can be developed is with stakeholders with a practical application as its focus. This also encompasses action-based research where observations are collected, documented and analysed. Its success is based on the strength of evidence-based research and the level of useability of the final output. This research is usually developed with a specific purpose in mind and is often reviewed by non-academic parties. An example of this type of research could be research undertaken to develop an economic framework for a local government sector. Outputs from this can be varied, but examples include the development of new frameworks, reports, working papers and academic papers. This research can be measured by its impact in society through adoption and uptake of the research by end users.

Research can be used during the adaptation process in a number of ways that depend upon the task being undertaken (Table 5.3). Examining these tasks can assist in ascertaining the type of research needed, when it might be needed and its potential value at a given stage.

Table 5.3 Research aim, area and tasks during the problem solution process.[13]

PHASE	KEY AIM	RESEARCH REQUIRED	POTENTIAL RESEARCH TASKS
Problem phase	To understand what the problem is, how the problem currently manifests and how it may manifest in the future.	■ Climate sciences ■ Economic, social and environmental ■ Social and business systems ■ Commercial	■ Assist with the collation, analysis and valuation of climate impacts. ■ Develop and provide knowledge and information to enable better understanding of the problem (eg. possible future impacts and risks, how they work, when and where they may manifest, and who will be effected). ■ Develop research communication that is fit for purpose.
Assessment phase one	To support decision making on potential risks identified and possible solutions.		■ Provide support in the form of guidance regarding analysis of options. ■ Prioritise risks, and identify and evaluate adaptation options. ■ Assist decision making. ■ Develop research communication that is fit for purpose.
Solution phase	Develop, test, monitor and analyse adaptation actions during the implementation process.		■ Analyse, monitor and evaluate adaptation actions during the implementation process. ■ Assist the development of frameworks to promote implementation including evaluation frameworks. ■ Support decision making and assist understanding during this process. ■ Develop research communication that is fit for purpose.
Assessment phase two	To analyse and evaluate the effectiveness of the adaptation action, and its implementation.	■ Economic, social and environmental ■ Community and business systems ■ Commercial	■ Monitor adaptation actions and subsequent outcomes. ■ Analyse the adaptation action and evaluate the outcomes against measures of success. ■ Support decision making. ■ Develop research communication that is fit for purpose.

Each area of research has its own specific language and so communication that helps translate, not only between these areas but also between researchers and stakeholders to ensure understanding, is important.

Different levels of research application are also important as these can help shape the type of project selected and how it is undertaken. Disciplinary, multidisciplinary, interdisciplinary and transdisciplinary approaches are quite different in the way they are undertaken and the types of outcomes they can create (Table 5.4).

Academic areas lead the activities in all these methods with the exception of transdisciplinary research. It is a research method where the researchers guide and participate as partners in the research, rather than direct and lead. A key part of the transdisciplinary process is knowledge sharing between research bodies and stakeholders.[14] This makes it one of the most useful research models for adaptation, particularly in the area of implementation. It recognises that production of the new knowledge comes from diverse sources which include public, private and community sectors.[15] The inclusion of philosophical and cultural considerations can also enhance the social understandings needed for effective adoption, diffusion and uptake of adaptation. Although it is not currently widely practiced or understood, it is an area of research that is gaining more recognition and its use is growing.

Key considerations for practitioners when using research:
- The aim and purpose of the research.
- The type of research needed (eg. theory-driven or empirical applied research).
- The area of research needed (eg. social, environmental, economic).
- The method of research which will be most useful (eg. transdisciplinary, multidisciplinary, interdisciplinary).
- Who are the researchers most suited to undertaking the work needed (eg. university researchers, consultants, internal researchers from organisations, citizen scientists).

Table 5.4 Research methods and use.

METHOD OF RESEARCH	EXPLANATION	USE
Disciplinary	Research undertaken within a boundary of a single discipline.	For specific tasks that require one source of information, for example, research into the migration of fruit bats.
Multidisciplinary	Using more than one discipline to produce work but the areas of research work in isolation during the process. This work is usually brought together in a synthesis report at the end of the research project.	For specific tasks that require more than one level of understanding, for example, the undertaking of an assessment that requires both social and environmental impacts. But for the most part, these disciplines work separately during the research process and the output is the result of different components, for example, a project that looks at an overall theme such as adaptation framing but has economic, political and social researchers.
Interdisciplinary	Using the more than one discipline within another and where there is crossover of understanding between disciplines during the process.	This uses one type of research as an umbrella for other areas of research who work together to address a specific task. The different disciplines work together during the process, but do not necessarily change how they undertake research in their own area. For example, risk researchers and social geographers undertaking an impact assessment for climate change on a vulnerable community.
Transdisciplinary	Multiple disciplines that work together beyond discipline boundaries with the possibility of new perspectives. This can include multiple sources of knowledge and levels of discipline and non-academic parties.	This involves multiple disciplines and knowledge to develop new understandings, perceptions and technologies, and can change the way people think and practice, for example, research to develop a new institutional framework for adaptation governance using both local and expert knowledge that can be integrated into current systems.

Summary

Development of new knowledge and integration into systems is a core part of not only enabling adaptation, but also ensuring its sustainability in the long term. It is also central to innovation and supports the building of resilience. Communication and social networks are a key part of this process. Understanding what different stakeholders offer in terms of knowledge can also enable better decisions to be made in relation to who is important to the knowledge process and community, and how best to manage them. It is also important to ascertain the types of systems, networks and structures needed for new knowledge and what pre-existing systems, networks and structures can be used to enable this.

Because adaptation requires the growth and integration of multiple sources of knowledge, understanding how to develop structures that identify and enable the consolidation and growth of knowledge is key to any adaptation process. Knowledge development requires nomadic thinking that is flexible and responsive. It is important not to reinforce fortress thinking, which can act as a barrier to the development and uptake of new knowledge. Above all, frameworks and structures need to enable practitioners to build new layers of knowledge that support deeper understanding and empower action.

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Managing change

6

Celeste Young

Understanding change

People, and how they think and respond, are at the core of any change process. The task for adaptation to climate change, given its broad and pervasive nature, is to develop new thinking frameworks that enable different ways of thinking and acting. Understanding how people feel, what motivates them and what they value, is central to the adoption and use of such frameworks.

All change requires understanding of the psychological aspects of how people respond to loss (see 'Areas of resistance', p59), and how they are motivated and given agency to act. These two aspects are particularly important for adaptation, which requires society-wide change and action. Most of this change will take place at the local level context and be shaped by why the change needs to happen, who needs to implement those changes, and the resources they have to do this.

Because adaptation is happening now and will be needed into the foreseeable future, change needs to be considered in the context of long-term *continuous change*, which contains a number of smaller changes, rather than *a change* with a beginning and an end. It requires thinking about long-term goals (where we want to be in the future), as well as the short- and medium-term (the transitions needed to get there) and establishing a robust culture to support this. These changes need to be strategic and planned because a succession of reactive and unplanned changes can waste limited resources and result in change fatigue and maladaptive outcomes.

Identifying potential areas of resistance and developing strategies for managing the transition through these phases is important. Particularly understanding when and how you can engage at different points in the change process; when to listen and when to act and motivate. Leadership that facilitates and provides direction by building and maintaining trust throughout the process is also crucial to achieving effective change.

> **'Leadership is changing, it is not about being a hero anymore; it is about facilitating people to be heroes.'**
> — Andy Lipkis, Treepeople

Understanding the landscape

It is helpful to understand the key components that make up an organisational system (Table 6.1). These components define and shape change responses in both the organisation and its individual members. Identifying which components influence current behaviour and how they influence it, can help clarify which strategies and levers are going to be most effective in achieving desired outcomes.

Table 6.1 Organisational components that shape change. Adapted from Dilts, R. (1990).[1]

Environment (Where)	The type of environment that surrounds the individual/group	What is the current environment and how can this constrain or support change?
Behaviours (What)	Established behaviours within that environment	What are the current behaviours and behavioural patterns in this environment? Which of those create opportunities for change and which create barriers?
Capabilities (How)	Ability, knowledge and skills	What skills, knowledge and ability to change do we have now? What do we need for the changes to occur?
Values and beliefs (What is important)	The values and beliefs that drive individuals and groups	How do existing values and beliefs enable or obstruct the change process? How do they influence how we develop and accept knowledge? How might they need to change?
Identity (Who)	How individuals and organisations see themselves	How do we see ourselves now and how do we want to be seen in the future?
Purpose (Who or what)	The core motivation for the individual/group	How can we use current motivations to enable change? What other motivations might we need?

Transformation and transition

Transformation is a concept that is often used in relation to adaptation and is central to adaptive management. Transformation has many definitions that depend on who or what is transforming and why. For example, adaptation transformation has been defined by the IPCC as 'The altering of fundamental attributes of a system (including value systems; regulatory, legislative or bureaucratic regimes; financial institutions; and technological or biological systems)' (IPCC, 2012).[2] In an organisational context, it has been defined as 'a process of profound and radical change that orients an organization in a new direction … and takes it to an entirely different level of effectiveness, through a basic change of character and little or no resemblance with the past configuration or structure.'[3] Either definition can be used by adaptation practitioners depending on the context and task being undertaken.

Transformation is the point at which the change occurs and this is useful for establishing a vision for the future and goals. However, for practitioners undertaking process change, the key area of focus is the *transition* to this state as this is the active phase that ultimately enables transformation.

Transitions can be undertaken as series of planned (incremental) transitions, which create a pathway to transformation. These transitions can be assessed as they are completed and then the next transition is undertaken. Such transitions will not necessarily be uniform. For example, a series of small transitions may result in a larger transition. Other factors, such as a disruptive event, may also change or shape a transition stage (Figure 6.1).
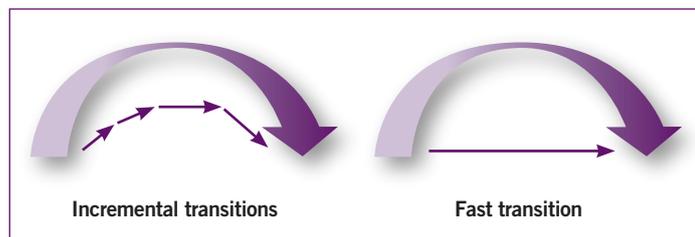

Figure 6.1 Types of transition.

Transitions can also be fast (rapid) transitions (see 'Case study: Grantham transformation', opposite), which respond to a trigger event and provide a direct route to transformation. The process of change in adaptation requires allocation of appropriate time and resources to achieve effective outcomes. Aspects such of behaviour change can take a number of years to fully be adopted. This can be challenging to smaller or poorly-resourced organisations and may require the building of long-term collaborations across organisations to provide the necessary support.

Strategic change

All change management requires the development of a strategy and process to enable it, and a variety of models can be used to do this. One example that has been used for climate change is David Kotter's eight-step change process detailed in his book, *Leading Change*[4], in which he outlines eight key steps needed to plan and implement change. This is particularly useful in structured organisations such as businesses that have clear rules to work within.

1. **Create a sense of urgency** – provide a case for why do we need to do this.
2. **Form a powerful coalition** – high level buy-in is essential at this stage, as well as key stakeholders.
3. **Create a vision for change** – where are we going?
4. **Communicate the vision** – how we are going to do this?
5. **Remove obstacles** – what do we need to change to achieve this?
6. **Create short-term wins** – what can we do now?
7. **Build on the change** – show progress to date and start the next action.
8. **Anchor the changes in the working culture** – integrate the changes into the operational matrix.

Case study: Grantham transformation

In January 2011, floods devastated Grantham in the Lockyer Valley region in Queensland, home to approximately 360 people. The flash flooding resulted in unprecedented levels of property damage and destroyed more than 130 homes (Lockyer Valley Regional Council, 2011). The council, in close collaboration with the community, decided that due to the profound effects of this event they would take a proactive stance when rebuilding their community by developing a planned voluntary relocation scheme. 935 acres of land was purchased by the council adjacent to Grantham that was above the flood lines reached in January. This was to ensure that residents could rebuild in a safer environment.

The council also committed to invest $30–$40 million over the coming year to support development. Lockyer Valley council worked with the community to develop the master plan for the new community through the Strengthening Grantham Community Workshops. This final plan included a community centre, show grounds and a possible new school. The Lockyer Valley Regional Council Community Recovery Plan (23 February 2013) and the Grantham Relocation Policy (11 May 2011) were developed and a flood study of the region was undertaken.

The first release of land was in June 2011 when 80 parcels of land were made available to the owners who had been most impacted by the flood. (This was later extended to 90 due to the uptake of the scheme.) These parcels were offered as exchanges of 'like for like' parcels of land and owners incurred no cost. They were then allocated to the residents through a ballot system.

This method was effectively used as a basis for a climate change program at Linfox Logistics in Melbourne, Australia to implement a sustainability program whose core aim was to reduce carbon emissions. Through the introduction of targeted training, new technologies and employee programs to raise awareness of climate change they were able to reduce their emissions by 36% from 2006 to 2012. They are now working towards a goal of 50% reduction from their 2007 emissions.[5]
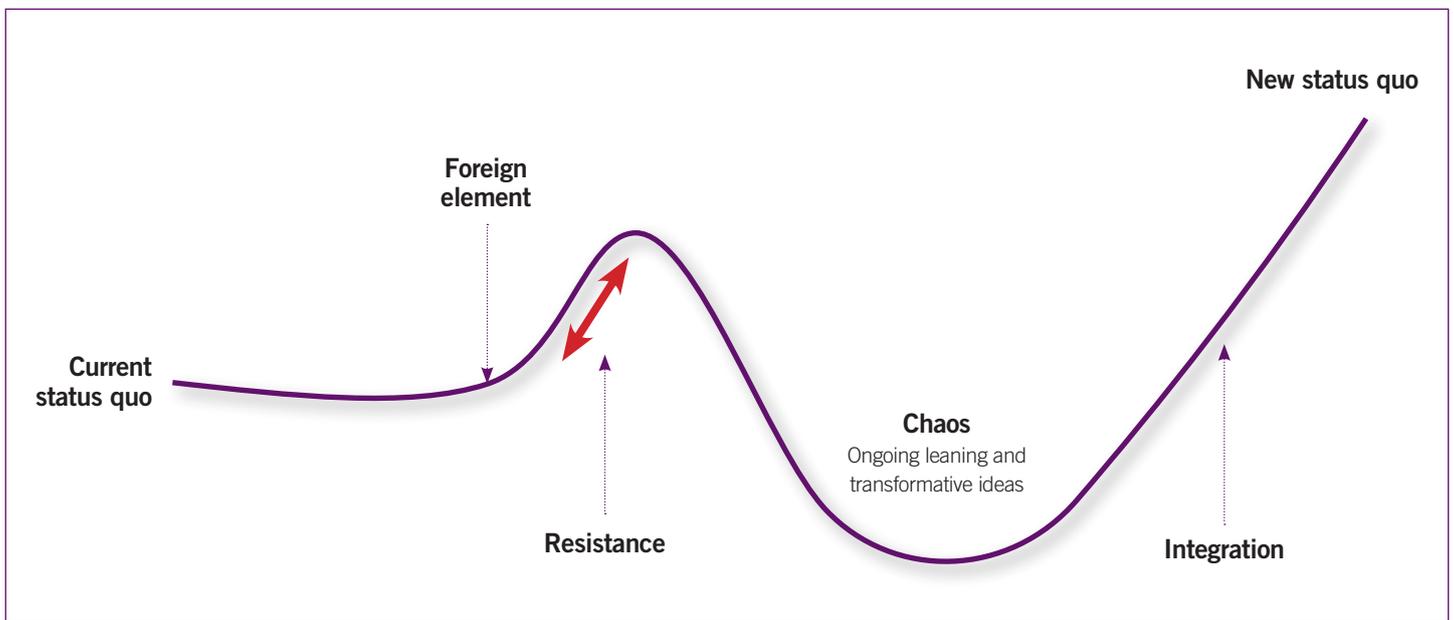
Figure 6.2 Satir Change Process Model. Adapted from Satir, V. et al. 1991.[6]

Areas of resistance

The Satir Change Process and the Kubler-Ross Stages of Grief models are often used by organisations to understand why areas of resistance arise and how they can be best managed.

The Satir Change Process Model (Figure 6.2) illustrates the social landscape of transformation. Although this was developed for family therapy, it has been used to enhance understanding of organisational change processes – particularly in areas of transformation management. It maps key stages of responses of feelings, thinking, performance, and physiology to the introduction of a new or foreign element, and the movement from one state to another. It can be used to map key aspects of the climate change pathway, from where the external element is introduced into working through resistance and chaos. Current structures are often dismantled during the chaos phase, creating an environment for transformative ideas and action to occur. Defined processes for continuous learning and knowledge development are crucial during the chaos phase to support transition to a new state.

The role of grief

Many change management processes are informed by both the understanding of the individual and larger group responses to grief associated with change. For adaptation practitioners, it is helpful to have some insight into grief responses when planning and implementing adaptation, because it allows for identification of issues and development of strategies that support the movement through these phases so people don't remain in one phase (particularly denial or depression phases), which can hamper both adaptation understanding and action.

Grief can be defined as a response to the loss of something cherished and is commonly encountered as part of the adaptation process. Part of understanding the need for action is accepting that the world we have grown up in is changing and will not be the same in the future. For many people and communities this is difficult to reconcile, and can cause grief for a variety of different reasons. For example, individuals may experience grief due to the perceived future loss of a way of life because of long-term environmental or economic change, or a community may feel collective grief following an event such as a drought, fire or flood. Grief can also be associated with changing circumstances and environments[7], such as changing organisational structures and traditional ways of operating, which might be required as part of transformational adaptation. How much grief is felt is subjective and relative to the person or group and their circumstances.

> **'A disaster for a peasant can be the loss of a crop, for a king it can be a spot of gravy on his tie.'**
>
> **— Guiseppe Lampdusa, The Leopard**

Addressing these responses is a delicate process and requires recognition that responses to grief can be uncomfortable but are part of a process. Activities to assist communities and groups of people to move through this stage have been developed within the local government, community and arts sectors. For example, the use of artistic expression or opening up group dialogues to help individuals and groups come to terms with the change process and accompanying sense of loss. (See 'The use of art in communication', p38.)

Table 6.2 Stages of grief with adaptation example and response.

GRIEF STAGES (KÜBLER ROSS)	STAGE DESCRIPTION	ADAPTATION EXAMPLE	POSSIBLE RESPONSE
1. Denial	Non-belief of the situation or the facts presented.	Climate denial, cognitive dissonance.	Consistent communication and engagement, accurate information. Education.
2. Anger*	Angry responses due to the understanding that denial cannot continue which often include blame and a sense of why me?	Angry responses to climate change flood maps being released publicly.	Listening activities that allow for anger to be voiced and acknowledged but don't engage.
3. Bargaining	Where the individual tries to delay the action or develop a compromise that reduces the inevitable impact.	People adapting housing in flood-prone areas that will eventually be uninhabitable.	Provision of support that encourages thinking and action beyond short-term solutions. Acceptance of the situation.
4. Depression	Beginning of acceptance of the inevitable which can result in emotions such as fear, sadness, a sense of hopelessness and fear and disconnection from things. A sense of loss of love and affection.	Depression in farming communities to having to sell a farm as a result of drought.	Programs that allow for supportive spaces where people can articulate their feelings but also be given strategies for dealing with them.
5. Acceptance	Acceptance of the situation.	The decision to relocate residents in areas of Grantham after the floods in 2011.	Facilitation to enable forward-thinking towards active solutions.

* Anger expressed during this phase in adaptation can also be as a result of fear of a perceived future grief of a potential loss.

Grief can be encountered in many stages of the adaptation process; firstly in the development of understanding and acceptance of the problem, and secondly in the solution phase where actions may cause change in environments and the circumstances. Understanding how and when responses to grief happen, and identifying resistance that may be encountered as a result of real and perceived current or future loss, are pivotal for informing the timing and type of engagement activities needed during the adaptation process (Table 6.2). These are informed by the key stages identified in the process outlined by Elizabeth Kubler Ross in her book *On Death and Dying*[8] that map responses to loss (Figure 6.3).
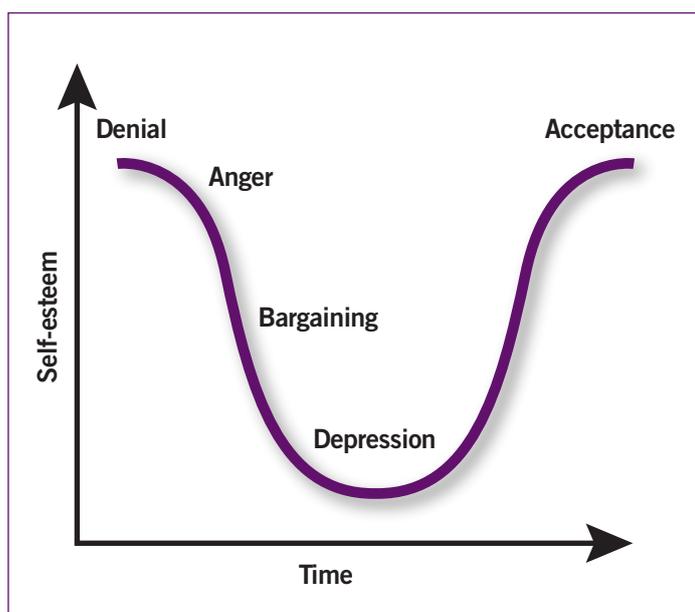

Figure 6.3 The Kübler-Ross model. Source: Kubler, E., Ross GaloppinLuc, online magazine for organisation change practitioners

Appreciative inquiry: working from the bottom up

Appreciative inquiry (AI) is a change management model used to facilitate social change in communities and organisations. Its key purpose is to identify and use the core values of organisations, communities and individuals to develop a foundation for enabling change. AI is seen as a new paradigm of change management that uses a bottom up approach and works at many levels. It is highly-collaborative and aims to create shared understandings of the changes needed, and how these changes can be undertaken.

Narratives (stories) are developed that identify what is central to, and sustains, the organisation and the individuals in it. Its key objective is transformative – changing how people think by asking 'what has been there already?' and 'what could be?'.[9]

It has four stages:

- **Discovery** (appreciating that which gives life): organisational resources are explored through interviews with numerous stakeholders who are part of the system.
- **Dream** (envisioning impact): the vision for the future is established with stakeholders by examining its potential and changes needed to go beyond the accepted status quo.
- **Design** (co-constructing the future): changes are decided upon and planned.
- **Delivery** (sustaining the change): new changes are implemented and tested within a continuous learning environment.

Evaluation, reflection and feedback are key to all stages of this process. Five philosophical principals also guide this process and form the basis for the type of activities (see Appendix 6.A).

Common aspects of successful change management models

There are many different change management models, and the selection of a preferred model will depend on the specific needs of those undertaking the change, and whether the change is an independent action or part of a continuous change program. The following key aspects are part of most successful change programs:

- Creating the right environment where change is encouraged and supported.
- Developing change with the group, not imposing change on the group – the use of practices that use collaborative mechanisms and support participation.
- Relevant, accessible and inclusive communication.
- Shared visions and understandings of where you are going and how you are going to do this.
- Flexible and iterative methodologies and frameworks.
- Ongoing learning and education.
- Appropriate planning, resources and financial support.
- Leadership – ongoing commitment from the organisational leaders and members across the organisation, leading by example.[10]
- Consideration of the impacts of change on people and support to enable them to change.

A particularly useful resource for practitioners in relation to tools and methods is *The Change Management Toolbook*.[11]

Summary

Change is present in adaptation and innovation, and change management models and methods can provide a number of options for practitioners to help them plan more effectively. For adaptation, the size of the task and the time frames over which it is to be effective requires the building of cultures in communities and organisations that are resilient and able to respond to changes as they occur.

Adaptation is a social process of change. It also requires appropriate planning, support and resources to enable and sustain activities. Because adapatation is a continuous change, not a single change, it also requires a long-term strategic approach. It is important to accept that discomfort is part of the process and work with this rather than against it. Understanding how to manage human responses to change, such as grief and fear in a way that creates a positive change environment, is key to achieving effective change actions.

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Appendix 6.A: AI principals

Five principals that underline AI as defined by David Cooperrider and Diana Whitney are summarised below from the *Sage Encyclopaedia of Management Theory*.[†] They are:

1) The **constructionist principle** proposes that what we believe to be true determines what we do, and thought and action emerge from relationships. Through the language and discourse of day-to-day interactions, people co-construct the organizations they inhabit. The purpose of inquiry is to stimulate new ideas, stories and images that generate new possibilities for action.

2) The **principle of simultaneity** proposes that as we inquire into human systems we change them, and the seeds of change, the things people think and talk about, what they discover and learn, are implicit in the very first questions asked. Questions are never neutral, they are fateful, and social systems move in the direction of the questions they most persistently and passionately discuss.

3) The **poetic principle** proposes that organizational life is expressed in the stories people tell each other every day, and the story of the organization is constantly being co-authored. The words and topics chosen for inquiry have an impact far beyond just the words themselves. They invoke sentiments, understandings, and worlds of meaning. In all phases of the inquiry, effort is put into using words that point to, enliven and inspire the best in people.

4) The **anticipatory principle** posits that what we do today is guided by our image of the future. Human systems are forever projecting ahead of themselves a horizon of expectation that brings the future powerfully into the present as a mobilizing agent. Appreciative Inquiry uses artful creation of positive imagery on a collective basis to refashion anticipatory reality.

5) The **positive principle** proposes that momentum and sustainable change requires positive affect and social bonding. Sentiments like hope, excitement, inspiration, camaraderie and joy increase creativity, openness to new ideas and people, and cognitive flexibility. They also promote the strong connections and relationships between people, particularly between groups in conflict, required for collective inquiry and change.[††]

[†] Cooperrider, D. Sorenson, P., Whitney, D. and Yeager, T. (eds). (2001). A positive revolution in change. In: *Appreciative Inquiry: An Emerging Direction for Organization Development*. Stipes, Champaign, IL, 9–29

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