The Emergence of Sustainability Culture and the Sustainability Practitioner

Matthew Roy Charles PARNELL

Bachelor of Building (B.Build.) - University of New South Wales

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I declare that this thesis is my own account of my research and contains as its main content work which has not previously been submitted for a degree at any tertiary education institution.

Matthew Roy Charles PARNELL

Abstract

In this thesis, I propose that sustainability is a new emergent cultural phenomenon – a new "dreaming" - arising from our conscious and unconscious actions, our relationships and our connection to place. Such a culture of sustainability is essential to support the vision of a sustainable global society. I further propose that the way sustainability is practised, both personally and professionally, has significant potential for fostering the emergence of sustainability culture, and that a mature sustainability culture, in turn, will support our myriad actions towards sustainability. The above propositions have a significant caveat: emergence, as understood in complexity theory, is not predictable. The current unsustainable paradigm of global development is also an emergent phenomenon. Real sustainability is therefore not inevitable, simply because a vision has been articulated, and strategies and actions implemented.

I also contend that as sustainability is holistic in conception, it requires a holistic approach to practice, in addition to the mechanistic prescriptions common to much contemporary sustainability practice. To move towards a holistic approach to practice requires a different type of practitioner from the conventional practitioner: more generalist than specialist, drawing on their "inner sustainability culture" when faced with complex sustainability problems, capable of working across scales, open to discovery of new patterns, and mindful of the degree of complexity in any practice setting.

In recognition of the need for a new cultural paradigm of sustainability, and drawing on the concept of emergence as described by complexity theory, I have designed this research project to investigate the following four themes:

1. Culture as an emergent quality of complex adaptive socio-technical systems;
2. The connections between human action and emergent system qualities;
3. The prospects for the emergence of a culture of sustainability; and
4. The implications of emergent sustainability culture for the sustainability practitioner.

In this thesis, I argue that we need a model of sustainability culture that accommodates the emergence phenomenon and new ways of emergence-based sustainability practice. I therefore propose an Emergence Model of Sustainability

Culture to illustrate the relationship between sustainability, culture and the emergence phenomenon, and I articulate four Emergence Patterns for Sustainability Practice as a working framework for emergence-oriented sustainability practice across different generic practice settings in simple, complicated, complex and chaotic space. I hope that sustainability practitioners will find my Emergence Model and Emergence Patterns to be helpful in progressing to a more considered and deeper approach to sustainability practice than contemporary approaches, especially where sustainability problems are complex and difficult. In this way we may continue to develop a culture of sustainability as a new “dreaming” and the practice of sustainability will progress further to service humanity’s compelling need.

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List of Abbreviations

ARIES: The Australian Research Institute in Education and Sustainability

ATSIC: Aboriginal and Torres Strait Islander Commission

ATWORK: Aboriginal Technical Worker Program

CAT: Centre For Appropriate Technology

CCP: Cities for Climate Protection

CHCC: Coffs Harbour City Council

CDEP: Community Development Employment Program

CoP: Community of Practice

CSR: Corporate Social Responsibility

DCDSCA: Department of Community Development, Sport and Cultural Affairs, Northern Territory Government

DK-CRC: Desert Knowledge Cooperative Research Centre

DOP: Department of Planning, New South Wales Government

EATING: Education, Action, Trust, Inclusion, Nourishment and Governance

EE: Environmental Education

EfS: Education for Sustainability

FHBH: Fixing Houses for Better Health

GECA: Good Environmental Choice Australia

GRI: Global Reporting Initiative

IAP2: International Association for Public Participation

ICLEI: International Council for Local Environmental Initiatives

IHANT: Indigenous Housing Authority of the Northern Territory

IISD: International Institute for Sustainable Development

ISSP: International Society of Sustainability Practitioners

LCA: Life Cycle Assessment

MAC: Mt Arthur Centre

MIPS: Material Intensity Per Units of Service

NABERS: National Built Environment Rating Scheme

NAHS: National Aboriginal Health Strategy

NSW: New South Wales

NTRC: National Technology Resource Centre

OLC: Our Living City Settlement Planning Process at CHCC

OR: Organizational Review at CHCC

ORT: Organizational Review Team at CHCC

PLA: Participation-Learning-Action

PME: Participatory Monitoring and Evaluation

PRA: Participation-Reflection-Action

QBL: Quadruple Bottom Line

RRA: Rapid Rural Appraisal

RTA: Roads and Traffic Authority, New South Wales Government

SCU: Southern Cross University

SA: Sustainability Assessment

SoE: State of the Environment

SRA: Sustainability Reporting Alliance

TBL: Triple Bottom Line

TNS: The Natural Step

UNDP: United Nations Development Programme

UNEP: United Nations Environment Programme

UTA: University of Tasmania, School of Architecture

WASIP: Waste and Sustainability Implementation Program

WSUD: Water Sustainable Urban Design

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Part 1: Proposition: The Emergence of Sustainability Culture

Chapter 1 Sustainability: A New Dreaming

1.1 A New Dreaming

Sustainability, as an idea, has gradually entered into the global collective consciousness over the last thirty to forty years. Sustainability is a worthy vision or goal for global society for so many reasons and as with many human visions before it, simply having the vision is not enough. Taking action, though important, is also not enough. Sustainability must be more than a goal, more than action: it must be nothing less than a new form of human culture, a new cultural paradigm for global society. I have therefore conceived this research project as a contribution to the development of sustainability as a new global culture.

In a global sense, we need a new "dreaming" to re-shape our culture of environmental exploitation and inequitable development and to guide our everyday actions in the world, no matter how imperfect this dreaming may be. Dreaming, thus, is both a useful metaphor for this research and a necessary process for culture change. I have respectfully drawn inspiration from the traditional indigenous Australian world-view where action in the world is guided by a holistic cosmology and is a deeply embedded ideational process.

Until recently, the literature on sustainability contained relatively few references to culture and its significance for sustainability. This situation has changed substantially since I began this research in 2000. The exploration of the culture and sustainability nexus must be a significant and inevitable path for anyone who has been a sustainability practitioner or advocate over the long term, especially in the "rational" realms of science and technology. Culture is particularly relevant for any sustainability practitioner who has experienced deep frustration with the slow and uneven pace of change.

To illustrate this point, having been a sustainability practitioner and advocate for over thirty years and having written a book on solar housing (Parnell & Cole, 1983), it has been an on-going source of frustration that simple technical solutions, which would make housing energy efficient, make it more healthy and more comfortable and reduce global warming and other environmental impacts, are generally not adopted by housing consumers or the housing industry. The increase in the average house size and appliance expectation illustrates that money is not the problem. It is not ignorance – these ideas have been around for some time, and are regularly featured on numerous

television lifestyle programs (usually as a separate lifestyle choice: just as picking paint colours, choosing a café, or wearing expensive running shoes are lifestyle choices). The problem must lie somewhere else: I believe the major obstacle to the implementation of sustainability is largely the problem of culture.

In recognition of the need for a new cultural paradigm of sustainability, I have designed this research project to investigate the following four themes:

1. Culture as an emergent quality of complex adaptive socio-technical systems;
2. The connections between human action and emergent system qualities;
3. The prospects for the emergence of a culture of sustainability; and
4. The implications of the emergence of sustainability culture for the sustainability practitioner.

My investigation of the above issues is a response to my growing realization that any social and cultural change is new pattern emerging from the complex interactions within human systems.

1.2 Sustainability: My Perspective

I hold a broad view of sustainability and prefer to avoid a rigid definition. There are many definitions in the literature, all with different emphases and meanings. All are generally useful and constantly being defined and redefined, as sustainability thinking matures. The most common definition comes from the Brundtland Report: Our Common Future (World Commission on Environment and Development, 1987); it is recycled in most of the sustainability literature. Many environmental organizations[1], government organizations and corporations have their own definitions of sustainability and sustainable development.

I do not see a problem with contested meanings of sustainability, as I believe the meanings change as part of the changing dynamics of human systems. There is room to share meanings and to debate meanings as part of the process of change: any definition is thus contingent. My contingent description of sustainability is set out below in Box 1-1:

[1] I have chosen to spell this word according to the American version, as the majority of literature in organizational theory uses this spelling. However, where I have used a direct quote or reference, I have used any alternative spelling used in such quotes and references. In all other similar words where there is a choice, I defer to the British version.

A Vision: what we strive for
A Set of Principles: what guides us
A Dynamic Process: how we act
A Series of Outcomes: what we achieve
A New Form of Human Culture: what supports us

Box 1-1 A contingent description of sustainability

I believe that sustainability is a dynamic process, and has a purpose as set out in Box 1-2 below:

To enable us to live well, with quality of life, expressing our personal and cultural values harmoniously, while protecting and restoring the natural systems upon which we all depend, indefinitely into the future.

Box 1-2 The purpose of sustainability

This thesis, therefore, is predicated on the assumption that sustainability has multiple, dynamic meanings, is fundamentally cultural, and emergent in character.

1.3 Research Motivations

1.3.1 My Personal Objectives

Reflection on my experience has enabled me to begin to express a long-held and deep concern about the ways of living on the earth in modern times. I see this process of study and reflection as a latter day Western “vision quest”: a sacred task, transformational on a personal level and an offering in hope to the wider world.

I want to make a contribution to cultural change towards sustainability, both as a researcher and as a sustainability practitioner. I have approached this research on that basis: I do not wish to develop and discuss a new theory for its own sake – I want that theory to inform my practice to make me a better practitioner and, if possible, to inspire other practitioners to improve their practice. I also hope that other practitioners find my proposals for an emergence-based model of sustainability culture and its related patterns for sustainability practice useful and contribute to their future development.

1.3.2 Discovering Sustainability Culture

Culture is a significant part of any human endeavour: anyone engaging in change processes must appreciate the role of culture in change. Culture is sustainability's "overlooked dimension" – the influence of culture (and its associated complex field of knowledge, values, attitudes, behaviours, agents, characters, relationships and events) on our capacity to act sustainably, as an intrinsic state or a second nature. A sustainability culture, therefore, is a culture in which sustainable behaviour is a part of life and a deeply informing impulse for our actions, especially where situations are complex and difficult, and sustainable solutions are hard to find.

The reason we need to pursue sustainability culture is simple: sustainability proponents regularly fall into the trap of thinking that any proposed model of sustainability with a "box" for human, cultural and/or social capital factors or a "circle" with society in it, have accounted for human, social and cultural factors. This thinking effectively ignores the cultural factors involved in actually making sustainability work, in sustaining any course of action or, more likely, in preventing sustainability outcomes from occurring. In other words, people and their cultures can stymie an otherwise well-conceived sustainability framework, model, strategy, process or tool. I revisit this theme through different perspectives throughout this thesis.

1.3.3 Holistic Sustainability Practice: Specialist or Generalist?

I am unashamedly a generalist and I have a few areas of technical expertise. However, my greater abilities (and the ones I wish to develop through this research) are my abilities to make connections where others don't see them, to link up good ideas from different domains to create a new synthesis, and to balance out competing interests and opinions. I also recognise that I have the capacity (and the courage) to expose myself to failure and criticism in this way. Arne Naess supports the notion of the generalist (Naess, 1989) thus:

> We daily decide between conflicting considerations and interest. To work for a more ecologically responsible personal and societal lifestyle is thus not merely the sociologist's job. Nor the philosopher's. We should all do it together as generalists rather than specialists.

My approach, after Naess, is not the conventional academic approach. It leaves me vulnerable to criticism by experts in all of the different domains covered in this research. I will never be able to compete with any of the domain experts, intellectually nor experientially; nor do I want to, as a generalist. I contend that the separateness of

the entrenched "silo"[2] mentality embodied in different knowledge domains is a major obstacle for the sustainability vision. It would be highly inappropriate for my research to adhere to those separate views. I am comfortable with the vulnerability of my approach because it mirrors my view of how a holistic sustainability culture will emerge. I have believed from an early stage of this work that I can engage in this research only on these terms, as a mirroring of the creative aspect of sustainability, especially through the messy, difficult and glorious business of working with people fostering sustainability in their own places.

I have great confidence in the resilience of my approach and I hope that this thesis demonstrates the value of the new ideas about the emergence of sustainability culture and of my reflections on my experience as a sustainability practitioner.

In this thesis, I contend that, in spite of the holistic scope of the sustainability vision, the implementation of sustainability is typically a linear, mechanistic and hierarchical process. That is, we are applying new paradigmatic thinking to an outdated cultural paradigm. I argue that our current approach to sustainability (being linear and mechanistic) will approach a state of diminishing returns and fall short of desired (and necessary) sustainability outcomes. We need to align our actions to be commensurate with the process implicit in our holistic rhetoric if there is a chance for sustainability culture to emerge.

The linking of sustainability's holistic rhetoric to holistic action raises the question of conducting holistic sustainability research. Traditional academic process is based on being expert in a narrowly focussed knowledge domain. The expert is commonly held to be "not qualified" to comment on matters outside of their expertise. While this stance is often entirely appropriate, it is counter-productive to the kinds of holistic thinking needed for a sustainability culture. Any academic or practitioner operating across many knowledge domains invariably has mixed knowledge and experience, thus increasing the risk of poor performance or failure arising from their lack of expert knowledge in specific areas.

Consequently, a different type of thinker and operator is required for holistic performance: a generalist rather than a specialist. Generalists have different qualities:

[2] A term used in management discourse, indicative of divisions within an organization with a vertical hierarchy, with the only connections between divisions being through upper management: i.e. there are no formal connections between staff of different divisions. "Silo" thinking can represent different degrees of non-connection. It can also apply to divisions between branches of academic knowledge.

a capacity to make sense of fragments of information, to have good basic "scaffolding"[3] across different areas, to know their strengths and weaknesses, to identify gaps, to communicate and consult widely, to make connections between apparently unconnected domains and events, and to be prepared to take calculated professional and personal risks. This research is consciously framed to depart from the traditional expert-driven research and embraces a generalist approach.

It is a conundrum of this research that the absence of linear causal connections between actions and outcomes could imply that there is no point in taking any action, as the desired outcome might not occur. I am not advocating this in my research. I believe that intelligently applied holistic action is necessary because small actions, in a whole system sense, may have large impacts.

1.4 Developing the Research Proposition

The research proposition in this thesis resulted from reflections on my experience as a sustainability practitioner over the last thirty years. In particular, this research was influenced by my experience working with traditional Aboriginal people in remote communities in Central Australia. My experience in the transfer and adoption of Western technologies to meet the needs of an indigenous culture has great lessons for the global sustainability agenda. Implicit in these technology transfer processes is the transfer of so-called superior technology under the mastery of the transferring culture. In terms of the sustainable development agenda, the existence of global environmental problems (arguably caused by modern technological development) demonstrates that we have not achieved the mastery implicit in the technology transfer process. We deceive ourselves about our technological mastery.

If possible, feedback of the remote community experience to the mainstream is a form of "reverse technology transfer" that may help the wider world understand its relationship to technology and its embedded culture. This approach may help to foster development of technologies closer to the aspirations and world-view of local cultures, bringing sustainability closer. This experience, in particular, has dramatically altered my personal world-view and has been instrumental in helping to frame the issues investigated in this research. Much of my experience demonstrates that sustainability culture follows a non-linear path.

[3] The concept of scaffolding is discussed in Chapter 7.

As I reflect on my life and the observations of how human systems often work, and the more I have read about complex systems, I have developed a strong sense that the emergent properties of our human systems create our outcomes. This approach helps to explain why some things work and others don't. Emergence may have great potential as a model to explain the failures of the sustainability movement. Emergence, as a model, may also indicate that successes may be more from a serendipitous combination of events than an outcome of conscious planning.

I have always believed that people, societies and cultures can change for the better: the improvement in human rights, equality for women, social justice, safer workplaces and reduction in poverty and conflict in recent decades in some parts of the world are testament to that. My belief is that we can move to sustainability, although I also believe that the ideas of emergence may hold either great promise or great peril.

1.5 Research Questions

As a result of my reflective process, I designed this thesis to respond to the two principal research questions described below in Box 1-3.

Principal Research Question 1
What is the role of emergence in the development of sustainability culture?

Principal Research Question 2
What are the implications of emergence for the sustainability practitioner?

Box 1-3 Principal research questions

The principal research questions guide the overall research. I have also developed nine supporting research questions to provoke specific research activities to assist in the response to the principal research questions. These questions represent my working hypotheses in each theme as developed through my on-going sustainability practice. Some of the questions are not the kind of "open" questions that may be typical of research, where the researcher commences a journey into new knowledge. Rather, the questions are a guide to my continuing enquiry into the themes of this research project. These supporting research questions are listed below:

1. Are there any conceptual gaps[4] in our common sustainability models?

[4] In this thesis, I use the term "gap" to describe a deficit, or missing dimension, in an idea, concept, model or process, especially where the systems paradigm is not considered. It is commonly used in management theory and practice and has a pragmatic sensibility.

2. Are there any conceptual gaps in conventional models of change with implications for sustainability?
3. Could the systems paradigm address the gaps in conventional understandings of change, and if so, how?
4. Does learning contribute towards change, and if so, how?
5. Could the dynamics of complex systems contribute to the emergence of new cultural paradigms?
6. What are the implications of emergence for the development of sustainability culture?
7. Are there any conceptual and capacity gaps in contemporary sustainability practice?
8. How does the case study experience contribute to the development of new patterns for sustainability practice?
9. How does the Emergence Model of Sustainability Culture contribute to new ways of sustainability practice?

These supporting questions also contribute to the content and direction of each chapter in the thesis (See Section 1.7 Thesis Structure, below).

1.6 Proposition: The Emergence of Sustainability Culture

I have engaged in an extensive process of enquiry over the period of my research, engaging with many different people, cultures, places and social contexts. I am most concerned with developing a culture of sustainability, rather than cultural development *per se*. Through reflection on this experience and on prior experience as a sustainability practitioner, and through the consideration of many provoking questions, I make a guiding proposition in Box 1-4 below:

Sustainability is an emergent cultural phenomenon, arising from our conscious and unconscious actions, our relationships and our connection to place. Such a culture of sustainability is essential to support the vision of a sustainable global society.

And further, the way sustainability is practised, both personally and professionally, has significant potential for fostering the emergence of sustainability culture, and that a mature sustainability culture will support our myriad actions towards sustainability.

Box 1-4 A guiding proposition

This new understanding of sustainability as represented by the above guiding proposition is based on the concept of emergence. Human systems are complex and adaptive. A significant feature of this type of system is emergence – that is, the emergence of system qualities that are different from the qualities of the individual parts of the system. In this research, I draw on chaos, complexity and systems theories to explore the emergence phenomenon, with the aim of articulating a new framework for understanding sustainability as practice as well as a vision. Further, the discussion of culture is a complex one with multiple contested meanings.

A significant caveat is attached to the emergence proposition: emergence works both ways. The current unsustainable state of global society and its associated paradigm of global development are also emergent phenomena. Real sustainability is not inevitable, simply because a vision has been articulated and promoted. I explore the prospects for emergence serving the sustainability vision throughout this thesis and consider them in the final synthesis.

1.7 Thesis Structure

The thesis is divided into three parts:

- Part 1 Proposition: The Emergence of Sustainability Culture
- Part 2 Change and Emergence
- Part 3 Contemporary Sustainability Practice

Each Part consists of several chapters exploring the responses to the research questions. The structure of the thesis, the content overview and the basis of the response to the research questions are explained in the following sections.

1.7.1 Part 1: Proposition: The Emergence of Sustainability Culture

Chapter 1 Sustainability: A New Dreaming

Chapter 1 introduces the research, the principal research questions, supporting research questions, the emergence proposition, thesis structure and the motivations for the research.

Chapter 2 Methodology

Chapter 2 describes the research methodology: a mixed method approach, combining phenomenological reflection, academic review and case studies. The following process was applied: reflecting on experience to highlight critical sustainability issues; reviewing

these issues through conventional academic research; reflecting on the body of academic work reviewed; the proposal of a model for understanding the emergence of sustainability culture; engaging in practice case studies to experience the issues first-hand; and reflecting on the case studies and theoretical issues to propose new patterns for sustainability practice.

My general approach places high value on culture, participation and the personal perspective, leading to an action-oriented, people-centred approach in the collection of information as the guiding ethical stance, with respect for local viewpoints and a meaningful exchange of service. In this research, I also review ways of dealing with obstacles presented by this ethical approach.

Chapter 3 Reflections on Sustainability Practice

In Chapter 3, I reflect on my early life and the formative experiences contributing to the development of my environmental philosophy. This review highlights the trajectory that led me to pursue both a career in sustainability and a sustainability-oriented lifestyle. I reflect on my professional experience and my personal struggles with sustainability, and demonstrate how these reflections resulted in the emergence proposition underlying this research.

1.7.2 Part 2: Change and Emergence

Chapter 4 The Problematic Intent of Sustainability

Chapter 4 addresses the fundamental need for sustainability both as a vision and as a culture, by reviewing the state of the world and the forces of change. I review different perspectives on the conception of sustainability, including the attitudes, models, strategies and tools informing current sustainability practice. This Chapter concludes by identifying the gaps and deficiencies in current sustainability models.

Chapter 5 Ways of Social and Cultural Change

In Chapter 5 I investigate processes of cultural and social change, with emphasis on change approaches considered in traditional social change discourse. Such ideas of change are fundamental to this research enquiry. This Chapter concludes by identifying the gaps and deficiencies in conventional thinking about social and cultural change.

Chapter 6 Change and the Systems Paradigm

Chapter 6 further explores social and cultural change by investigating the systems paradigm and socio-technical systems in particular. The perspectives about culture and society from systems and complexity theory have the potential to improve

understanding of change processes beyond the values, political preferences and biases of conventional social enquiry. This Chapter begins the investigation of ways to link complexity to sustainability. I review the role of technology in social change as part of socio-technical systems discourse, but temper the review by including perspectives from contemporary technology critique.

Chapter 7 Learning as Feedback in Human Systems

Chapter 7 extends the enquiry to investigate the importance of learning as an important part of system dynamics. Learning is the means of feedback for human systems; it orients systems towards system goals and is an important aspect of the proposition of emergence. The main point of this Chapter is how modes of learning and their related learning cycles act as feedback in human systems and have the potential to facilitate emergent cultural change.

Chapter 8 An Emergence Model of Sustainability Culture

This Chapter engages with the theoretical basis of chaos, complexity and emergence. This Chapter further develops the emergence proposition, through proposing working parameters for a model of sustainability culture considering complexity theory and the emergence phenomenon: this model of sustainability culture is expressed as a metaphor, a manifesto and a graphic image. The Chapter closes by identifying the implications of the emergence model for the sustainability practitioner.

1.7.3 Part 3: Contemporary Sustainability Practice

Chapter 9 Themes in Contemporary Sustainability Practice

Chapter 9 introduces contemporary sustainability practice to prepare the theoretical grounding for the interpretation of the sustainability practice experiences in the Chapter 10 case studies. The review of sustainability practice follows three broad themes: community development practice, organizational development practice and specific approaches to sustainability practice. The Chapter identifies and reviews conceptual and capacity gaps in contemporary sustainability practice.

This Chapter concludes by introducing three case studies. They were selected to explore sustainability practice issues at different places, at different scales, in different processes and in different cultural contexts.

Chapter 10 Sustainability of Remote Indigenous Communities in Central Australia

This case study reviews my experience in working in remote indigenous communities in Central Australia until 2008. I originally planned this case study to be a place-based

study at one particular desert settlement, but it has adapted to a changing political landscape by aggregating a series of my practice experiences across several communities in Central Australia, and focussing on sustainability practice in the process of settlement development rather than the settlement dynamics of one place. This aggregation allows for reflection on issues as they unfold at both community and regional scales. My experiences were situated in helping remote indigenous communities with technology choice and implementation projects aimed at developing sustainable communities.

Chapter 11 Community Learning for Sustainability in a Tasmanian Rural Community

Between 2001 and 2002, I worked closely with a small group in a rural community in North-Eastern Tasmania. This group was set up to support the development of their community and as part of that development, took over a former community school site as a centre for community development. I worked as a development facilitator during the planning and early implementation stages. This case study reflects on how a small group of people can make a difference in strengthening its community and how its aims intersect with learning cycles and the technology of sustainable place development.

Chapter 12 Embedding Sustainability at Coffs Harbour City Council

From 2005 until the completion of this thesis, I have been working with Coffs Harbour City Council on a culture change process aiming to strengthen sustainability within Council processes and practices. I worked with a several staff in different parts of the organization supporting the integration of sustainability across the organization. This study focuses on how an organizational culture around sustainability emerges, develops and matures, as well as the roles of participants in the process.

Chapter 13 New Patterns for Sustainability Practice

This Chapter completes the learning cycle by offering my reflections on the theoretical perspectives and the case study experiences to synthesise learning. In this Chapter, I outline new emergence-based patterns for sustainability practice based on the Emergence Model of Sustainability Culture.

Chapter 14 Conclusions and Recommendations for Further Research,

The thesis concludes by summarising the various contentions and arguments proposed throughout the thesis, responding to the principal research questions and the original emergence proposition, and drawing appropriate conclusions. I conclude with some recommendations for further research into the emergence model and the proposed new patterns for sustainability practice.

1.7.4 Appendices 1 and 2

During the course of this research, I prepared many academic papers and project reports, and made several presentations to client groups. Some of these papers formed the basis of one or more Chapters of this thesis. Some papers, reports and presentations were part of the agreed return-of-service to the participants in the case studies. The full list of papers is included in Appendix 1. Each paper, report and presentation has been reproduced in full text on the DVD attached to Appendix 2.

1.7.5 References

This section includes a full bibliography of all papers, documents and other source material referred to in the thesis. Referencing uses the American Psychological Association 5th Edition method of referencing (APA 5th).

1.8 Issues not Addressed by this Research

As this research has been fundamentally cross disciplinary, and generalist in character, to fully explore the knowledge domains identified in this thesis along with their theories, models and processes, was beyond the scope of the research. These knowledge domains include the following: social change theory; cultural studies; anthropology; indigenous knowledge; systems, chaos and complexity theory; educational, environmental and behavioural psychology; community and organizational development; participatory processes; and sustainability strategies, models and tools. In particular, the mathematical basis of complexity and emergence was beyond the scope of the research and my capacity as researcher.

Chapter 2 Methodology

2.1 Introduction to the Methodology

In my general approach to this research, I have placed high value on culture, participation and the personal perspective, leading to an action-oriented, people-centred approach in the collection of data and information. My guiding ethical stance was respect for local viewpoints and a meaningful exchange of service with my informants. This Chapter outlines my strategies for research and my ways of dealing with obstacles presented by this ethical approach.

2.2 Research and Ways of Knowing

In Western culture, it is a common, but erroneous, view that knowledge is the product of scientific method and that facts exist because of scientific "proof"[5]. It is now widely acknowledged that scientific method has served us well, but does not always allow for other ways of knowing. There is a difference between the knowledge derived through scientific method, and the knowledge derived from lived experience. There are numerous ways to classify and understand ordinary experiences: for example, technical work, problem solving, relating to others, and living in our places. We naturally assume truths from basic experiences, everyday: we know what we know, and that knowledge, however derived, guides our actions. Kerlinger (cited in Burns, 2000, p. 5) identifies four broad ways of knowing:

- **Method of Tenacity:** Where a common held 'truth' is known to be true, with greater validation through repetition. This method is representative of the kinds of truths people cling to, often in spite of clear evidence to the contrary.
- **Method of Authority:** Truth is validated by an authority figure or authoritative source, whether or not it has a sound basis.
- **Method of Intuition:** Truth is based on reason: ' ..it stands to reason that… '
- **Method of Science:** This is a logical process of enquiry, with in-built checking and self-correcting processes, where hypotheses and their alternatives are tested and evaluated.

Box 2-1 Ways of knowing (Kerlinger, cited in Burns, 2000, p. 5)

Kerlinger's classifications, while typical of conventional thinking, are somewhat limited in describing human experience. Through the use of qualifying statements, his classifications imply that the method of science is the valid approach to knowledge, and

[5] Scientific method does not actually aim for such an absolutist position, whereas "proof" exists in mathematics.

that the other ways of knowing are questionable. Kerlinger's position is open to question with regards to the primacy of quantitative research over qualitative research. Burns (2000) describes the quantitative research process as linear in character with the following sequence of activities:

1. Define a research problem
2. Formulate hypotheses
3. Design the study
4. Select samples and instruments
5. Gather the data
6. Statistically analyse the data
7. Draw conclusions
8. Report the results

Box 2-2 Quantitative research as a linear process (Burns, 2000)

Acknowledging that the pre-eminence of this approach in generating new knowledge is the cornerstone of Western culture, and coming from a background of technological practice based on this paradigm, I have consciously chosen another path to new knowledge, using softer, more holistic and interconnected approaches. For me, as in the method of intuition, it "stands to reason" that science doesn't know what it doesn't know, and finds it difficult to take action based on fragmentary or imperfect knowledge. It also "stands to reason" that the scientific approach has many uses, but has many limitations when confronted by complexity. Proponents of a science-based approach to knowledge, in defending the pre-eminence of scientific method, frequently expect human systems to conform only to what is known by science. Yet, according to Milavec, the culture of science still contains a substantial amount of faith-informed tacit knowledge (2006, p. 483): "If the progress of science can be said to depend on reason, one must also say that it likewise depends on a cultivated faith that leads to revelatory discoveries".

Given that the Earth now faces many hard limits, and that narrow silo-type approaches to knowledge are insufficient for achieving sustainability, much of our future knowledge will need to be more integrative across disciplines and knowledge domains. In this vein, Kuhn (1970) proposed a challenging new view of science: that science did not change by small iterative steps – the great discoveries usually occurred through a paradigm shift, where whole new ways of thinking about problems emerged, with whole new possibilities. The problem with a new paradigm is that while it can solve new problems, it often cannot solve the type of problems usually solved by the more traditional paradigm, indicating an early appreciation of emergent properties of systems.

New problems may be emergent problems without direct causal links: a different way of thinking does not necessarily invalidate previous knowledge; it simply recognises that a new domain with different system goals has emerged. Kuhn's view challenges rigid scientific worldviews and identifies that the vagaries of human culture, values and social systems tempers much of what passes as hard, absolute fact in science. Kuhn further stresses that such paradigm shifts[6] are good for science. He identifies that human culture is part of the process of problem definition and solution development and that the debate about values of problems and solutions of competing paradigms is outside the realm of what Kuhn describes as normal science. Kuhn's point of view has significantly influenced my choice of research methodology. After all, scientific method is situated in a human cultural context and cannot, as such, be as absolutist as it is usually presented.

2.3 Qualitative Research

In contrast to the approaches of hard science, there are ways of knowing other than through collecting statistics and analysing hard data. In many situations it is not possible to collect statistical data, particularly in complex social settings. Consequently, a suite of methods has emerged which facilitate the development of new knowledge without the hard numbers: qualitative methods.

Qualitative approaches accommodate different perceptions of reality. Unlike the relative objectivity of a quantitative method, a qualitative method brings the researcher into the study and declares the subjectivity involved. The researcher must make the research framework transparent and be clear about the limitations of the approach. The qualitative approach is particularly good for the formation of hypotheses: reasoning (or induction) is used to create a working framework for a new idea, leading to the proposition, which can be placed in the public domain for further study (Burns, 2000). Medawar (1972 cited in Cohen, Manion, & Morrison, 2000, p. 14) describes the proposition as: "…a speculative adventure, an imaginative preconception of *what might be true* - a preconception which always, and necessarily, goes a little way (sometimes a long way) beyond anything which we have logical or factual authority to believe in". Further, Walliman states that qualitative research does not have to be locked into a firm hypothesis (2005, p. 217): "Research into society, design, history, philosophy and many other subjects usually cannot provide the full criteria for the formulation of

[6] When consensus on "the way things are" reaches a tipping point and a completely new consensus emerges.

hypotheses and their testing, and it is inappropriate to try to fit such research into this method".

Alternatives to a hypothesis are possible. Walliman (2005, p. 217) suggests that a study can focus on a proposition or series of propositions or on research questions. Such an approach allows the researcher to study events and their relationships, and instead of being tested, the researcher experiences the proposition, asks questions in the process of the experience, and reflects upon the experience.

In the design of this research, I have considered the following common methods of qualitative research:

- Phenomenology**:** the subjective study of lived experience (Heidegger, 1962; Lester, 1999);
- Action Research: socially-positioned research, with the researcher as participant (Lewin, 1946; Senge & Scharmer, 2001);
- Ethnographic/field research**:** participant observation; the study of people in context (Neuman, 2003);
- Storytelling**:** the story is the data (Dart & Davies, 2003; Snowden, 2010);
- Case studies**:** investigation of a specific example of a research field (Burns, 2000, p. 462); and
- Multi-methods research**:** a combination of qualitative and quantitative methods (McMurray, Pace, & Scott, 2004).

2.4 Research Design

2.4.1 Introduction

I have positioned the research methodology firmly in the qualitative using a multi-method approach incorporating several qualitative methods after Walliman (2005, p. 217). Sustainability, as a new cultural paradigm, is in the rapid process of development and ideas are evolving constantly. Even during the timeframe of this research (from 2001 to the present), much has changed. A conventional academic approach would be inadequate to illustrate the unfolding story of sustainability. Sustainability is essentially a story growing in the telling, with storytellers and meaning-makers at its heart. Consequently, I have approached this research as a story to be uncovered and place myself in the context of both a listener (and learner) and as a storyteller.

To tell the story of emergence and sustainability practice, I consider two aspects of the story: the structure of the research project and the process of the research project.

2.4.2 The Personal and Subjective Approach

The questions addressed by this research have developed through my reflections on experience as a sustainability and technology practitioner. Thus I can legitimately take the position of continuing this phenomenological approach. This approach allows me to explore the proposal, understand the theoretical perspective, explore the theory in real-life experiences and research myself as a practitioner who wants to make a positive contribution to change for sustainability.

2.4.3 Project Structure

The research project and the structure of this thesis reflect my personal experiential learning cycle which aligns with the Kolb Learning Cycle for experiential learning (Kolb, 1984). This experiential learning cycle was later proposed by Bell and Morse (2003) for sustainability contexts. The Kolb Learning Cycle is grounded in experience and is strongly influenced by Dewey's work on experiential learning (Dewey, 1997b) and Lewin's Action Research (Lewin, 1946). Concrete experience is the starting point, following by reflection on experience, conceptualisation of new ideas, applying new ideas to real situations, experiencing the new ideas in practice, and continuing the cycle as appropriate. The Kolb Learning Cycle and the thesis structure are related in the following ways:

- Experience (doing): professional and personal experience before beginning the research;
- Reflective Observation (reflection): the proposition emerges from the reflective process, illustrating how the reflective process can generate new theoretical ideas (in Part 1: Proposition: The Emergence of Sustainability Culture);
- Abstract Conceptualisation (connection): develops the conceptualization of the new ideas of emergence (in Part 2: Change and Emergence);
- Experiment (modelling): investigates the new ideas in different case study contexts and creates new learning (in Part 3: Contemporary Sustainability Practice); and
- Experience (doing): applying the learning in my future sustainability practice, and the practice of other sustainability practitioners.

I have applied this learning cycle to my own learning in this research because of its utility and effectiveness in bringing about personal change. I believe it is a useful tool as part of the culture change required for sustainability. Chapters 7 and 9 further explore the potential of the Kolb Learning Cycle.

2.4.4 The Phenomenological Approach

I have chosen the phenomenological approach because I consider it the most authentic way of reporting on human activity, particularly in complex adaptive human systems. A critical aspect of the phenomenological approach is that objectivity is only relative, and that the depth of our own personal cultures is so great that we are not fully conscious of them: we cannot fully disassociate ourselves from the subject of research and place ourselves in a truly "objective" position. Our personal cultures inform our perceptions and the mere fact and presence of our enquiry changes the domain in which we research. My experience working with traditional Aboriginal people taught me that even the simplest action is informed by culture, mostly in an unconscious way: there were many times when my actions were received in a very negative way when my intent was nothing but positive to the people and process. I simply was not conscious of the impact of my actions, body language and cultural "baggage". For researchers not dealing with people, consideration of one's own culture is not an issue; when researching people, a researcher's cultural bias has a considerable capacity to influence outcomes.

Experiential learning supports the phenomenological approach. In many Chapters, I report on my own experience and reflections on that experience. Therefore, I write mostly in the first person taking responsibility for my reflections, not as a stance of ego, but attempting to maintain an authentic position as a practitioner. I do this because I can only vouch for my own perception, and my response to the theoretical ideas underpinning sustainability.

Because some of this personal experience was situated in remote Aboriginal communities, I have been very uncomfortable with the ethics involved, especially in seeking permission from communities and individuals. Even with the best spirit and methods, it is problematic obtaining useful insights from local people in a way that authenticates and validates the veracity of the local story. There is also a risk that Aboriginal people will sign an ethics release form which they cannot read and do not understand. Explaining the point and uses of research does not have a lot of meaning for Aboriginal people. It can be easy to distort the picture, especially when consciously trying to be objective. Cross-cultural problems can also affect the quality of communication: in my experience, it is never certain that communication is successful. I have avoided such possibility, by reporting solely on my own experience rather than

the experience of others, supported by information already in the public domain where possible.

2.4.5 Literature Review

Literature reviews are an important part of any research process, but the value, purpose and application may vary widely. Some fields of research change slowly and have few practitioners, few books and a handful of papers published each year. It is possible in such cases to read all published literature in a particular field. Other fields are growing in an exponential way and it is not possible to review literature in the traditional way. For example, Falk (2000) reported that the number of published books and articles on social capital grew from zero to over ten thousand in less than two years in the late 1990s. I decided early in my research program that I would not be able to read or review the entire extant body of knowledge on sustainability at the outset of the research and during the course of the research because of its scope and breadth.

I have taken the approach of selective sourcing of published materials across the various sustainability domains reviewed in this research and have continued reading and collecting materials. During this time, the literature on sustainability has increased exponentially, with a large number of relevant web sites on sustainability. Thus it is simply not possible to take a definitive position based on a point or fact not being in the literature. The irony is that the complexity involved in simply deciding what to read mirrors the complexity of aiming to achieve sustainability.

The work of many authors, theorists and practitioners has informed my study and practice; some of their theoretical frameworks have strongly influenced my proposition. As this research traverses many disciplines, in some cases I have drawn on the meta-analyses of theorists reviewing the body of knowledge in particular disciplines.

2.4.6 Developing the Proposition and Research Questions

The emergence proposition arose from my reflections on experience as a sustainability practitioner, through my own process of transformational learning[7]. In Chapter 3, I review my personal and professional practice in the period up to the commencement of this research project to outline the aspects of sustainability which I consider to be significant for a culture of sustainability.

For the research for Part 2 Change and Emergence I used a desktop-based, traditional academic approach, referenced to current academic thinking in the following

[7] Transformational learning and its role in sustainability are explained further in Chapter 7.

knowledge domains: sustainability thinking, technology philosophy, social and cultural theory, systems theory, educational psychology and complexity theory. I reviewed work of significant theorists along with their main ideas, models and processes. The purpose of this review is to support the theoretical basis of the proposition of an Emergence Model of Sustainability Culture in Chapter 8.

2.4.7 Action Research

Applied Principles

My approach is indebted to Action Research. The concept of Action Research was first articulated by Kurt Lewin in the 1940s (Lewin, 1946); he was among the first to challenge the role of the objective social scientist. Action Research has been closely associated with research in organizational development. Later it was associated with the growth of international aid, in community development and more recently, in classroom-based educational research. It is an applied form of research that is often part of a process of carrying out real actions or projects, with meaningful outcomes for participants and recipients. For example, with reference to research in remote Indigenous communities, Anderson (2001) states this succinctly: “Don’t do anything about us without us.”

In Action Research, the researcher is a participant in the process, working with people in their cultural domains and specific contexts. The purpose of Action Research is to generate learning about a situation, process or context for all participants. While the purpose of Action Research is not to create new generalizations for application elsewhere, such outcomes are entirely possible, although transferability of learning may be problematic. Action Research can help develop theory and proposition or to contribute to a body of experience around an existing theory or proposition.

Action Research is the methodology of choice for people in organizations or community contexts where the individual or group wants to learn more about themselves, their functions and how to improve performance in achieving group goals in better and more productive ways. It is also a tool for continuing professional development: a professional can understand the context of their work environment and to reflect on that environment to determine ways to improve practice. The learning from an Action Research project may be for the group only, or can be circulated to others in a community of practice. This aspect of continuing professional development is a compelling reason to use the methodology as part of the enquiry into sustainability practice.

Coghlan and Brannick (2003, pp. 16-26) identify and explain the components of the Action Research cycle and how the cycle moves in an iterative fashion over time. They list and explain the main phases of the cycles as: diagnosing, planning action, taking action and evaluating action. They describe the process as having a spiralling nature rather than a straight cycle: each cycle moves experience and learning forward to a new starting point as illustrated below in Figure 2-1:

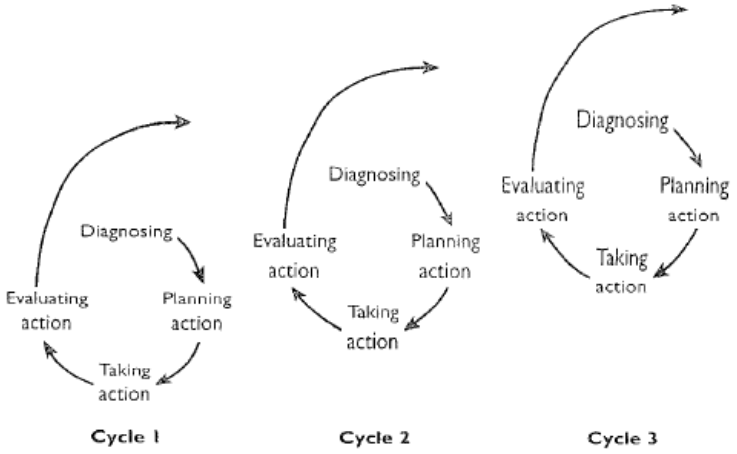

Figure 2-1 Coghlan and Brannick's Spiral of Action Research Cycles (2003, p. 18)

The models are useful for planning an Action Research approach. However, reality takes its own course making it imperative for the Action Researcher to be responsive and adaptive to changing circumstances. This is the challenge and encouragement of community development educator and practitioner Robert Chambers to "At all times, use your own best judgement" (Chambers, 2000).

Based on the principles of Action Research, I chose to carry out the experiential side of the research as a participant in real projects and activities in communities, community groups and organizations. I have been inspired and guided in my sustainability practice by direct personal experience in community development and the body of knowledge, both theoretical and practical, from development contexts in First, Third and Fourth[8] World communities.

Many frameworks and methodologies can be used to guide community development processes; such frameworks have been evolving over the post-World War 2 and post-colonial periods. Early development processes supported national development rather

[8] The term Fourth World refers to communities with a state of development more typical of Third World communities but situated within First World countries.

than community development. There has been an increasing emphasis on grassroots development processes which include local people in the design and implementation of local development projects and programs (Narayan, Patel, Schafft, Rademacher & Koch-Schulte, 2000). Chambers (2000) proposes that the language of development has changed to reflect this evolution as illustrated below in Box 2-3:

From things to people

• **Mode:**	blueprint to process
• **Keyword:**	planning to participation
• **Goals:**	pre-set to evolving/closed to open
• **Decision making:**	centralised to decentralised
• **Analytical assumption:**	reductionist to holistic systems
• **Technology:**	fixed package to varied basket
• **Methods/Rules:**	standardised/universal to diverse/local
• **Professionals:**	instructing/motivating to enabling/empowering
• **Seen as:**	beneficiaries to partners/actors
• **Force flow:**	supply-push to demand-pull
• **Outputs:**	uniform/infrastructure to diverse/capabilities
• **Planning and action:**	top-down to bottom-up

Box 2-3 The language of development (Chambers, 2000)

The people-centred ideas arising from community development have been a significant influence in the development of the structure, approach, tone and flavour of this research project. These frameworks recognise that research that extracts and uses data inappropriately is exploitative and includes situations where there is no immediate or obvious benefit returned to research subjects arising from the research intrusion. Researchers thus use other peoples' intellectual property to further their academic careers, while the owners of the research "data" gain no benefit, or are ignored or disadvantaged.

Framework 1: Participatory Methods

Community participation is at the heart of a community development process developed by Robert Chambers and others of the Institute of Development Studies, University of Sussex. This method enables local participation in projects and allows specific processes to emerge. It can encompass design, planning, decision-making, analysing and evaluation processes (Chambers, 2000, 2002; Davis-Case, 1990; Guijt, Arevalo, & Saladores, 1998; Guijt & Gaventa, 1998). Common application of the methodology occurs throughout the developed world, developing countries and third-world communities. The following questions in Box 2-4 below embody the philosophical basis of participation:

- Whose reality counts?
- Whose knowledge?
- Whose criteria?
- Whose analysis?
- Whose priorities?
- Whose planning?
- Whose action?
- Whose monitoring and evaluation?
- Who participates in whose project?

Box 2-4 Questions leading to the philosophical basis of participation (Chambers, 2000)

Researchers become participants to influence the way information is gathered and analysed. A spirit of optimal ignorance and appropriate imprecision is engendered whereby no more information than necessary is sought and comparing is preferred to measuring as an aid to understanding (Chambers, 2000). Finally, participatory Action Research must be an open process in terms of its ethical and political implications. It must be open to change from the participants (Chambers & Guijt, 1999).

Other similar participatory frameworks have also contributed to the development of the methodology of this research project: a community development practice framework (Ife, 1995, p. 250) a participatory framework for building and community design (Hamdi, 1991); community and settlement planning guidelines (Wates, 2000); community planning participation frameworks (Sarkissian, Cook, & Walsh, 1997; Sarkissian, Hurford, & Wenman, 2010; Sarkissian, Hofer, Shore, Vajda & Wilkinson, 2009); and planning for country processes in remote indigenous communities (Walsh & Mitchell, 2002).

Framework 2: HealtHabitat's "No Survey without Service"

Housing for Health and its evolutionary derivative Fixing Houses for Better Health (FHBH) are primarily Action Research techniques developed by Paul Pholeros, Stefan Rainow and Dr Paul Torzillo of HealtHabitat for use in improving the health outcomes for people in remote indigenous communities by improving health hardware in housing. Fred Hollows' philosophy of "no survey without service" influenced the development of this framework. This philosophy requires that this research project must return an immediate benefit to the subject community as part of the process of data collection (Pholeros, Rainow, & Torzillo, 1993).

Framework 3: Head, Heart and Hand

This framework, developed by Tony Kelly and Sandra Sewell (1998) through years of community development practice, has a core concept of "head, heart and hand", combining action, knowledge and good intentions. This framework promotes the primacy of relationships and of acted behaviours in successful community work, as Kelly and Sewell explain (1998, p. 3):

> Because relationship is the pivot on which all else turns in community building, it is important for us to be aware of the many and different relationships that are possible and of the many ways to engage in them. Who-we-are makes a great deal of difference to what we do, but who-we-are-in-relationship is the process through which the work gets done.

Kelly and Sewell's idea of "relationship" as central to a development process has had significant influence on my approach to Action Research. Kelly and Sewell, also refer to the problematic nature of writing about community development (Kelly & Sewell, p. 3):

> Community building is, in any case, primarily an oral and action tradition. Much of its wisdom grows out of the discussions of people talking with and working alongside other people. How to share that collective wisdom beyond immediate networks is often a dilemma. To write, publish and distribute a book seems a good idea. However, while a book can engage people's minds, even their hearts, the translation of those ideas and feelings into action can be tenuous.

In the above quote, Kelly and Sewell express the need to work with people, not research on people; they also express a certain reticence about the process of writing. Further, the implication is that this research, then, is not merely adding to a body of knowledge, but is, more importantly, a form of community building, and is thus a positive opportunity.

2.4.8 The Case Study Approach

The case study approach is an appropriate way to explore the phenomenon of emergence and its implications for sustainability practice. This thesis includes three case studies in Chapters 10, 11 and 12 respectively. The first case study reflects on the development of remote indigenous communities in Central Australia, with emphasis on the sustainability of the physical settlement, through several examples. The second case study is located in a small rural community in North-East Tasmania, where I assisted a community group in planning and developing a centre for personal and community development. The third case study examines sustainability issues in an organizational setting in local government on the mid-North coast of New South Wales.

The primary focus on data and information collection is via service-oriented community-based participatory actions where the realities (and interests) of people in the case study communities and community organizations are paramount. Further, my participation with community groups was by invitation and partnership agreement.

The approach applied in the case studies responded to opportunities as they arose. Over the course of the research, I explored over twenty case study possibilities in organizations and communities: local communities, mainstream communities, remote indigenous communities, and third world communities. The intention was to investigate the issues in contrasting places and contexts.

With the self-imposed requirement of action and participation, it was important to participate in a project as close to home as possible. As I have lived in Northern Tasmania and on the mid-North coast of New South Wales during the course of this research, case studies from those states are included.

The remote Indigenous communities case study in Chapter 10 included communities where I previously worked and had existing relationships. The Mt Arthur Centre case study in Chapter 11 arose from professional, academic and personal networks. I developed the case study in Chapter 12 as a learning opportunity with Coffs Harbour City Council without any prior relationship. All case studies began with some form of relationship building, which is a necessary pre-cursor to receiving an invitation to participate.

2.5 Ethics in the Community Context

Through the application of ideas in the frameworks described above, particularly the return-of-service, this research program self-imposes a more stringent ethical requirement than that which is normally required. The normal doctoral research outcomes are not problematic for most researchers, even with the requirements of university ethics protocols and requirements. However, in situations where communities are an information resource, research practice and its accompanying behaviour and attitudes may:

- Hinder development of relationships with community people;
- Fail to build trust;
- Raise suspicion about motives; and
- Adversely affect the availability and flow of information.

The research program has undergone the normal ethics approval processes, including not revealing identities unless specifically indicated, and using photographs of indigenous people and communities without consent with respect to the first case study in Chapter 10.

The ethical approach to this research program raised the degree of difficulty in terms of having an adequate number of case study communities and community organizations and being able to learn enough about them in order to explore the proposition and the principal research questions.

I began this process fully expecting that results would be rich in human terms, but patchy in terms of the significant issues identified. At all times there was a risk that any participatory research actions might not produce any usable outcomes and that any arrangement could end at any time for whatever reason. I allowed for potential case studies to collapse, which is why I initially identified many potential case study communities and organizations.

Gaining permission from research partners at Coffs Harbour City Council and the Mt Arthur Centre has been straightforward, but gaining written permission from remote indigenous communities has been more complex. While I received verbal permission from traditional owners across different sites, I was not able to progress this process to the formal written approval stage. Thus I have avoided references to people, places and quotes, other than those already in the public domain, and I have avoided using any images with potential to offend or reveal people and locations. This protocol lessens the requirements for the difficult task of gaining written permission from people and community councils. I am thus limiting the research in this case study to my personal response to the activities and issues experienced. I have used relevant public domain documents and source material to support my reflections and perceptions.

The underlying sensibility for me in this research program is one of reticence about intruding on peoples' lives and the subsequent risk of misrepresenting their realities. This sensibility raised the degree of difficulty but the value of the outcomes to the "researched" justifies the approach. It is personally satisfying for me knowing that there has been an exchange in the process rather than merely an extraction of information.

2.6 Publications and Writing

Another aspect of the research methodology was writing papers and reports over the course of the research. In some cases, I explored and tested theoretical ideas through conference and seminar presentations; in others, I produced reports and papers for various organizations and community groups as part of the Action Research approach, often with participants as co-authors. Some papers and reports were subject to formal refereeing processes for conferences and journal articles. Some material was produced for presentations and induction processes. Reports for the Housing Lifecycles Project for the Desert Knowledge Cooperative Research Centre were written because of program requirements. I also provided material from Chapter drafts for a Unit Study Guide for the Bachelor of Technology Education course at Southern Cross University.

Documents produced in the course of the research are listed in Appendix 1 and full text versions are on the DVD in Appendix 2.

2.7 Conclusions

In this Chapter, I have presented the philosophical framework underlying my research methodology and identified the ethical nature of my approach. I have designed a research process that draws on conventional academic research while engaging with the research through personal and subjective experience: a phenomenological approach. I have adopted an action learning approach through a:

- Cycle of learning;
- Reflections on experiences;
- Proposal of significant sustainability issues;
- Research of the critical academic theories underlying such sustainability issues;
- Proposal of a new model of sustainability culture;
- Reflecting on practice issues and the new model of sustainability culture through three case study experiences; and
- Concluding with the proposal of new patterns of sustainability practice.

The exposition of my research commences in the next Chapter through my reflections on my early life and my personal and professional endeavours in furthering sustainability.

Chapter 3 Reflections on Sustainability Practice

3.1 Background

I have been a technology and sustainability practitioner since my undergraduate days in Sydney in the late 1970s. As part of my study in the Bachelor of Building at University of New South Wales from 1975 to 1979, I experienced new critical thinking around the way we build and in particular, how we build and develop our towns and cities in very environmentally damaging ways. This new thinking involved use of solar and other renewable energy sources and proposed simple ideas about house and building design for better environmental performance.

During my childhood and my youth, awareness about the importance of the environment was absent: in my family, circle of friends, my school, my suburb, in the city and in my world generally. I remember as a young child, the shock of my early encounters with the inner city: the ankle-deep rubbish in every street; the in-grained dirt of most city buildings (inside and outside); and "the slums"[9], now the site of the vibrant inner city life of Darlinghurst and Paddington.

My local beaches at Dee Why and Long Reef were severely degraded; sand dunes had been reduced from mountains to almost nothing and Dee Why Lagoon was a putrid rubbish tip caused by industry as well as domestic rubbish dumpers. It was popular for dumping cars, building waste and old tyres. Countless school excursions and weekend walkers stripped the rock platforms and rock pools of Long Reef of any marine life, and its flanks suffered from erosion by foot traffic and indiscriminate car parking. The only part of the landscape that appeared to be cared for was the golf course on top – at least there was some remnant coastal heath between the fairways. Nevertheless, this area became my playground as I grew older and gained more independence. I surfed at breaks along the strip between Long Reef and Dee Why and out at the "Bommie"[10] and spent many hours on the headland or the reef itself. I marvelled at the sense of space and freedom I felt here. I went to this place when lonely or a bit down or just grappling with all the usual issues of being a teenager and growing up. In this place I began the development of my own environmental philosophy

[9] My contemporaries (kids and adults alike) on the Northern Beaches referred to this area as "the slums" to contrast between the inner city and the beaches: we had to drive through this area to get to the Royal Easter Show, the football or cricket at the Sydney Cricket Ground or the then Sydney Sports Ground at Moore Park.

[10] An abbreviation of "bombora", a wave breaking on an offshore reef.

– when very few around me were even interested and there had yet not developed, at least in my part of Sydney, any such thing as environmentalism.

On trips out of Sydney on holidays, I remember visiting many depressed country towns, strewn with rubbish and wrecked cars, boarded-up shops and peeling paint everywhere. Our usual destinations in the Blue Mountains and the Gold Coast offered a better visual and less polluted environment. With the first high-rise building being constructed on the Gold Coast in 1970, however, in a short time that place too became a degraded over-developed environmental disaster and I no longer wanted to go there on holidays.

An event that appalled me and yet awakened a sense of irony occurred not long after we moved into a new house at Collaroy, near Long Reef, in 1970. Over the road was a large area of remnant bushland on a plateau of Hawkesbury sandstone. This became another playground. There were many rock shelters, probably used by the original Kameraigal people, who lived across the Northern Beaches area of Sydney. This was a far-away place yet surrounded by suburbia and was another place of escape and refuge for my friends and myself. Then, after a couple of years, the land, always privately owned, was subdivided for new housing. When the roadwork began, the developer stripped bare all "my" bushland and my favourite cave became part of someone's private block and was eventually fenced off. I could not believe that someone owned the rock outcrop and cave which had a panoramic view of the area and beach, and could not accept that I could no longer go there. For a long time I was distraught and I could not bring myself to even to acknowledge the people who lived there. My parents and most of their peers thought the land was rubbish scrub, and building houses on it (with panoramic views) was the best thing to do.

At the time, I appreciated the irony that when we built our house nearby on the northern edge of the plateau, exactly the same thing had occurred: who knows whether another kid might have felt exactly the same way about the destruction of their favourite place as a result of the construction of our street and our house? Thus from an early age I experienced the emotion of loss and the awareness of the trade-offs we make to live, work, build and get around. However, I still firmly believe that we should not lock up some places in private ownership. Furthermore, there are some places where we simply should not develop.

Another significant issue influencing my environmental sensibility was the condition of the ocean. Being a keen surfer, I spent many hours in the water and was always aware

of the questionable water quality. Holidays and trips up and down the coast of New South Wales indicated that the water quality was better elsewhere than in Sydney. In the early to mid-1970s, began the "Poo" wars[11], where the surfing fraternity fought back against the dumping of raw sewage into the ocean off North Head. By this time, I was mobile and frequently surfed at Manly Beach. There were many times when raw sewage (or as surfers called it, "blind mullet") polluted the water. Ear and gastro-intestinal infections became common amongst surfers.

In the early to mid-1970s, many events, in addition to the ocean sewage situation, helped to transform my awareness:

- Waterways such as the Parramatta River and Dee Why Lagoon were officially "dead";
- Many parts of Sydney became highly polluted – Homebush and Rhodes, for example, and no development could happen there in their degraded state;
- The huge Norfolk Island pines along the beach at Manly (from South Steyne to Queenscliff) died from pollution, causing much anguish (not least for local businesses, who used the pines as part of the marketing image of Manly beach);
- Famous parks and trees were lost to roadwork and subdivision;
- Photochemical smog blanketing Sydney: I had to drive into every day on the way to University (while my car was adding to it); and
- Many fine old buildings were lost, driven in part by the lack of appreciation of heritage.

Further, through international events such as the near extinction of whales, the oil price shocks of the early 1970s, the awareness of the effects of DDT and other toxins and the damage to the ozone layer, the need for change became clear. Such events did not affect me alone: they heralded the beginnings of environmental awareness amongst concerned members of our broader society.

These forces and events shaped my sensibility about environmental issues and contributed to my personal and professional approach to changing things. I was not positive about future prospects: the environment was going to get a whole lot worse before it would get better.

I had to do something, but what should I do?

[11] This was the colloquial name for this particular environmental battle, especially amongst surfers.

3.2 Professional Practice

3.2.1 Introduction

In the latter stages of my undergraduate degree, I realised that the general course of work and career was not my major motivation. To work to effect change was my aim. I realised that I needed to build my motivation on the back of my professional education and not abandon several years of study. I resolved to work in the broad area of the built environment as a change agent wherever and whenever opportunities permitted.

3.2.2 Early Sustainability Advocacy

Undergraduate Thesis

My first task was to produce something useful from my undergraduate training, so I chose to focus my undergraduate thesis on solar housing. A number of books had appeared which reviewed solar heated buildings, particularly in North America. I decided to carry out similar research in the Australian context. I studied everything I could from Australia and overseas and began writing to many organizations, architects and builders to find examples of local practice. I made some good connections with local practitioners and one of my lecturers was building an interesting passive solar house in inner-suburban Sydney.

In my final year of study, in 1978, a major conference on energy in housing convened in Sydney, featuring a national awards program (the first of its kind) for energy efficient housing. I met architects and designers from throughout Australia, and immediately arranged to visit a selection of them in southern Australia. In December 1978, I embarked on a three-week road trip through Canberra, Albury, Melbourne, Ballarat, Ararat, Hamilton, Adelaide (and the Adelaide Hills) and Broken Hill, looking at houses and interviewing the owners, designers and builders of active and passive solar houses. This initial review gave me a keen insight into the qualities of people wishing to push design into new areas and making a commitment to changing our ways of building. They were motivated, committed, aware, thought differently, and were all slightly crazy: the perfect formula for the role of change agent. The inspiration from this trip remains with me to this day. I probably modelled my approach to sustainability on the influence of the people I met during this period.

I submitted my undergraduate thesis in March 1979 and graduated in October 1979.

Solarch Research Unit, University of New South Wales, Sydney

My first job on completion of my course (but prior to graduation) was as a research assistant with the Solarch Research Unit, of the then Graduate School of the Built

Environment at University of New South Wales, working under John Ballinger. My major role was to contribute to a research project exploring the feasibility of the application of solar energy to NSW schools. This was an opportunity to engage in advocacy for different approaches to design and construction and to see how other committed professionals approach the task of change. However, given my lowly status I doubt if I influenced much. I was encouraged that the NSW Government did eventually build the school at Menai in southern Sydney years later, using the ideas and principles advocated by the project team. At that time, I believed that change was possible with the right combination of motivation, attitude, expertise and institutional support.

At this point of my career, I strongly and passionately believed that great change was imminent, that the truth and value of what we were proposing was so necessary and self-evident that I would ride a wave of change over the next few years and that massive improvement in environmental performance was possible. I strongly believed that within five years we would see houses covered in photovoltaic technology and that we would see the economics of renewable energy change to make them the first choice for power generation. I believed, as well, that energy-efficient housing would soon be standard practice.

I was very wrong. I was soon to learn that being “right” does not change anything.

Preparation of the Book: *Australian Solar Houses*

During the period at the Solarch Research Unit and after completion of my undergraduate thesis, I considered the prospects of turning my thesis into a book, or whether to continue the work as a Master’s Degree. At the time, I had the opportunity to carry out the research as a Master’s Degree program, but I chose to publish the information as a book. I believed that producing a book was a far better use of the information than a Master’s Degree, more in keeping with my personal career purpose and would ensure its dissemination to a wider audience. During my travels looking at solar houses, many of the people I met encouraged me to turn the thesis into a book. Like me, they wanted the material to disseminate as widely as possible and I agreed with them. Without knowing much about the process, I embarked on a plan to produce a book, little knowing that it would be five years before publication.

I was hoping to publish it through the University of New South Wales, but this avenue fell through when the University's support changed from publishing the book to releasing information to a new publication called Solar Progress. While I contributed

two house case studies to the first issue of the magazine, I stopped after that, preferring the option of a published book with a potentially wider readership.

From February to June 1980, I travelled around Australia, as far as Paraburdoo in the Pilbara, to look at houses and to talk to advocates and practitioners, many of whom I had met in late 1978. Interest in the area had increased substantially since the previous trip: I was able to inspect demonstration houses from various State housing departments. Support also came from some project home builders and many more passionate early adopters. I returned with substantial new material, featuring many interesting examples of innovative applications of solar house design.

In the period after this second trip, I linked up with Sydney architect Gareth Cole, whose house appeared in my undergraduate thesis. Gareth had received funding through the Royal Institute of Architect's Sisalation Scholarship and Sydney University's Byera-Hadley Scholarship to make a film about solar energy and a report on the status of solar housing in Australia, respectively. We agreed to join forces: Gareth could financially support on-going work, particularly for more travel, and the book would be co-authored. We made many more trips for further research to Adelaide, Brisbane, Canberra, Melbourne and Hobart to look at more houses, to photograph ones already known and to meet with a variety of committed practitioners. Gareth made available the resources of his home office and some of his staff to provide contributions for graphics. Gareth's wife Kim, a graphic designer, designed the book. The book, titled *Australian Solar Houses* was successfully published in 1983 with a print run of approximately 3000 copies (Parnell & Cole, 1983). A second printing of 2000 copies occurred in 1987[12].

This experience, while very tough and frustrating at times, taught me the value of advocacy and education and that sustainability practice at influential points has a chance to shape culture. I believe that the book had a significant but subtle impact in promoting cultural change, contributing to more stringent building regulations and greater awareness of ecologically sound building methods.

[12] The process almost failed for a lack of a publisher. Early on in the association with Gareth Cole, we talked to several publishers who expressed interest, particularly Oxford University Press. However, after some time this effort failed, and the project stopped for about eight months. I knew of a small alternative publisher in Sydney (later relocating to the Blue Mountains), Second Back Row Press. They agreed to edit and publish the book, but could only fund half of the costs of printing. Gareth and I drew on family and other resources and funded half the cost of the book ourselves, on the agreement that in addition to author's royalties we would also receive 50% of the publishing profits. This book was successful, every copy sold out, and it was purchased in many libraries around Australia, particularly University libraries. For many years after publication, I received good comments from many different people, especially about how useful the book was and how inspired they were about its contents. I was particularly pleased that, when I applied for work at the School of Architecture, University of Tasmania in 1990, several of the staff were very familiar with the book, and several copies were on the library shelves.

The Speaking Circuit

From 1980 to 1983, I also engaged in further advocacy of green building and renewable energy by giving talks and running workshops in a variety of forums. Through my father's involvement with Rotary International, I was invited to Rotary Clubs as guest speaker, mainly presenting a slide show of houses I visited in my travels. I also made up a mobile display for alternative festivals and organic farming field days. This enabled me to present information to a wider audience, where many were pre-disposed to be interested, while others were new to the concepts and possibly not open to them. At the Rotary Clubs, there was always someone ready to reject and criticise the ideas I presented.

The feedback from my talks helped me shape my approach and communication skills, particularly when there was a difference of opinion. This experience certainly gave me a sense of how these ideas were definitely not "self-evident" to the majority and just how hard it would be to bring about change.

3.2.3 Professional Practice

A Project Home Builder in Western Sydney

During the period of preparation of Australian Solar Houses, I occasionally had to stop work on the book to earn money to continue with the process. In 1981, I worked for three months for a very unpleasant mainstream project-building company, whose management was completely unsympathetic and hostile to my ideas. This short experience helped me realise that culture change in the building industry would not be easy: full of sharp operators, crooked businessmen and dishonest staff[13]. What hope would there be for change in an industry made up of people without at least some fundamental ethics and decency?

Solar Energy Information Centre

After this telling experience, I went back to writing for a few months until late 1981. There were very few work opportunities for people with building degrees to work in sustainability – there was no green building industry as such. My early enthusiasm for quick change was tempered somewhat by reality and the lack of opportunity for work in solar and energy-efficient building. With my professional education and personal

[13] This company was in a poor financial state, having become a tax "write-off" by its owners. It was not liquid, and could not pay its bills, but was still selling product. One of my tasks was to talk to irate clients who wanted to know when their houses were going to be built: I was instructed to lie to these unfortunate people, knowing that it was unlikely that work would start. After three months, I left. One month later, the company was on the Nine Network's *A Current Affair* program, with the full consumer advocacy treatment and the camera knocked to the ground in a scuffle. I found out a year later that one of the head supervisors had been arrested for fraud because he had diverted materials from houses he was supervising to his own house, having virtually stolen all his materials!

idealism, I decided that pursuing advocacy and education would the best avenue for my efforts.

I worked for the Energy Authority of NSW at the then Solar Energy Information Centre, as an Information Officer, until late 1982. This involved talking to individuals and groups of all ages about the applications of renewable energy, use of solar hot water systems and housing design. Therefore, with work on the book set aside, the opportunity to play a role in public education was an appropriate step. It was a very enjoyable period.

The Solar Energy Information Centre was a pet project of the then NSW Premier, Neville Wran, and was a major breakthrough. For a period, this Centre achieved much in the way of promotion of the principles, until later Governments dismantled the solar advocacy. This experience further reinforced that Government policy, when focussed on change, can display considerable leadership. However, I think that the later scaling back to general energy education (including coal, gas and oil) indicated that there was not enough base cultural change to support such cutting-edge educational leadership. Subsequent State premiers perhaps saw such advocacy as an electoral risk.

This experience, however, demonstrates that I must have instinctively known that we needed culture change (although I didn't think of it in those terms) and that education was the major avenue I had for contributing to culture change. However, I was to find that there would be limited opportunities for such advocacy.

Earthways

In early 1982, I moved from Sydney to Earthways - an intentional community near Wollombi in the Hunter Valley, 150km North-West of Sydney. The next section, details the community sustainability perspective of my time at Earthways. In this section, I concentrate on professional practice as part of the consulting arm of this group. I remained at Earthways until early 1985.

Earthways had a professional arm carrying out consulting on design, construction and education in ecological building techniques, with a focus on earth building. I contributed to design and construction projects and edited a small publication on building a low-cost solar water heater. However, my main sustainability practice was in earth-building education. I also conducted a summer school at the University of Newcastle in solar housing design.

Of course, the other aspect of Earthways was living what we preached: so we built our own building in mud brick, grew our own food, shared cars communally, did not use

power tools, used wind and solar as our main form of power and re-cycled almost everything. We were a complete demonstration of the sustainable life and we were very influential in our region as a source of information and inspiration. Many people from the Hunter Valley region and from Sydney, seeking to learn more about change to a more sustainable lifestyle, visited Earthways.

However, there were aspects about my involvement there that were not ideal, so I returned to Sydney in early 1985, with no money, no car and no job. By this time, much of the growing interest in sustainability had died down somewhat and there was less interest than there was in the late 1970s. The prospect of a socially and environmentally responsible job in the building industry appeared unlikely.

Leighton Contractors

A chance encounter with an old university friend presented an opportunity to work again in the mainstream building industry with one of Australia's largest construction companies. I began work as a project engineer/quantity surveyor, commencing on the construction of Pittwater Palms Retirement Village project at Avalon Beach, NSW. In a short period, I had gone from the purist eco-living situation to its philosophical opposite, with one of the hardest of "hard-dollar" construction companies.

I had not worked in mainstream construction for three years and had little "hard dollar" experience[14]. I believed that this experience would get my mainstream career back on track. Yet the one thing that cemented the job was my book, *Australian Solar Houses*: not because of the content being worthy (to my employer, the content was of little interest), but because it was evidence of self-motivation, application to a major self-setting project and the ability to bring the project to a successful conclusion. My employers were looking for this quality. Quite ironically, it is also the quality of the change agent.

My first project was subject to on-going protest by local environmental groups, because of impacts on some remnant native vegetation and because it was a known koala corridor. Most of the site was already clear of vegetation and was in a degraded state before construction. One aspect of my job was as the site liaison person for neighbouring residents, many of whom were hostile about the project and thus hostile to the local council and the builder. I had found myself in the heart of a pro-development versus anti-development conflict. I tended to support the anti-development lobby and was uncertain about the impact on the koala corridor. While I

[14] A colloquial term used in the building industry to describe working under situations of high financial risk.

enjoyed the job *per se*, I was never comfortable with the cognitive dissonance I experienced.

While I was always looking for koalas, in eighteen months on that site, I never saw one, nor any koala scat as evidence of their presence, including in areas undisturbed by construction operations. However, before construction, a class of primary school kids walking through the site reportedly spotted over 30 koalas! This news made the local press and re-ignited the opposition. Based on my experience, I believe the kids saw what they and their teachers wanted to see, and their claims were taken on face value by the public. I learned that perception is everything.

At project completion, I was glad to transfer to a heritage restoration project in the city – the Commonwealth Bank Refurbishment Project in Martin Place. I believed that restoration of a city landmark and preservation of what remained of our early built environment was a way of contributing to city sustainability. I was responsible for a variety of work: restoration of heritage metalwork, timberwork and joinery, fit-out and finishes, especially to the executive offices and the main banking chamber. I learned much about the quality of material and how to repair and re-use good material. Unfortunately, the project absorbed the last supply of old-growth native Queensland Maple[15].

For nearly two years I also managed occupational health and safety issues on the project – when new legislation had come into force and Leighton Contractors insurance company required an improvement in its safety record. I was in the midst of a major cultural change process: many of the issues that we argued about on a daily basis are now an unquestioned part of work practice on construction sites and part of mainstream culture. This cultural change took some twenty years or more, even with the force of legislation, to become standard practice. I learned a valuable lesson about what it takes to create major cultural change.

I worked with Leighton for six years until late 1990. With a major recession looming and an imminent major building industry downturn, my wife and I bought a backpackers hostel and eco-tourism business and moved to Deloraine in Northern Tasmania.

[15] At that time, most of the remaining old-growth Queensland Maple trees were under protection in the Queensland National Park system. It is encouraging to note that plantation-grown supply of this beautiful native timber is now available.

Eco-Tourism at Highview Lodge, Deloraine Tasmania

This career diversion into the tourist industry (given my wife's background in adventure travel) enabled us to explore a wilderness culture in Tasmania. Reflectively, it was another way to promote the sustainability message. The hostel was a very run-down building and we did substantial renovation work, improving the energy efficiency as part of the scope.

We oriented the business around the promotion of the Tasmanian wilderness, as a way of promoting greater appreciation of the natural world and to open up local and international tourists to the need to preserve and protect natural heritage. By running transport and tours into wilderness areas, we were able to educate people to consider their impacts on the natural world. At times I joined with other wilderness tour operators to advocate for old growth forest protection in public advocacy events.

The business was successful, but demanding. During our ownership, from 1989 to 1994, we saw major change in the nature of tourism in Tasmania. Within two years, the number of backpacker hostels had doubled; tour operators had increased; and bus, boat and plane schedules and ports changed every year. These factors determined how visitors to Tasmania plotted the timing and direction of travel around the State. We had to develop a new strategy every year to remain a viable business. This experience taught me how dependent the sustainability of an activity is on circumstances as well as one's own actions and that resilience and adaptability are fundamental aspects of sustaining action.

Department of Architecture, University of Tasmania at Launceston

During the period of hostel ownership, I also worked as a casual lecturer in the then Department of Architecture at the University of Tasmania, specialising in building technology and professional studies. The material I was to teach had very little content about sustainable building. One unit taught by a passionate lecturer introduced the fundamentals of sustainable building. I tried to introduce material about sustainability, but encountered limitations imposed by course structures.

Sustainability was articulated as a significant theme of the Bachelor of Environmental Design Course[16] in the Lufra Charter, a joint declaration by staff at a retreat in Lufra, Tasmania in 1991 (Department of Architecture, University of Tasmania, 1991). There was widespread support from staff, but very little action or awareness in the main design studios, as the teaching of design did not always promote sustainability. This

[16] The first three years of education in Architecture at the University of Tasmania.

experience indicates that while the culture of an organization can be strong enough to be able to articulate a desirable vision, it may not be able to take the next step to make it a core part of daily practice. To achieve that takes a level of awareness, motivation and knowledge and requires considerable more energy input than any individual staff member was prepared to give. At the time, it may have been beyond anyone's capacity to implement such changes.

Being a casual academic was not a permanent basis for work and there were no prospects for permanent work by mid-1994; so having also just sold the backpackers hostel, we decided to go bushwalking for six months in Tasmania and South-East Australia until the next opportunity presented itself.

Centre for Appropriate Technology, Alice Springs and Cairns

In early 1995, we moved to Alice Springs, so that I could work with the Centre for Appropriate Technology (CAT). I had sought such an opportunity for some time: the chance to work with indigenous people in the development of their communities, helping them with technology choice. From early 1995 to mid-1998, I participated in many development projects, with the focus on participatory housing in Central Australia and on community planning in Cairns. Through this work my questions about sustainability developed more fully. Remote desert communities are located in the toughest physical environments, far from services, subject to clash of cultures and with doubtful economic prospects. Many politicians and commentators are questioning their viability as settlements and continuing national debate is unresolved.

During my time at CAT I participated in a variety of community and organizational development activities such as the following:

- Advising on building, health hardware and infrastructure issues to remote Indigenous communities;
- Assessing building systems, technologies and materials submitted to the then Aboriginal and Torres Strait Islander Commission (ATSIC) for evaluation;
- Fieldwork and research participation in settlement planning projects in remote Indigenous communities;
- Producing Action Research papers based on project experience for the National Technology Resource Centre (NTRC) clearinghouse
- Receiving the *Building Products News* Ecologically Sustainable Building and Architecture Award: Team Achievement Award 1997, (with Olive Veverbrants of Arrillhjere Aboriginal Corporation and Brendan Meney Architect);

- Managing construction projects in remote Indigenous communities promoting community participation, education and training, with research outcomes;
- Participating in organizational restructuring and in development of CAT's strategic plan in 1995 and 1996; and
- Representing the Development Services Unit (1995-1997) and the Cairns office (1998-1999) as a member of the CAT Management Team.

These experiences helped me to identify the problems implicit in the relationship of technology and local culture in small communities. People in such communities do not, for the most part, participate in the process of technology selection and implementation, although they may be responsible for sustaining such technologies. Many of the technologies transferred to communities do not reflect local cultures and ways of living, fail regularly and have proved very difficult to sustain.

I learned that the capacity to sustain any action outside of traditional cultural and family responsibilities is very difficult for indigenous people and that communities are very dependent on funds and expertise from outside. Substantial questions arise about the sustainability of such places. However, I also consider that issues of sustaining technology in remote indigenous communities are similar to the problems of sustainability for the technologically advanced mainstream. It is simply that the issues are more apparent in remote indigenous communities. The technologically advanced mainstream has become good at denying and hiding their technical failures. Thus the failure of technology in remote indigenous communities is as much an early warning for the technologically advanced mainstream as it is an indicator of the problems of technology transfer.

I review my more recent experience of working with remote communities in more detail in Chapter 10.

School of Architecture, University of Tasmania at Launceston

I returned to the re-named School of Architecture at the University of Tasmania at Launceston in 1999 on a full-time, tenured basis, with the additional role of Building Technology in Design Stream Co-ordinator. This new role gave me the opportunity to review all the units and their contents and to take a leading position in instituting the goals of the Lufra Charter in a more thorough fashion. I was able to propose a new framework based on sustainability and oversee the implementation of agreed changes. This requirement grew out of a major course re-structure in 1999 and from recommendations made by the National Accreditation Committee of the Royal

Australian Institute of Architects. The course re-structure saw the elevation of building technology teaching to the status and timing of a Design Studio, at the core of architectural education. This re-structure created opportunities to link building technology issues more strongly with student design projects and was, at the time, an innovation unique to architectural education in Australia. The new course structure highlighted the existing inadequacies of the Building Technology stream of units, particularly the mismatch of technology teaching with the scale and complexity of Design Studio projects. It also reduced the proportion of lecture-based delivery in favour of studio/workshop teaching.

From November 1999, I conducted a review of the Building Technology stream, including extensive consultation with other lecturers, and proposed a new framework in early 2000: the Building Technology in Design stream of units. I facilitated teaching out the old framework and implementing the new one. I maintained regular contact with lecturing staff to make continued minor improvements to the framework.

My contribution to the new stream resulted in improvements in the Design Studio stream, by demanding clearer articulation of Design Studio objectives. By incorporating sustainability in the Building Technology in Design stream of units, I was able to leverage sustainable design into the major design projects such that while their designs may have attracted good assessments from other lecturers in the Design Studios, if they did not address sustainability in the design, they would not pass their Building Technology in Design unit.

The review process I conducted received good support from colleagues. The results of student work over the next three and a half years showed a substantial increase in interest in sustainable building design and greater application of the principles in their output, as well as greater rigour in technology choice. The new structure and content of the Building Technology in Design stream achieved recognition by the Centre for Sustainable Futures at the University of Technology, Sydney in a national research project as the national benchmark for teaching of sustainability in the built environment in 2002 (Mitchell, McGee, & Carew, 2002).

I was also able to pursue sustainability practice in practical “learning by making” building projects in selected Specialised Studios (Wallis, 2001). One studio saw the design and construction of an earth dome structure (Parnell & Dewsbury, 2001) and two studios involved working with a community group to design and build two small straw bale structures as part of a community development process (Parnell, 2002b;

Parnell, Peart, & Burnham, 2003). These latter two projects are the subject of a Case study in Chapter 10.

I also became the driving force behind School of Architecture participation in the annual Tasmanian Alternative House Expo. With students, we designed and constructed a travelling display showing students design work for sustainable building. I mentored students to staff the display so they could gain experience talking about sustainability concepts to the general public. This experience allowed me to take a major leadership and change agent role in an educational setting. There are now many practitioners across Australia, Malaysia, Singapore and Indonesia who have been educated to some depth about sustainable design and that they are likely to be contributing in some way to changing culture towards sustainability.

I believe that the effectiveness of what I achieved at the University of Tasmania relied on timing and staff co-operation. There was pent up interest in sustainability in the school, but a form of "silo" mentality meant that connections were not being made to facilitate action. The situation simply needed someone with the energy to ask the right questions and to link things up in the right way. At all stages of the process, the staff was supportive. The major lesson is that change agency can work best when there is a certain base level of culture and disposition towards certain outcomes, some fertile ground perhaps, even if no real action has yet been taken.

School of Education, Southern Cross University, Coffs Harbour Education Campus

I later relocated to be a lecturer in Built Environment Technology and Sustainable Development in the Technology Education course at Southern Cross University. Part of my motivation to relocate here was to work closely with a former CAT colleague, Kurt Seemann, on a research project with the Desert Knowledge Cooperative Research Centre, examining the lifecycles of infrastructure in remote desert communities: a potential case study opportunity.

I saw this opportunity as another way I could contribute to changing cultures, this time via the school education system. By teaching future Design and Technology teachers about sustainability, I hoped to influence the way technology teaching in schools, particularly in New South Wales and Queensland. With the support of Kurt Seemann, I was able to re-work some of the content of units and turn a course based on computer-aided design (CAD) into an eco-design unit. I introduced major sustainability issues into the teaching of transport and engineering systems and transformed a product design unit to teach innovative eco-design processes.

Not all these changes were supported by local technology teachers and most staff in the School of Education, who contended that many of the ideas we wanted to teach were ours only and that practising teachers did not hold them in high regard. We encountered many obstacles, mainly from our own School of Education, including pressure to drop much of the new sustainability content from the course. Fortunately, influential people at the NSW Board of Studies recognised what we were trying to do and defended our proposed content, as "cutting edge". They wanted all technology teachers to be knowledgeable about such material. These battles within the School of Education (and a perceived lack of respect for my body of knowledge and experience) led me reluctantly to resign as a permanent staff member[17].

Creating a Sustainability Consultancy

My current step on the path has led me to set up business as an independent sustainability professional, specialising in consulting in the built environment, partly through adaptation to circumstance and partly through choice. I provide the following services:

- Building sustainability ratings, applying various ratings tools;
- Sustainability research, through my connections with the University sector;
- General consulting and facilitation in a variety of sustainability areas;
- Education for sustainability; and
- Cultural change programs for the commercial, government and community sectors.

The above range of services illustrates the value of my engagement with this research project over the previous ten years: I believe I now have the capacity to be an independent professional change agent for sustainability culture, capable of acting through different institutional, commercial and community domains.

3.3 Personal Sustainability

My professional sustainability practice story highlights the difficulty involved in finding ways to promote sustainability while earning a living in a meaningful way. However, trying to apply sustainability principles to my personal lifestyle has been an even greater struggle. I have lived the "purist" green existence at several stages of my life, reducing my needs to the barest minimum and using minimum amounts of energy, with most of it being renewable. I have lived with no running water, basic sanitation and a

[17] In recent years, the Technology Education course at Southern Cross University has been modified and restructured, with most of the sustainability philosophy and content removed from the course.

very small ecological footprint: first, as a cliff-dweller in a Depression-era hut overlooking the entrance to Sydney Harbour from 1981 to 1982, and then in an intentional community in a remote part of the Hunter Valley from 1983 to 1985. I hitchhiked in lieu of using a car as often as I could. When I bought a car during this period it was small and energy-efficient. I felt very self-satisfied about my choices, my voluntary simplicity and being more thoughtful and environmentally aware than most during this phase of my life. Yet I have never thrown myself in front of a bulldozer or chained myself, Chipko[18]-style, to a tree, preferring to advocate for change through my work.

My experience at Earthways Farm at Wollombi helped to develop my views about sustainability and also helped me understand that it is possible to be so purist and politically correct that we can have nothing to offer to mainstream society, preaching only to the converted. Earthways, at the time, was an intentional community, with a changing residency, reaching thirteen adults and children at the peak of my time there. It was also the peak residency as I left in 1984. Life at Earthways required total commitment: no personal possessions, no individual income and adherence to rigid rules. It was a social experiment grounded in the belief of total social change to transform the world into a more ecologically based society. Every new situation that conflicted with the agreed community rules was debated endlessly and in the end the most charismatic person or the extreme view usually prevailed. While there were many wonderful aspects about life at Earthways, it became rigid and anti-democratic; individuals became fearful about expressing themselves if it went against the "correct" response, where it was impossible to gain a consensus without some members threatening to sabotage things. As an experiment in sustainable community it failed: Earthways ceased long ago to be a community, reverting to being the family home of the original community convenor. I left because it was no longer consistent with my vision for sustainability in spite of the low impact lifestyle, the organic garden, the mud brick building, the solar shower and solar powered life.

Living in an intentional community taught me that when we consciously design human systems with a particular goal in mind, we must temper our expectations to be consistent with the actual system dynamics that emerge. The system's own goals may often differ significantly from the "designed" goals. I no longer believe in intentional communities as a model for living: they are simply another lifestyle choice, and can often be a smug, self-centred one.

[18] A grassroots anti-logging group in the Himalayan foothills, who would chain themselves to trees as a form of protest.

When I moved back to Sydney, I (and later my wife) lived in a small one-bedroom studio flat for five years. So, with such a small ecological footprint, commuting by bike, and working on a heritage restoration project, was my lifestyle more sustainable than at Earthways?

When we bought the hostel at Deloraine in northern Tasmania, plus an acre of land adjoining, I had grand plans of creating a sustainable living demonstration which, when combined with the eco-tourism venture and my part-time lecturing, would give me the opportunity to live exactly the type of life I sought. Unfortunately, this plan depended heavily on my wife running the hostel business and us earning a certain level of income from all sources. After nearly five years, it was apparent that we were not earning the money needed to carry out our sustainability vision. My wife was tired from years of sharing her home with up to forty guests. We wanted to start a family and we believed it would be too difficult under these circumstances. Therefore, I gave up that particular dream.

In our relocations to Alice Springs and Cairns, our lives were essentially of a suburban nature, although in Cairns, we lived in a traditional Queenslander without heating or cooling. In both places, I rode to work by bike – for nearly four years. Was this living sustainably?

When we returned to Tasmania, I had grand plans to re-create something like an Earthways, but in a way that would work for my family and my professional life. We bought an unusual house on a beautiful acreage overlooking the Tamar River just north of Launceston, on the edge of the Tamar Valley wine region. This was a thermally inefficient house requiring substantial quantities of electrical energy and biomass to keep it comfortable for eight months of the year. It was technically very difficult to improve. Because I had to commute over 20km to work, I purchase the cheapest car I could buy - a thirty year-old inefficient Mercedes 300SE; it pumped out lots of pollution (and until Lead Replacement Petrol [LRP], lots of lead) and greenhouse gases. We also had a van for family use.

The location was idyllic, if a little too park-like, very much in the landscape, with many native animals and water birds. There was plenty of introduced grass species to cut with a ride-on mower or to slash with a petrol-powered brush cutter. I did not have the time or patience to manage a flock of sheep or goats, which would not have been able to keep pace with the growth when it really needed cutting. I did not use the

convenient, but limited, public transport that picked up and delivered at the front gate because of timing and connection issues. As an academic I earned a good income by Tasmanian standards, but like anyone on the verge of financial over-commitment, I had great difficulty sustaining my place and my technology. I could not afford to maintain essential transport, only the barest minimum servicing to keep the cars moving. When the television or video broke down, it stayed that way for some time. There were broken appliances and many blunt tools that took years to fix. I found that the land management and house maintenance were a drain on time, contributing to wear and tear on equipment. In three years, I did not manage to improve the land, to regenerate the bush, improve bio-diversity, re-introduce bush tucker and reduce the introduced plant species as I had hoped. I spent instead many hours on the ride-on mower, chopping wood and raking leaves instead.

I have had the joy, however, of experiencing that strong connection to place, so I know it is possible. During our time in Tasmania, I developed a very deep relationship with my piece of country while meditating on these themes astride the ride-on mower or while swinging the brush cutter. Most of my thinking that informs this research is a summary of many insights during this period. I believe that while I had difficulty in furthering my personal ecological sustainability outcomes, I nevertheless experienced a connection with my place. I felt the ecological cycles, watched the tides in the Tamar River as they exposed the muddy banks, rejoiced at the snow on Mt Barrow (feeling the space and the depth of the rolling hills in the distance), and celebrated the afternoon light, the fog and the rainbows. This experience was part of my cultural change and indicative of my personal capacity and state of personal sustainability.

When we made the decision to make our (hopefully) final move to the Coffs Harbour region, the plan was to look for something similar, but with less demand for maintenance. We bought a small place with the intention of buying what we really wanted a year or so later, but work circumstances changed, property prices doubled, and we lived in this tiny ($90m^2$) brick veneer house from the beginning of 2003 until early 2009. In spite of the lack of sustainable design, the house had a small footprint, I rode my bike to work for nearly two years and we met many of our needs locally, so perhaps we lived more sustainably than we thought. This experience certainly had none of the “romance” of sustainability about it. For a long time, we found ourselves living in a place where we felt no connection with the people around us. The sensibility is suburban, materialistic and not aspirational in a big picture sense: unlike anything I have experienced since my upbringing in Sydney suburbia. It is a very beautiful region

to live in and I get much joy from being near to the ocean again. However, I did not achieve the sense of connection to place that I did when I lived in Wollombi, Deloraine, Launceston, Alice Springs, Cairns or even in North Sydney. This period saw me struggling with notions of sustainability again, but we chose to stay in the region, as we were committed to staying in one place so our boys could finish their education at a great school. At least while living in the "wrong" place, occasionally I gained a sense of connection – some days the beauty of the beach or of the rainforested ranges moves me. To see the whales and dolphins from the nearby headlands is a delight.

We sold our house in early 2009 and found the ideal place down the road in the coastal village of Sawtell. Our new house sits on the edge of the village, in a natural environment, within easy walking distance to shops, cafes, cinema, beach, reserve, recreational facilities and the creek leading into Bongil Bongil National Park. It is also cycling distance from my office. I feel I now live in a small community, rather than bland suburbia. We bought this house from the family who built it in the immediate post-World War II period. Built from local North Coast hardwood, the house has no particular thermal design features (other than high ceilings), but has substantial scope for an eco-renovation. To date, the ceiling has been insulated and the floors sanded and finished with a non-toxic natural wax. A 2kw solar electricity system has been installed and renovations will commence in 2012. With my business in sustainability and the prospects for sustainable living in a place where I now have a strong connection, I am more positive about the future than I have ever been.

3.4 Reflecting on Experience

My personal sustainability journey has had a long unfolding. Life moves and priorities change because of the demands of work, the drive to gain experience of the way the wider world works and the needs of relationships and family, with considerations other than the purist environmental position. There are also the inevitable maturing views that the purist position is a middle-class luxury, and often a reason to disengage with the world. It certainly is not a realistic solution to our ecological crisis, as Lewis (1992, p. 249) points out:

> While I have nothing against religion in general or environmental religion in particular, I do fear the religious intensity that so often infects members of an idealistic generation … Whereas social progress demands broad inclusion, radicalism excludes all persons judged sinful – or, in the current jargon, politically incorrect. Where workable solutions to social and environmental problems require compromise, radicalism calls for implementing one's own program while vanquishing those of one's rivals.

In the light of my experience as discussed in this Chapter, I believe that a purist approach to social and environmental problems is counter-productive, and may lead us to inappropriate solutions or to a situation where mainstream society rejects appropriate action. The above quote from Lewis cautions us in seeking such purist approaches.

The reasons for reflecting on my personal and professional sustainability culture are to highlight that for all my education and experience, like Arthur Dent in *The Hitchhiker's Guide to the Galaxy* (Adams, 2005, p. 171), I am having tremendous difficulty with my lifestyle, and I ask: Why am I having trouble in living sustainably, even though my personal philosophy is pro-sustainability? And, more to the point, if someone who is so favourably disposed is having difficulty in changing behaviour, what does that mean for people who are not similarly disposed, particularly when the movement to sustainability requires behaviour and culture change on a global scale?

These questions have significance from the local through to global scales. While some of us are in denial, the issues of the environment are covered and discussed widely in the media, on the Internet, in triple-bottom-line corporate reporting and not solely in the developed world. Environmental education in schools has occurred for some time. Whether people do or do not agree with the full prognosis of impending ecological catastrophe and the worst-case scenarios, most are at least aware of the situation and have formed some kind of view on the matter. Register (n.d.) explains it thus:

> Society built sprawled development, and with it a gargantuan dependence on cars, oil, vast acreage of raw land, millions of tons of asphalt, trillions of dollars, billions of wasted hours and half a million lives expunged globally every year in car wrecks. It's an amazing story because we are STILL not confronting what it means to rebuild and reshape our society.

In the above quote, Register's view that society has not engaged in the change we need in spite of the nature and extent of our ecological problems has helped me crystallise my position that sustainability is fundamentally cultural. The lack of cultural development is illustrated by the fact that most ecologically positive changes tend to be small and unconnected, subject to changing support regimes from government and industry, of an enthusiast nature and often dwarfed by the rampant development still occurring here, in North America and particularly in Asian countries, such as China and India. Ecological ideas may spring from a base of ecological culture, but more often occur via a pragmatic or cynical hedging of the future, and the potential profits (political

or economic) that may arise. I believe that this is the culture of self-interest and domination, not ecological sustainability.

I contend that the key to understanding behaviour change lies in the understanding of how people sustain their behaviours over long periods: that is, their life as lived, whether by conscious choice or not. The short cycles of fashion are strongly influential and can be beneficial in supporting environmental issues. I have experienced at least three cycles of ecological fashion since the early 1970s.[19] Most people, including myself, tend to be habitual beings. Life is too complex to consider all the ecological impacts of our actions. We often fail to cope with change, risk or lack of security. We keep doing our thing and perhaps change only over long periods. Finding our own level of sustainability (ecological or not) is largely an unconscious process. Raising the energy to sustain a higher order of conscious activity is a difficult task for anyone.

Culture is vitally important for furthering sustainability: I believe culture and behaviour interact in a systemic way. Some conscious behaviours by individuals or groups are acted out at significant leverage points in systems and can have a wider effect: policy changes, legislation, improvement of service delivery, and facilitation of environmentally positive behaviour by wider groups of people. These kinds of interventions in the system can change culture, making it easier for people to raise the energy of their behaviour and improve their overall lifestyle with little conscious effort, as Naess explains: “So any system which is to serve as a type of common platform must be articulated at low levels of preciseness” (Naess, 1989, p. 43). The overall capacity of communities to sustain, in terms of personal and group effort, any form of systematic, self-organizing behaviour is a prerequisite for sustaining ecology. However, it is no guarantee of the desired outcome.

Many prescriptions have been offered for improving the situation: from Naess’s humble request for us to develop our personal ecosophies (Naess, 1989), Karl-Henrik Robèrt’s Natural Step[20] process (Holmberg & Robèrt, 2000), to government pamphlets advising us politely. All of those can contribute to cultural change, but most are perhaps too distant from most people to create significant or effective change.

[19] The waves are: the response to the OPEC oil shocks of the early 1970s; the expansion of interest in environmental issues in the late 1970s and early 1980s due to rising energy costs and issues like the Franklin Dam; renewed interest in forestry issues and climate change in the late 1980s/early 1990s from local movements and the Rio conference; the impact of the “green” Olympics for Sydney; and the Kyoto Protocols and climate change work of Al Gore.

[20] A framework identifying steps needed to move to sustainability using “backcasting” as a method of working backwards from a future state in order to determine the tasks that are required for change. This framework is discussed in Chapter 4.

3.5 Conclusions

In this Chapter, I have reflected on my early life and formative experiences contributing to the development of my environmental philosophy, highlighting the trajectory leading me to pursue both a career in sustainability and a sustainability-oriented lifestyle. I have reflected on my professional experience and my personal struggles with sustainability, and have demonstrated how these reflections contributed to the emergence proposition embodied in this research project.

Through this reflective process, I have come to believe that personal and professional sustainability are central to our future: behavioural and cultural change, at the personal level, where we live and work. The process of this research project investigates my position, by extending the idea of personal and professional sustainability through understanding the implications of complexity in the systems paradigm.

However, I believe that the ideas emerging from my reflections on experience should be grounded in theory. The next section of this thesis, Part 2 Change and Emergence, thus reviews principal sustainability concepts, the theoretical basis of social and cultural change, the systems paradigm, the importance of learning and the character of the emergence phenomenon.

Part 2: Change and Emergence

Chapter 4 The Problematic Intent of Sustainability

4.1 Introduction

This Chapter concerns the positioning of the emergence proposal through exploring the following supporting research question: Are there any conceptual gaps in our common sustainability models? Before investigating ways of change and the role of emergence in change, in this Chapter I briefly review the need for sustainability and the main ideas currently motivating the pursuit of sustainability; offer a constructive critique of sustainability and its problematic intent; and review the gaps in existing sustainability models as a response to the above supporting research question.

In Chapter 1, I declined to propose a fixed definition of sustainability for the above reasons. I acknowledge that much of the day-to-day discourse about sustainability is stabilising around the links among economic, social and ecological systems. However, I contend that it is the ecological domain of sustainability that makes the sustainability concept so innovative and powerful. The pursuit of economic and social development has been part of the human project for centuries (if not millennia) with strong links between the two. If it were not for the development of serious global ecological problems arising from the pursuit of economic and social goals, the ecological aspect would not carry the same weight. In my opinion, our economic and social systems are "business-as-usual", even though that they do not always create good outcomes for people, business, industry, communities and nations. Perhaps the economic and social domains represent our long-term human project, and eco-system impacts and human-caused damage to the landscape indicate its quality (Thayer, 1994).

In this Chapter I propose that sustainability has multiple layers of meaning and demands myriad actions. To implement sustainability, many theorists and practitioners have developed various models, strategies and tools, guided by different sustainability perspectives, philosophies and contexts. Many have both conflicting and complementary intent. However, the articulation of sustainability must be compelling, accessible to everyone, and applicable at different scales and crossing cultural and national boundaries. People everywhere must have opportunities to forge and communicate their own sustainability stories. Such diversity of opinion and different personal meanings represent sustainability's strength. However, as the meaning of sustainability is highly contested (Davison, 2001), its intent, interpretation and application are problematic.

4.2 The Need for Sustainability: Forces for Change

4.2.1 Consensus

There is no question that we are at a point in history unlike any other time, where rapid population growth, technological change, globalisation, increasing resource usage and generation of waste, social complexity and conflict, uneven wealth and development, loss of ecosystems and reducing bio-diversity are converging (Krockenberger, Kinrade, & Thorman, 2000; Lowe, 2005; Millennium Ecosystem Assessment Board, 2005; UNEP, 2011). Nearly two decades ago, a reliable international source confirmed that the impacts of our actions have wide-ranging synergistic effects that have never previously been experienced (Union of Concerned Scientists, 1992). We have the capacity to do great things and yet we do so much to destroy much of what is great on Earth in pursuit of narrow, often rationalistic, goals. There is also a broad consensus about the symptoms of our current unsustainable state, particularly the social and environmental impacts.

Based on his historical study of societies that have collapsed through the agency of environmental degradation, Jared Diamond identified twelve sets of interrelated environmental problems (Diamond, 2005, p. 486):

1. Destruction of habitat;
2. Loss of wild foods;
3. Reduced biodiversity;
4. Depletion of soil;
5. Use and depletion of fossil fuels;
6. Over-consumption of freshwater;
7. The photosynthetic ceiling;
8. Release of toxic chemicals;
9. Invasive species;
10. Atmospheric changes and global warming;
11. Population growth; and
12. The per capita impact of people.

Box 4-1 Diamond's twelve sets of interrelated environmental problems (2005, p. 486)

In its broadest sense, sustainability addresses these issues by setting ambitious goals and visions with the intent of changing every facet of life, not only to ensure future survival at a high level of liveability, but also to raise the quality of life of all who live in poverty while doing so. I review the most significant forces for change in the next sections.

4.2.2 Population

The issue of population is one taken very seriously by environmentalists, often accompanied by prescriptions for zero-population growth and sometimes overstatements of the problem (Ehrlich, 1968). On the global scale, population is increasing; however, in the developed world, rates have stabilised, and in some cases declined to below replacement level. However, in the developing world some countries and regions have high rates of growth. There are links between population densities and every aspect of sustainability (Yencken & Wilkinson, 2000, pp. 31-34), with emphasis on environmental degradation and over-exploitation of resources. Degradation takes different forms: in developed countries, the damage is externalised and moved somewhere else, whereas in underdeveloped countries and developing countries, the degradation is more localised.

Population issues are problematic for many environmentalists and some sustainability proponents: there is an ethical dimension to the discussions about the rights of people to live on Earth. This ethical dimension can conflict with opposing views about damaging local environmental and cultural practices and can bring out environmentalist opinions that border on the extremist and which are incompatible with democratic society. Otherwise, according to Dyson, the ethical dimension is ignored in the debate altogether (Dyson, 2001).

Much of the environmental view of population, however, incorporates assumptions that development processes, life-ways and technological productivity will not change; thus it is assumed that pressures on ecosystems and resources will inevitably continue to grow. While such growing pressures may indeed be the reality, an alternative view is that more sustainable living methods (combined with a dematerialization of economies), "cradle-to-cradle"[21] production (McDonough & Braungart, 2002) and reductions in energy densities will allow a much bigger global population than at present, using less resources with fewer or less harmful impacts. While it is proposed that global population should stabilise in the future, there is a substantial economic development being driven by the growing population in the developing world (United Nations, 2004), and the need to accommodate this growth, its demand for resources and its environmental impact requires a sustainability-based approach.

[21] An approach to manufacturing contrary to the standard "cradle-to-grave" approach, where disposing of products occurs at the end of life. Cradle-to-cradle treats all waste and end-of-life material as resource for new production.

4.2.3 Ecosystem Impacts and Limits

The impact of development on global and local ecosystems has resulted in the disappearance of ecosystems through development, deforestation and urbanization or through pressures causing ecosystems to collapse (Hertsgaard, 2000; Power, 1996).

Through many processes, we are learning more about our impacts at individual, local, national and global levels. For example, processes such as State of the Environment Reporting by Federal, State and Local Governments (Australian State of the Environment Committee, 2001; Beeton, et al., 2006; Carter, 2000; Deville & Hankinson, 2004; State of the Environment Advisory Council, 1996) and global initiatives such as the United Nations Millennium Ecosystem Assessment (2005) and continuing research by the United Nations Environment Programme (2011) have outlined the state of the Earth's ecosystems. Trends in some areas are improving, but most are getting worse over time. Many such publications and reviews focus on the Earth, its environment and human systems. The Millennium Ecosystem Assessment, because of its scope, depth and approach to understanding of the world's ecological problems (particularly the importance of human capacity and human systems in any solutions), compellingly contributes to the case for sustainability to be the pre-eminent paradigm for the 21st century and beyond.

Identifying environmental limits to inform plans of action is problematic, especially in relation to evidence-based action. Lomborg (2001) argues that environmental lobbyists misuse, misrepresent and misunderstand environmental impact data. Thus, policy responses and priorities for action are skewed, and scarce funds misallocated. While Lomborg's position is useful in calling for more rigour in the debate, it merely highlights the difficulty in achieving certainty about the real state of the environment and underscores the fact that plans of action would have different priorities according to cultural and social contexts. The fundamental point here is that there is never enough information to be certain about our impacts, let alone to help us plan future actions. While the material development of the Earth is occurring at rates never before seen (especially in China and India), our capacity to "listen to the land" has also increased: through a combination of civil society action, re-connection to place and scientific and technological research.

4.2.4 Technological Change

Change in technology has been a constant through human history. As history's broadest pattern, Jared Diamond proposes that technological change through the co-evolution of humans with technology enabled the more technologically dominant,

innovative and capable cultures to dominate the less capable: “Those historical inequalities have cast long shadows on the modern world, because the literate societies with metal tools have conquered or exterminated the other societies (Diamond, 1998 p.13)”. He identifies, amongst several possible explanations, that the receptivity of whole societies to innovation is probably the most significant factor to explain why technology evolved at different rates in different places. He also proposes that technology develops accumulatively, not by heroic acts of invention, or by invention driven by need, but when certain social and contextual factors are present. Human culture is a critical aspect of technological change. We are all participants in the change, although some are participating more than others are. Relatively few people, in influential positions, make many of the decisions about technological change. These leverage points generally occur in the upper echelons of industry and government; civil society often does not make much contribution other than as the “market” and consumers are very much at the downstream end of technological change.

Thus technology holds both great promise and great danger for sustainability. Part of the problem of technology is that we do not interact with technology, through a capacity for “technacy”, a holistic understanding and creative application of technology, as a fundamentally cultural process. Seemann and Talbot (1995) propose that technacy is the vital human capacity for technological change and is what harnesses the most important human quality for change and innovation: creativity.

At the beginning of the 21st century, we are on the cusp of the convergence of discrete technologies: information technology, artificial intelligence, biotechnology, genetic engineering and nanotechnology to name a few. When the boundaries between the technologies converge, a state of “technological singularity” will be achieved, which some commentators say will dramatically alter human society (Brand, 1999; Vinge, 1993). The possibility of the singularity is one of the big issues of technological change, yet it will be difficult to predict what will occur post-singularity.

Technology, as a co-evolved facet of human culture, has a dual role in the sustainability debate: much extant unsustainable practice is technology-driven, yet much of the hope for a sustainable future will be bound up in the technological paradigm. Thus technology is a substantial force for creating the need for sustainability as the pre-eminent paradigm.

4.2.5 Globalisation

The globalisation of the world economy could only be possible with the technological developments of the late 20th Century, particularly with information and communication technologies. Dramatic technological changes in the extraction, processing and manufacturing of resources and products mean that old industries are shutting down, new industries are developing and existing industries are re-locating to new countries seeking cheaper labour. The focus on making products for the global market place is quickly moving to such places as China, India, Brazil, Thailand, South America and Eastern Europe.

The tremendous growth of the economies of China and India, the two most populous nations, means that local and national social systems are subject to international pressures. Such pressures mean that our social systems have to change as well, whether desirable or not (Mander & Goldsmith, 1996). For some communities, international pressures are a threat, for others an opportunity. Communities that adapt by working to their strengths to develop competitive advantages will thrive (Plowman, Ashkanasy, Gardner, & Letts, 2003). The forces of globalisation, along with any benefits, are causing the disappearance of communities in both developed and developing countries (including their indigenous cultures) (Shiva & Holla-Bhar, 1996). Newman, Beatley and Boyle identify that a significant outcome of our globalised world is the confluence of peak oil and climate change, and their far-reaching effects, and propose that resilient qualities and adaptive capacity are the main hopes for the future. (Newman, Beatley & Boyle, 2009).

Developed countries can no longer dominate manufacturing for the mass market; however, another outcome of this change is that knowledge has become more valuable than ever before resulting in what is termed the “knowledge economy” (Seemann & Fee, 2004), which is re-shaping the relationships among human culture, social systems and technology. Many parts of the economy are growing, according to Rifkin, without producing more “stuff”: such de-materialization is driving developed economies to operate on a service-oriented basis, with technology still at its core, but more focussed on its service capacity rather than the artefact nature of technology (Rifkin, 2000).

The forces of globalisation are both a threat and an opportunity. Global cooperation must develop political, cultural, economic, technological, ecological and social solutions on the path to sustainability. The interdependence of the world economy, if combined with trade liberalisation specifically to create opportunities for the world’s poor, may contribute to the cultural basis for global sustainability.

4.2.6 The Developmental Gap between Rich and Poor

While economic development has freed more people from absolute poverty than ever before (Lomborg, 2001), the fact remains that substantial numbers of people are subject to poor standards of housing and health and experience difficulty accessing education and economic participation. In short, livelihoods for many are unsustainable and there is little capacity for environmental protection (UNDP, 2010). Wealth in the developed countries, on the other hand, strongly links to environmental problems, yet creates the capacity to engage in environmental protection. The growth of wealth in developed countries and in countries such as India and China, and the increasing absolute number of people in poverty, are driving the world to an extent of ecosystem damage that may be hard to repair. This is one reason why the sustainability movement must continue both to address poverty in the developing world and to transform the economies of the wealthy countries in directions away from the current unsustainable pathways.

4.3 Conceiving Sustainability

4.3.1 Introduction

The conception of sustainability has progressed in recent decades through stages of development from ideas, definitions and attitudes to the articulation of frameworks, models, processes, strategies and tools. There are no clear-cut boundaries or beginnings here, but a continuum of understanding and application. It is not important to describe these as models, frameworks and so on. Rather, the emphasis is on the formation of a strong view with the capacity to translate into action in some way, no matter how limited or problematic. A complicating factor is that many accepted sustainability principles emerged before the articulation of sustainability as a social goal. Therefore, in this section, I briefly review some of the significant aspects of this continuum and offer a critique of that thinking as a basis for exploring the potential for emergence and change.

4.3.2 Perspectives

Sustainability as a conceptual idea emerged from a number of different streams of thinking over the last one hundred years or so in the fields of urban and regional planning and design, wildlife conservation and environmental protection, landscape planning and design, economics and technology. Contemporary sustainability writing refers to the ideas of many diverse authors and commentators. In urban and regional planning, Patrick Geddes in Scotland (Welter, 2002), Lewis Mumford (Guha, 1996)

and Jane Jacobs (Jacobs, 1965) in the United States, Hassan Fathy in Egypt (Steele, 1997) and Constantinos Doxiadis in Greece (1968, 1970), wrote as critics of urban planning and also as originators of new thinking about cities, urban development processes and liveability. For environmental protection and our connection to the environment, the writings of John Muir (Sierra Club, 2010), Henry Thoreau (2004), Aldo Leopold (Knight & Riedel, 2002) and Rachel Carson (Carson, 1964; Garb, 1996) have been influential in changing attitudes and raising the ideas of limits to exploitation of the environment. Actions by organizations such as the Sierra Club (Cohen, 1988) and the World Conservation Union (Holdgate, 1999, p. 108) helped procure legislation to protect wild places. An integrated view of sustainability emerged in the 1980s through the work of Lester Brown and his Worldwatch Institute (Brown, 1981) and the Brundtland Commission (World Commission on Environment and Development, 1987). The succession of international environmental conferences, such as the United Nations Conference on the Human Environment, Stockholm in 1972, the Earth Summit, Rio de Janeiro, in 1992 and its follow-up conferences in New York in 1997 and Johannesburg in 2002 (United Nations, 2010a); the Kyoto conference on climate change in 1997 and its follow-ups, including Bali 2007 and Copenhagen 2009 (United Nations, 2010b). All of those initiatives have helped shape a global environmental ethos. In economics, E.F. Schumacher (1974), Hazel Henderson (1988), Herman Daly (Daly & Cobb, 1989), Manfred Max-Neef (1991) and Paul Ekins (1992) proposed different ways of conceiving of the economic domain by linking economics and environment to future livelihood prospects for communities.

The above important perspectives and events have largely arisen from a refined, intellectual and critical sense responding to events and emerging patterns. While they have resonance for many sustainability practitioners, the degree to which such conceptions have contributed to broad cultural change is still open to question. How individuals conceive of sustainability and then integrate it into their work and life-ways is critical: it engages attitudes, values, norms and behaviours as crucial aspects of the conception of sustainability. These conceptions apply to different domains of human activity and inform the design and development of conceptual models, processes and tools for application to the real human development project.

4.3.3 Attitudes

Sustainability is often expressed through conceptual thinking usually involving a reductionist “laundry list” of desirable actions, outputs or things (Lowe, 2005), while using the language of holism. Other attitudes can be heartfelt and genuine, and a

source of hope and inspiration. Conceptual attitudes can be informed by a cultural or ideological perspective that at best is only a partial view of sustainability. I do not see a problem with these approaches inasmuch as they reflect people making meaning and grappling with the need for sustainability from their cultural perspectives and are thus a part of the emergence of a sustainability culture. It is also common for proponents and adherents of different conceptual attitudes to believe that their prescriptions are the primary way to progress sustainability. They may often be highly critical (and often obstructive) of other approaches. The frequent ideological arguments among environmental groups represent this attitude. Much energy is expended in such debates, sometimes with no, or a negative, result. Consequently, before reviewing models, processes, institutions, strategies, tools and outcomes, I believe it is useful and instructive to examine some typical attitudes[22]. While attitudes are a fundamental component of shaping an individual's behaviour, they are not always good predictors of action and can be more related to an intention to act rather than the action itself (Bohner & Wanke, 2002). In this section, I define "attitude" to generally include values, norms and beliefs, to discuss common approaches to sustainability as a precursor to my general critique of sustainability and its problematic intent. I have included a more detailed treatment of attitudes, values, norms in Chapters 5, 6 and 7, and link these concepts to issues of culture and behaviour.

Having contended earlier that the ecological aspect of sustainability makes sustainability a new paradigm, I argue now that it is also clear that many attitudes about sustainability are focused solely on environmental issues only, and often only one issue at that: climate change, salinity, loss of biodiversity and so on. This tendency to a single-issue focus is due in part to the substantial energy required to advocate, pursue and foster change on any single issue and explains why many environmentalists appear to have little concern for the wider issues beyond any particular environmental battle. Much of the sustainability movement has developed from these single-issue attitudes, yet the single-issue focus can be at odds with whole-system thinking (Shellenberger & Nordhaus, 2004). Often single-issue approaches are the focus of the media and feature in campaigns on "how to save the planet", including well-meaning pamphlets and checklists produced by environmental groups and government agencies advising. These campaigns are worthy and useful for those

[22] I have consciously fallen into the trap of making a "laundry list" of attitudes. However, I believe that there is much overlapping and connection, between the listed attitudes. During a lifetime, these attitudes change and intermingle. I have been a proponent or adherent of many of the listed attitudes at different times.

consciously embarking on cultural change in the first flush of enthusiasm, but usually do not contribute to change over the long term (McKenzie-Mohr & Smith, 1999, p. 9).

It has been widely documented in the literature in environmental psychology that many people cultivate a love of nature as an object-in-the-landscape (rather than as living systems). Or they may see nature as a fascinating subject of study or a romantic idea. Thayer (1994, p. 2) proposes that such topophilia is a significant step in the development of pro-sustainability attitudes that can develop into a wider appreciation of ecosystems and their human interrelationship. However, topophilia can be compartmentalized and disconnected from the sustainability movement. An example is the rejection of wind generators solely on the basis of their visual impact in the landscape, while coal-fired power stations are acceptable because they provide their power from "somewhere else".

Many people view sustainability as primarily a "technological fix"[23]. Over the last twenty-five years of my sustainability practice, beginning with my solar housing research, the technological fix attitude was predominant amongst most sustainability practitioners and authors I encountered. According to this view, sustainability is achieved by substitution of a harmful technology with a benign technology. Proponents of green technology in the 1970s and 1980s such as Steve Baer (1977), William Shurcliff (1978, 1979) and Sim Van Der Ryn (1978) in the United States and myself and Gareth Cole (Parnell & Cole, 1983), Steve Szokolay and Jack Greenland (1985), and more recently, Ian Lowe (2005) and Michael Mobbs (2010) in Australia have exhibited this attitude. In spite of the lack of adoption of green technologies, the technological fix attitude still predominates amongst practitioners, government and the media. Recent government programs to stimulate the uptake of grid-connected solar electricity systems are representative of this attitude. I am not rejecting the focus on technology as artefact *per se*; my critique is that by understanding such technology as a social and cultural process, our vision of sustainability is more likely to succeed. In environmental discourse, Dryzek (1997) refers to this as "environmental problem solving".

The experiences of remote Indigenous communities highlight the problems with the technological fix attitude. In Australia, as Paul Pholeros reports, remote Indigenous communities have experienced waves of technological change that have failed to deliver the outcomes of safe, adequate housing, safe water, reliable power and a healthy living environment. This is not to say that the technologies are failures, but the

[23] See Chapter 6 for more discussion about technology as a social process.

lack of consideration at the design and consultation stages of a range of local social factors is a significant contributor to the failures (Pholeros, et al., 1993). Such experiences reveal that transfer of any technology, green or otherwise, to any domain will not be successful or useful without careful consideration of local cultural and social factors.

Technophobia, or fear of technology, is a common attitude shaping common approaches to sustainability (Thayer, 1994). This fear is often confused with the much-maligned Luddite attitude to technological development[24] (Sale, 1996). This attitude drives people to a minimalist view of sustainability oriented to "low-tech", "do-it-yourself", small-scale solutions, or appropriate technology (Schumacher, 1974), typical of the low-cost owner-builders and the back-to-the-land new settlers of the 1970s and 1980s in Australia (Cock, 1979) and other developed countries. A rejection of mainstream society and a positive, romantic, utopian sensibility combine in this attitude, which can also be seen as a form of "survivalism" or "green radicalism" (Dryzek, 1997). While this attitude has significantly influenced early sustainability thinking, as a model for global action, it is unlikely to influence the mainstream. Frequently, it is more of a personal lifestyle choice than a means of moving most of society to sustainability. According to Newman, the proponents of this lifestyle choice believed they had developed a model for the future, while ignoring potential impacts arising if this attitude had translated through to widespread action (Newman, 2006).

Another attitude to consider, or more correctly, a state of mind, is the experience of "solastalgia", a neologism coined by Glenn Albrecht (2005, 2006, 2010) to describe the emotional distress caused when one's home environment is under threat of destruction or desolation. Solastalgia in people can be caused by both natural and man-made disasters. The concept of solastalgia suggests that human mental and emotional health is strongly related to a sense of place, and when such a place is under threat, our wellbeing is also under threat. Solastalgia may be a very important mental state for sustainability: perhaps a precursor, or even a pre-requisite, for decisive action for sustainability. Our response to environmental impact is a significant learning opportunity, which I discuss further in Chapter 7. A sense of solastalgia may also be an important part of developing a personal eco-philosophy. Having an eco-philosophical

[24] The Luddite movement was one of the earliest examples of technology critique manifesting in a short-lived social movement in the north of England in the early stages of the Industrial Revolution. Trivialised as ignorant people who had a deep fear of technology, they saw that the new production processes had a negative impact on the social fabric of their communities. They organized and fought back. The Luddite story is a very valuable one about how a community deals with technological change and it still has resonance today.

attitude is an important part of developing a conception of sustainability: it can help a practitioner gain a deep-seated anchor to sustainability principles and a strong, resilient pro-ecological attitude. This attitude can be represented by the deep ecology of Arne Naess (1989) and the "Zen-poet" eco-philosophy of Gary Snyder (1990), where nature is experienced as spiritual, ethical or political. It is often very personal, focusing on individual relationships with the environment. The eco-philosophy experience can lend itself to introspective types in solo contemplation in natural environments, and at its extreme manifestation, it becomes merely a romantic notion without the capacity to re-shape the drivers of environmental destruction. However, in the case of Naess' ecosophy, the deep-seated anchor provided by an eco-philosophy is an important aspect of taking action because "decisions and actions count more than generalities" (Naess, 1989, p. 42). A manifestation of eco-philosophical attitude can be present in the activist stance, largely taken in non-violent environmental protest campaigns, such as against dams, logging, whaling and resort development in sensitive areas. In particular, the eco-philosophy/activist nexus is demonstrated in the Third World through community-based activism where pressures on the environment and communities can be intense, unregulated and destructive (Mies & Shiva, 1993).

Others believe that sustainability is primarily a matter of policy and regulation and that government action should stop any anti-sustainability practices. On face value, it would appear that this approach would lead directly to change. It is often too easy for sustainability proponents to adopt this attitude as their primary focus and to forget that policies and regulations usually only come about when politics is driven by a critical mass of community demand. A negative aspect of this attitude is that responsibility for change passes from communities to the governments they elect, with problems exacerbated when elected governments avoid making difficult decisions supported by a compliant electorate (Lowe, 2005, p. 95).

Another view of sustainability is that it must be science-based and that any proposal for change requires clear evidence before taking action. For example, logging and other resource extraction should continue unless scientific evidence exists to demonstrate otherwise[25]. The science-based view is usually proposed by those who oppose change for sustainable practice and it plays well in the media by implying that those opposed to the practices concerned are not being rational. It is an attitude in opposition to the

[25] This was the rationale behind the drive to Resource Security legislation to support the clear-felling of old growth forests, particularly in Tasmania from the early 1990s (Brown, 2003).

"precautionary principle"[26] and it could be argued that it is responsible for the problems in addressing climate change over the last ten years in Australia in spite of scientific evidence and the precautionary principle being on the same side of the climate change debate.

Another common attitude to sustainability concerns the projection of a public image for a policy, product or service based on an assumed sustainability quality. This attitude can be a very shallow expression of sustainability principles and attracts people based on short-lived fashionable images, where the sustainability lifestyle presents in similar ways to conventional product branding, except preceded by the words "eco" and "green". This is not to say that the product, image or thing promoted is not part of the sustainability prospect: as a step towards deeper understanding and change, image promotion is useful. However, this attitude, when focused on image and not substance, can manifest itself as greenwash: the appearance of being sustainable, green or "ecologically-friendly" without actually being so (Wilson-Field, 2010).

Regular social polling in Australia demonstrates that support for the environment rates very highly (Yencken, Fien & Sykes, 2002); if that translates to support for sustainability more broadly, it is evidence of a positive background attitude. However, such polling is unclear about the extent of environmental knowledge in the community. This support for the environment means that there will be support for government initiatives, and perhaps green products, but limited individual action for change. Therefore, when the drivers for change to sustainability demand action, it is likely that the majority will look to their leaders for action.

The selection of attitudes described above represents the struggle of many different social sectors with the meaning and application of sustainability and indicates the beginnings of a culture of sustainability. Yet, these common sustainability attitudes do not represent a mature culture of sustainability: extending these disparate attitudes into a more holistic, wide-ranging culture is a major challenge. Further, there is also the question of uncommitted and unconvinced people who may disagree with any effort or funding to be expended in pursuit of sustainability. Of all the attitudes described here, this is the attitude that is an obstacle to change. This attitude is deeply entrenched in government, media and in the general population.

[26] The precautionary principle is a concept such that if the environmental impacts of development activity cannot be predicted or managed adequately, then such development should at least be postponed until more information about the impacts is available.

In considering the reality for people living in poverty in many parts of the world: what type of sustainability attitude is possible in situations where there is no financial or technical capacity and disempowerment is the norm? Disempowerment overrides any other possible attitude that could lead to the emergence of a sustainability culture. Finally, as sustainability is holistic in concept, it requires holistic attitudes to foster its emergence. Holistic attitudes encompass many of the above attitudes and involve many other qualities informed by higher order ways of knowing and acting. This theme is explored further in Chapter 7.

4.3.4 Models and Frameworks

The above discussion of perspectives and attitudes reveals that sustainability has been activated in many and varied ways. I believe that the positive aspects of these perspectives and attitudes have been instrumental in the development of seminal conceptual models of sustainability emerging in the 1980s and 1990s, particularly after the publication of *Our Common Future* (World Commission on Environment and Development, 1987) and *Agenda 21* as adopted at the Rio Earth Summit in 1992 (UNEP, 1992). Some of these models include:

- Total Capital: this model tempers the primacy of financial/economic capital in determining processes of development and to identify value other than in direct financial terms so that a sustainable society lives off interest generated by the capitals. It was first developed through the Four-Capital model (Ekins, 1992, p. 148), linking environmental, human, physically produced and social/organizational capitals. These ideas were also expressed as Natural Capitalism (Hawken, 1993) and as the Five Capitals Model (Porritt, 2005) with the capitals described as: natural, human, social, manufactured and financial. This general thinking as also been referred to as the Total Capital model (Seemann, Parnell, McFallan & Tucker, 2008).

- Sustainable Livelihoods: This model adopts and extends the Total Capital approach with some consideration of system dynamics, through the linking of the capitals (natural, physical, financial, social, human and (later) political capital) with a focus on livelihood as the emergent outcome of development (Farrington, Carney, Ashley & Turton, 1999; Scoones, 1998; *Sustainable Livelihoods Guidance Sheets: Part 2.1*, 1999). This framework has been applied extensively in community development projects and programs throughout the developing world and in remote

Indigenous communities in Australia (Fisher, 2002). The sustainable livelihoods framework is described in Figure 4-1:

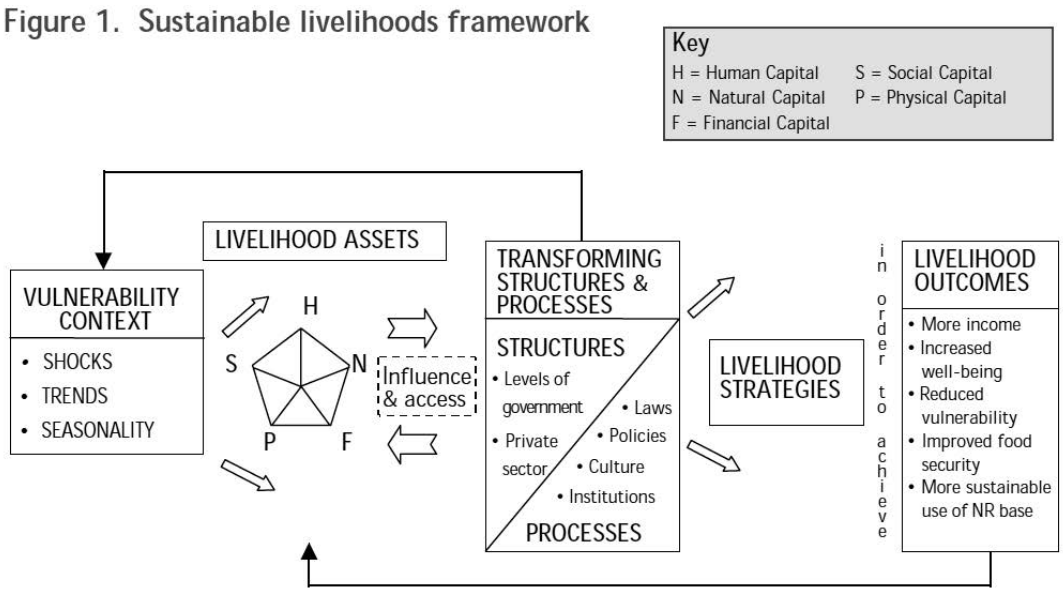

Figure 4-1 Sustainable livelihoods framework

(Sustainable Livelihoods Guidance Sheets: Part 2.1, 1999, p. 1)

- Input-Output models: A suite of systems-oriented Input-Output models focus on the flow of material resources through settlements: the input of materials and energy and the outputs of waste. Mostly of European origin, they include: Ecological Rucksack; Material Intensity per Unit of Service (MIPS); Material Flux Analysis and Substance Flow Analysis (Yencken & Wilkinson, 2000). Simply put, quantities of material sourced, items produced and wastes generated are quantifiable for a particular industry, process or place. The end destination is identifiable as part of this analysis, for example, greenhouse gases into the air, solid waste to landfill, and liquid pollutants to waterways.

- Ecological Footprint: This model and its variants Sustainable Process Index (Krotscheck, 1997) and Environmental Space (Hille, 1997; Spangenberg, Femia, Hinterberger & Schutz, 1999), expresses the environmental impact of human activity as a single value, based on the land area needed to provide energy, food, materials and other material resources, generally on a country-by-country basis (Rees & Wackernagel, 1994; Wackernagel & Rees, 1995).

- Pressure-State-Response model: This is the model of choice for preparation of State of the Environment Reports, originating from the Paris-based Organization for Economic Cooperation and Development (Group on the State of the Environment,

1993). In Australia, this approach has proven to be readily applied at all levels of government, and has been generally successful at local government level. The Pressure-State-Response model is illustrated in Figure 4-2:

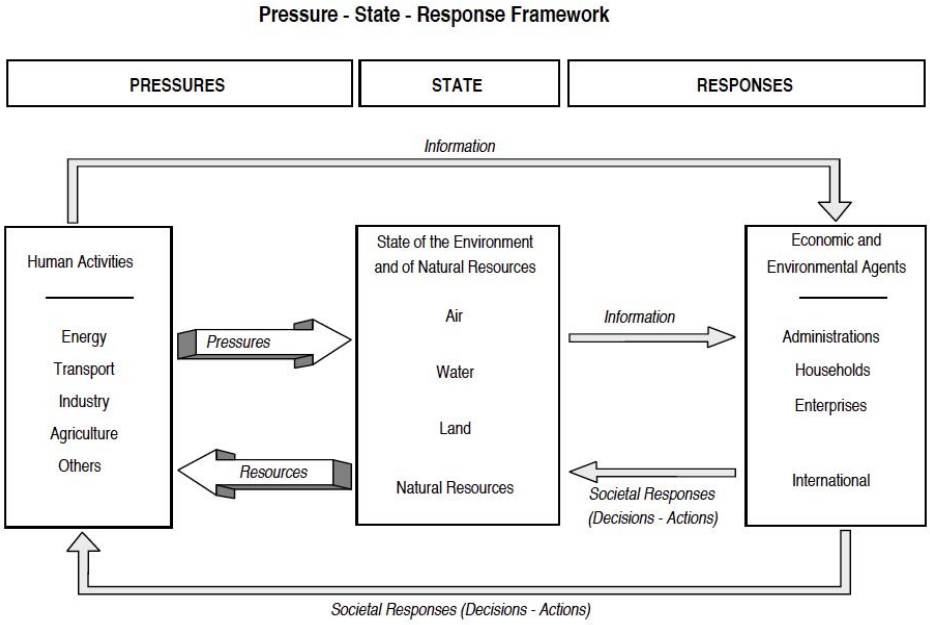

Figure 4-2 Pressure-State-Response model (Group on the State of the Environment, 1993)

- Extended Metabolism Model of Human Settlements: This model links the Total-Capital model with Input-output models, by analysing stocks, flows and impacts (Newman, 1999; State of the Environment Advisory Council, 1996; Yencken & Wilkinson, 2000, p. 121). Resources such as land, water, energy and materials flow through settlements, with liveability as the system goal: that is health, employment, income, education, housing, accessibility and community. The model acknowledges that the system generates waste as an outcome, which also affects liveability: more waste, lower liveability. The model and its variants have been applied in industry as Industrial Ecology, such as at the Kalundborg Eco-industrial Park in Denmark (Kibert, 1999) where the flow of resources through the dynamics of industrial processes have been analysed such that waste outputs from one factory become resource inputs for a different factory. Figure 4-3 illustrates the model, with a comparison of present settlement sustainability with an ideal state of ecologically sustainable settlement, with reduced waste output and increased liveability.

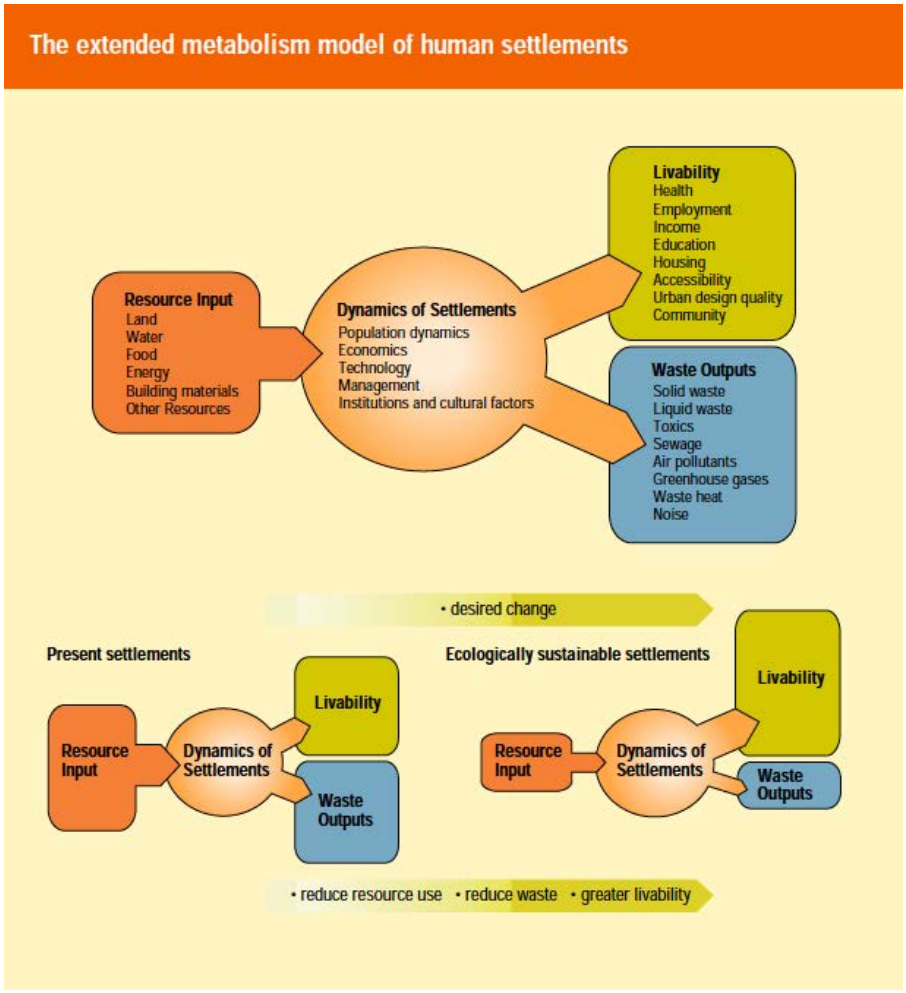

Figure 4-3 Extended Metabolism model (State of the Environment Advisory Council, 1996, p. 19)

- Life Cycle Assessment (LCA): Commonly applied in product innovation and development, this model can also be applied to the development of buildings, infrastructure and transport systems. This model addresses the approach where lowest capital cost is the chief determinant of a product's viability, with the resultant ecological costs of waste and energy usage and any negative social impacts treated as externalities. Consideration of economic, ecological and social factors over various lifetime horizons highlights the real costs to the consumer, civil society and the environment. It can also be invaluable in demonstrating how high capital cost solutions may return a greater benefit over given time horizons by "locking-in" positive environmental features and "locking-out" undesirable environmental impacts (Gertsakis, Lewis, Grant, Morelli & Sweatman, 2001; Gertsakis, Lewis & Ryan, 1996) than low capital cost solutions with significant on-going environmental and operational costs. The significant feature of this model is that overall impacts reduce as the design of systems and products incorporates sustainability. Thus

many of the whole-society behaviour-change issues are managed by applying behaviour change upstream to the design process, as illustrated in Figure 4-4.

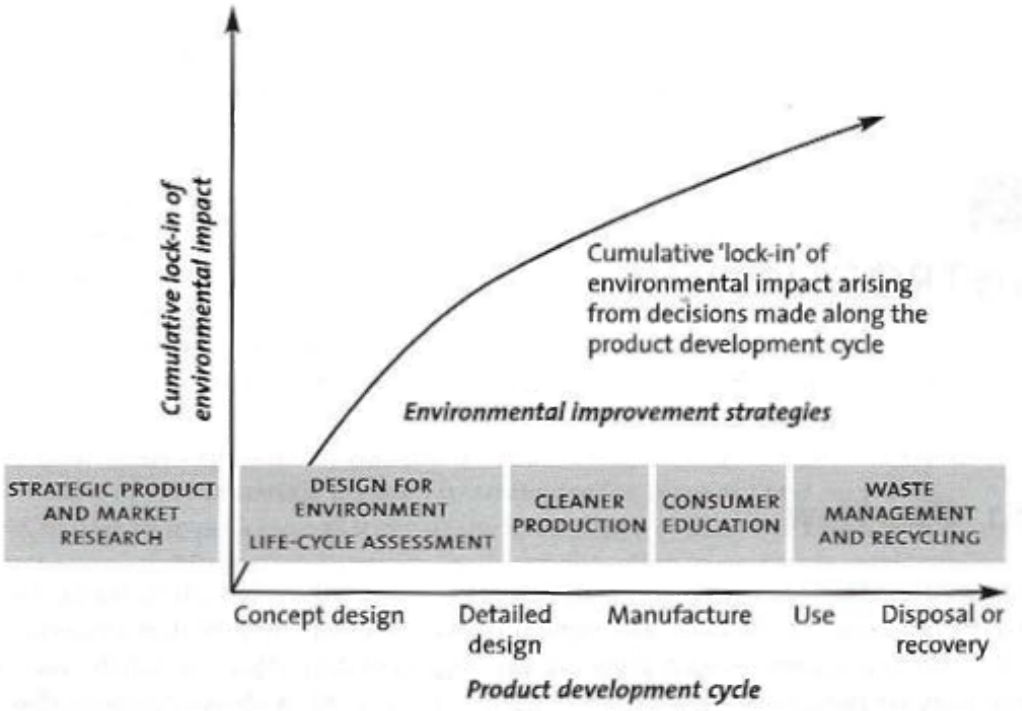

Figure 4-4 Environmental 'lock-in' over a product's development cycle (Gertsakis, et al., 2001, p. 14)

- Triple Bottom Line (TBL): This model arose from increasing application of the Total Capitals model in the business sector in the early-mid 1990s (Elkington, 1999). The TBL model allows companies to report on social and environmental performance as well as the usual financial accountability processes. TBL can further assist companies in decision making for reduction of negative social and environmental impacts. It introduces the concept of environmental and social issues as “bottom lines” as equivalent in importance to the financial bottom line as a way of demonstrating corporate social responsibility (CSR). Many businesses and government agencies are using the TBL model for reporting, sustainability assessment, decision-making and driving cultural change (ICLEI, 2004; *Sustainability Reporting Guidelines*, 2006; Vandenberg, 2002). TBL can also guide decision-making and development at any scale as illustrated in Figure 4-5.

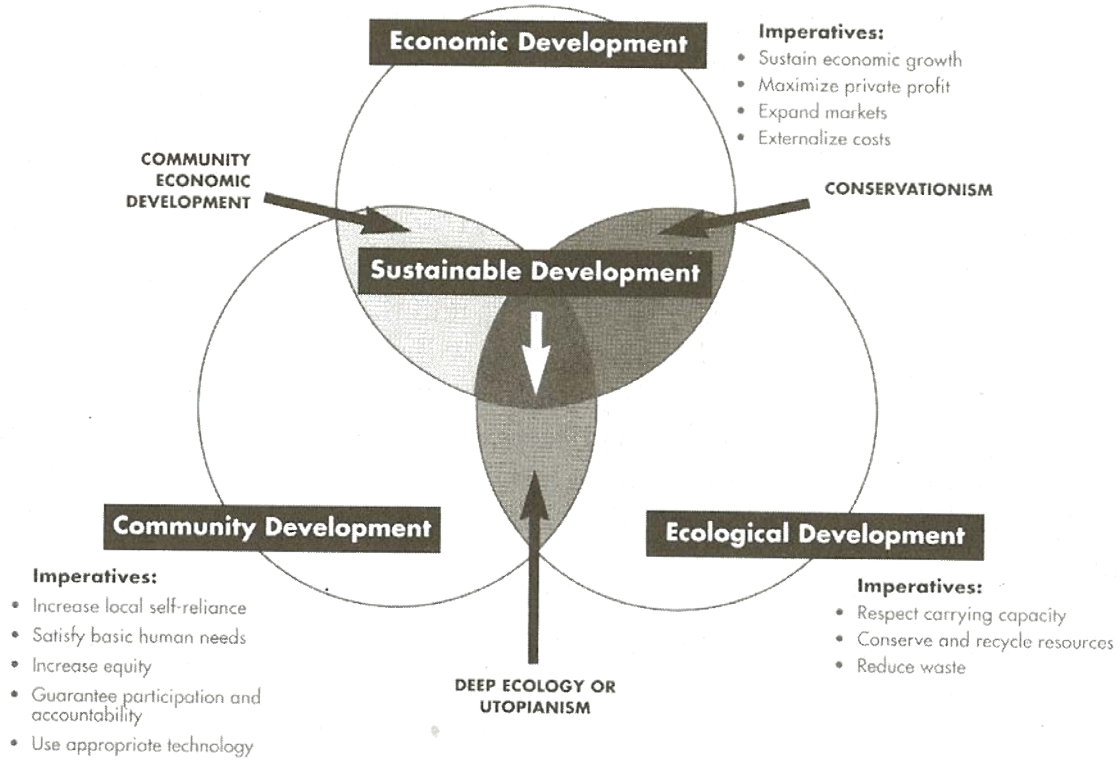

Figure 4-5 Three distinct development processes underway at the local level (International Council on Local Environmental Initiatives (1996) cited in Newman & Kenworthy, 1999, p. 4)

- TBL Variants: The TBL model has proven to be mutable, having undergone substantial modification since inception. Modifications include the addition of governance, extending TBL to a QBL (Quadruple Bottom Line) model [27]. Another variant is the Concentric Circles model, initially developed by Ian Lowe (1994) to show economy, society and environment as nested circles, later modified by Sarkissian to add a circle of culture (2009, pp. 22-23). The intent of the modifications is to demonstrate that the components of the TBL model are not equivalent in scale, with the environment being the most important. The Concentric Circles model is illustrated in Figure 4-6.

[27] See Chapter 12 for a treatment of the QBL model in the Coffs Harbour City Council case study.

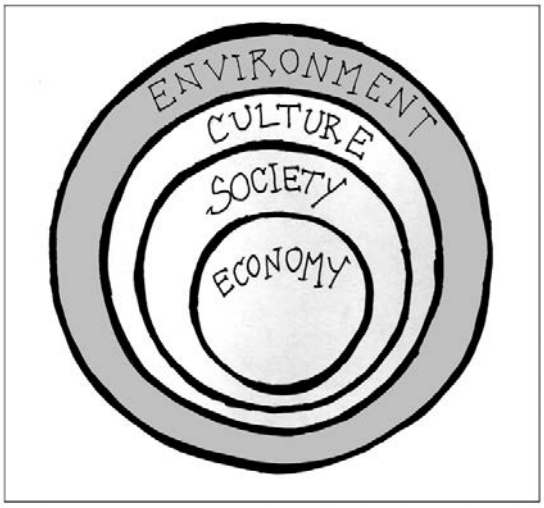

Figure 4-6 The Concentric Circles model of sustainability (Sarkissian et al., 2009, pp. 22-23)

- The Natural Step (TNS): Developed by Karl-Henrik Robèrt with Karl-Erik Eriksson and John Holmberg in Sweden from 1988 (Holmberg & Robèrt, 2000), this model is based on the contention that as population and development pressures increase the rate of degradation of ecosystems and ecosystem services, the "funnel of converging trends" closes the margin for remedial and transformational action. To address this, TNS is based on systems principles combined with specific application tools and can be applied in any activity to create a "window of opportunity" for change (The Natural Step Environmental Institute Australia, 2000, p. 13), by planning action based on "backcasting" from a desirable future state. TNS forms part of Sweden's sustainability strategy and has been applied in business, government and community sectors to frame such activities as the re-engineering of production processes, designing buildings, planning transport systems and local government (James & Lahti, 2004).

4.3.5 Strategies

Models help to focus conceptual and strategic thinking, but any organization, community or group must apply such thinking to create workable ways to achieve sustainability, that is, to develop strategies as templates for action. Such strategies should apply at different scales from global and multi-national to the small village or organization. In terms of strategy development, much of the work done has occurred on a broad scale: through global organizations, national and provincial levels. In most large-scale strategies, the main activity is policy development. The United Nations' Agenda 21 (UNEP, 1992) and the Millennium Development Goals (UNDP, 2005) are examples of the global strategic approach. Given that policy can result in international

agreements and strategy development and legislation at the national level, they may not be detailed enough to create templates for action at smaller scales.

In Australia, strategy development, for example, has occurred at the national level with the National Strategy for Ecologically Sustainable Development (Ecologically Sustainable Development Steering Committee, 1992), and more recently in Western Australia, with the development of the highly detailed Western Australian State Sustainability Strategy (Government of Western Australia, 2003). Agenda 21 has generally been adopted as a template for sustainability at the local government level (Australian Local Government Association, 2007); however, strategy development had been moving slowly at the local government level, with substantial movement only occurring since 2005. Currently, all local government agencies in New South Wales are now required to use an Integrated Planning Framework, based on a Quadruple Bottom Line approach [28]. At the local level, communities can draft sustainability strategies to guide future development and this is becoming common in local government and in community planning (Beatley, 2004; James & Lahti, 2004; Newman & Jennings, 2008).

4.3.6 Measurement and Decision-Making Tools

The ability to monitor and evaluate systems, processes, activities, outputs and outcomes is an important aspect of learning and feedback about sustainability performance. These processes can be used by any individual, group, or organization, but they tend to occur at the upper and middle echelons of organizations; individuals in action-oriented positions often do not have sustainability tools that are sufficiently detailed to apply in specific instances. Nevertheless, the use of measurement tools such as those developed by the Global Reporting Initiative (GRI) (Global Reporting Initiative, 2006) is becoming more widespread.

The International Council for Local Environmental Initiatives (ICLEI) has developed a series of TBL tools for monitoring progress and for reporting. In Australia these tools have been adapted for use at Melbourne City Council (Dickinson, 2004; ICLEI, 2004) and Coffs Harbour City Council (Coffs Harbour City Council, 2002; Nicolson, 2004). The tools are essentially checklists of factors grouped under TBL headings, with references to specific documents or Council policies relevant to the factors. Such tools are generally still in the early stages of development and are a mix of indicators, statistics and physical measurements. Councils such as Randwick, Hornsby and Clarence Valley in New South Wales; Brisbane City and Sunshine Coast Regional

[28] As of 1st July 2010.

Council in Queensland; and Mandurah and Gosnells Councils in Western Australia have applied a range of sustainability tools for measuring and reporting performance (Parnell, 2010).

To measure sustainability performance, the development of tools for specific industries has increased substantially in recent times. In the built environment and manufacturing, increasingly sophisticated tools assess sustainability: the BREEAM tool in the United Kingdom (BRE Global Ltd., 2009); LEED in the United States (US Green Building Council, 2010); Green Star (Green Building Council of Australia, 2010) and the National Australian Built Environment Rating Scheme (NABERS) in Australia (New South Wales Department of Environment Climate Change and Water, 2010). In New South Wales, the BASIX tool measures potential energy and water usage residential buildings (New South Wales Department of Planning, 2010). In-house tools have been developed by large engineering consultancies, such as Arup's SPeAR tool (Braithwaite, 2010). Tools for rating tourism and hospitality facilities, such as EarthCheck and Green Globe (EarthCheck, 2010) have been recently developed. Material and product rating schemes such as Ecospecifier (2010) and Good Environmental Choice Australia (GECA) (2010) are being increasingly used.

4.4 Gaps in the Sustainability Models

Many of the models, strategies and tools discussed above have proven to be very useful and effective in bounded, single-issue situations. Sustainability solutions in complex space are harder to achieve. With so many innovative sustainability thinkers proposing models, strategies and processes there can be an impression of major change. However, in my view, we need deeper, more effective change and I propose that problems with models include:

- Lack of consideration of the dynamics of systems and their emergent effects (Capra, 2002, pp. 86-88);
- Inaccurate assumptions of direct causality in sustainability processes (Spangenberg, et al., 1999, pp. 25-26);
- Failure to consider the human values driving resource flows in Input-Output models (Hille, 1997, p. 8);
- Failure to act on information generated by models (Krotscheck, 1997, p. 662);

- Lack of rigour to support policy responses and budgeting processes (Parnell, 2005b)[29];
- The difficulty in defining the nature of social and environmental "bottom lines" is problematic for TBL models and its variants and may result in a lack of authentic meaning (MacDonald & Norman, 2004);
- Positive TBL reports or exaggerated green claims from organizations with poor environmental and human rights records engaging in greenwash (Wilson-Field, 2010); and
- Failure to identify ways to foster change for sustainability (McKenzie-Mohr & Smith, 1999, pp. 2-3).

Sustainability frameworks that are marginally effective or which do not bring about the necessary change (for example when environmental limits have been reached) are insufficient for furthering sustainability. Many of our sustainability policies, structures and processes have not brought about the deep cultural change required, as they are symptomatic of conceptual and practice gaps and are likely to lack grounding in culture. If such models allude to the need for cultural change, they do not indicate how to achieve it. Culture is sometimes present in the models as a "capital". However, the nature of culture as dynamic and systems-oriented is rarely identified, and thus cultural factors are a major contingency for any model, framework, strategy or action for sustainability.

Another major conceptual gap in the models concerns the understanding of technology and its role. As a form of culture, technology is an implicit part of every sustainability model and if mentioned explicitly, it is usually as the agency of ecological destruction. Frequently, its presence is only implied: the Extended Metabolism Model, for example, is wholly about our technology-mediated lifestyles with no mention of technology as a significant force in the system. This capacity gap assumes technology as artefact: inert and value-free. Until we truly understand how we have co-evolved with technology, we will have great difficulty in managing technology its central role in a sustainable society.

Another gap in understanding concerns the holistic conception of sustainability – the interrelatedness of the issues and their transdisciplinary nature – and the cognitive dissonance[30] experienced between a practitioner conceiving of sustainability as holistic

[29] This was the experience at Coffs Harbour City Council, especially in allocation methods for Environmental Levy funding. Refer to the Case Study in Chapter 12.

[30] Defined as the "Phenomenon in which a person experiences a discrepancy between an attitude and a behaviour or between an attitude and a new piece of information incongruent with it, which leads to a state of tension and a subsequent change in attitude, behaviour, or perception" (Westen, 1999, pp. G-4).

but acting mechanistically. Many models incorporate holism, but do not advise how to operate holistically. Until sustainability practices become actively holistic, even the best intent cannot achieve good sustainability outcomes. Further, if those charged with the responsibility of carrying out holistic-based sustainability actions do so in a non-holistic way, there is a heightened risk of rhetoric overtaking real sustainability outcomes.

I believe that the most important gap in the models is the absence of any guidance to sustainability practice: that is, activating the models in the real world of people and their cultures. Thus, the models, strategies and tools described above are either static (the "what" of sustainability) or process-oriented (the "what happens" of sustainability). Static models generally map the issues and dimensions of sustainability and the process-oriented models tend to illustrate a linear flow, but do not necessarily consider whole systems. Such models do not readily explain the "how" and "why" of sustainability. To do so means engaging with complexity.

In the conceptual thinking behind the above sustainability models, there is considerable emphasis on the words like "could" and "should" in any recommended practice change or prescription. As a position, it is understandable, as all sustainability practitioners, organizations, academics and commentators are working for change. The transformation and development of people and their social systems are not given due consideration as critical aspects of sustainability, and problems emerge when people do not want to, or are not capable of, making the change that the models require.

Over the long course of this research, interest in sustainability has grown substantially, in vision and practical application, locally and globally. I was concerned that some of the ideas about emergence in this research might have already become part of mainstream change practice before I was able to finish this thesis. However, at the recent national Behaviour Change for Sustainability conference in Sydney in October, 2010, I found that leading edge thinking about change was firmly situated in a mechanistic approach, with little observable evidence of an understanding of complex systems, even though a systems approach was stated as a learning outcome of the conference (3 Pillars Network, 2010). In particular, most of the change processes discussed were of the single-issue variety and the keynote speakers, while stimulating, did not explore issues about complexity. This lack of treatment of complexity confirmed for me the difficulty in conceiving sustainability as a complex, non-linear activity, as the leading change practitioners in Australia are clearly approaching sustainability as if change were only about incentives and education. In my view, this lack of

understanding of complexity is indicative of a major capacity gap, especially amongst sustainability practitioners.

4.5 Discussion: A Mixed Reality

I believe it is clear that as a society our negative impacts on natural systems are significant. There is a compelling need to protect and restore our natural systems and their eco-system services, while providing for economic development and social equity. At no time in human history has there been such a need to change. We need a complete re-design of our cities, towns and communities, our houses and buildings, our methods of resource extraction and energy usage, our modes of production and transport, amongst many other areas. This change can occur only if sustainability becomes the leading cultural paradigm of the 21st Century.

There is clear evidence that a global paradigm shift is underway in many areas of government, business and civil society (Hawken, 2007). It emerges from our growing awareness of the significance of our impacts on global and local ecology; however, it is coarse-grained and uneven in its conception and application, with the outcomes being a mixed reality. It is impressive to see where the language, attitudes and principles of sustainability have been adopted as visions, goals and strategies. While this change in language represents a substantial cultural change, the good stories from this paradigm shift are small in number compared to the continuing stories of exploitation arising from our linear economic system, our mechanistic approach to development and its outdated paradigm.

Governments are now generally recognizing our environmental problems, but are having difficulty charting coherent courses of action, especially after the Global Financial Crisis of 2008 (Taibbi, 2010) and the failure of the United Nations Climate Change Conference at Copenhagen (COP 15) in December 2009 (Lynas, 2009) and Cancun (COP 16) (Energy Matters, 2010). Failure to follow through on recommendations such as outlined in the Stern report into global warming and climate change in the United Kingdom (Stern, 2007) and the Garnaut Climate Change Review into an Emissions Trading Scheme in Australia (Garnaut, 2008) indicate that there is substantially less consensus for the ways of moving towards sustainability, and a consequent lack of commitment. The recent social disruption over proposals to manage the Murray-Darling Basin (Miller, 2010) is an example of the difficulty of getting support for a broad-based sustainability approach to managing water in arid lands.

Further, as sustainability gains traction as a framework for action, an anti-sustainability reaction has developed, having reached a peak in the period before COP 15, in 2009. The impact of social movements such as the climate change sceptics and "deniers" internationally, and the Tea Party in the United States of America (Broder, 2010), has seen the rise of an anti-environment and anti-sustainability stance which has set back the progress of sustainability in many ways, with the local and global effects still to unfold.

4.6 Conclusions: A Difficult Mission

At the beginning of this Chapter, I asked why is an understanding of the processes of social and cultural change the missing dimension in our conceptual frameworks of sustainability. Through my review of the various sustainability perspectives, attitudes, models, strategies and tools, I conclude that a general lack of understanding of the social and cultural aspects of sustainability limits our capacity to implement sustainability. Many of our models of sustainability fail to identify the importance of culture, let alone work with cultural factors in order to bring about change; this is clearly the missing, or "overlooked" dimension of sustainability.

I must be very clear on a critical point: I am fundamentally interested in a culture of sustainability; that is, an inner personal culture that we bring to our bear on our actions in the domains of sustainability – a form of "the habitus", the broad collection of socially learned practices acquired through everyday life (Bourdieu, 1977). "Cultural sustainability" is a different concept to the culture of sustainability. I have no argument with the ideas of cultural sustainability – I have incorporated it into my contingent description of sustainability in Chapter 1. The two concepts are not mutually exclusive: to achieve cultural sustainability requires a culture of sustainability: it is possible to maintain a cultural activity or stance, but still be unsustainable with respect to the integrated view of sustainability expressed in many of the models described in this Chapter. However, theorists and practitioners commonly conflate the two concepts, linking the social aspect of sustainability to cultural development, as I believe is the case when a sustainability model incorporates "culture". Such models also provide little guidance as to how to practise sustainability as a cultural expression in itself. Writing on this topic, Duxbury and Gillette (2007 p3) state that: "To date, culture has traditionally been viewed as a component of the social dimensions of sustainability or as part of discussions on social capital, and has largely been unexamined." While culture has been examined further since this statement, I suggest that this is still the case, because sustainability models incorporating culture still largely treat culture as a

fixed state, or a “capital”, rather than a dynamic flow, and because such discourse limits an understanding of culture to our familial or ethnic culture or culture as a synonym for artistic expression. Such models certainly have no scope for consideration of the fact that many forms of cultural expression in the present day act as a means of preventing sustainability.

A culture of sustainability is more complex. Our next step should be to embed sustainability principles in the individual, as a deeply transformational and ideational internal guide, so that he or she can apply the sustainability principles appropriate to any context, and with particular emphasis at significant leverage points in our socio-technical systems so that our efforts connect, synergise and build momentum for change. Thus, to extend the achievement of the sustainability movement to date, and to create a culture of sustainability, two actions are necessary:

- To facilitate those already sympathetic to sustainability principles to deepen their existing understanding, strengthen their capacity to take pro-sustainability action at every opportunity and to live up to their ideals; and
- To attract the uninterested and uncommitted (as well as the covertly and overtly hostile) to participate in the on-going creation of the new sustainability paradigm.

Achieving these actions is the most difficult aspect of the mission of the sustainability movement. The discussion about social and cultural change in Chapter 5, socio-technical systems in Chapter 6, learning issues in Chapter 7 and the concept of emergence in Chapter 8 illustrate just how difficult the above actions will be, reinforcing the notion that the intent of sustainability, while necessary and noble, is highly problematic.

Chapter 5 Ways of Social and Cultural Change

5.1 Introduction

In this Chapter, I discuss the connections between culture, values, norms, attitudes and behaviour and review some significant perspectives on social and cultural change. I discuss change in a flexible and broad way, because there is considerable overlap between the cultural and the social. As Cocks notes this is because much of the social change literature applies the terms culture, society, societal change and socio-cultural change as interchangeable (Cocks, 2003, p. 148). A broad understanding of culture will assist sustainability practice, as we can develop a sense for how cultures and societies change; how we can consciously and actively foster change; and how we can develop ways to a culture of sustainability. While I have attempted to be consistent in my use of terms, with the initial discussion of culture in this Chapter referring to social change theory, my pragmatic approach is to derive meaning from a fluid interpretation of society and culture to avoid an ideologically-bound approach and habitual thinking.

This Chapter mainly focuses on change as a general social phenomenon. However, as sustainability practitioners are concerned not only about change on the general social scale, but also at smaller scales: the community, social grouping or sector, the organization or institution and at the individual level of personal practice. I discuss these themes in Chapter 9.

From this perspective, this Chapter explores culture as a working model for sustainability practitioners, and not as theory *per se* for purely academic interest. This approach places great value on the following research question: Are there any conceptual gaps in conventional understandings of change with implications for sustainability? By asking this question, this Chapter investigates sustainability's overlooked dimension – the influence of culture and it's associated values, norms, attitudes and behaviours – often alluded to as significant, but with its impacts usually overlooked by sustainability proponents and practitioners. Thus I ask how culture really works in a human systems sense. For Ingleheart, it is "an essential causal element that helps to shape society – and a factor today that tends to be underestimated" (Ingleheart, 1990, p. 14).

I believe that culture runs deep, is often unconscious, and an essentially ideational motivator of our actions in the world: a significant part of any human endeavour. Further, I propose that anyone engaging in social change processes must appreciate

the role of culture in change. Coming from a technology background, I am very much aware that for most technologists, culture (and any social issue) is a minor consideration, often regarded as irrelevant in the modernist technological society. This is very dangerous thinking (and a dangerous culture) and a contributing factor to our current unsustainable practice.

In Chapter 1, I presented my proposition about the emergence of sustainability culture and its implications for sustainability practice. Thus, the understanding of the cultural domain and its relationship to sustainability is critical for practice, because change emerges in the cultural domain. This domain represents a field of possibilities, in constant movement, creating new values, attitudes and norms, driving the behaviours of individuals, communities and societies (Yamauchi, 2005, p. 104). However, Hardison (1989, p. 288) sounds a warning note, suggesting that cultural change is unpredictable:

> Cultural evolution should not be understood, any more than biological evolution, in terms of movement from bad to good or good to better. Its absolute direction is best symbolized by an arrow pointing down a dark corridor.

So with Hardison's spirit of doubt, I am approaching this exploration of society and culture as a stage in my growth from a technologist to a sustainability practitioner – as a participant in the real world of activity: where we must engage with people, make plans and take action. However, In spite of the importance I am placing on culture and its role in sustainability, I do not profess to be a cultural studies theorist or a social scientist. While I cannot hope to have more than a working knowledge, I can develop a sense of how culture relates to sustainability, and communicate that sense in this Chapter.

5.2 Culture: Sustainability's Overlooked Dimension

I argue that the purpose of developing a new cultural paradigm of sustainability is to attain an intrinsic state – a second nature - where sustainable behaviour is a part of everyday life, and a deeply informing impulse in our actions.

Sustainability proponents regularly assume that, by identifying social and cultural factors in any plan, model or strategy, they have accounted for social and cultural factors. Further, when culture is considered in models of sustainability, it is tends to concern maintaining extant cultural practice rather than creating a culture of sustainability to support sustainability activity (United Cities and Local Governments, 2010). However, such thinking effectively ignores the cultural factors involved in either

sustaining any course of action or in preventing sustainability outcomes from occurring. Thus, people and their existing cultures can adversely affect any otherwise well-conceived sustainability framework, model, strategy, process or tool.

Culture, then, can potentially facilitate as well as obstruct action for sustainability. The Cynefin Centre for Organizational Complexity plainly states the role of culture: "Whether in a Petri dish or the global economy, things happen because culture is the fundamental medium. Organizations, communities and societies are realizing that ideas and efforts grow, contend and thrive only when nurtured by the culture" (Snowden, 2003). Culture can be understood at different levels as well: at different system hierarchies and varying degrees of depth. To illustrate: while I was attending the Ecology-Culture-Community conference at the University of Queensland in 2002, a black-clad delegate from Melbourne, after hearing I was living in Tasmania, asked me if there was any "culture" in Tasmania. The different meanings of this exchange struck me and I proceeded to defend what I consider to be a very rich, possibly unique, and accessible culture, the equal of culture anywhere. I knew that my interlocutor was implying a view of culture based around concerts, entertainment, ethnic food and art-house movies. However, the exchange convinced me that the treatment of culture is often restricted to such a shallow view.

In light of the above anecdote, I refer not only to culture but also to the related human factors of values, norms, perceptions, beliefs, attitudes and their ensuing conscious and unconscious behaviours - definitely more than having access to the local art-house cinema. Therefore, in the pursuit of a working understanding of culture, in this section I review some significant ideas from social and cultural theory.

Barnouw (cited in Matsumoto, 1994, p. 4) defines culture as the set of attitudes, values, beliefs and behaviours shared by a group of people, communicated from one generation to the next via language or some other means of communication. Culture is the "totality of whatever all people learn from each other" (Segall, Dasen, Berry & Poortinga, 1999, p. 3) and it "is only an abstraction based on the commonalities displayed by the behaviour of a given group of people" (Barnlund & Araki cited in Segall, et al., 1999, p. 3). It has been described as forming a worldview and an adaptive strategy, which is, according to Howard:

> … the basic cultural orientation of the members of a society – the way in which people perceive their environment … Not all members of a society adhere to the same perceptions or beliefs, but a society's

> worldview is thought to represent the shared understanding of that society as a whole (Howard, 1996, p. 143).

Howard's idea of culture as an adaptive strategy provides a link to an understanding of culture as complex and adaptive, and informs the discussion of complex human systems in Chapter 8. Matsumoto (1994, p. 4) extends Barnouw's definition:

> This definition of culture is "fuzzy". That is, there are necessarily no hard and fast rules of how to determine what a culture is or who belongs to that culture. In this sense, culture is a sociopsychological construct, a sharing across people of psychological phenomena such as values, attitudes, beliefs and behaviours. Members of the same culture share these psychological phenomena. Members of different cultures do not.

Matsumoto's above description reinforces the idea that culture is complex. Matsumoto (1994, p. 4) continues by describing culture as not rooted in biology or nationality, but "as much an individual, psychological construct, as it is a macro, social construct". This latter definition is important because it confirms that culture, as both personal and social, operates across different scales, with implications for sustainability at different scales. So, to summarise the general view, culture encompasses the seven characteristics described in Box 5-1:

1. The ways of life of a particular nationality
2. The ways of life of a particular ethnic group
3. The ways of a particular religious group
4. The ways of life of a community
5. The ways an organization carries out its business (organizational culture)
6. The ways of self-organized and self-styled groups (subcultures)
7. The personal cultures of individuals (self-styling)

Box 5-1 Seven broad characteristics of culture

More specifically, it includes learned knowledge and skills, social knowledge, symbolic behaviour, ideas, myths, fields of action and myriad adaptive processes. We have to be careful, however to avoid the trap identified by Snowden (2002, p. 2): "Culture is the new bucket class into which anything involving human factors is deposited". By extension, this point has implications for a culture-based sustainability model: it may be important to avoid attributing to culture every difficulty experienced in furthering sustainability.

5.3 Values and Attitudes

5.3.1 Values

In the cultural domain, what are values and how do they relate to culture? The public discourse on values has opened up in recent years, especially in terms of debates about immigration, terrorism and nationalism. Howard (1996, p. 145) proposes that values are an expression of culture, both social and personal, and are "emotionally charged beliefs about what is desirable or offensive, right or wrong, appropriate or inappropriate".

The domain of values, for example, is where much of the sustainability movement is taking place. Beatley and Manning (1997, p. 17) argue that the sustainability crisis is a crisis of values, demanding the creation of a new environmental ethic. Values are often expressed in terms of "what we value". However, in the sustainability context, the assumption is that if the majority "value" the environment, implementation of sustainability principles should follow. However, we also value our cars, our real estate, our appliances, our ability to get on a plane at any time to anywhere, our money, our entertainment, the self-esteem derived from our work and freedom of choice. Our expression of these commonly held values is regularly conflict with our valuing the environment. Our value systems thus do not necessarily help us chart a way when our different values are in conflict, because the discussion about the meaning of values is often too vague to be useful.

Thus, Langdon Winner is scathing of the "values" discourse, particularly its vagueness (1989, p. 162):

> One obvious cure for the hollowness of "values" talk is to seek out terms that are more concrete, more specific. Whenever we feel the urge to say "human values" or "social values," perhaps we should immediately substitute a phrase closer to our intended meaning. If we mean "motives", then let's talk about them. If we mean "consumer preferences", then say so. If we mean the norms of a "particular group in society," then talk about those. If we mean "general moral principles that ought to guide our action," then explore, define, and defend those principles.

The above quote from Winner suggests that as practitioners working with people, we should endeavour to move the discussion of values to a more specific and grounded basis. Further, "What we will find, I believe, is that these more specific topics are an improvement over the vague label, and that once we've begun using them, the word "values" can never again substitute meaningfully for more substantial terms and questions" (Winner, 1989, p. 162). Thus, following Winner, when we talk about values

we are talking about motives, preferences, group norms and moral principles, and it implies that values are strongly demonstrative of beliefs and perceptions. Religious belief, in particular, opens up exposure to a set of group norms and moral principles.

5.3.2 Attitudes

Values can also develop into the expression of attitudes. Much social polling, including environmental polling, seeks to understand peoples' attitudes to specific issues, with the implication that attitudes lead directly to behaviour (as in voting intention), and further, that attitude change leads to behaviour change.

In social theory, attitudes are regarded as having three components in a complex of affect, cognition and behaviour (Forsyth, 1995, p. 198) - feeling, thought and behaviour - with continuous interplay among the elements. Thus, sometimes behaviours drive attitudes, rather than the other way around, enabling people to retain a semblance of personal consistency and to avoid cognitive dissonance (Festinger, 1957). Fishbein and Ajzen's theory of reasoned action (cited in Forsyth, 1995, p. 213) proposed that attitudes do not cause behaviour – they signal an intention to perform a behaviour. Therefore, attitudes may not be a strong indicator of likely outcome, with implications for change for sustainability if attitude change becomes a focus. I discuss the relationship between attitudes and behaviour in greater detail in Chapter 7.

From the point of view of the sustainability movement, the preceding discussion demonstrates that culture is indeed a deep ideational process (I referred to it as a "new dreaming" in Chapter 1) that shapes our values, creates new social norms, changes the focus of perceptions, defines our attitudes and drives our behaviour. I prefer to orient the discussion of culture away from nationalistic or ethnic interpretations and focus on the way groups of people in contemporary life adapt to, accept or reject change, whether self-organized, imposed or emergent.

5.4 Ways of Change

5.4.1 Introduction

When we talk about change, what do we mean? Who or what are we changing? Are we changing communities, societies, processes or material artefacts? Do we mean individual change? Do we mean unplanned change that occurs through external forces? Do we mean slow evolutionary change or fast, possibly catastrophic change? At what scale? Moreover, what is the role of culture in all forms of social and technological change? Ingleheart (1990, p. 3) addresses this issue thus:

> Each culture represents a people's strategy for adaptation. In the long run, these strategies generally respond to economic, technological, and political changes; those that fail to do so are unlikely to flourish, and unlikely to be imitated by other societies. Though cultures change in response to changes in the socio-economic, political and technological environment, they also shape that environment in return.

Ingleheart's perspective supports change as a dynamic and an emergent, and accommodating many ideas and layers of change, ranging from personal behaviour through to large cultural shifts. Thus, the arrow of time becomes significant: adaptation to new conditions is not reversible. Further, when culture is passed on from one group of people to another, or from generation to generation it performs in ways somewhat like the transfer of genetic traits. The term "meme" was coined by Richard Dawkins (2006) to explain such cultural transmission.

Change is a given, at any scale and domain. It is "inherent in the very nature of things" (Whitehead cited in Sztompka, 1993, p. 9). Nevertheless, divergent views exist about the nature of social change. Noble (2000) and other theorists (Bourdieu, 1984; Anderson et. al., 1987; Giddens, 2001; & Hilgers, 2009) argue that many of the theories of social change reflect major ideological and practical conflicts and do not lead to an integrated view. Bourdieu (1990, pp.34-35) reinforces this point, and shows that social theorists are prone to theory bias:

> One can bring together under the name of sociologist people who carry out statistical analyses, others who develop mathematical models, others who describe concrete situations, and so on. All these types of competence are rarely found together in one and the same person, and one of the reasons for the divisions that tend to be set up as theoretical oppositions is the fact that sociologists expect to impose as the sole legitimate way of practicing sociology the one that they find most accessible.

Noble groups significant theories in social change as contesting pairs, to highlight the conflict (2000, p. 5): endogenous vs. exogenous - whether causes of change lie within a social system or external to a social system with the possibility that interpretation of causes depends on prior political belief; and inevitable vs. contingent - whether there is an unfolding pattern to history.

Noble also sees the character of change (structure vs. agency; materialism vs. idealism) and the character of explanation of social theory (science vs. ideology; rationalism vs. empiricism) as significant to understanding change. The implications of

Noble's summary of social change theory are significant for sustainability if, as Noble proposes, the social theorists cannot agree about the process and character of social change. Thus, because there is no simple way of integrating the theory of social change, the sustainability practitioner needs to approach change with an understanding of multiple pathways for change. There may also be value in avoiding dependence on ideas of change that are rigid and ideologically based.

Noble's grouping of social change theories may be unnecessarily conflict-oriented, reflecting the culture (and biases) of their proponents, rather than pragmatic real world processes. It may perhaps be more helpful to see these different ideas of social change as linked and evolving ideas, reflecting social and cultural changes (and their timeframes). As a tempering idea and to avoid being captured by dogma, Giddens (2001, p.664) suggests that there is no single theoretical position that dominates sociological theory, and that "the jostling of rival theoretical approaches and theories is an expression of the vitality of the sociological enterprise."

The next sections summarise these broad themes in social change, as understood through patterns observed in history. The eight broad approaches are listed in Box 5-2:

1. Change as a trajectory or wave of history;
2. Change through demographic transition;
3. Change by generational world-view;
4. Change through social movements and revolutions;
5. Change led by heroic individuals, leaders or champions;
6. Change through social engineering;
7. Change through behaviourist methods; and
8. Change from the holistic perspective.

Box 5-2 Eight broad themes in social change

Practitioners in the field of organizational development (as an alternative to social change theory) have identified a number of change paradigms. Much of the literature on managing change in organizations is focused on organizational structures, development of policies and the role of leadership: I have described these (Parnell, 2010) as the structure and policy, and the leadership paradigms. Management consultants de Caluwé and Vermaak (2004) describe an additional five broad change paradigms: competing interests, rational design, behaviourist, action learning, and systems. The systems view is explored in Chapter 6 and de Caluwé and Vermak's ideas are explored further in Chapter 9.

5.4.2 Change as a Trajectory or Wave of History

Noble (2000, p. 8) describes change as either inevitable or contingent, that is, whether there is an unfolding pattern to history, especially as an inevitable linear progression according to Toynbee (cited in Noble, 2000, p. 7) or whether, as Karl Popper proposes (cited in Noble, 2000, p. 8; Sztompka, 1993, p. 181), there is a logical flaw in seeing a pattern to history from present outcomes. The contingent view, according to Noble (2000, p. 8), means: "the trends we tentatively discern, the sequences we believe we can trace, the configurations of apparently related events do not represent the secret pattern of history".

With change as a trajectory of history (or at least as a recurring narrative), it is difficult to discuss its social and cultural changes without appearing to be determinist, historicist and falling into Popper's logic trap where history is regarded as determinism, fatalism and finalism, and where Popper rejects any notions of predictability (Sztompka, 1993, pp. 181-182). However, the alternative view is that there may be patterns in the trajectory of history which are not representative of an inevitable predetermined course and yet may have implications for change to sustainability. The lessons about overshoot and collapse are particularly relevant today, as are lessons of cultural and technological co-evolution.

Cocks (2003, p. 158) argues that accepting a pattern and direction to history is useful, as long as the tendency to extrapolate present trends into the future is resisted and the importance of initial conditions is not underestimated. It may be useful to conceive of a trajectory as not being a rigid path to the future, but rather as a (Dodghson cited in Cocks, 2003, p. 159):

> … list of constraints (historical bindings) which reduce society's spectrum of possible future paths include *[sic*] natural laws, physical limits and logical, technological, economic, ethical, psychological, cultural and political constraints.

Some analysts believe there are patterns (or more correctly, cycles) to change over time. An example of such a perceived pattern is the Kondratiev Cycles of technology-driven economic and social change (Newman & Kenworthy, 1999, p. 48) where evolutionary and incremental change is punctuated by abrupt social "phase changes"[31].

Another way of looking at patterns in history concerns cycles created by the inherent time component of human activity. Human development is intimately linked with time

[31] Discussed in greater detail in Chapter 8.

cycles that range from the immediate and fashionable to others that allow for long-term cultural change (Brand, 1999, pp. 34-39). The concept of “deep time” and the “long view” (as a counterpoint to short-term thinking) is part of Brand’s model in Figure 5-1 and is informed by how different sectors of the world have demonstrated change (not based on events or narratives from history).

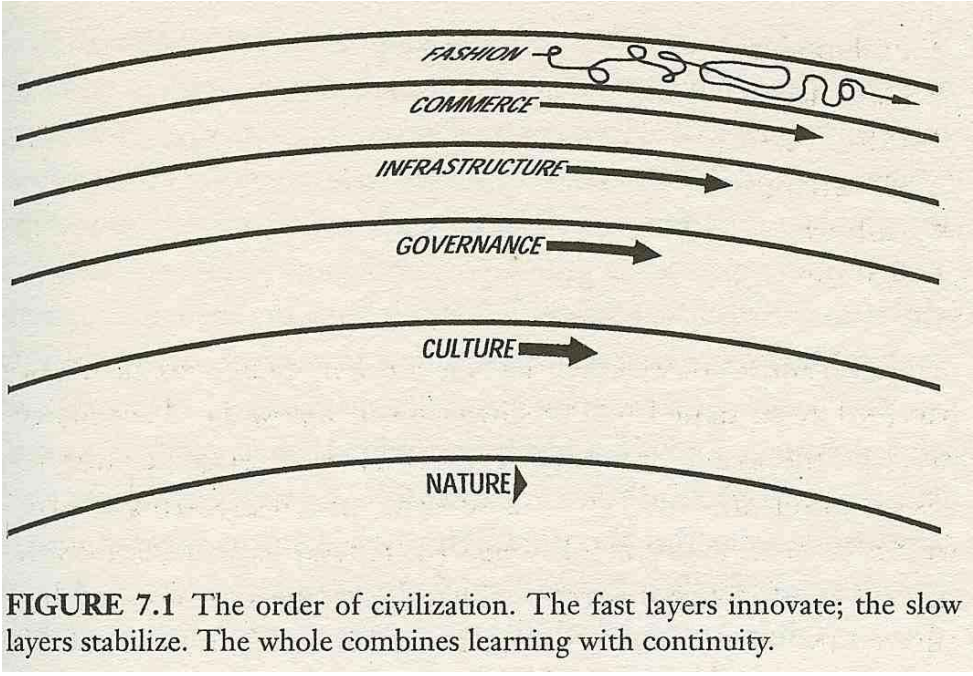

FIGURE 7.1 The order of civilization. The fast layers innovate; the slow layers stabilize. The whole combines learning with continuity.

Figure 5-1 Brand's order of civilization (1999, p. 37)

From the above, it is clear that some things change very regularly – fashion, innovation, political and business cycles - and that other things change more slowly, such as governance and infrastructure: roads, power stations, dams, ports. (They take a long time to plan and build, and are designed to be in use for many decades.) Culture and nature, according to Brand, operate on the slowest and underlying cycles (1999, p. 38). It is also important to distinguish the deep, shared cultures behind whole social systems - from the smaller cultures (operating on the fashion cycle) pervading smaller scale domains of human activity, such as organizations, clubs, political parties, communities, communities of practice, tribes (traditional and post-modern) and subcultures. The political cycle, for example, varies from polity to polity; depending how often elections are held. Further, change driven by cycles of fashion gives the illusion of cultural change. However, once the fashion has moved on, no real change may remain. Unfortunately, the failure of fashion to progress to cultural change has occurred frequently in the development of sustainability over the last 25 years.

One long view of history concerns the co-evolution of technology and human culture. Hardison (1989, p. 288), reviewing the relationship of culture to technology over time, identified that technology (and communication technology in particular) are intimately connected to human cultural development in a movement that is, in the long view, continuous. Jared Diamond (1998) also investigates this co-evolution from a different perspective: geography and environment are the primary forces of cultural and technological change. Many things we take for granted as "natural" are the result of sustained co-evolution of humanity and environment over long timeframes. Further, independent development of technological improvement is rare: most come from somewhere else, often by appropriation. Cultures that have flourished have a tendency to adopt innovative technologies to the extent that they often absorb neighbouring cultures. However, Diamond does not address the potential impact of global technology on our perceptions of geography and environment. The co-evolution of technology and human culture is supported by Wilson (1999) who proposed that modern humans are a result of co-evolution of the hand with tool usage, particularly in terms of shaping brain structure and function. We are inherently technological beings. The implication is that our technology significantly determines human cultural change.

Expressing an ecologically based view of long-term social and cultural change, Ponting (1993) elaborated on the connections between cultural and technological development and the collapse of many societies through history as a result of environmental overshoot and collapse. Diamond (2005) further developed this theme drawing lessons for the future from past experience.

The appreciation of the historic unfolding of cultural and technological development does not confirm a deterministic trajectory: whether we try to change culture, or simply observe it in motion, the outcome may not be what we envisage because of the nature of human systems, and their complex, adaptive and competing interests.

5.4.3 Change through Demographic Transition

Demographers refer to a phenomenon called the demographic transition, in which population growth declines as economic development and urbanization increases, causing populations to level off (Dyson, 2001). Many demographers are predicting a levelling out of the global population in 2050 to between 9 billion and 14 billion, with 11 billion most likely, as more countries pass through the demographic transition (Yencken & Wilkinson, 2000, p. 33). This level of population has long-term implications for sustainability. It seems to be an emergent quality of population growth rather than as a

result of a population policy, as advocated by many environmentalists (Newman, 2006, p. 280). The demographic transition occurs as a result of extended individual life expectancies and reduced infant mortality, creating rapid population growth. A further quality is that reduced mortality rates mean that families have fewer children, with resulting improved prospects for economic development. Often economic development is commensurate with increasing urbanization, with correspondingly greater access to services (especially health and education services), and further lowering of birth rates. The effect becomes most marked in developed countries, where population growth has already levelled so that most growth comes via immigration rather than from growth of the existing population. Some demographers predict that, given the changes in death rates combined with reduction in rates of poverty, many more Third World countries will experience that demographic transition.

The demographic transition, therefore, is a form of indirect, social change responding to many society-wide and internationally significant pressures, acting systemically rather than through policy and structure. Lomborg (2001, p. 47) suggests that such large-scale changes indicate that the demographic transition is a natural evolution for human affairs, with the resultant gradual economic development contributing to the improvement in quality of life.

5.4.4 Change by Generational Worldview

This view of change is similar to the demographic transition. Ingleheart (1990, p. 128) proposes that generational change is a major reason why cultures change. While certain values and norms pervade a culture and may be internalised by newer generations, the lived experience of the newer generation will be different, especially through formative experiences around changes in politics, science and technology. In addition, higher levels of education increase political skill levels and thus promote greater participation in politics. Ingleheart (1990, p. 5) identifies the values changes thus:

> The values of Western publics have been shifting from an overwhelming emphasis on material wellbeing and physical security toward greater emphasis on the quality of life. The causes and implications of this are complex, but the basic principle might be stated very simply: people need to be more concerned with immediate needs or threats than with things that seem remote or non-threatening.

For example, in environmental terms, an implication of the above quote is that the fear of environmental catastrophe, real or imagined, is very distant from the everyday

concerns of many and may not apply great pressure for change. Ingleheart (1990, p. 212) identifies another mode of generational change: the pursuit of individual goals. Individuals growing up in a particular social state take that state for granted, placing less value on the social goals they experienced while growing up, with the resultant dissatisfaction motivating the seeking of new goals: “As one generation replaces another, the priorities of an entire society may change” (Ingleheart, 1990, p. 212).

5.4.5 Change through Social Movements and Revolutions

Recent history has witnessed mass social movements that have harnessed enormous power for change: the civil rights movement, the women’s movement, the occupational health and safety movement and the environmental movement are examples of how social and cultural change can be achieved in a relatively short span of time. Similarly, the transformation of China from a closed society to a free market basis since the 1970s (notwithstanding the retention of political constraints) represents a phenomenal change process, akin to a social movement. However, to the outsider is unclear how much of such change has come through popular demand or a change in the underlying political culture.

Change through social movement occurs when ideas about change become internalised by individuals and social groups who become motivated to bring about the socially agreed changes (Sztompka, 1993). After some time, the changes have been internalised to the extent that the ideas have become a part of the relevant culture. The movement to sustainability has much in common with the idea of social movement. Thus, it is reasonable, as many believe, that this is the way a sustainable society will come about – as a compelling vision adopted by a critical mass of people. Hawken, (2007) proposes that the myriad small grassroots organizations taking sustainability-oriented action, constitutes the largest social movement in history, albeit a distributed one due to its major characteristic being the absence of organized or centralised leadership.

However, successful change by social movement tends towards single or highly focussed issues. While the environmental movement has had success through approaches to preserve a particular river or forest, environmentalists have been less successful when issues are more socially complex. This is why specific campaigns have had success, but success in the larger domain of sustainability is limited. Thus it remains to be seen whether Hawken’s view of a movement results in effective and synergistic action beyond their current domains of action.

5.4.6 Change Led by Heroic Individuals, Leaders or Champions

Change through the actions of heroic individuals can appear suddenly and is often unplanned: it is a reactive approach that relies on a foundation of others' efforts. Yet it often appears that the heroes are acting alone (Sztompka, 1993). Such change is concerned with promoting and leading new ways or reacting to specific conditions and events. We have a deep cultural belief that certain individuals champion the changes shaping society and this belief tends to govern our approach to thinking about change. We focus on individuals doing specific things: we believe that the right actions, the right knowledge, by the right people at the right time will effect the desired change. If change does not occur as desired, we are likely to blame individuals within the system. However, if enough heroes emerge at critical places in the midst of a planned process, they can provide substantial momentum. However, when the heroes fail to bring about change, they are merely rugged individualists.

5.4.7 Change through Social Engineering

Social structure is the focus of social engineering: the institutions, policies and laws developing over time and which tend to persist in social systems. In theoretical terms, the social engineering approach to social change, as described by Noble (2000, p. 10), represents a conflict of sociological realism (or structure), with methodological individualism (or agency). Essentially, this conflict is about the individual and society and thus is an argument about whether change occurs by the agency of individuals or through the structures of society. According to Noble (2000, p. 10), many social theorists have difficulty accepting that both ideas are valid and operational. Such difficulty reflects that social change theory can be ideologically bound and thus may have limited value for progressing sustainability.

Change through social engineering is usually a planned process. Politicians, business leaders, social and cultural leaders, and change agents develop a vision, articulate objectives and pursue them. Visions may or may not derive from stakeholder consultation. Such change usually occurs in organizational and governance contexts where the change agents have the backing of the organization and requisite authority and resources to act. However, change through governance tends to be imposed change. In this approach, behaviourist thinking drives the hoped-for social change, which is depends heavily on rewards and punishments. Sometimes it works, and sometimes it does not. In civil society, imposed government change is sometimes accepted, sometimes resisted and occasionally subverted through much seeking of

"loopholes". This range of responses is because of the tendency for complex adaptive human systems to create opposing forces that can stymie success. Or it may be because the system may not be capable of making the desired change. I argue that the closer the social engineering is to the base level of culture in the social system, the more likely the social system will accept the proposed changes. If the gap is great, social engineering will not work, or worse, will generate considerable social conflict.

Within business organizations, social engineering is much more successful than in broader society, because of business' ability to adopt a command-and-control approach: organizations are generally not democratically constructed, change can be imposed and those not accepting change will have limited tenure within such organizations.

Discussions about sustainability often speak of a conscious, planned, government- and institution-led process, combined with an expectation that individuals will transform themselves accordingly or simply follow along as a "path of least resistance". Therefore, the attitudinal norm for many sustainability practitioners is the belief that government is largely responsible for engineering the social change needed to support sustainability. While a certain degree of social engineering is important in creating regulations, incentives and education programs to promote sustainable behaviour, I believe that excessive reliance on this approach can be counter-productive by reducing creativity and capacity for systems to adapt.

5.4.8 Change through Behaviourist Methods

The behaviourist approach pursues cultural change through a combination of education, training, rewards, incentives and penalties and is conceptually based on dominant thinking in the field of psychology in the 20th Century, particularly the behavioural work of B. F. Skinner (Skinner, 1965). Behaviourism can be defined as a "perspective that focuses on the relation between observable behaviours and environmental events or stimuli" (Westen, 1999, p. G3). This approach is favoured by government agencies seeking change in the community: health campaigns, road safety, and recycling waste, for example. Advertisers employ it in leading people to buy new products or to switch brands. In organizational theory, this field of psychology was embraced in the belief that change is essentially a human resource management issue and that failure to change is usually due to inadequate education and training. Therefore, according to this view, any desired changes can be positively and negatively reinforced (de Caluwé & Vermaak, 2004).

A common way to approach social change through behaviourist methods is through social marketing (McKenzie-Mohr & Smith, 1999). According to Andreasen, social marketing involved identification of a social problem, framing the problem, identifying the structure of the problem, setting priorities, identification of the target audience, and implementing programs based on information dissemination, education, social norming and support (Andreasen, 2006). The period required to create sustained change is generally long-term, and thus other long time-frame change approaches (such as change by generational worldview) overtake social marketing initiatives

The behaviourist approach tends to be applied to "single-issue" change methods and does not work well in complex environments. Organizational change methods are heavily oriented to behaviourist approaches, and, according to Isern and Pung, the success rate of change in organizations is poor (Isern & Pung, 2007, p. 2).

5.4.9 Change from the Holistic Perspective

Another theme in contemporary social critique is positioned to resolve the apparent conflict amongst proponents of different views of change. Francis (1987, p.1) identifies an alternative view where social change is fundamentally holistic, as the transformation of society is a transformation of the whole, yet he questions "how change in one dimension of social organization transmits its effects to other dimensions." To deal with the unnecessary ideologically bound conflicts, and to respond in part to issues raised by Francis' rhetorical question above, social theorists Anthony Giddens and Pierre Bourdieu propose a fluid understanding of change as situated in an everyday practice that is influenced by its enveloping social structures and yet is capable of influencing those same social structures (Bourdieu, 1997, 1990; Giddens, 1984, 1986, 2001). Hilger (2009) suggests that Bourdieu:

> … attempts to overcome a series of oppositions: subjectivism vs. objectivism, micro vs. macro, strategy vs. non-strategy, freedom vs. determinism, and so on … Bourdieu stresses the impossibility of integrating a theory of practical knowledge of the social world into a strictly objectivist perspective. Praxeological knowledge is useful because it effects a synthesis between the givens of objectivist knowledge (which it preserves and surpasses all while incorporating its assumptions that allow a theory of action) and those of practical knowledge of the social world.

Thus Bourdieu outlines an approach based on reflexivity, where the individual engages in practices responding to the implicit knowledge embodied in any social context, yet

allows for new socially learned changes in behaviour to influence, in turn, the social context. Giddens (1984, 2001) posits that one of the great theoretical dilemmas in social theory is the nexus of human action and social structure: “we make and remake social structure during the course of our everyday activities” (2001, p.668). Previously, Noble identified that this was a major point of contention; Giddens (1984) resolves the conflict with his theory of structuration, linking structure and action in an inseparable duality. Giddens states that what we normally regard as structure in society (and generally supported by the pioneering sociologist Émile Durkheim [1982]), is a pattern of actions rather than a thing or object, especially when people behave in regular and fairly predictable ways.

Extending everyday activity into broader scales, Giddens identifies the concept of “unintended consequences of purposive action” (1992, p.364), whereby actors may “know” what they are doing, but the results are contrary to their purpose. Giddens struggles with this dichotomy and uses mechanistic terms to explain this phenomenon, demonstrating that the link between the theory of structuration and the emergence phenomenon is not clear.

With Gidden’s theory of structuration, he demonstrates the beginnings of a model of change with a dynamic systems-oriented basis, especially with his appreciation of the importance of patterns of relationships (1986, p.12; 1993, p.165). However, his treatment does not appear congruent with the main themes and language of systems and complexity: in critiquing conventional social change theory, Giddens remains within his own milieu as a social researcher. While the degree of influence of a systems approach in the development of his theory, if any, is arguable, it addresses the problem of activating any purposeful action in a reflexive social setting.

To reinforce this, the beginnings of understanding of social systems and social change from a complexity viewpoint arose from social researchers informing themselves about complexity theory, and not from a natural emergence of complexity theory from the above main themes in social theory (Anderson et.al. 1997; Byrne 1998; Urry, 2005; Castellani & Hafferty, 2010). A key difference between conventional social theory and complexity is that the former generally considers that social causes have social effects, whereas complexity is open to the fact that emergent effects are never purely social (Urry, 2005 p.7). Although some researchers suggest that the early themes in social theory were essentially supported by early systems concepts but later dropped from the body of social theory (Castellani & Hafferty, 2010), it is still reasonable to suggest that, as a complex systems view of social change has emerged over the last twenty

years from outside the body of social theory, it can arguably be treated as a body of knowledge about change in its own right, and thus deserves further investigation. Castellani and Hafferty (2010) have begun the process of articulation of the links between conventional (or "main street") social change theory and complexity theory, through reviewing the work of many theorists from the perspective of complexity. Castellani and Hafferty (2010, p.4) state that: "Our basic thesis – that is, the genealogy we wish to construct – is that western sociology (including its various smaller, national sociologies) has been and continues to be a profession of complexity, although not always of the same type." The map shown in Figure 5-2 below shows the connection and general relationships of the two approaches to social change using the metaphor of a "town" (Castellani & Hafferty, 2010 p.245):

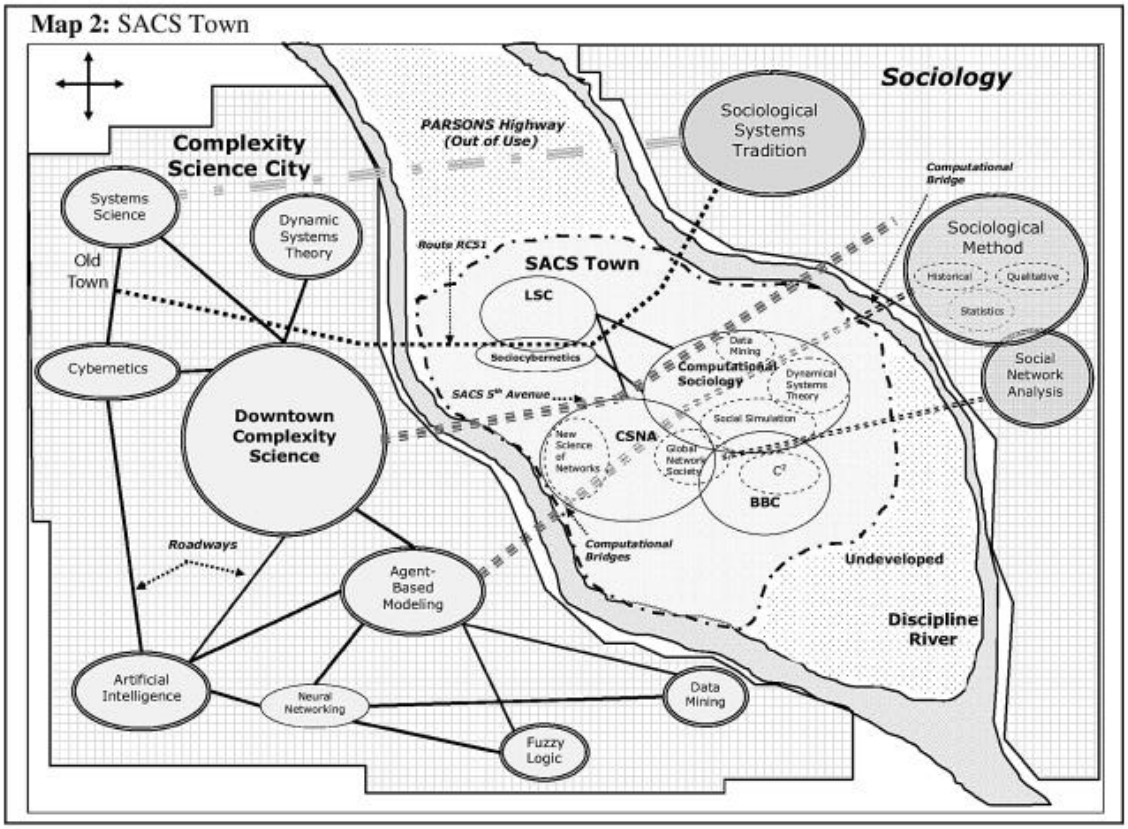

Figure 5-2 Relating sociology to complexity science (Castellani & Hafferty, p.245)

The above map shows that the process of understanding social change through application of ideas from chaos and complexity theories is now underway, both in theory development and in practice. This offers some hope of bridging the gaps, although, for in spite of the themes in social theory reviewed in this Chapter, our fundamental situation is clarified by David Goldblatt in his review of classical and contemporary social theory (Goldblatt, 1996):

> We know that we cannot go on as before. But how to go on, how to live individually and collectively, how to make the transition soon and how to persuade the intransigent, the selfish, the powerful and the uninterested? These are the questions that neither classical socialism nor contemporary social theory have provided sufficient intellectual or moral resources to answer. We shall have to equip ourselves.

A consideration of the potential application of social practice theory to sustainability practice is reviewed in Chapter 9.

5.5 Conclusions: Implications for Sustainability Culture

In this Chapter, I have reviewed the conventional understandings of social change, at generally broader social scales, to respond to the question posed at the beginning: Are there any conceptual gaps in conventional models of change with implications for sustainability? In framing my responses to the above question, I have focussed on broad themes in social change theory. I identified a gap in understanding in the conventional perspective, particularly problems in accounting for the dynamics of complex systems and to account for emergence-based change.

In this section, I have drawn considerable insight from the works of Trevor Noble, Ronald Ingleheart and Piotr Sztompka, all of who offer a meta-analysis of conventional themes and ideas in social change. Each discusses issues, approaches and problems with conventional social change theory and have articulated, if only in part, a view of change suggesting that the systems paradigm, with its interaction of scales, hierarchies and networks, may be useful in understanding and working with change. These three social change theorists demonstrate the considerable degree of disagreement about the processes of change in the different change themes.

The traditional view of social change underestimates the role and place of technology in driving change and shaping its character. Commonly heard is the dualistic view that technology provokes change, while also considered as inert, free of embedded values and culture: merely an appendage to human socio-cultural pursuits. This duality indicates that common views of social change have an inherent gap in understanding of technology as a core cultural expression: this betrays what is possibly a form of technophobia (or fear of technology) or an unquestioning technophilia (or love of technology) (Thayer, 1994, p. 25 & 52). Therefore, in Chapter 6, I propose to explore the idea that the social processes reviewed above are either driven or mediated

through technology and that participants in change are usually not conscious of the role technology plays even though, we are inherently “technological” beings.

To temper my critique of the gaps in conventional views of change, my review of the work of Bourdieu and Giddens suggests that holistic approaches to understanding social change are possible, and that such views appear to grasp the importance of the dynamics of social systems, the co-evolution and reflexivity of structure and agency, and the relationship of macro-scale social change to micro-scale change. Giddens thus shows an inherent feel for complexity, yet he refers to systems theory as a side issue without exploring it as a complement to his theory of structuration (Giddens, 1984, 1993), and does not draw on the emergence phenomenon to explain unintended consequences, unlike Urry (2005) and Byrne (1998). Nevertheless, the work of Giddens and Bourdieu may act as a bridge between the more disaggregated and mechanistic views of change in conventional social discourse and the systems view of change, with its understanding of the emergence phenomenon. Yet I have contrasted this with the beginnings of a connection between complexity and social change through the work of Anderson et. al., Byrne, Urry, Castellani and Hafferty, perhaps finding complexity and systems thinking more meaningful than the debates among the conventional social theorists.

To create meaningful sustainability practice, we must extend our consideration of how societies and cultures change beyond ideologically bound models to develop an understanding of the qualities of complex systems and their emergent properties. Emergent change mostly occurs over time in most human contexts. As we know that human systems have a habit of defying linear causal thinking, change emerges as a new pattern of behaviour and understanding from the complex field of knowledge, values, attitudes, behaviour, agents, characters, relationships and events. The process of social change often yields outcomes that are mostly different from those originally envisaged: the unintended consequences. While planning for social change as conscious action is an inherently worthwhile pursuit, as we try to shape the world I propose that change through emergence is the way that most change occurs. Thus, I conclude that any desired social and cultural change supporting sustainability intimately connects to the emergent possibilities of complex systems. In Chapter 6, I extend the discussion by investigating systems concepts, and socio-technical systems in particular, and clarify why a complex systems approach offers substantial potential for the sustainability practitioner.

Chapter 6 Change and the Systems Paradigm

6.1 Introduction

In addressing the second broad view of change described in Chapter 5, this Chapter responds to the following question: Could the systems paradigm address the conceptual gaps in conventional understandings of change? In framing a response to this question, this Chapter introduces the body of work on systems by reviewing a number of fundamental concepts and systems types, with focus on the importance of socio-technical systems in understanding processes of social and cultural change. Technological processes are central to the understanding of socio-technical systems, so some technology critique has been included. Finally, as a way of understanding complexity and change, this Chapter reviews the real-world application of the systems paradigm within the socio-technical domain.

6.2 The Systems Paradigm

The systems paradigm (sometime referred to as "systems thinking" or simply "systems") is a set of developing theories, principles, ideas, frameworks and practices. The systems paradigm applies to the understanding of natural, technological and social systems, the latter encompassing politics, culture, economics and ways of organization. It encompasses the domains of philosophy, theory, methodology and application (Bánáthy, 1996). The systems paradigm also includes the metaphoric or symbolic, story and narrative, as a qualitative approach. Some critics contend that the systems paradigm is also a form of ideology, religion and pseudoscience (Lilienfeld, 1978), although this is not a widely held view.

A large body of academic and practical work explaining the systems paradigm has emerged since the early 1940s, from such diverse domains as biology, anthropology, cybernetics and organizational psychology. From these earliest stages of development of the systems paradigm, critical concepts developed such as the following:

- "Feedback" as articulated by Gregory Bateson and Margaret Mead in anthropology (Brand, 1976);
- "Cybernetics" by Norbert Wiener (1965);
- The General Systems Theory of Ludwig von Bertalanffy in biology (1969) and Kenneth Boulding (1956) in social science;

- "Purposeful" systems in the organizational psychology of Russell Ackoff and the related work on socio-technical systems of Fred Emery and Eric Trist (Ackoff, 1971; Ackoff & Emery, 1972; Emery, 1971; Emery & Trist, 1973; Trist, 1981);
- The Systems Dynamics of Jay Forrester (1995);
- The "living systems" of James Miller (1978; Miller & Miller, 1990);
- The concept of "self-renewing" from biologists Francisco Varela and Humberto Maturana (1987);
- Soft Systems Methodology of Peter Checkland in management practice (1981);
- The "designed" systems approach of Béla H. Bánáthy (1996) in educational psychology; and
- The "living networks" approach of physicist Fritjof Capra (1981, 2002).

The systems paradigm provides an integrated framework for identifying general principles common to how things work in different domains of the natural, social and technological worlds. The central concept of the systems paradigm is that any natural, social and technological process is more than the sum of its parts – a system is a dynamic network of relationships that allow energy and/or action to flow as the parts interact to create new conditions or outcomes from inputs as transformed by system processes. Biologist Richard Dawkins (2001) quoted the late author, humourist and naturalist, Douglas Adams, in his eulogy at the latter's funeral: "If you try and take a cat apart to see how it works, the first thing you have on your hands is a non-working cat".

This is a pointed critique of reductionist thinking: a critique of the common attitude that the world is seen as a something best understood and manipulated by reducing everything to its constituent parts. This reductionist approach has been described as a Newtonian-Cartesian world-view, where, like Adams' cat, the world can only be understood only by breaking things into component parts (Capra, 1997, pp. 19-20; Cohen & Stewart, 1994, pp. 16-17). This way of thinking has in many ways served society well, but has been responsible for substantial environmental and social damage. However, while the reductionist world-view has its place in simple and complicated space, it has reached a point of limiting returns in our relationship with the natural world and with our increasingly complex social domains (Bernstein, 1983). I develop this theme further in Chapters 9 and 13.

The systems paradigm is also a framework for synthesizing understanding about system goals, processes and outcomes, by looking at a system as a complex, dynamic whole. Ackoff (1981, cited in Skyttner, 1996, p. 35) identifies a system in several ways, as set out in Box 6-1 below:

A set of two or more elements that satisfies the following three conditions:

- The behaviour of each element has an effect on the behaviour of the whole;
- The behaviour of the elements and their effects on the whole are interdependent;
- However subgroups of the elements are formed, all have an effect on the behaviour of the whole, but none has an independent effect on it.

Box 6-1 Ackoff's definition of a system (1981, cited in Skyttner, 1996, p. 35)

Skyttner's qualified definition of a system is: "A system is a set of interacting units or elements that form an integrated whole intended to perform some function" (Skyttner, 1996, p. 35). In contrast to Skyttner's rather utilitarian definition, Capra defines systems in terms of his understanding of living systems (Capra, 1997, p. 29):

> According to the systems view, the essential properties of an organism, or living system, are properties of the whole, which none of the parts have. They arise from the interactions and relationships between the parts. These properties are destroyed when the system is dissected, either physically or theoretically, into isolated elements. Although we can discern individual parts in any system, these parts are not isolated, and the nature of the whole is always different from the mere sum of its parts.

The above systems definitions from Skyttner and Capra clearly stress that the systems paradigm is founded on holism and by implication sustainability as a holistic endeavour can be well-served by the systems paradigm. To clarify understanding, systems can used to describe any action or phenomenon, generally through the perceived system goals. Some system examples are:

- Mechanical systems: cars, boats, planes, bicycles;
- Electrical systems: electric circuits, washing machines, internet server;
- Habitation systems: tents, buildings, transportable structures;
- Biological systems: microclimate, watershed, bio-region, flora and fauna;
- Social systems: clubs, organizations, governments;
- Cultural systems: nations, tribes, language groups, moieties, street gangs, philosophical systems; and
- Economic systems: banks, stock exchanges, co-operatives, aid agencies.

The above systems examples can be described in terms of their goals, processes and outcomes. For example: a car is a transport system for moving people and goods; a bio-region is a system for maintaining the living systems, landscape systems, water

systems and geological systems within its notional boundaries; a bank is a system for storing, transforming and distributing financial capital, and so on. Further, a system can be described differently according to the context of the observer: to a conservationist, a car is a system for killing wildlife; to a car dealer, a system for making money; to a teenager, a system to pursue independence; to an asthmatic, a system for polluting air, and so on.

6.3 Critical Systems Concepts

6.3.1 System Qualities

The systems paradigm has emerged in response to the failure of reductionism to provide value in the face of complexity. It is concerned with a holistic interpretation of the world. While the path to understanding a system includes knowledge of the elements and structure, a holistic understanding can only be derived from the interaction of the constituent parts and thus the elements and structure are seen as interdependent.

Systems have a goal or purpose, but the purpose may be apparent, known or knowable, or not, depending on the nature and type of the system. Goals are designed or implied, the former being a quality of socio-technical systems for example, and the latter a quality of natural, or living, systems. Both types of goals can have emergent qualities. Any system has its own dynamics, unfolding according to the interactions of the system components in the system context. Skyttner (1996, p. 44) describes systems as “goal-maintaining” (as in simple regulatory mechanisms), “goal-seeking” (such an automatic control responding to changing conditions) or “goal-changing” (a reflective capacity of members of living systems). Goal-seeking systems can have multiple goals. The interactions of the system components determine the real goals of a system.

In the case of simple, closed systems, the purpose can be transparent, and known to the system designer or operator – such as in a mechanical system or electronic circuit. Outcomes can be more or less as the system designer intended. The more complex a system becomes, and the less designed it is, the less transparent is the system goal and may not be knowable for the system observer, participants or agents. This lack of transparency is particularly true of natural systems, where the qualities are emergent and the system goals are not readily apparent to the human observer. Even designed systems may have a clearly articulated purpose, but the unfolding of the system in the

context confounds the purpose, delivering outcomes divergent from system goals. This divergence is of particular significance for a design-oriented approach to sustainability.

Context represents the sum total of external drivers and pressures acting on the system. These include physical environmental and climatic conditions; social domains; cultural, moral and ethical contexts; government policies; economic conditions; individual attitudes and behaviours; knowledge systems and so on. Walker (2000, p. 3) summarises the context specific nature of knowledge: "A lot of what we know is only valuable where we live; it often does not have universal portability". Context gives rise to the idea of a system boundary, the limit of a system. Boundaries can be very precise, as in the case of a mechanical system such as a motor vehicle, or very imprecise, such as in a cultural system. Sometimes, a system boundary is a notional cognitive construct to enable system analysis, particularly for open systems. The concept can assist in using a bounded approach in design (Bánáthy, 1996, p. 29). It is certainly evident where people exhibit bounded rationality[32] in making economic choices.

A system is thus not an isolated entity, as it is connected to other systems in some way. Scale is also important: systems can sit in a hierarchy of nested systems (Gunderson & Holling, 2002, p. 74), with a system potentially acting as a subsystem of a much larger suprasystem. Beatley and Manning (1997 p. 23) illustrate this concept of scale as a significant dimension in the sustainability of communities, "the building and site, the neighbourhood, the city, the region or bioregion".

Context also determines the initial system conditions; complexity theory places considerable emphasis on a system's initial conditions – small variations in initial conditions can lead to wide divergence of outcomes. Context is critical: the more a participant understands context, the more transparent the system becomes. As discussed in later Chapters, context is highly significant for sustainability practice in complex space.

Inputs refer to the resources used in a system, the things to be transformed by the system to achieve system goals: energy, materials, food, money, education, services, knowledge, skills; Inputs can be supply-driven or demand-driven, pushed or pulled through systems. The system's metabolism, through interaction with other system

[32] Bounded rationality, a term coined by economist Herbert Simon in the 1950s, describes a decision-making process where rational processes apply once an issue has been simplified. More recently, Nobel Laureate Daniel Kahnemann extended Simon's view (Kahneman, 2002).

elements, transforms inputs into system output, according to system goals (Miller, 1978).

Systems are not necessarily inherently efficient: resources can flow through systems in a wasteful or inefficient way, whereby system goals cannot be achieved, or worse, a new set of problems can be created. Resource flows also indicate any mismatch between the nature of inputs and system capacity. Managing resource flows through dynamic system processes to meet system goals is the principal challenge for any system.

Resources retained in a system for processing at a later stage, are known as stocks. Stocks can be physical (such as water in a dam or materials in a building) or qualitative (such as in knowledge or capacity of a particular group of people). Human, social and cultural capital are examples of stocks. Stocks help to moderate flow by using resources as needed and not at the rate of input. Thus, stocks contribute to system resilience, so that external shocks can be absorbed and processed.

The regulatory aspect of system dynamics is feedback, whereby the system communicates or transfers information or experience to an upstream point in the system process to enable the system to alter or adjust its course. Feedback is described by Skyttner (1996, p. 49) in the following way:

> … a basic strategy which allows a system to compensate for unexpected disturbances and is often defined as the 'transmission of a signal from a later to an earlier stage'. Information concerning the result of own actions is thus delivered as a part of information for continuous action. As a control mechanism it acts on the basis of its actual rather than expected performance…System conduct may however become very complex if several feedback elements are interconnected; the resulting dynamics will be difficult to calculate.

From Skyttner's quote above, feedback can be simple to understand, but where multiple feedback elements exist, systems become more complex and their dynamics more difficult to understand. Extending this complexity, there are two forms of feedback: positive or negative. Positive and negative forms are value-neutral. Positive feedback generally tends to move a system towards changing trends and negative feedback brings the system back in line with original goals: as a loop. Positive feedback (without the balancing influence of negative feedback) has the capacity to move a system to a zone of instability, making it harder to attain a state of dynamic equilibrium, with the possibility of new system goals and behaviour emerging. The outcomes may improve the system or be catastrophic for system integrity.

Depending whether a system has been designed or has evolved, the achievement of system goals can be vulnerable to changing conditions or subject to conditions which were not fully anticipated in the design process. To protect against external shocks, systems need to have qualities of resilience, with the capacity to adjust relevant aspects of internal processes. Even simple systems need some attention or adjustment via feedback pathways. In this way, systems reach a state of dynamic equilibrium, where course corrections oscillate around the system goals. When a system has reached dynamic equilibrium, it is in a state known as homeostasis, a term derived from biological systems denoting self-organization or autopoesis (Varela & Maturana, 1987)

Systems transform resources to achieve system goals. The transformation process can be transparent or, in a metaphorical sense, a "black box" where system process is obscure to the observer. A critical aspect of transformation is entropy: how energy (physical or metaphysical) is ordered in a system; it usually concerns the dissipation of energy, tending to disorder, chaos and randomness (Prigogine & Stengers, 1985). The opposite of entropy is ectopy (or negentropy): the tendency for living systems towards greater order, especially where self-organization is concerned. Self-organization is the process behind the emergence of new patterns in complex space, and is discussed further in Chapter 8.

Output is what actually results from dynamic system processes. Certain types of systems, generally with set inputs and simple linear processing capacity, tend to be predictable, with a high level of certainty (for example, chairs – a system to facilitate sitting – rarely fail). This example demonstrates where the mechanistic worldview still has power and utility. Other types of system tend to be unpredictable (such as a community planning meeting – a system of group decision-making – usually has unforeseen outcomes). Thus, systems do not always produce output according to the assumptions about the inputs and the system goals.

The quality of system output can also be illustrated by the following divergent terms: equifinality and multifinality. Equifinality refers to similar outcomes achieved by different system inputs and behaviours; multifinality occurs when similar system inputs generate different outcomes.

6.3.2 Types of Systems

The above discussion of system qualities and concepts is a preparatory step to understanding different systems types and the concept of emergence as a foundation for the proposal of an Emergence Model of Sustainability Culture in Chapter 8.

There are many different systems classifications, depending on the relevant theorist's perspective. Systems are open or closed, simple or complex, hard or soft, living or non-living. Further, systems can be concrete, conceptual, abstract or unperceivable (Skyttner, 1996, p. 36) and natural, human activity, designed-physical (artefact-based), and designed-abstract (such as a management system) (Checkland, 1981). The characteristics of different systems, according to Skyttner's taxonomy are summarised below in Box 6-2:

- **Concrete** systems exist in physical space and time
- **Conceptual** systems are ideas, usually expressed in symbolic or metaphoric ways which exist within concrete systems
- **Abstract** systems are all conceptual, being subtly different in application to conceptual systems and
- **Unperceivable** systems have a level of complexity and lack of transparency such that the inner workings and structures of the system are not knowable.

Box 6-2 Skyttner's systems taxonomy (1996, pp. 37-38)

Closed systems are simple in concept, generally with minimal exchange with their environment. Defining a truly closed system is problematic – it is a construct to contrast against open systems, by relative comparison. For example, the Earth and its biosphere are treated as a closed system, even though there is input of solar radiation, the occasional penetrating meteorite and a regular coating of cosmic dust. Certain machines perform conceptually as closed systems, again apart from energy input and waste heat and pollutants as outputs into the environment. Open systems rely on constant interchange of matter, energy and information with the environment or context (through the system boundary): living organisms and social groupings are examples of open systems.

Simple systems are generally observable and understandable; their goals are stable, their feedback is straightforward and direct, and they have few internal interactions. Complex systems have more elements and interactions that are more concurrent than simple systems. Size is not the significant aspect. For example, the solar system, as a series of planetary bodies orbiting the sun, is large-scale, but simple. DNA at the cellular level is small, but its interactions are complex. Flood and Jackson (cited in

Skyttner, 1996, p. 66) make the following comparison between simple and complex systems as illustrated in Box 6-3:

Simple systems are characterized by:

- a small number of elements
- few interactions between the elements
- attributes of the elements are predetermined
- interaction between elements is highly organized
- well-defined laws govern behaviour
- the system does not evolve over time
- subsystems do not pursue their own goals
- the system is unaffected by behavioural influences
- the system is largely closed to the environment

Complex systems are characterized by:

- a large number of elements
- many interactions between the elements
- attributes of the elements are not predetermined
- interaction between elements is loosely organized
- they are probabilistic in their behaviour
- the system evolves over time
- subsystems are purposeful and generate their own goals
- the system is subject to behavioural influences
- the system is largely open to the environment

Box 6-3 Flood & Jackson's comparison of simple and complex systems (cited in Skyttner, 1996, p. 66)

Complex systems also tend to be non-linear, less stable than simple systems, operate close to or on the edge of chaos, are unpredictable and difficult to regulate. They can often exhibit adaptive behaviours, especially complex living systems, which are examples of complex adaptive systems. Complex systems can respond to new information or feedback, to continue to follow system goals, or adapt to the changing situation to form a new dynamic; that is, there can be a capacity to self-organize in its adaptive process. Of course, systems can collapse rather than adapt. When viewed in terms of complexity theory, the systems concept expands to accommodate the concept of emergence or new patterns or qualities of systems, with implications for sustainability practice.

Livings systems are characterized by their openness to the environment, their complexity and their capacity for self-ordering and self-renewal (Varela & Maturana, 1987). Living systems are complex and bounded in complex natural suprasystems as part of a natural hierarchy. They have a tendency to evolve into forms of increasing complexity. Social and cultural systems have been classed as living systems and

feature in Miller's hierarchical order of living systems (Miller, 1978): cells, organs, organisms, groups, organizations, communities, societies, and supranational systems.

The theory of soft systems was a response to the dominant hard systems thinking. Typically, hard systems thinking arose from the engineering domain, where systems could be analysed in a systematic way with defined results (Checkland, 1981). This type of thinking lent itself to concrete, man-made, simple systems, but failed in understanding what Checkland describes as soft systems, where human problems are "wicked" (Brown, Harris & Russell, 2010; Rittel & Webber, 1973). Wicked problems have no obvious solution and there may be many possible pathways to a solution. The process of reaching the solution is a process of discovery. Checkland (1981) proposed that the way these wicked solutions were approached would be fundamentally different from problem solving in hard systems. He recommended using phenomenological Action Research methods rather than hard science as the primary path to discovery. Checkland also differentiates between human activity systems at a large scale (defence systems, trading systems and transportation systems) and designed systems conceived as meeting specific needs.

The systems concepts discussed above are fundamental to the arguments mounted in this research project, especially the emergence proposition. However, further clarification is necessary before proceeding. The next sections link to socio-technical systems concepts and their role in social change.

6.4 Change and Socio-technical Systems

6.4.1 Socio-technical Systems

Of particular interest to the development of sustainability is the concept of the socio-technical system, whereby people, societies and cultures and their technological systems intersect; or (in terms of the typologies discussed above), where the soft social systems integrate with hard and soft, physical, conceptual and abstract technological systems. The understanding of socio-technical systems is critical for the development of a sustainability culture. The concept of socio-technical systems was first articulated by Eric Trist, Ken Bamforth and Fred Emery at the Tavistock Institute in the United Kingdom in the early 1950s and 1960s (Emery & Trist, 1973; Trist, 1981; Trist & Bamforth, 1951) and developed over the years since (Berkhout, Smith & Stirling, 2003; Geels & Schot, 2007; Pasmore, 1988, 1995). The concept originally had a narrow focus on the improvement of productivity in manufacturing and industrial settings through organizational design and it still generally informs thinking about socio-

technical systems. In recent times, however, ideas of socio-technical systems have transcended the commercial/industrial organizational process domain, and they now describe any intersecting social and technological domains and the human processes therein (Berkhout, et al., 2003).

The industrial and organizational contexts of socio-technical systems theory are indicative of the concerns of the progenitors, and their attitude to technology based on a narrow definition of technology as artefact. However, the experience of working in such contexts suggests that any intersection of place, social system and technological system is a socio-technical system. Even the later work of Emery and Trist expanded beyond the industrial and organizational contexts, to include community work, search conferences and participative design in broader social settings (Pasmore, 1995, p. 18; Trist, 1981, p. 56).

As many analysts have explained, socio-technical systems are complex, adaptive, open and living systems (Capra, 2002; Pasmore, 1988). Their adaptive aspects concern the capacity for innovation, novelty, and the adaptability to new contexts. Thus, our socio-technical systems are our drivers of change – either destructive/unwanted or constructive/wanted – and will be the domain through which a sustainability culture will emerge. In my view, then, the theoretical concept of the socio-technical system supports the understanding of sustainability culture as an emergent quality of complex systems.

6.4.2 Social Construction of Technology

Many theorists agree that as technology is socially embedded, the main processes of social change are generally socially constructed rather than technologically determinate (Bijker, Hughes & Pinch, 1989; Volti, 2006; Winner, 1977). Technological determinism implies that technology is autonomous and independent of external influences. Volti, while mostly positive about the consequences of technological change, acknowledges that the main characteristic of the technological change process is subversiveness, in the sense that any new technology changes the social world without the social world being conscious of the fact (Petroski, 1985; Volti, 2006, p. 17). Volti (p. 37) proposes that socio-technical system change is pushed and pulled by social forces, usually market-based, but sometimes for altruistic or playful exploration reasons. Neither the shaping of society by technology nor the shaping of technology by society have primacy over each other (Volti, p. 272):

> … but technological and social change is better understood in terms of probabilities, reciprocal interactions and feedback loops…Both are dynamic processes characterized by the reciprocal interaction of a host of factors, some of them narrowly technical in nature, others not.

The above quote suggests that change at the socio-technical interface, while "socially constructed", is systemic in nature, and by implication, exhibiting the behaviour of complex systems and their emergent qualities.

6.4.3 Roger's Innovation Diffusion

In his Innovation Diffusion framework, Everett Rogers (Rogers, 2003) proposes that innovation is not just the design of new products – it is a whole socio-technical change process encompassing new ideas, their development and diffusion as a social and cultural process. Innovation is commonly understood as a research and design-oriented process. However, Rogers extends understanding to include the social context into which new ideas and products diffuse.

Rogers identifies the main elements of the innovation process as primarily a process of diffusion: an innovation, communicated through certain channels over time among the members of a social system. Participants in any social milieu must adopt a new technology for it to be an innovation: yet innovations do not necessarily need to be new, they just need to be perceived as new by the receptive social system. Much innovation is about technology as artefact, but consistent with a broader view of technology, it can include ideas, systems and practices.

An innovation process has achieved its broad aims when an individual or social system changes to accommodate the innovation. Rogers (Rogers, 2003, p. 470) classifies consequences as desirable/undesirable, direct/indirect and anticipated/unanticipated. He proposes that we cannot separate the desirable from undesirable consequences and that the undesirable, indirect and unintended consequences go together. The key factors in innovation are form, function and meaning. Form and function have a narrower technological sense, but only individuals, societies and cultures can make meanings. Meaning is context specific, and changes in social systems are often substantially different from those anticipated by the designers, developers or change agents.

An innovation diffusion process can adversely affect its host social system, even a stable one. The unpredictability of the process leading to uncertain consequences influences the meaning that adopters place on any innovation. The success of an

innovation and its consequences, then, is directly related to the ways a social grouping makes meaning of technological intervention (Rogers, 2003, p. 471); further, a social system's structure is significant in determining the extent of sharing of consequences, thus confirming the importance of understanding change in terms of the socio-technical process. A key aspect of Rogers' framework is the identification of different archetypes in social systems: his adopter categories. Any innovation diffuses through a social system at different rates because of different adopter characteristics and behaviours regarding innovativeness. Rogers (2003) has classified and explained these as shown in Box 6-4 below:

Innovators: venturesome; networks beyond local peers; financial capacity; the ability to understand and apply complex technical knowledge; ability to cope with uncertainty; the pathway for new ideas into a social system.

Early adopters: respected by peers; more integrated in social systems than innovators; high degree of opinion leadership; give advice to others; speed the diffusion process.

Early majority: deliberate; adopt new ideas before the average person; are not opinion leaders; an important link between the early and late adopters; may take time to reach a decision.

Late majority: skeptical; adoption as a result of economic necessity and peer pressure; cautious; innovation must reach system norms before a late adopter is motivated.

Laggards: traditional; last to adopt changes; localite in outlook; past is the point of reference; resistant to change.

Box 6-4 Rogers' Innovation adopter categories

Rogers' explanation has been extended with some later development by Atkisson (1999 pp. 180-185) in Box 6-5 below:

Change Agent: The "idea broker" for the Innovator; the promoter of new ideas, solutions, directions; the innovation marketer and communicator.

Reactionary: Has a vested interest in keeping things as they are or in moving in the opposite direction; actively resists the adoption of the innovation; sometimes has an economic or power interest in the status quo; changes only if unavoidable, and then very late in the process.

Iconoclast: "A person who attacks cherished beliefs"; actually a silent partner to the Innovator; also believes things must change for the better; often a journalist, critic, artist, or social gadfly; while the Innovator pulls …from in front, the Iconoclast kicks … from behind (and keeps the Reactionaries busy).

Spiritual Recluse: The monk, ascetic, visionary, meditator; more preoccupied with eternal truths than present realities; often a source of inspiration to the Change Agents, Innovator, or even the Iconoclast.

Renunciate Curmudgeon: The grouch who hates society and has abandoned it; often a source of inspiration to the Iconoclast; the backwoods pioneer, solitary crank, angry punk rocker, or even the criminal; sometimes creates an antagonistic subculture.

Box 6-5 AtKisson's extension of Rogers' Innovation Adopter Categories

AtKisson expresses the framework, using the imagery of the single cell amoeba to characterise people in an organization, group or community according to their capacity to lead change and to adopt new ideas as well as the capacity to block and disrupt change efforts (AtKisson, 1999, p. 182). These relationships are illustrated in Figure 6-1 below:

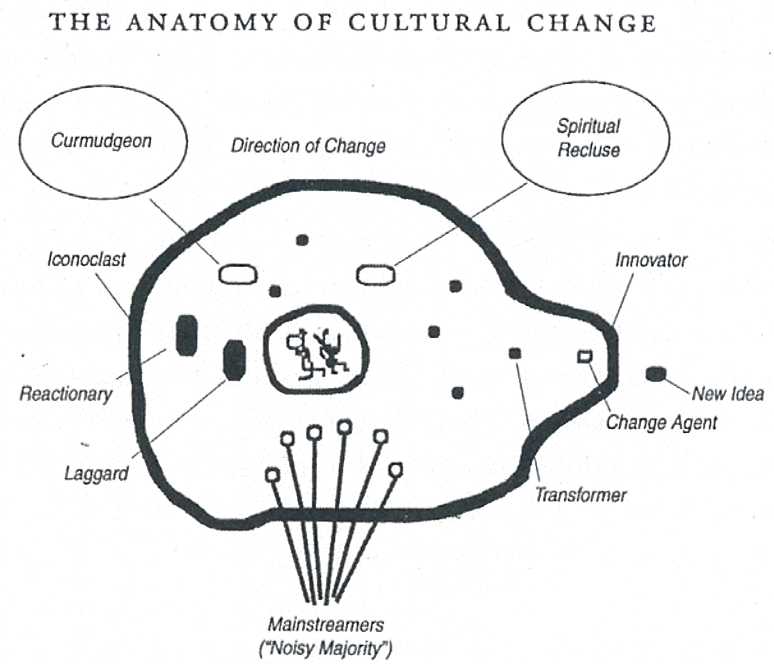

Figure 6-1 AtKisson's Cultural Change model [after Rogers' Innovation Diffusion Adopter Categories (AtKisson, 1999, p. 182)]

Roger's Innovation Diffusion is a pragmatic framework for understanding change as a socio-technical process. It substantially extends beyond simplistic behaviourist approaches to change and while it does not explicitly relate the process to the concept of emergence, it has internalised a feel for emergence through practical application over many decades: its wisdom is in leaving the innovation process open to unpredictability and owns the effect of so-called "unintended consequences".

6.4.4 Seemann and Talbot's Technacy Theory

Technacy is a framework for understanding how technology embeds in human activity in a socio-technical systems sense (Seemann, 1997, 2001; Seemann & Talbot, 1995). The development of technacy as a theory was informed by socio-technical systems theory as well as the earlier work of Schumacher (1974), Willoughby (1990) and Smillie (1991) in the field of appropriate technology. In addition, the experience of technological activity in remote desert communities informed its development, especially the Indigenous people from a remote Western Desert community (Seemann, et al., 2008, p. 25). It emerged from practice and is thus a practical and pragmatic framework and is characterized as holistic rather than reductionist. Its main usage has been in the teaching of technology in schools, in tertiary education and in community-based education. The inherent quality of technacy is the appropriateness of any technological activity, and behaviour change through interaction with and manipulation of technology in a social and environmental context. Smillie (cited in Seemann, 1997) identified that technology had a few common components:

- A social component (inclusive of organization, people and culture);
- A technical component (inclusive of hardware and techniques such as computers, jets, tools, machines, and processes);
- A contextual or environment component (inclusive of farms, factories, communities and the resource characteristics of these contexts); and
- An evolutionary or time influence component (inclusive of historical information and influences to technical activity).

Technacy emerged from practice, and is thus a practical and pragmatic framework, but characterized as holistic rather than reductionist. As a conceptual framework, technacy is continually evolving to (Seemann & Parnell, 2008):

- Facilitate greater understanding of technology as a value-laden social process;
- Link the technological, social and environmental aspects of human activity; and

- Develop problem solvers (or technate individuals) who can choose, evaluate, transform and apply technologies that are appropriate for local contexts.

As described by Seemann (2001, p.2):

> In the same way as literacy is core to language and comprehension in society, or numeracy to number and mathematics, so too is the discourse in technacy to technology in society. Technacy is therefore not driven by vocational themes or agendas. Instead, its themes are driven by developmental concerns that underpin all other discourse that may follow in related branches of study and vocations.

Technacy integrates three intersecting sets representing Human Context Factors, Technological Context Factors and Environmental Context Factors (Figure 6-2). It is rare for these three factors to be considered as connected and interrelated: technologists rarely consider environmental contexts or social factors; social theorists may discount technological factors as having social significance; the environmental viewpoint is based on technology as responsible for negative environmental impacts or, in the case of eco-technology, as a way forward. Such judgments are common and result in the disaggregation of the three technacy factors and a lack of holism (Seemann & Talbot, 1995). The right-hand side of Figure 6-2 represents the interrelationship of the three factors, with technate activity as a potentially integrated solution.

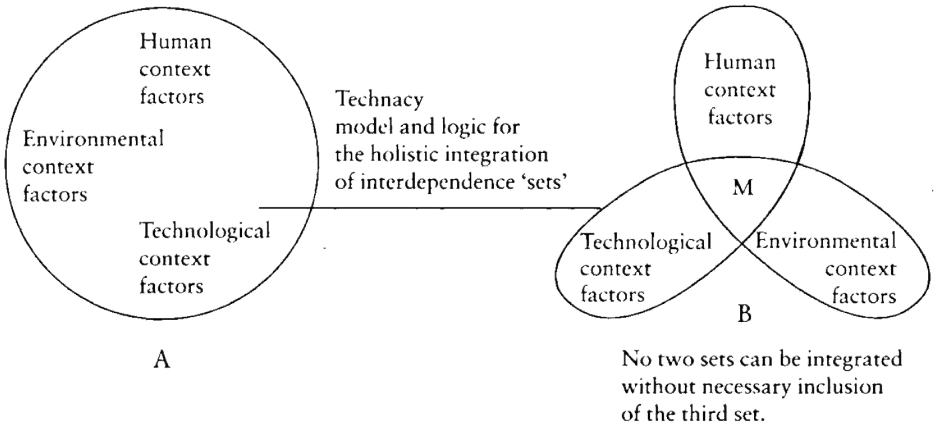

Figure 6-2 The Technacy model and holistic integration

(Seemann & Talbot, 1995, p. 770)

This model shows (Seemann, 2000p. 12):

> ... that no one aspect of human technology practice can be defined and analyzed without necessarily including the other aspects. Holistic technology practice exists at 'M'. Holistic technology education therefore must foster the capacity to function creatively in

> 'M'. Thus technology practice and technology education have their performance regulated by how well they have been tailored to the human, environmental and technological contexts of the end-users of technologies and technical training programs.

The technacy model cycles like a system through the stages of socio-technical activity. It can operate fractally[33]: the technacy pattern is discernible at different scales and hierarchies of activity as shown in Figure 6-3 below:

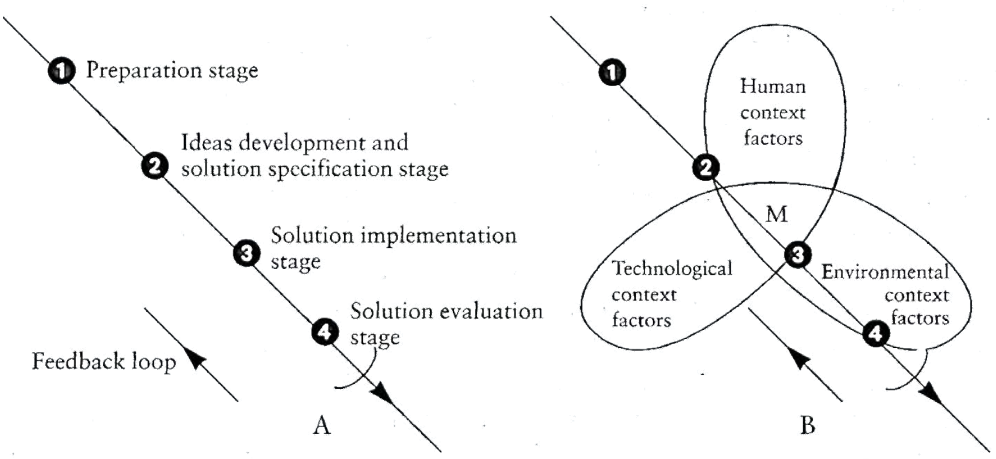

Figure 6-3 Technacy as a cyclic process in technological activity

(Seemann & Talbot, 1995, p. 770)

The fractal nature of technacy, combined with its integrating nature can aid in sustainability practice by assisting the practitioner to account appropriately for socio-technical system behaviour. The application of technacy to learning is discussed in Chapter 7.

6.4.5 Socio-technical Transition Contexts and Pathways

As part of an updating of understanding about change processes in socio-technical systems, Berkhout, Smith and Stirling (2003, p. 3) make a link between the socio-technical systems paradigm and the concept of sustainable development:

> Since the advent in the mid 1980's of the concept of 'sustainable development' as an objective in policy-making, political attention to environmental challenges has grown at national, regional and international level. In few other areas is the two-edged nature of technological development more pronounced, the ambitions more transcendent, and the conflicts more acute.

[33] Repeated patterns at different scales. See Chapter 8 An Emergence Model of Sustainability Culture.

According to the above quote, the socio-technical systems concept extends beyond the industrial workplace into any domain where social and technological systems intersect, and is thus substantially more useful for understanding the value of the socio-technical in sustainability culture. Therefore, they identify socio-technical change as occurring in terms of a multi-level model as summarised below in Box 6-6:

- **Socio-technical niches** - where innovative technology is protected by the social system
- **Socio-technical regimes** – the dominant technological paradigm in a given practice domain and its structures, tools, techniques, policies, knowledge and symbolism
- **Socio-technical landscapes** – the physical infrastructure, culture, polity, paradigms, demography and environment that places external pressure on the socio-technical system

Box 6-6 A multi-level model of socio-technical change (Berkhout, et al., 2003)

Berkhout, Smith and Stirling describe the process of transition of socio-technical change, from niche through regime to landscape and contend that (Berkhout, et al., 2003, p. 7):

> Throughout this journey, the socio-technical configuration becomes better adapted to its context, becomes more stable (technically and in terms of the social relationships that interpenetrate and mediate the technology) and exhibits growing irreversibility.

Further, they argue that socio-technical change does not pass from the socio-technical niches where new ideas incubate and progress to regime change. Rather they propose four types of transition context to describe socio-technical change as set out below in Figure 6-4:

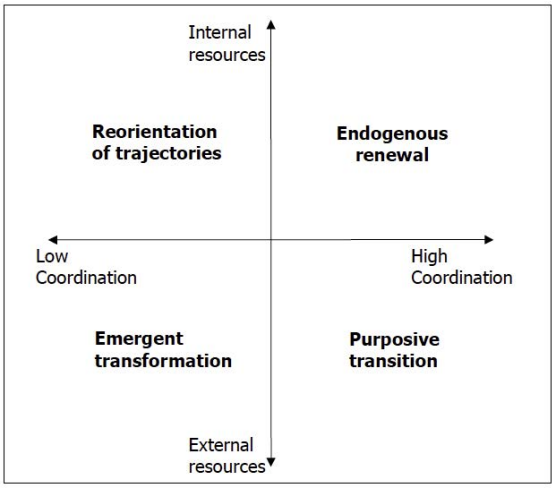

Figure 6-4 Four transition contexts and transformation processes (Berkhout, et al., 2003, p. 24)

These transition contexts are tempered by whether resources for change are available from within the regime or external, and whether there is a high level of co-ordination and control input or low. The first two transition contexts describe incremental change, and the fourth describes managed change with external resources. The third context describes the real product of complex systems: emergent change, which is of most interest in this research.[34] These are explained in more detail in Box 6-7 below:

Endogenous renewal
…..Decisions over future technological choices will be guided by past experience. Thus the transformation process will tend to be incremental and path-dependant.

Re-orientation of trajectories
…trajectories of change may be radically altered by internal processes without being associated with discontinuities in the actors, networks and institutions involved in the regime. The stimulus for the radical re-orientation is a shock (from outside the regime or within) impacting upon the technological system. The response, however, is formed within the incumbent regime.

Emergent transformation
… This type of transformation in our typology arises from uncoordinated pressures for change and responses formed beyond the incumbent technological regime. The technological cycles described in Kondratiev's long waves have this character of emerging from highly complex social and economic processes that lead to the emergence of technologies with pervasive impacts.

Purposive transitions
…. While emergent transitions have an autonomous quality, we seek to distinguish these from purposive transitions which have in some senses been intended and pursued to reflect the expectations of a broad and effective set of interests, largely located outside the regimes in question.

Box 6-7 Transition contexts and transformation processes (Berkhout, et al., 2003, pp. 23-27)

Geels and Schot (2007, pp. 406-413) qualify the Berkhout model by proposing transition pathways are not deterministic, their sequence of events are not automatic, and there is no guarantee that change will occur in the socio-technical system as a response to interventions. See Box 6-8 below:

[34] However, it appears in context that their use of the term emergent is the common-use meaning: a new or novel thing, idea or process, not necessarily the particular quality pertaining to complex systems.

P0 Reproduction Process
If there is no external landscape pressure .., then the regime remains dynamically stable and will reproduce itself. Radical niche-innovations may be present, but have little chance to break through as long as the regime is dynamically stable. Reinforcing landscape developments help stabilise the regime. There may be internal regime problems, but the shared perception is that the regime has sufficient problem-solving potential to deal with them. Stable regimes still experience dynamics: firms compete in markets, invest in new product development, pioneer mutations, engage in take-overs, etc. But these processes take place within stable rule-sets and proceed in predictable directions (trajectories).

P1 Transition Path
If there is moderate landscape pressure ('disruptive change') at a moment when niche-innovations have not yet been sufficiently developed, then regime actors will respond by modifying the direction of development paths and innovation activities. In this pathway moderate landscape changes create pressure on the regime, leading to reorientations by regime actors.

P2 De-alignment and Re-alignment Path
If landscape change is divergent, large and sudden ('avalanche change'), then increasing regime problems may cause regime actors to lose faith. This leads to de-alignment and erosion of the regime. If niche-innovations are not sufficiently developed, then there is no clear substitute. This creates space for the emergence of multiple niche innovations that co-exist and compete for attention and resources. Eventually, one niche-innovation becomes dominant, forming the core for re-alignment of a new regime.

P3 Technological Substitution
If there is much landscape pressure ('specific shock', 'avalanche change', 'disruptive change') at a moment when niche innovations have developed sufficiently, the latter will break through and replace the existing regime. This pathway assumes that radical innovations have developed in niches, but remain stuck because the regime is stable and entrenched.

P4 Reconfiguration Pathway
Symbiotic innovations, which developed in niches, are initially adopted in the regime to solve local problems. They subsequently trigger further adjustments in the basic architecture of the regime. Radical innovations are initially developed in niches. If they have symbiotic relations with the regime, they can be easily adopted as add-on or component replacement. These adoptions are driven by economic considerations (improve performance, solve small problems), leaving most regime rules unchanged. When the basic architecture remains the same, this is a transformation pathway. But the adopted novelties may lead to further adjustments as regime actors explore new combinations between old and new elements and learn more about the novelties. This may lead to technical changes or changes in user practices, perceptions, and search heuristics. This may create space for new adoptions of niche innovations. Sequences of component innovations can thus, over time and under influence of landscape pressures, add up to major reconfigurations and regime changes.

P5 Sequence of Transition Pathways
If landscape pressure takes the form of 'disruptive change', a sequence of transition pathways is likely, beginning with transformation, then leading to reconfiguration, and possibly followed by substitution or de-alignment and re-alignment.

Box 6-8 Transition pathways Geels and Schot (2007, pp. 406-413)

Where Berkhout outlined the multi-layered quality of socio-technical contexts, Geels and Schot apply the element of unpredictability, with significant consequences for sustainability practice. In spite of this, there is a linear causality sense in this model representative of simple systems and not the non-linear emergent qualities understood through complexity theory. The strength of the model lies in its identification of structural issues that explain why niche innovations need certain conditions to go through transitions to the mainstream. However, as a model of change, it seems to fall short of the description of the innovation diffusion model, where people are the key in

the innovation diffusion process, and not the power structures and a dry discussion of regime agents.

Highlighting the problem of connecting actions to change, Seyfang and Haxeltine (2009) relate the multi-level/transitions model to sustainability practice in their review of the transitions towns movement in the United Kingdom, especially issues concerning attempts "to grow and diffuse beyond the niche" (2009, p2.). They find that sustainability activities can successfully diffuse within the niche, yet have difficulty in extending beyond the niche to bring about regime shifts: the problem of "scaling up". They attribute this to group dynamics in opposition to the encompassing regimes and landscapes: the oppositional nature creates capacity for the niche to develop, but inhibits the capacity to extend. Seyfang and Haxeltine recommend the problems described are entirely social, and not socio-technical and they do not identify the problems as an emergent quality of the socio-technical system. This situation suggests that Berkhout's ideas are experiencing difficulty when applied to analysis of practice by social theorists that don't understand socio-technical systems, and I thus conclude that the Socio-technical Transitions and Multi-Level approach to change is an emerging framework for analysis but does not give guidance to practice as Seyfang and Haxeltine identify in their critique (2009, pp.17-18). However, in a recent analysis, Grin et. al. (2010) extend the concepts to account for change as a function of the interaction of system dynamics which mutually reinforce and emerge as a transition.

6.5 Critiques of Technological Change

As our social systems have co-evolved with technology, from feudal times to the present day with its globalised economy, the relationship between society and technology has changed. Some authors, such as Lewis Mumford (1934, 1971), Jacques Ellul (1973) and Neil Postman (1993) have attempted to identify the stages of the evolution of the technological society as their structural approach to critique and warn that our technological systems have become so ubiquitous that society is shaped by technology. Others, such as Langdon Winner (1977, 1989); Jerry Mander (1992; 1996); Stephanie Mills (1997); Robert Thayer (1994) and Aidan Davison (2001) have a searing view of the social and environmental impact of technology and its ensuing changes. The critique of Schumacher (1974) resulted in the advent of the appropriate technology movement. Conversely, Michalski (1999) reviews technology with a sense of wonder and does not dwell on the negative, even when looking at the future of technology.

Such ideas illustrate the complexity of socio-technical systems, the unpredictability of their outcomes and the problematic nature of change involving technology. An important lesson from these authors is that technology regularly fails to deliver on social goals and, in fact, delivers the many so-called "unintended consequences" [35] identified above. The failure to deliver on social goals arises from applying linear thinking about technology to complex social systems – the assumption of technologists is that everything about a technology is knowable as part of the innovation, design and development process. However, according to Petroski, any new technology changes the world into which it is applied (Petroski, 1985): that is, the socio-technical system changes, as do system dynamics and system output. The fact that they may be undesirable and unforeseen does not alter the reality that they are outputs of the system that has been unleashed in society.

While many technologies have negative impacts, on balance society chooses to retain such technologies for their positive benefits. People tend to be highly critical of the negatives, while happily accepting the benefits. The problem is that people generally do not see the connection between the two. While it is a useful activity to develop and mature a technology to eliminate its negative impacts, the reality is that there is a "downside" to any and every technology. The problem is that the negative impacts can take many years to develop, as the socio-technical system within which it resides takes time to process the impact of the new technology. Further, it is a given that any new technology, when proposed, does not highlight its negativities, both because of focus on the positive and because of lack of attention to possible future negative scenarios.

Thus, attempting to have any proper public debate about technology is problematic – it can be difficult to separate the technophilia/technophobia of the members of a social system from the rationality of the proponents of the technological intervention. The proponents of technology have rationalism on their side: it appears that they have logically, and with purpose, developed a solution to a social problem or a market demand. There may be substantial investment behind any new technology, so there is an innate sense that it must be right and that any side effects have been established and resolved. This assumed innate sense helps to explain why the technological fix approach to sustainability is so compelling. However, this critique of technology is not widely held and thus has little power to effect a different view given the ubiquity of

[35] To illustrate how deep seated this mechanistic attitude is, a pamphlet and CD produced by the Institute of Engineers Australia (Engineers and Sustainability, 1999) stated that Engineers are experts in sustainability and that any adverse environmental impacts were as a result of unintended consequences.

technology. While the critics talk about technology from the position of power and manipulation of individuals, societies and cultures, they generally fail to understand that not only is technology socio-technical in nature, it also exhibits complex systems behaviour. Consequently, many of the qualities of technology as the focus of resistance are not, as such, under social control. Therein lies a major weakness in all the anti-technology arguments, in spite of their capacity to awaken, stimulate and inspire, and to promote the precautionary principle.

6.6 Conclusions: Change, Complex Systems and Emergence

I posed the following question at the beginning of this Chapter: Could the systems paradigm address the gaps in conventional understandings of change? In response to this question, I have argued that an understanding of systems, and socio-technical systems in particular, presents an alternative perspective for understanding why societies and cultures change. Further, when argued in terms of systems thinking, complexity, technacy, socio-technical diffusion and transitions, the differing views put forward in this Chapter and in Chapter 5 vary in their efficacy to explain how such systems change; how changing systems could help develop a sustainability culture; and how this knowledge assists the sustainability practitioner to pursue change.

Human systems are complex and adaptive, and of a socio-technical nature; they operate at many different levels and scales, which are more or less interconnected. Thus it becomes critical how a social system is defined or self-defined by its members. It is possible that members of a self-defined social system may have less-than-perfect knowledge about their own system or worse, are self-deluded by their perceptions, such that their self-understanding bears little relation to how their social system actually unfolds through their actions. It may be difficult for members of a social system to perceive any nested hierarchies and to define their system's boundaries, making effective sustainability practice difficult. It is therefore incumbent on the sustainability practitioner to understand such complexity and its place within the systems paradigm, and to communicate it. This theme is discussed in Part 3 Contemporary Sustainability Practice.

To consider whether the systems paradigm addresses the gaps in conventional understandings of change, I conclude that social change can be better understood through the systems paradigm because it is more flexible than conventional social theory, avoids its potentially ideologically-bounded limitations and accommodates the emergence phenomenon. The concept of emergence as a way of social and cultural

change has been alluded to in this and previous Chapters and I will examine it further in Chapter 8. Also in this Chapter, I discussed the process of feedback as a critical concept in the systems paradigm and contended that learning is the primary feedback pathway for complex adaptive human systems. The character of learning as the primary feedback pathway needs qualification, and I develop the concept further in Chapter 7.

Chapter 7 Learning as Feedback in Human Systems

7.1 Introduction

This Chapter begins the enquiry into whether we can actively foster change for sustainability. This enquiry reviews ideas about personal change (of attitudes, values and behaviour), connects them to processes for actively pursuing change at broader social and cultural levels and discusses processes for fostering change. In this Chapter I argue that learning is the critical dimension of any sustainability change process, because it is the pathway for feedback in complex adaptive human systems. I investigate different learning theories, and consider their implications for sustainability by asking the following question: Does learning contribute towards change, and if so, how? These learning theories, applied through a systems-oriented approach, have potential to foster change in individuals, organizations and communities, through to national and global change.

According to theorists in educational psychology, the main role of learning is to bring about behaviour change in the individual; and given that behaviour change is one expectation of the sustainability movement, we need to understand the main themes in attitude and behaviour change. Andreasen (2006, p. 5) makes this need very clear:

> Social change requires individuals to act. For social change to happen, someone – or many "someones" – must bring the issue to our attention. Someone has to assemble possible solutions and evaluate them. Someone has to decide on the best course of action. Someone – presumably many someones, in many kinds of arrangements – must mount efforts big and small to make change happen … Finally, someone has to keep track of how things are going, what modifications or redirections are necessary, and whether more or less effort is necessary.

Sustainability requires informed action from Andreasen's many "someones", as we must transform our processes of development. However, the many "someones" cannot bring about the required change if they are not actively involved in continual, iterative learning.

In the sustainability context, our society places high value on formal education but underestimates our need for more change-oriented learning. Given that the global ecological crisis has been part of our awareness for several decades now and that we still have not adequately changed our behaviours in response, it appears that we are

not learning the lessons needed for a change in our worldview. Our failures to manage water and to keep our greenhouse gas emissions to 10% above 1990 levels are cases in point. Further, the development of the knowledge economy and the potential role for sustainability in it highlights the importance of the knowledge domain. Recent problems with gaining International agreements at the 2009 Copenhagen Climate Change Conference (Lynas, 2009), and Cancun in 2010 (Energy Matters, 2010), illustrate how a campaign of concerted misinformation and manipulation of mainstream and social media are an effective counter to knowledge gained from scientific methods. As a result disagreement about knowledge systems obstructs action.

From a practical point of view, to further sustainability, we should consider that learning is a completely different issue from education. Education, training, teaching and schooling are part of a paradigm that is separate from the natural cycles that we must learn to experience and understand. Formal and traditional methods of education also seem to conflict with the real learning that occurs informally, especially when people are motivated to make real changes in their lives (Sarkissian, et al., 2009, p. 85). For this reason, I believe the small arenas of human activity are vitally important: there is immediacy about the effects of unsustainable behaviours; there is also immediacy about the learning opportunities that arise from these effects. The type of learning we need will only occur through our direct experience: a silted-up water hole, a polluted water supply, poor air quality, dramatic fuel price rises, surfing in raw sewage, release of genetically modified organisms and so on can stimulate appropriate responsive action with the commensurate learning required to change behaviour. Thus the real issue of learning concerns personal and community capacity building as part of the behavioural and cultural change process.

Many of my views about learning and cultural change arise from my reflections on experience as both a learner and educator in formal and informal learning frameworks and in community development. Typically, in the social world, in the media and in academia, discussions about learning focus on formal process, through codified education, that is, education as a technology: classrooms, lecture halls, teachers, resources, modules, units, curricula, syllabus and, hopefully, participant response in such a socio-technical system. However, in reviewing the role of learning in sustainable development, I question the capacity of formal education to contribute to the types of extensive behavioural and cultural changes that are needed and whether it can lead a transformative approach to learning.

Such questions remain valid in terms of current formal education, implicitly or explicitly promoting ecologically sustainable development principles. Assessing whether such formal education is ecologically meaningful in terms of actual cultural change is an important task.

Here, I discuss meaningful learning in terms of formal and informal frameworks, and their value relative to each other and to the sustainability movement. I contend that, while a base of formal education potentially opens up myriad possibilities for behavioural change, it is the informal, reflective learning that arises from real-world action and experience that provides the most potential. In this Chapter the discussion of the role of learning in change for sustainability will inform the emergence proposition by connecting ideas of learning and change to a systems perspective where modes of learning and their related learning cycles act as the primary form of feedback in human systems.

7.2 Educational Theory

7.2.1 Educational Psychology

The standard teacher education texts summarise the main theories guiding present-day formal education: Piaget, Vygotsky, Bloom, Bandura, and Gardner amongst others (McInerny & McInerny, 1998; Woolfolk, 2001). These ideas focus not only on the development of children and young people, particularly in terms of syllabus-centred strategies in compulsory education; they also offer useful ideas for the discussion about the role of meaningful informal learning in the development of a sustainability culture. Ironically, while behaviour change is an important aspect of change for sustainability, I contend that strictly behaviourist views of learning are not the most useful for achieving deep cultural change. The behaviourist approach would represent the kind of behaviour change bought about by policy, regulation, taxes, reward and punishment. This approach has its place in the sustainability agenda, but the types of cultural change engendered by this approach are questionable: it may be shallow, fickle and begrudging. As Woolfolk argues, cognitive views of learning, rather than behaviourist views, may be more useful for deep time sustainability (Woolfolk, 2001, p. 240):

> Cognitive theorists believe, for example, that learning is the result of our attempts to make sense of the world. To do this, we use all the mental tools at our disposal. The way we think about situations, along with our knowledge, expectations, feelings and interactions with others and the environment, influence how and what we learn.

This view describes the types of process where people engage in self-motivated learning; it has positive implications for meaningful change. In the cognitive domain, other useful theories include: Vygotsky's Sociocultural Theory of Development (Krause, Bochner & Duchesne, 2003, pp. 60-65); Bruner's scaffolding metaphor (Woolfolk, 2001) and Bandura's Social Learning and Social Cognitive Theories and concepts of self-efficacy (Bandura, 1997; McInerny & McInerny, 1998, p. 129). With their cognitive views of learning the above theorists contend that much learning takes place in social and cultural settings: such situated learning occurs in a process of acculturation to a community's beliefs, values and norms; it reinforces behaviours appropriate to such a community.

7.2.2 Experiential Learning

There, are, however, educational theorists whose ideas shed some light on the value of informal learning frameworks. Dewey's[36] real-world views about the role of education in society (Dewey, 1997a) have significance beyond the formal and the school setting (Dewey, 1997b, p. 49):

> What avail is it to win prescribed amounts of information about geography and history, to win ability to read and write, if in the process, the individual loses his own soul: loses his appreciation of things worth while, of the values to which these things are relative; if he loses desire to apply what he has learned and, above all, loses the ability to extract meaning from his future experiences as they occur?

In the above quotation, Dewey suggests that the ability to reflect on experience transcends informational learning, and is significant for its development of values and meanings. Dewey further identifies that learning is most effective when tied to experience. Apart from the social learning aspects of this position, experience opens up further opportunities for learning, creating a spiral of deepening interest and understanding (Dewey, 1997b, p. 37). Dewey is critical of formal educational structures which are divorced from experience: for example the knowledge acquired in order to pass an exam, later lost and needing to be re-learned. Thus, education for sustainability in formal learning frameworks, then, can be flawed if not grounded in experience. For Dewey, this learning in isolation "was segregated when it was acquired and hence is so disconnected from the rest of experience that it is not available under the actual conditions of life" (Dewey, 1997b, p. 48).

[36] John Dewey was an educational philosopher and psychologist whose work in the first half of the 20th Century has been influential in the development of modern educational systems and in strengthening civil society.

7.2.3 Informal Learning

Some theorists and educational commentators present views highly critical of formal education. For example, Ivan Illich's radical prescription is to eliminate formal education altogether (Illich, 1973). While this radical prescription would be unrealistic and socially unacceptable, such a contentious view helps to highlight the problems with formal learning frameworks. In a sense, these views indirectly support the idea that for meaningful learning to take place, it must connect deeply with individuals and their world-views, their aspirations and what they want to achieve through their actions in the world. Illich argues (1973, p. 7):

> The current search for new educational *funnels* must be reversed into the search for their institutional inverse: educational webs which heighten the opportunity for each one to transform each moment of his living into one of learning, sharing and caring.

While written in the 1970s this point of view still retains its relevance, and seems to have predicted the informal, viral-like ways of learning currently developing on the Internet. Illich's use of the term "educational webs" has proven highly prescient. Illich reinforces this idea: "Most learning happens casually, and even the most intentional learning is not the result of programmed instruction" (1973, p. 20). Postman and Weingartner are critical of syllabus-centred learning because its primary aims for learners are "to prepare them to be docile functionaries in some bureaucracy and to prevent them from being vigorous self-directed learners" (1971, p. 72). While this view is highly contentious, it raises the question of meaning in learning: is the meaning for the individual's benefit or for society's utility?

Environmental philosopher and philosopher, David Orr (cited in Spayde, nd, p.3) suggests that there are two types of knowledge: fast knowledge and slow knowledge. Slow knowledge takes time to accumulate; it takes time for reflection and testing. In Orr's view, "The aim of slow knowledge is resilience, harmony and the preservation of long-standing patterns that give our lives aesthetic, spiritual and social meaning" (cited in Spayde, nd, p. 3). Perhaps Orr's view demonstrates the benefit of informal learning: formal education is the fast knowledge, and a lifelong approach seated in informal learning is the slow knowledge. Orr's slow knowledge also supports Brand's view of culture change as a slow cycle, as discussed in Chapter 5.

7.2.4 Meaningful Learning

Meaningful learning is a context-specific idea – both for individuals and society. It equips people to act to achieve the things they value for themselves, their families and

their communities. Meaningful learning is possible in any learning framework. Postman and Weingartner also draw on the idea of meaningful learning (1971, p. 85):

> Simply said: there is no learning without a learner. And there is no meaning without a meaning maker. In order to survive in a world of rapid change, there is nothing more worth knowing, for any of us, than the continuing process of how to make viable meanings.

With the importance of meaning as an outcome of learning so clearly stated in the above quotation from Postman and Weingartner, I believe that how we make meaning is critical for change. In the previous Chapter, I discussed Bijker's ideas of the social construction of technology as well as Roger's Innovation Diffusion. A critical factor in both perspectives is the necessity for technology to have meaning for any social domain into which the technology diffuses. Roger's experience (mirroring the experience of Schumacher in appropriate technology and international development) illustrates that social groupings must have some scaffolding (Bruner, 1968, p. 90; Wood, Bruner & Ross, 1976) to attach the new ideas and to connect to their usual patterns of meaning making. Any innovation must have form, function and meaning (Rogers, 2003, p. 31). Thus a primary requirement for learning is that it connects with people and they find meaning in it. This process of making viable meanings has significant currency for learning for a sustainable society. The making of viable meanings is also predicated on whether individuals personally find meaning in formal education or whether meanings will be made through informal learning. The important differentiation is the capacity of either of the above learning processes to foster motivation to learn what is needed for sustainability.

7.2.5 Capacity and Capability

"Capacity" and "capacity building" are terms that used regularly in the training and development sectors and in the Australian Indigenous community sector in particular. However, the understanding of these concepts is often shallow: lack of capacity is regularly seen as being indicative of a lack of formal education and training. The terms are often used as the "politically correct" way of indicating, for example, that Indigenous people are not skilled enough to be capable of running their own affairs.

I prefer to conceive of capacity as more than a skills and knowledge capability – it is more equivalent to a form of fitness to use a knowledge base, with the attendant motivation, persistence and resilience to learn what is needed to know, to learn how to apply it, to be persistent in applying it and to be resilient in the face of the inevitable failures. Thus, one can learn knowledge and skills in the classroom, but capacity can

only be developed by reflective practice and deep diffusion over long timeframes. The lack of capacity is often referred to as a "capacity gap". According to Seemann et al., capacity gaps in any community or social system include the items listed in Box 7-1:

- Literacy, numeracy and general education gaps
- Technacy gaps
- Health and wellbeing gaps
- Investment and livelihood gaps
- Governance and management gaps
- Social capital gaps
- Personal gaps (such as motivation, self-esteem, self-efficacy)

Box 7-1 Capacity gaps in a social system (Kurt Seemann, et al., 2008, p. 106)

It is conceivable that the above list in Box 7-1 represents our "sustainability" gap – where, as local and global societies, we need a form of learning which enables us to close such a gap. The degree of internalization of knowledge and meaning is a critical factor in closing the capacity gaps. When new cultures develop around the new knowledge, new problems can be solved and individuals, communities and societies become adaptive to changing situations. Beatley (2004, p. 210) reinforces the point that situations where communities need to make sustainable decisions are opportunities for learning-by-doing.

7.2.6 Formal Education and Capacity

Many of our environmental problems have been created by technologies developed by people with the highest levels of formal education available in Western society. This level of education did not stop the development of technologies and associated behaviours that contribute to ecological degradation. Formal learning is the basis of contemporary Western society; it is a broad community and social expectation and it is legally prescribed for young people. Formal education is a based on a structure of qualifications (degrees, diplomas and certificates) consisting of courses, streams, units, modules, syllabus, curricula and content. These qualifications are the modern technological society's form of "tribal initiation" into various domains: it is assumed that learning is the basis of the passage of the uninitiated into initiation. Learning praxis, in formal structures, is mostly geared to the necessities of making that initiatory passage, not simply for the value of learning. The rhetoric behind every course, qualification and syllabus is full of the broad educational aims of study, the development of the person, the acquisition of knowledge, skills and attitudes. However, in reality, the application of

course content often falls below this aim, in my experience. Instead the pressure is to pass the exam! get the grade! better job! higher pay! I believe these are the norms underlying the educational system in Australia, if not throughout the Western world.

Formal education, because of its qualification focus, often creates very fragmented views of the world, with no crossovers between disciplines. It packages a whole area of experience, a body of knowledge, into something digestible in a relatively short timeframe. In the modern economy, there is no longer any scope for the traditional twenty-year apprenticeship. Because of the fragmented nature of formal education, knowledge gained through formal processes may not be internalised by the learner: it does not necessarily have the transformative content that results in deep behaviour change.

7.2.7 Motivation and Learning

Motivation to learn is a critical factor for both formal and informal learning. In the informal approach, the motivation to change comes before the motivation to learn what is needed to change. The informal approach requires a highly motivated personal reflective process, because it is difficult to sustain an informal learning approach without motivation. A motivated learner can engage in both formal and informal approaches appropriate to their vision of change, and are thus well placed to achieve change.

In the field of educational psychology, motivation for learning is described in a theoretical framework of expression, approaches, goals and self-schemas (McInerny & McInerny, 1998; Woolfolk, 2001). Motivation can be expressed as intrinsic or extrinsic, that is, from personal interest or outside influence. People can be partially motivated in both ways or they can move from extrinsic to intrinsic motivation as a learning process progresses. Intrinsic or extrinsic expression of motivation is evident through four general approaches: behavioural (rewards and incentives); humanistic (need for self-actualisation and self-determination); cognitive (thinking, making plans, developing goals, interpreting and responding to events); and socio-cultural (participation in the life of the community/communities of practice). These theoretical motivation frameworks also describe the behaviour of learners as being goal-directed, with four broad kinds of goal: learning goals (knowledge/skill/task-centred); performance goals (demonstration to others/ego-driven); work avoidance goals (participation is highly conditional); and social goals (extension to social relationships beyond task). “Self-schemas”, or beliefs about one’s ability, are also critical for a learner’s motivation, particularly if, from an

incremental perspective, the belief is based on the possibility of increasing ability through learning and experience.

It should be noted that these motivational frameworks do not fully describe the whole learning process as dynamic and changing. People move through the motivation framework as their motivation responds to a changing range of intrinsic and extrinsic factors. For motivation to provide the missing ingredient, it must sit in a socio-cultural approach, with learning and social goals as forces for change. Kingma and Falk argue that “an ethos of active and self-directed learning is the only way in which individuals and society can manage change in an inclusive and equitable fashion” (Kingma & Falk, 2001). Motivation is thus a critical factor in learning, and socially based learning in particular, and by extension it is a critical factor in reducing our sustainability gaps.

7.2.8 Orders of Learning

In Chapter 1 I argued that the mechanistic approach to implementing the holistic concept of sustainability contributed to the many difficulties we experience in furthering sustainability. I believe that this relates to individual capacity for thinking at different levels of complexity, and explains why so much sustainability change effort is directed towards single-issue activities. As our socio-technical systems are now very complex, interaction in such systems requires commensurate capacities of learning and thinking.

From a theoretical perspective Bloom’s Taxonomy provides some insight (Bloom, 1956). Developed by Benjamin Bloom and later modified (Anderson & Krathwohl, 2001), the taxonomy identifies three domains of learning: knowledge, attitudes and skills. The knowledge (or cognitive) domain outlines a hierarchy of knowledge categories; the attitudes (or affective) domain, a hierarchy of emotional categories; and the skills (or psychomotor) domain, a hierarchy of perception, physical and movement categories. For the purposes of sustainability practice, particularly in working with people for change, Bloom’s cognitive and affective domains are critical and may indicate the qualities needed to work effectively with complexity. The cognitive domain is conceived as being from simple to complex: knowledge, comprehension, application, analysis, synthesis and evaluation. This list of domains was later modified, with synthesis regarded as more complex than evaluation. The affective domain is also conceived as being from simple to complex: receiving phenomena, responding to phenomena, valuing, organization, and internalizing values.

Any mechanistic application of the hierarchical character of Blooms Taxonomy is dangerous. However, there is some fluidity across the layers, depending on context.

Nevertheless, as different individuals have different cognitive and affective capacities to deal with complexity, not everyone will be capable of implementing sustainability holistically in their place in the world. For sustainability practitioners it is a different story: Bloom's Taxonomy gives insight into capability and practitioner qualities, and this will be discussed further in Chapter 13.

7.3 Learning and Behaviour Change

One of the foundational tenets of teaching and learning is behaviour change (Woolfolk, 2001). However, much of that foundation is built on the assumption that knowledge and skill development leads to behaviour change as a natural progression. Because formal schooling is an intimate facet of an individual's personal development over the thirteen years or so of kindergarten to Year 12 education, there is much evidence that such learning and knowledge accumulation leads to behaviour change. However, as an individual leaves the formal education of early life and develops into adulthood, behaviour change is driven more through social contexts and the general pressures of life, than through formal education.

Behaviour change is mostly an individual pursuit and an individual responsibility, albeit socially situated and subject to cultural influence (Bandura, 1997; McInerny & McInerny, 1998). Thus, much of the focus on behaviour change, such as in health, safety or multicultural domains, is aimed at the individual, often with limited success. Behaviour change for sustainability is no different: and still proves difficult to initiate, implement and sustain. There is another implication of behaviour change: a common assumption is that if carried out over enough individuals, behaviour change will bring about social and cultural change.

The theoretical basis of behaviour and behaviour change has a very long history and many different viewpoints. A comprehensive review of this substantial body of literature is beyond the scope of this thesis. In this section, I review how learning and behaviour change connects, through the practical ideas of Bandura (1977), Kolb (1984), Halpern (2004) and Jackson (2004).

Bandura's Social Learning theory (1977) is based on the idea that pure trial-and-error learning is not the primary way we learn to change; while it is part of the process, our learning is accelerated by exposure to the social. We learn and change through our direct experience and the experience of observing those in the world around us. We imitate others because of its inherent efficiency, particularly others' behavioural responses to situations. Bandura also described the personal phenomenon of "self-

efficacy" (Bandura, 1997), where an individual has an inner conviction that they can learn to change through their own ability to be effective in making the desired change. In my view, this concept of self-efficacy is a critical component, along with intrinsic motivation, of an individual's capacity to change. Bandura's ideas have therefore been critical in informing the direction of contemporary thinking about behaviour change for sustainability.

Another approach to behaviour change through learning is Kolb's Action Learning Cycle (Kolb, 1984), which I introduced in Chapter 2 as a guiding methodology for this research. Derived from earlier work of John Dewey and Kurt Lewin, the main contention of the approach is that one-off learning processes are inadequate for any type of personal, social or cultural change and that learning should be activity-situated and subject to a cycle of action and reflection, over an appropriate timeframe. Figure 7-1 illustrates the Kolb Action Learning Cycle:

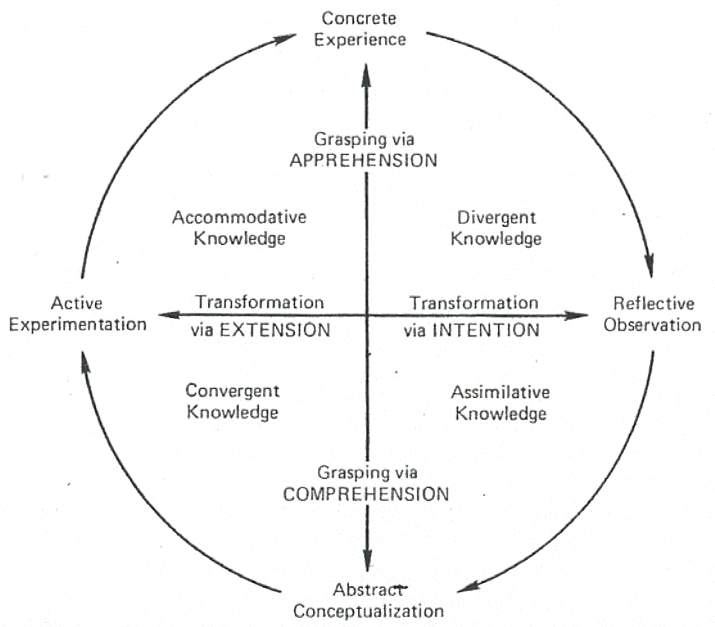

Figure 3.1 Structural Dimensions Underlying the Process of Experiential Learning and the Resulting Basic Knowledge Forms

Figure 7-1 Kolb's Action Learning Cycle (Kolb, 1984, p. 42)

The cycle of learning, from abstract conceptualisation, through active experimentation and concrete experience, to reflective observation and on to the next cycle, is marked by different knowledge experiences, modes of understanding and processes of transformation. As with Orr's slow knowledge, it requires time to practise the learning, to reflect on the effectiveness (or lack thereof) of practice, and to improve the activity and the understanding of the activity.

The Participation-Learning-Action (PLA) and Participation-Reflection-Action (PRA) approach to participatory development was introduced in Chapter 2 as part of the methodology for this research. The framework also serves as a sustainability practice framework and I review it in more detail in Chapter 9. PLA/PRA situates learning in a participatory process – very much a social learning process, with much in common with Kolb's Action Learning Cycle. However, the type of development work where the family of PLA processes are applied is much more open, inasmuch as the process undertaken is not clear, and outcomes are part of a discovery process; issues of behaviour change are quite flexible in response to the openness of the process.

A significant aspect of PLA/PRA is reflection on experience as part of the learning process. Thus, participation and action cannot be rushed or the opportunity for reflective learning and behaviour change will be lost. It can take time for people to absorb new information and experiences, to derive meaning and to appreciate the impacts of any decision-making. Unlike other learning domains where what is learned is not necessarily applied, in community development, the purpose of the participatory approach is to make decisions and to take action. In this situation, Bruner's concept of the cycle of learning as a spiral process is in evidence (Bruner, 1996, p. 39).

In support of the social learning perspective on behaviour change, a recent study into behavioural economics by the New Economic Foundation (Dawnay & Shah, 2005, p. 2) proposes seven principles of behaviour and behaviour change as set out below in Box 7-2:

1. **Other people's behaviour matters:** people do many things by observing others and copying; people are encouraged to do things when they feel other people approve of their behaviour.

2. **Habits are important:** people do many things without consciously thinking about them. These habits are hard to change – even though people might want to change their behaviour, it is not easy for them.

3. **People are motivated "to do the right thing":** there are cases where money is de-motivating as it undermines people's intrinsic motivation.

4. **People's self-expectations influence how they behave:** they want their actions to be in line with their values and commitments.

5. **People are loss averse** and hang on to what they consider "theirs".

6. **People are bad at computation when making decisions:** they put undue weight on recent events and too little on far-off ones; they cannot calculate probabilities well and worry too much about unlikely events; and they are strongly influenced by how the problem/information is presented to them.

7. **People need to feel involved and effective to make change;** just giving people the incentives and information is not necessarily enough.

Box 7-2 Dawnay & Shah's 7 principles of behaviour and behaviour change

(Dawnay & Shah, 2005, p. 2)

These socially based approaches to learning and behaviour change are essentially responsive to the socio-technical systems within which an individual operates. There is unpredictability about this type of learning because of myriad influences on the learning and behaviour change process. The approaches listed above in Box 7-2 recognise the importance of systems-based learning. Stimulating people to engage in such uncertain processes is the challenge.

Some researchers and policy analysts in the United Kingdom conducted meta-studies of the literature exploring behaviour change for environmental initiatives. (Halpern, et al., 2004; Jackson, 2004). Halpern et al's meta-study is particularly important as it was carried out for the United Kingdom's Prime Minister's Strategy Unit. Proposing alternatives to conventional approaches, the authors explore the idea of human behaviour as a complex ecological system with many competing pressures. They contend (2004, p. 14) that much of the conventional behaviour change methods used by governments and policy makers are ineffective: economic incentives; reliance on assumptions of rationality in human behaviour; and prohibitions. Further, they propose that influencing behaviour through relationships and transactions (as is common in the business world) is a more sophisticated and preferable approach. Ecological models

have had success, have been supported by theoretical research and bring together individual, interpersonal and community perspectives. They identify six reasons that support the value of an ecological view, as illustrated below in Box 7-3:

1. The individual has certain real and perceived capabilities and attitudes and these affect their success and "survival" chances;
2. They interact with other individuals such as family, professionals and colleagues;
3. They may face institutions or people promoting specific, sometimes negative behaviours;
4. They are influenced by, and interact with, their physical, cultural and social environments and the norms in those environments are an important influence on their behaviour;
5. They face 'selection pressures' that reward success and punish failing behaviour; and
6. Like animals in a natural eco-system, humans conserve their time and energy to maximise their chances of success – for example, by using short cuts, mental models, rules of thumb or 'heuristics' to guide their behaviour.

Box 7-3 An ecological systems view of behaviour change (Halpern, et al., 2004, p. 16)

This ecological view links to their grouping of behaviour change theories into three types: individual level theories (such as those of Festinger, Fishbein and Kahneman as discussed in Chapter 5); interpersonal behavioural theories, (including Bandura's Social Learning theory); and community theories of behaviour (for example, Social Capital theory (Putnam, 2000), and Rogers' Innovation Diffusion, as identified in Chapter 6). From the six components of Halpern's view, I conclude that people's behaviour is influenced by multiple scales of social system, from family and friends to broader social pressures. In dealing with such complexity, people look for simplicities (the short-cuts and rules-of-thumb) in order to make sense of the forces acting upon them, and in turn, these simplicities become behavioural habits, or fixed patterns of behaviour. Once a pattern of behaviour becomes habit, and cannot readily respond to external pressures, change becomes more difficult.

Like Halpern et al., Jackson (2004, p. 16) reviewed many theories of behaviour change, but settled on a selection of social learning approaches to support behavioural change towards what he terms as "sustainable consumption". These include participatory approaches, problem-based learning and community-based social marketing. Jackson (2004, p. x) concluded that change processes guided by socially situated learning provide the best vehicle for behaviour change:

> Information campaigns have been widely used for achieving public interest goals. But they are known to be less effective than other

> forms of learning. Research suggests that learning by trial and error, observing how others behave and modelling our behaviour on what we see around us provide more effective and more promising avenues for changing behaviours than information and awareness campaigns.

In the light of this statement from Jackson, socially situated learning of a practical experiential nature is more effective than information and awareness campaigns in changing behaviour in individuals. In extending this idea, Kaplan proposes three understandings of behaviour change: telling people what to do; asking them what they want to do; and helping people understand the issues and inviting them to explore possible solutions. For Kaplan, clearly the most effective way to resolve the problem of habits is to make change processes participatory, as per the third approach (cited in Jackson, 2004, p. 102):

> Rather than telling people what they must do or do without, the proposed approach provides people with an opportunity to figure out for themselves how various broadly defined goals can be met.

The above perspectives of Dawnay and Shah, Halpern, Jackson and Kaplan support socially situated learning as a critical aspect of behaviour change. While formal learning can be tailored to social contexts, an informal reflective approach through experiential learning (similar to Kolb's action learning cycles) and as influenced by people modelling sustainable behaviour, is likely to be more successful in creating change in the myriad individual daily actions that could contribute to sustainability. By conceiving of the process of behaviour change through Halpern's ecological systems view, rather than as a purely psychological construct, individual behaviour change can be linked to broader social and cultural change, through the complex systems approach. This linking of concepts of individual behaviour change to complex adaptive human systems creates the potential to see behaviour change as an emergent phenomenon, and learning as the vehicle for feedback. In the next section I examine a systems perspective of learning, which has potential for informing the sustainability practitioner's approach to working with behaviour change.

7.4 Learning and Sustainability

7.4.1 A Systems Perspective on Learning

A central contention of this research project is that individual, experiential, socially situated learning, is the main pathway for feedback in complex human systems. Thus a systems approach to learning is needed to support a systems approach to change for sustainability. In the previous section, Halpern identified an ecological systems view of

behaviour change, but did not explicitly link it to learning, other than the implication that learning is required to make the kind of heuristics recommended to simplify a complex world. According to Arthur, Gordon and Butterfield, the ecological systems view has been applied to new ways of conceiving formal school education (Arthur, Gordon & Butterfield, 2003), whereby the class room, teachers, students and pedagogical methods form an ecology, with the personal ecologies of the participants as significant contributors to the classroom ecology. They argue that the ecological systems approach to learning "is best able to promote and encourage, rather than enforce, behaviour change" (Arthur, et al., 2003, p. 13).

A tempering response to a systems view of learning comes from management theorist Peter Senge (2001). Addressing learning via a management paradigm, he applies systems thinking to the learning process and identifies that there is a problem with the experiential model. According to Senge, experience works well when feedback is timely (Senge, 2001, p. 23):

> But what happens when we can no longer observe the consequences of our actions? What happens if the primary consequences of our actions are in the distant future or in a distant part of the larger system within which we operate? We each have a "learning horizon", a breadth of vision in time and space within which we assess our effectiveness. When our actions have consequences beyond our learning horizon, it becomes impossible to learn from direct experience.

In the above quote, Senge articulates the problem of feedback that is too far removed from any present activity. This process is clearly present in the example of many environmental issues such as climate change, where debate rages over the approaches to be taken to prevent or mitigate the impact of climate change. As some of the impacts will not have significant effects for many years in the future, some sectors in society do not believe there is any urgency to change.

With the benefit of a systems perspective on learning, we can gain a sense of how difficult it is to achieve meaningful learning for individual behaviour change, let alone to achieve the kinds of learning needed for broader cultural change. Bawden reinforces this need for a systems view of learning for "the propensity and capability for responsible collective action" (2001, p. 24). This systems view of learning is especially important to improve the possibility for gaining real cultural change, and has great potential for connecting hard-won meaningful learning to sustainability.

7.4.2 Technacy Learning

In Chapter 4, I argued that technology is not merely a collection of artefacts; it is socially situated and better understood in terms of the socio-technical systems perspective. In Chapter 6, I reviewed the technacy model as a way of understanding socio-technical systems, with its integrated view of technology, people and place. In this section, I extend the discussion to describe technacy as a facet of the systems perspective on learning with considerable scope to support sustainability.

A critical capacity of people in a sustainability culture could be described as "technate": the ability for people to think and work creatively in all genres in the field of technology (Seemann & Talbot, 1995). While the elements of technacy are present at any scale of socio-technical activity, for it to be of value in progressing sustainability, it must be a capacity based on continued experiential learning. Therefore, anyone designing a learning process should be mindful of the need to embed the technacy model in all stages of design-based and problem-solving education, should apply technacy education to socio-technical functions as project-based rather than tool-based activities and should connect projects to real needs.

Technacy learning in real-life settings was conceived as passing through four developmental stages, expressed specifically for the remote Indigenous community context in Box 7-4:

Stage 1: Embed the technacy model in all stages of design-based and problem-solving education.

Stage 2: Organise the application of technacy education around the functions in remote communities supporting sustainability. Common technical failures are situated in the key settlement functions of water, waste, shelter, transportation and communication, each involving a particular social, technical and environmental dynamic.

Stage 3: Make technacy education project-based rather than tool-based, and connect projects to real community needs. Tool-based skills can be acquired during such activity in meaningful settings as needed.

Stage 4: Structure the technacy education to create career paths for desert people, maximising local and indigenous knowledge and articulating to other courses.

Box 7-4 Four developmental stages in Technacy learning (Seemann & Talbot, 1995)

The first technacy-based education program was the Aboriginal Technical Worker (ATWORK) program (with a qualification in Applied Design and Technology), designed and delivered through the Training Division of the Centre for Appropriate Technology,

Alice Springs.[37] The ATWORK program is different from conventional technical and trades training because of its emphasis on technate action pursuing appropriate solutions as the first step to sustainability, rather than just technical skills for their own sake (Talbot & Kroker, 1998). In a technacy-based learning experience, participants can engage in real projects with direct meaning to them, and learn what they need to know to continue engaging in such future activity. If statements of attainment or other accreditations are required, the technacy educator can map formal modules against what the participants achieved. As a technacy educator, I facilitated informal activity against formal training modules on several projects in Central Australia (Parnell, 1995, 1998a, 1998b).

In the previous Chapter, I emphasised the importance of the place of socio-technical systems in social and cultural change. I now argue that becoming more technate will be an important strategy in closing the sustainability capacity gap.

7.4.3 Education for Sustainability – A Formal Approach

Notwithstanding my earlier critique of formal education, there have been significant changes in formal education structures in recent times to accommodate sustainability thinking and practice[38]. The point of my critique of formal education is not saying, after Illich, to abandon formal education; rather, transformation of the formal sector is essential for better capacity development, as illustrated in the following examples.

In the school system, requirements to include sustainability are increasing, as is demonstrated by the release of a comprehensive policy on Environmental Education in NSW schools (NSW Department of Education and Training Curiculum Support Directorate, 2001). In the Vocational Education and Training sector, nationally accredited courses are appearing: in renewable energy[39], environmental building[40], water and wastewater management[41], appropriate technology[42] and sustainability assessment[43]. University courses in architecture, engineering[44], planning, and environmental studies and management are featuring substantial sustainability content, for example. Specialist sustainable development courses are also increasing in number

[37] This program achieved national recognition in the Vocational Education and Training (VET) sector,

[38] For example, the New South Wales Syllabus for Design and Technology requires sustainability issues to be considered in design projects (Board of Studies New South Wales, 2009).

[39] Certificate IV in Renewable Energy Technologies

[40] Certificate IV in Environmental Building Principles

[41] Water Industry Training Package

[42] Certificate I, II & III in Applied Design and Technology (The Aboriginal Technical Worker Program); for remote Indigenous communities through the Centre for Appropriate Technology in Alice Springs, NT.

[43] Certificate IV in Home Sustainability Assessment

[44] Engineering for Sustainability at University of Technology Sydney

and popularity.[45] In a framework sense, these trends have been formalised under the heading of Environmental Education (EE) (Lucas, 1979 cited in Lang, 2003, p. 2) which is a recognised aspect of formal school curricula, university courses and environmental learning centres; but recently, the term, Education for Sustainability (EfS) has emerged (Lang, 2003), and is being increasingly used to describe the efforts of formal education frameworks aiming for cultural change. According to Fien, Education for Sustainability (Fien, 2003 cited in Lang, 2003, p. 3):

> ...involves approaches to teaching and learning that integrate goals for conservation, social justice, appropriate development and democracy into a vision and a mission of personal and social change. It seeks to develop the kinds of civic virtues and skills that can empower all citizens and, through them our social institutions, to play leading roles in the transition to sustainability.

The concept of Education for Sustainability (EfS) has been further developed at Macquarie University ARIES unit (Delgado, Cerone & Tilbury, 2007; Hunting & Tilbury, 2006). The ARIES approach embeds education in an action learning/research methodology and extends the methodology to building sustainability culture for application in any practice context. The methodology references the systems paradigm. It extends the concept of education and training beyond individual behaviour change into a cyclic action-reflection process to pursue systemic change as illustrated by Table 7-1 below:

[45] Such courses in sustainable development are available through the Institute for Sustainability and Technology Policy at Murdoch University; the Curtin University Sustainability Policy Institute; and the Institute for Sustainable Futures at University of Technology, Sydney.

Understanding	by going beyond awareness raising to address the underlying issues causing unsustainable practices.
Values clarification	by creating a sense of personal relevance in, and connection to, change for sustainability.
People as the key to change	by promoting capacity-building opportunities that harness the ability of individuals to act as agents of change.
Systemic change	by helping learners develop skills that influence change within a system, organization or wider society.
Integration and innovation	EfS considers that integration, transformation and innovation are needed to change organizational and individual behaviour.
Alternative futures	by using positive methods such as futures thinking to create alternatives to the current situation that lead to action plans for change.
Reflection, negotiation and participation	by challenging the role of the educator as the conveyor of information. By encouraging a collaborative learning process using critical reflection, negotiating ideas and building trust, EfS builds the capacity of the learner with life skills for sustainability

Table 7-1 Education for Sustainability (EfS) methodology

(The Australian Research Institute in Education for Sustainability (ARIES), 2009, p. 4)

The Education for Sustainability framework incorporates the systems view and links up with an action learning and participatory approach. The following guide comes from a participatory learning context based on a systems thinking approach as shown in Box 7-5:

How to deepen systemic understanding:

- Look for multiple influences and interactions, rather than trying to identify a single, linear cause and effect.
- Be wary of the 'obvious' explanation, and look for deeper issues that might be influencing the problem.
- Take a 'helicopter' perspective 'above the issue' to look at the larger picture.
- Look for relationships and feedback by asking, 'what does this have to do with that?'
- Put yourself in 'others' shoes' – what is their perspective?
- Question boundaries and assumptions when an issue is labelled or a solution is suggested.

Box 7-5 Systems thinking in a learning process (Sterling, 2004, p. 91)

The guidance in Box 7-5 above is valuable for activating systemic change, and thus extends the ARIES EfS model by identifying significant actions that practitioners can readily apply. As a cautionary note, in a learning situation in the sustainability context where negative environmental behaviours are representative of cultural norms, formal education for sustainability may be of limited value in the short to medium term. My preference is to apply the EfS model in practice settings through informal, rather than formal, processes.

7.4.4 Sustainability Learning Frameworks

In an earlier conference paper, I outlined the concept of a learning framework to guide experiential learning in real-world sustainability activities as a form of system boundary (Parnell, et al., 2003). I argued that any activity or project requires a framework to foster the different learning needs of participants, particularly if connecting meaningful learning to sustainability outcomes is the purpose.

A learning framework is the mix of motivations, aspirations and process outcomes that determine the style of learning, pedagogical strategies, the knowledge and skills to be acquired, the process of application of acquired knowledge and skill, and the method and pace of feedback. It can incorporate the structures of formal qualifications or competency based education, as well as a looser, informal approach.

A learning framework in a practical activity creates cycles of learning under the influence of feedback. These cycles may be directly related to the stages of an activity and determine who is involved, their roles and learning needs. Because the range of knowledge and skills of participants will vary in any activity, they should be quantified and acknowledged in the design of appropriate learning frameworks, because participants have different reasons for their participation. Gaining new knowledge may be a central factor in their motivation, or it may simply be, for them, an effective way of achieving their aims and "getting important things done". Sustainability learning frameworks, therefore, are potentially an important aspect of embedding appropriate learning processes in sustainability activity in complex systems, and they may promote timely feedback[46].

7.4.5 Informal Learning for Sustainability - Examples

Researchers, facilitators and extension workers in regional Australia and in Third World development contexts are contributing some of the more illuminating thinking in the

[46] The Case Study in Chapter 11 discusses a practical application of learning frameworks in a sustainability activity.

connection of meaningful learning and sustainability. In a study of learning, cultural change and sustainability amongst pastoralists in the tropical savannahs of northern Australia (Arnott & Benson, 2001), pastoralists engaged in cultural change by a combination of context-specific processes embedded in a network of relationships with other pastoralists, extension services and educators. Timeframes were important: pastoralists motivated to change constantly chose to do so in their own time. The study also demonstrated that pastoralists gained their motivation and knowledge through largely informal means, based on their own diagnosis of their own contexts. They also accessed formal education when they deemed it necessary.

Many other exemplars illustrate how informal ways of learning can help us to "care for country" and connect us, and our behaviours, to the needs of local ecologies. Much work in developing countries, in remote Indigenous communities and in the mainstream has been based on a meaningful learning approach. Community-based Landcare groups (including Coastcare, Rivercare, Bushcare and Wildcare) have demonstrated how much cultural change can be achieved in land management practices through a highly motivated, informal learning approach (Landcare Australia, 2001, p. 12).

Settlement planning projects in Indigenous communities incorporate learning processes to further develop the capacity of community members to make decisions about their long-term future "on country"[47], and to take action to make their visions a sustainable reality. In 1998, a community in North Queensland engaged in an intensive planning project over a three-month period, followed up by regular workshops to focus on specific areas (Mona Mona Community Djabugay Tribal Aboriginal Corporation & Centre for Appropriate Technology Inc, 1999). The planning process was essentially learning-based; people needed to learn that they can make their own decisions about their community's future and more importantly learn the strategies for successful decision-making. Another planning process example in the east Kimberley region of Western Australia responded to an existing motivation for change where there were strong views about what was needed to ensure a viable, sustainable community. The project was structured to facilitate the community's own decision-making (Anda, Yuen, Calais & Revell, 2001).

There is a growing body of experience of participatory development projects in remote Indigenous communities, demonstrating how informal learning can contribute to cultural change. Haar (2003) describes a self-build project in the Torres Strait Islands in the

[47] The term "on country" is in common use in Indigenous communities in Australia. It refers to living on one's traditional lands, and implies that living on country has physical and cultural benefits and responsibilities (Myers, 1991, pp. 40-46).

late 1980s and early 1990s, where the learning, though facilitated, was essentially informal. The project fostered substantial individual and community change, although political realities of land tenure and national politics have since stifled progress. Scally (2003) describes a successful approach where a mix of formal and informal learning structures has bought about significant development of outstations in the Top End of the Northern Territory. In a participatory project report, I described how an informal learning process on a real, locally valued project brought about change in a small outstation community in Central Australia (Parnell, 1995).

Another example is a long-term slum community redevelopment project in India where sustainable development is a critical goal. Learning has been built into the process, including the production of a planning handbook developed to record and reflect the long-term aspirations of the community and to ensure the path to sustainability is followed (Burnham, 2002). The project is unfolding over a ten-year timeframe to better foster change to a sustainability culture.

7.5 Transformational Learning

Personal transformation is at the heart of any change process, as it confronts one's personal culture. The well-known sayings, "We must be the change we want to see in the world" (attributed to Mahatma Gandhi); and "If you want to change the world, change yourself first" offer insights to the core of the issue. Thus, the "self-help" sections of bookshops are full of personal transformation manuals: often purchased, occasionally read, sometimes applied, but rarely sustained. Culture is ultimately personal because we absorb so many different cultures as we grow, develop and mature. Culture can be so personal that it is difficult for anyone to perceive his or her own culture. In this vein, Hardison (1989, p. xiii) proposes, for example, that: "anyone who discusses modern culture has to do a great deal of contemplating of the invisible in the obvious".

There must be many aspects of my life that represent deep and invisible culture. However, experience combined with an open mind allows me to become aware of this invisible culture from time to time. For example, my experience with Indigenous people in remote communities has highlighted cultural baggage that I either wasn't aware of or was in denial about (ignorance, racism, insensitivity, and so on). Similarly, travelling in Third World countries has displayed my status and culture as a rich, white, Western male. Hardison (1989, p. xiii) reinforces the role of personal culture by arguing that culture is never a series of "separate departments". Rather, he argues

> It is a unity, a single identity that is a product of all the influences that have shaped it, which is to say that it is the end result of everything that makes up the culture … By the same token, there are not fifteen cultures or even two cultures: there is one culture. It is the culture we inhabit. It shaped our consciousness as we grew up, and it continues to influence us throughout life in ways we perceive and in ways of which we are largely unconscious.

In the light of the above quote, for the most part, I am not conscious of what cultural influences might be influencing my behaviours at any given time, but nevertheless, it is my own internal culture: the culture I inhabit.

Personal transformation is another one of the main expectations of the sustainability movement: that people will change their behaviour to accommodate sustainability principles by engaging in sustainable behaviour. However, such change is as complex as other personal change such as changing diet, losing weight, giving up smoking or drugs, ceasing risk-taking behaviour, or even simply getting out and exercising regularly. Nevertheless, many of the dominant approaches of the sustainability movement consider the issue as if it were easy to stop doing things one way and start doing them a different way. Further, their proponents seem to assume that people always act rationally in response to a clear need to change. However, this view fails to acknowledge that people find personal change difficult because of the complex mix of incentives and support needed to overcome the inevitable barriers to adopting and sustaining new behaviour. Drawing on research findings, McKenzie-Mohr (n.d., p. 1) identifies the impact of these barriers in sustainability change:

> Research indicates that each form of sustainable behaviour has its own sets of barriers and benefits. For example, the factors that impede individuals from composting are quite different from those that preclude more sustainable forms of transportation. Even with apparently closely associated activities such as recycling, composting and source reduction, different sets of barriers and benefits have been found to be important … multiple barriers and benefits may exist for any form of sustainable behaviour.

McKenzie –Mohr's position in the above quote regarding barriers does not identify them as cultural in nature. However, while some barriers to sustainable behaviour may be physical or structural, I believe that in many cases they are cultural and require a process of personal transformation. The personal transformations needed for sustainability are intimately connected to people's real learning capacity; that is, not simply knowledge accumulation, but internalising knowledge and turning that knowledge into new ways of behaviour.

7.6 Conclusions: Connecting Meaningful Learning to Sustainability

In the foregoing review of learning, I have argued that formal education develops capacity in the individual, and has the potential to foster sustainability culture. Our structures of education create the foundation for learning: we learn the basics of literacy, numeracy and technacy; we develop our abilities to research, to analyse, to synthesise, to create, and to evaluate; we develop knowledge, skills and attitudes; and we develop this learning foundation throughout pre-school, primary, secondary and tertiary education. We journey through this process with our capacity primed: to get a job, start a career, launch a business, become a social entrepreneur or even choose to do nothing much. I argue, however, that this capacity alone contributes little or nothing to the development of a sustainability culture. I demonstrated above that developed capacity, with its increased knowledge skills and attitudes, does not automatically lead to changed behaviour. The individual, with a developed capacity requires another ingredient, motivation: to apply the new knowledge, skills and attitudes to bring about change; to actively seek out what is needed to support any change process; to reflect on real-world action and experience; and to apply that capacity at key points in human systems.

At this point in human history, we are yet to achieve an intrinsic sustainability culture - a second nature. Learning will be part of the process of achieving that second nature. It is crucial, therefore, for us to understand how and why we learn and what we need to know. It is even more crucial to understand how to connect what we learn, to facilitate changing our culture from the ecologically destructive to the restorative. This will help to answer the question raised at the beginning of this Chapter: Does learning contribute towards change, and if so, how? We must also maintain awareness of Senge's (2001) warnings about the importance of time lags in feedback in our learning systems.

The implication here is that while our early years in formal education provide the scaffolding for how we act in the world and develop our capacity for change, it is not enough to change our behaviour, as acted over our lifespan. The knowledge gained through formal education is, for some, absorbed deeply; for others it is shallow and unconnected and is perhaps part of a cycle of fashion. While an essential foundation, it alone is insufficient for cultural change.

Informal learning links our periods of formal education; it transcends the quick fashion cycles and is fundamental for significant change over deep time. Informal learning is

alive when we are open to the impacts of our actions, especially when they are environmentally destructive. Informal learning provides the vehicle for the feedback we need to modify and change our behaviour. When it comes to actively seeking change I propose that an informal approach to learning, on a foundation of developed capacity, applied in meaningful ways, in socially situated real-world actions, at critical intervention points, and with a high level of motivation, is an essential part of the process needed to create a culture of sustainability over deep time. With the perspective on learning as the primary feedback process in our human systems as discussed in this Chapter, we can now proceed to the discussion of complexity and the emergence phenomenon in Chapter 8.

Chapter 8 An Emergence Model of Sustainability Culture

8.1 Introduction

In previous Chapters, I discussed the systems paradigm and introduced the concept of complex systems. In this Chapter, I extend the systems discourse into chaos and complexity theory. With the discussion of the socio-technical systems as a basis for social change in Chapter 5, I avoided including the key concept of emergence, either overtly or in different language. Emergence is the missing dimension in our understanding of change, as it explains the dynamics behind the unintended consequences of our socio-technical systems.

Reviewing culture and social change processes in Chapters 5 and 6, I proposed that the absence of a systems view in typical social analysis represented a major gap in understanding. I further argued that change is essentially an emergent quality of complex socio-technical systems. The concept of emergence is fundamental to this proposition. The perspectives to be gained about culture and society through knowledge of complex systems can potentially raise understanding of change processes to new levels, particularly beyond the values, political preferences and biases of conventional social enquiry. Thus, we can approach a more realistic understanding of how things really work. This Chapter, therefore, responds to the following questions, by exploring chaos and complexity, the phenomenon of emergence, and how it relates to cultural paradigms: Could the dynamics of complex systems contribute to the emergence of new cultural paradigms? And what are the implications of emergence for the development of sustainability culture? The response to these questions culminates in my proposal for an emergence-based model of sustainability culture and discusses its implications for sustainability practice.

8.2 What is Emergence?

Originally investigated in the fields of mathematics and science, emergence was first articulated by scientists studying the natural world (Morowitz, 2002). However, the advent of systems thinking has shown that emergent phenomena are observable in many human systems as well: from the social effects of technology to the behaviour of people in crowds. Emergence as an idea has captured the imagination of participants in the fields of computer science, educational psychology, management systems, organizational change and human resources amongst others. Corning (Corning, 2002, p. 19) explains:

> Among other things, emergence has been used by physicists to explain Bénard (convection) cells, by psychologists to explain consciousness, by economists and investment advisors to explain stock market behavior, and by organization theorists to explain informal "networks" in large companies. Indeed, a number of recent books view the evolutionary process itself as a self-organizing, emergent phenomenon.

Indeed, as Corning confirms in the above quote, emergence can be observed in almost any field where complexity is in evidence, and by implication the field of sustainability is no different. Emergence describes simplicity emerging from complexity. It is a phenomenon whereby simpler, new patterns and behaviours "emerge" from the interaction of components of complex systems, and further, between interacting systems (Cohen & Stewart, 1994, p. 232). Any new emergent behaviour is qualitatively different from the behaviour of the systems from which it emerges. There is an unpredictable nature about emergence – while it is dependent on the nature and state of system components or the intersecting complex systems, there is generally no apparent, direct, causal, and sequential connection between components, patterns and behaviours of the underlying complex systems and the components, patterns and behaviours of the emergent simplicity (Urry, 2003, p. 25). Thus, it can be difficult to see the connection between any set of circumstances and its emergent behaviour and between related phenomena at different scales and levels of reality, as identified by Fromm (2004, p. 19) in Box 8-1 below:

For example, when one examines a single molecule of H_20, there is nothing that suggests liquidity:

- one water molecule is not fluid,
- one gold atom is not metallic,
- one neuron is not conscious,
- one amino acid is not alive,
- one sound is not eloquent.

But a collection of millions of water molecules at room temperature is clearly liquid, a collective interplay of millions of neurons produce consciousness, and a common interaction of millions of gold atoms cause metallic properties. Liquidity, superfluidity, crystallinity, ferromagnetism, metallic conduction are emergent properties.

Box 8-1 The problem in predicting phenomena (Fromm, 2004, p. 19)

Further to Fromm's above description, the mere existence of the possibility of emergent behaviour in any complex situation, means that any complex set of processes designed with a particular goal in mind may generate emergent phenomena which may or may

not serve any particular set of intended or designed goals (Shaw, Stacey & Griffin, 2000, pp. 88-89).

Different authors and researchers have identified the value of the emergence concept and have described it as follows:

- Mathematicians Jack Cohen and Ian Stewart (1994, p. 4): “collective behaviour of a system that somehow transcends its components”;
- Sociologist John Urry (2003, pp. 24-25): “It is not that the sum is greater than the size of its parts – but that the system effects are somehow different from its parts. Complexity examines how components of a system through their interaction ‘spontaneously’ develop collective properties or patterns, even simple properties, such as colour, that do not seem implicit within, or at least not implicit in the same way, within individual components.”;
- Physicist Fritjof Capra (Capra, 2002): “This spontaneous emergence of order at critical points of instability is one of the most important concepts of the new understanding of life. It is technically known as self-organization, and is often simply referred to as ‘emergence’. It has been recognised as the dynamic origin of development, learning and evolution.” (p. 12). “Emergence results in the creation of novelty, and this novelty is often qualitatively different from the phenomena out of which it emerged.” (p. 36);
- Business professor Jeffrey Goldstein (cited in Corning, 2002, p. 24): “The arising of novel and coherent structures, patterns and properties during the process of self-organization in complex systems”;
- Management professor Margaret Wheatley (Wheatley & Frieze, 2006): “Emergence is how life creates radical change and takes things to scale”; and
- Physicist Doyne Farmer (cited in Corning, 2002, p. 19): “It’s not magic...but it feels like magic.”

What can be made of all the above points of view? Emergence expresses the fractal nature of systems: pattern and scale, pattern and scale and so on. Increasingly, complexity theorists are describing the narrative of nature and life as emergence: from the Big Bang to the evolution of the human brain, through to complex social organization, and from the micro scale to the macro scale (Fromm, 2004; Morowitz, 2002). Lissack (1999, p. 112) clarifies:

> It is less than an organized, rigorous theory than a collection of ideas that have in common the notion that within dynamic patterns there may be underlying simplicity that can, in part, be discovered through

> large quantities of computer power ... and through analytical, logical and conceptual developments ...

Lissack's view demonstrates the emergence concept is a work in progress with a common theme across different activities. Thus, the idea of emergence is in itself emergent. For the purposes of this research, I believe that a flexible definition of emergence, encompassing the ideas expressed by the above voices, will be of greater service. I see emergence as a working concept to guide our action, our understanding of social change and the development of sustainability culture.

8.3 The Theoretical Basis of Emergence

Chaos is fundamental to the concept of emergence, and while distinct from complexity, both concepts are related by an understanding of non-linear behaviour in natural phenomena, and can be considered to be different facets of the one concept (Cohen & Stewart, 1994). As systems become more complex both in the numbers of components and the numbers of interactions, they can develop non-linear, "chaotic", behaviour. Such behaviour tends to be unpredictable, creating new unexpected phenomena and patterns, frequently simpler than the underlying complexity.

Chaos theory came to prominence in the 1980s, after slow development through the 1960s and 1970s. Some scientists uncovered chaotic anomalies in mainstream science, dating back to the very early 20th Century (Gell-Mann, 1994, p. 25). According to Gleick (1987, p. 5):

> Chaos breaks across the lines that separate scientific disciplines. Because it is a science of the global nature of systems, it has brought together thinkers from fields that had been widely separated.

For example, an early chaos theorist, Edward Lorenz, was a meteorologist who discovered that by running his weather models through a computer from different starting points in the process, substantially divergent information arose about the system he was studying (Gleick, 1987, p. 17). He found that simple systems were predictable in the short term, but were highly dependent on initial conditions: if he processed the data from a different set of initial conditions, different behaviour would be observed. Thus how a system is observed, and how the data are extracted and projected can give widely varying results. The mathematics of complexity showing that much of what is taken as fact has more of a basis in assumption than in reality, with the implication that modern scientific method (chiefly, the reductionist approach) has limits (Capra, 1997, p. 133).

In this vein, there is an underlying assumption in science that facts enable prediction of outcomes. This is generally regarded as a positive viewpoint. It was not until some physicists and mathematicians began examining non-linear dynamic systems that were beyond the equations of traditional science that they discovered “disturbing” information whereby predictability became problematic. Mainstream science tends to treat such phenomena as anomalies and excludes them from consideration (Gleick, 1987, p. 304). Even Newton ignored messy, non-linear, conflicting data to arrive at his elegant formulae in the physics of motion and thermodynamics, which for the most part, have been the basis of much of modern technological development (Ball, 2004, p. 74; Cohen & Stewart, 1994, p. 17). His approach, however, only yielded results through simple assumptions, and was not able to resolve complex relationships, such as the mechanics of three bodies interacting through gravitational forces (Morowitz, 2002, p. 10).

Mainstream science has thus been masterful at observing nature, identifying facts, and developing models of understanding: such models enable technologists to manipulate the material world to create real outcomes: aeroplanes, nuclear weapons, laser beams, medical imaging machines, particle accelerators, satellite orbits. While practical and effective this process of treating the anomalies of non-linear behaviour as problematic, and thus ignorable, is an example of a flaw in conventional scientific thought, which was not fully understood before Lorenz’s observations.

Lorenz found that any change to the assumptions about initial conditions led to system behaviour changes and that there are scales where predictability ceases as complexity increases, and the Newtonian universe enters the region of chaotic behaviour (Gleick, 1987, p. 23). Contrary to populist notions of science as a collection of facts, much of conventional science is based on assumptions about theoretical models of reality. Without the cultural process of meaning making from knowledge-as-fact, or indeed, model making, hypothesis development and scenarios, discrete facts, of themselves, are valuable only in certain contexts. Facts are regularities or stabilities in observed nature or in human experience, or, as termed by Gell-Mann, “frozen accidents” (Gell-Mann, 1994, p. 134). If we are to solve our problems, and to make decisions to act, facts don’t always tell us what we need to know. Thus, when a scientific fact is communicated to the social milieu, it actually ceases to be science.

Facts, often thought to be absolute, may only exist for a limited time. New methods, models and understandings can render facts obsolete. Further, as many have argued,

conventional science is largely about proving the models wrong rather than proving a model right. For example, theoretical physics tells us that Higg's Boson must exist, even though it has not been identified in fact (The Exploratorium, nd). Another example is the Ptolemaic system of astronomy (Cohen & Stewart, 1994, p. 25) with its theoretically constructed "epicycles" which were remarkably effective in explaining observed planetary behaviour: yet Newton's model supplanted them. As hypotheses, the proof in the examples of Higg's Boson and Ptolemy's epicycles lies in their ability to avoid falsification, as described by Karl Popper (Burns, 2000, p. 8). Unlike the Ptolemaic worldview, as new facts have not yet been discovered to refute the existence of Higg's Boson, these hypothetical particles remain part of the working model of the physical universe[48]. Effectively, then, any view of the world is a working model, until a better model emerges, or the output of theoretical models fail due to the outcomes of new observations: differences are in the level of knowledge, detail graining and coherence. The scientific worldview, in spite of our technological mastery, is a more uncertain place than many scientists and science writers would have us believe. Yet, Gleick (1987, p. 303) identifies in Box 8-2 that the traditional scientific view of complexity assumes:

- Simple systems behave in simple ways
- Complex behavior implies complex causes
- Different systems behave differently

Box 8-2 Gleick's summary of traditional views of complexity (1987, p. 303)

Chaos theorists discovered that the simplest systems, set forth into non-linear dynamic motion, with a small number of system rules, are capable of generating incredible complexity. In chaos and complexity, there is a dynamic tension between order, chaos and randomness. Most apparent random behaviour develops chaotic properties, and order can arise from chaos. Further, the chaos theorists observed that some system behaviours remained chaotic – that they were too complex for predictability. Conversely, they also saw that patterns sometimes emerged from complex behaviour (that is, order from chaos) and that these patterns allowed predictive capacity through the development of dynamic equilibrium and identification of apparent system goals. Gleick (1987, p. 5) described the early chaos theorists as follows:

[48] If forthcoming experiments at the Large Hadron Collider in Switzerland "falsify" the model based on dark matter and the behaviour of the Higgs Boson, the physical maps of current scientific thought will have to be fundamentally re-drawn.

> They had an eye for pattern; especially pattern that appeared on different scales at the same time. They had a taste for randomness and complexity, for jagged edges and sudden leaps. Believers in chaos – and they sometimes called themselves believers, or converts, or evangelists – speculate about determinism and free will, about evolution, about the nature of conscious intelligence. They feel that they are turning back a trend in science toward reductionism, the analysis of systems in terms of their constituent parts: quarks, chromosomes, or neurons. They believe that they are looking for the whole.

In the above quote, Gleick articulates a significant defining quality for chaos theorists: one that could be equally assigned to sustainability practitioners. Chaos and complexity researchers also saw that these processes were creative (Gleick, 1987, p. 43):

> Those studying chaotic dynamics discovered that the disorderly behaviour of simple systems acted as a creative process. It generated complexity: richly organized patterns, sometime stable, sometimes unstable, sometimes finite, sometimes infinite, but always with the fascination of living things.

By extension from the above quote from Gleick, patterns, therefore, are the currency of complexity, and pattern identification a central task for practitioners in complex space. In addition to Edward Lorenz, several other investigators articulated the new worldview and developed the basis for understanding patterns in natural phenomena:

- Mitchell Feigenbaum, a physicist, famous for the Feigenbaum number, a constant which emerges from period doubling cascades and which is observed in boiling liquids, predator-prey models, electronic oscillations and blood cell production (Gribbin, 2005, pp. 75-82);
- Benoit Mandelbrot, a mathematician, famous for the Mandelbrot set (which conforms to the Feigenbaum number) showing the complex and multi-scale patterns called fractals, emerging from simple mathematical formulas (Capra, 1997, pp. 143-150);
- David Ruelle, who studied turbulence and its chaotic behaviour and developed the understanding of the role of strange attractors (Ruelle, 2006); and
- Ilya Prigogine, a Belgian mathematician who investigated the behaviour of complex systems and described the phenomenon of dissipative structures[49] (Prigogine & Stengers, 1985).

Gleick (1987 p.304) summarises the essence of chaos in Box 8-3 below:

[49] A dissipative structure refers to a system increasing in complexity and dynamic activity, away from a state of static equilibrium.

- Simple systems give rise to complex behavior;
- Complex systems give rise to simple behavior; and
- The laws of complexity hold universally.

Box 8-3 Gleick 's summary of chaos (1987, p.304)

This new paradigm creates a new model for understanding natural phenomena and leaves the interpretation as to how things actually work open to greater question: the usual linear, reductionist assumptions failed to provide adequate answers. It does not deny reductionist science; it acknowledges the domains where the physical world demonstrates linear behaviour, yet it extends our assumptions about the world towards a less certain basis. In this paradigm, the new simple patterns can be dynamic rather than static, while achieving a state of equilibrium around a notional point called a "strange attractor". Particularly strong attractors can create "basins of attraction" - a space where dynamic system movements appear to be contained in a state of dynamic equilibrium. Basins of attraction can also be described as "fitness landscapes". Edward Lorenz demonstrated that systems in a state of dynamic equilibrium engage in chaotic behaviour seemingly attracted to a point or space in place and time; yet the strange attractor is notional, it does not actually exist.

Climate systems, such as an El Nino, appear to oscillate around basins of attraction with local variations occurring within a general basin. Perturbations to the climate system (such as greenhouse gases emissions from human activity) cause disequilibrium and chaotic behaviour, with less predictive capability, until a new attractor emerges to create a new basin of attraction. Strange attractors, therefore, are emergent phenomena in dynamical systems (Cohen & Stewart, 1994, p. 207) and are present whenever a system displays consistent behaviour over time.

Inputs and outputs remain in tune with the dynamics of the system, with feedback helping moderate behaviour. Some natural systems demonstrate considerable stability over time, with great resilience to perturbations. Stable systems can absorb and process perturbations while keeping within the basin of attraction. Thus changing a system from its current basin of attraction can require considerable energy input. Prigogine's dissipative structures further illustrate this, as Capra points out (Capra, 2002, p. 12):

> A dissipative structure, as described by Prigogine, is an open system that maintains itself in a state far from equilibrium, yet is nevertheless stable: the same overall structure is maintained in spite of an on-going flow and change of components. Prigogine chose the term "dissipative structures" to emphasize this close interplay between structure on one hand and flow and change (or dissipation) on the other.

Prigogine's dissipative structures as described above by Capra, explain that structures are stabilities created by flow and change. Further, the concept of the basin of attraction helps to explain why change can be so difficult, and yet when change comes, it can be sudden and transformative – resilience has its limits, and the energy in the system reaches the point where the system no longer retains its dynamic equilibrium, and breaks out into a chaotic state. It can remain chaotic until it can settle into a new state of dynamic equilibrium in a different basin of attraction. Of course, the new basin of attraction may be a completely different "landscape" from what existed previously. In social systems, it is likely to be completely unexpected.

Another way of describing dissipative structures and basins of attraction is as follows: Complex systems operate in a phase space; that is, a space accommodating all possible states of a system. When the system changes from an equilibrium state due to new inputs or feedback, it can transition into a new phase space, similar in concept to the phase transition of water from solid to liquid and from liquid to gas after input of appropriate amounts of energy. Ball (2004, p. 119) suggests "the key notion about a phase transition is that it happens everywhere throughout a system (that is, globally) all at once, and it does so because of a constituency of countless constituents". It has been observed in social and ecological systems, in adopting new technology or when grasshoppers begin to swarm, for example. The change of phase process is another way of explaining how stable systems move from a basin of attraction through system perturbations, through a period of chaotic behaviour, to a new basin of attraction, and thus to a new emergent pattern (Cohen & Stewart, 1994, p. 200). Capra (1997, p. 81) identifies the importance of pattern and differentiates pattern from structure:

> Patterns, however, cannot be measured or weighed; they must be mapped. To understand a pattern we must map a configuration of relationships. In other words, structure involves quantities, while pattern involves qualities.

The implication is that creative, higher order thinkers can visualize emergent patterns, but reductionist thinkers may not. Hence, we have the dominance of the mechanistic worldview, and the difficulty in moving to holistic thinking (Capra, 1997, p. 81): "Most

reductionist scientists cannot appreciate critiques of reductionism, because they fail to grasp the importance of pattern."

In terms of socio-technical systems, the mechanistic view is manifest in commentary from all sides of politics, even the "green view"[50]. There is a perception among social theorists that changing structure will change society in desired ways: some social theorists propose that structure is the main determinant of social systems[51]. Such a perspective is contrary to integrative thinking and pattern recognition as significant qualities of a sustainability practitioner. As complexity in our world increases, and as we hope to engage with the world in a sustainable fashion, we must use our visualization capacity to perceive the self-organizing behaviour of complex systems. Self-organization is an emergent quality observed in natural and social systems, stemming from countless complex system interactions. However, as Best and Kellner contend, we still have much to learn about how self-organization operates in social systems as compared to biological systems (Best & Kellner, 1999), especially where perceptions about self-organization are for positive social goals. Certainly, the notion that a social system can be left to self organize to achieve a desired social goal is problematic (Ashby, 2004). However, understanding that any social system will exhibit self-organizing behaviour irrespective of designed or expressed goals is an important lesson for the future.

8.4 Emergent Phenomena

As the research questions stated at the beginning of this Chapter lead me to seek out the implications of emergence in shaping social and cultural change, it is important to investigate examples of emergence in the real world. A growing body of work investigates manifestations of emergence in socio-technical systems. While not all of these perspectives explicitly connect their observations to a definition of emergence, they nonetheless describe socio-technical scenarios exhibiting emergent qualities and behaviours. As a qualitative form of meta-study, this body of work investigates diverse areas as human settlement development, crowd and group behaviours, epidemics, agricultural systems, learning systems, economics and globalisation, social networks and other social phenomena to describe emergent patterns, critical mass effects, phase changes and "tipping points".

[50] Refer to my critique of sustainability attitudes in Chapter 4, where many sustainability proponents use the language of holism while approaching sustainability problems with a mechanistic mind-set.
[51] Refer to Chapter 5.

8.4.1 The Emergence Narrative of Harold Morowitz

American academic, Harold Morowitz has reviewed the concept of emergence as evident from the Big Bang through to the development of the human mind, according a grand narrative of twenty-eight "emergences" (Morowitz, 2002). Morowitz includes the physical, geological and biological emergences of phenomena such as atomic particle formation, planets and planetary structures, cells and nervous systems amongst others. Of real interest to the sustainability domain, Morowitz's narrative connects the physical/geological/biological to the emergences of human mind and society, technology, language, settlement, agriculture, philosophy and spirit. Every human development is a story of interrelatedness through emergence (Morowitz, 2002, pp. 156-157):

> With the appearance of *Homo Sapiens* various emergences are no longer independent, since social activities are complex and interdependent. Thus, tool making, language, agriculture, and war all relate to each other. We treat them separately for convenience to assess the major features in a culture's coming to be and defining its characteristics.

In the above quote, Morowitz sets out an understanding of human development as a dynamic, complex process, and includes technology as part of that process: a socio-technical process. Morowitz characterizes the emergence of human society and its technosphere as a different order of magnitude from the impact of prior species, with human society dominating the environment through artefacts and their capacity to change ecosystems, aided by the development of centralised authority, hierarchical social structures and new forms social organization. Emergent technologies such as large-scale agriculture and irrigation, monument construction and engineering systems have shaped the environment and influenced ecosystem function, as an inherent part of human development.

8.4.2 Ekistics: Science of Human Settlements

The idea of emergent settlement patterns was explored by architect and urban planner, Constantinos Doxiadis in the 1950s and 1960s in ekistic theory, or the science of human settlements (Doxiadis, 1968, 1970). Doxiadis observed emergent patterns of settlement development in many different types of human settlement, of different scales, in different cultural and geographical settings. Ekistic thinking has had a widespread influence in planning and regional development, and continues to guide thinking about discrete settlement establishment and regional development. Major settlement planning projects are still using ekistic theory as a framework in many parts

of the world. Extending Doxiadis' work, Walker (1976) proposed that the ekistics framework is useful for research into human settlements and their particular problems.

Doxiadis (1968) proposed the fundamental ekistic concept that human settlements are metabolic; that is, human settlements establish, develop and decline or transform. Doxiadis' metabolic concept pre-dates the advent of the Extended Metabolism model identified in Chapter 4. It was arguably influential in the latter's development. Internal adaptation to change driven by external factors is critical in facilitating sustainability outcomes. Responses to external factors are strongly connected to settlement goals, expressed by a settlement's inhabitants, and are largely subjective. Doxiadis (1968, p. 6) proposes that a principle, and common, goal for settlement development is a sense of happiness, security and safety. In responding to the lack of a theory of evolution for human settlements, Doxiadis proposed an emergent taxonomy (1968, p. 200). As Doxiadis developed ekistic theory in the 1950s and 1960s, complexity theory was in its infancy, and was largely confined to the cybernetic and biological spheres. Doxiadis appeared to have an implicit understanding for the emergence concept, and built the ekistics theory on an emergence basis.

Ekistics identifies emergent patterns of settlement through a classificatory framework incorporating the dimension of scale and the dimension of elements common to all human settlements, resulting in the articulation of 54 Laws of Development of human settlement. Scale ranges from the individual in its living space to world city and the region. Common elements include nature, society, shells (such as buildings and urban spaces), networks and culture. Networks can be virtual (such as relationships between people and groups) and physical (such as roads and telecommunications). Doxiadis (1968, p. 200) describes the forms of human settlement as emergent over time, as illustrated by Box 8-4 below:

- Non-organized human settlements (early in human evolution)
- Organized village settlements lasting 10,000 years (Epulis)
- Static urban settlements or cities lasting 5,000 to 6,000 years (Polis)
- Dynamic urban settlements over the last 200 years and into the future (Demopolis)
- The phase of the universal city, now beginning (Ecumenopolis)

Box 8-4 Doxiadis' emergent forms of human settlement (1968, p. 200)

Through his understanding of the dynamic interactions among the ekistic components of human settlements, and his natural feel for emergent qualities of increasingly complex settlement forms, Doxiadis developed the above taxonomy. Doxiadis was also

one of the earliest theorists to place importance on networks for shaping the life of human settlements. It was not until the 1990s that networks were taken seriously in understanding social systems and social change. Recent insights into settlement patterns have linked emergent forms to their prospects for sustainability, especially in terms of the relationship of settlement patterns to liveability (Newman & Kenworthy, 1999; Beatley, 2000). Beatley develops the layered view of settlements in his "Biophilic Cities" concept, where biophilic urban design elements appear at scales ranging from buildings, blocks, streets and neighbourhoods through to communities and regions (Beatley, 2011, p. 84), reflecting Doxiadis through a sustainability vision.

8.4.3 Networks: Small Worlds and the Strength of Weak Ties

Parallel to the work of Doxiadis, the idea of networks was being investigated from the 1940s to 1960s in the fields of cybernetics (Wiener, 1965) and psychology (Milgram 1967, cited in Granovetter, 1973, p. 1368). However, as the field of systems science and complexity was still in a formative stage, such work had not greatly influenced the study of change in social systems, until the groundbreaking social networks research of Mark Granovetter. Granovetter (1973, p. 1360) suggests that there are emergent patterns in macro-scale systems arising from the weak ties in micro-scale social systems:

> A fundamental weakness of current sociological theory is that it does not relate micro-level interactions to macro-level patterns in any convincing way … I will argue … that the analysis of processes in interpersonal networks provides the most fruitful macro-micro bridge. In one way or another, it is through these networks that small-scale interaction becomes translated into large-scale patterns, and that these, in turn, feed back into small groups.

Granovetter, then, identifies interacting systems at different scales as a significant feature of the social milieu. Further, he underlines the importance of interpersonal networks as the way systems of different scales interact and provide pathways for feedback. The importance of Granovetter's work became increasingly clear as understanding of chaos and complexity grew in the 1980s and 1990s, and theorists applied complexity theory to the understanding of social systems and organizations.

More recently, Buchanan (2002) reflects on the emergent qualities of networks and social networks in particular. Buchanan shows common patterns across different types of network: information and influence moves long distances along weak ties, linking people and social groupings in ways that are not usually apparent. This is Milgram's "small world" concept (cited in Granovetter, 1973, p. 1368), made famous in popular

culture as “six degrees of separation”. Regular networks typically have highly clustered nodes, with many connections, and with short distances between the connections. This means that information or ideas have to travel through many nodes to travel far.

Watts and Strogatz (1998) found that randomized networks have minimal clustering and quick jumps, but small world networks feature highly clustered, well connected nodes, but with occasional random connection between otherwise not directly connected nodes. This allows knowledge to spread from a localised space into a distant space. This is effectively describing the difference between Putnam’s bonding and bridging social capital (Putnam, 2000). Social change, then, becomes an emergent quality of social clusters bound in networks connected by weak ties. Thus it is possible to discover meaningful patterns in dispersed, complex social connections. Buchanan concludes that: “social networks possess a special and hitherto unsuspected organization and structure that make for a truly small world” (2002, p. 16). Buchanan cautions, however, that emergent qualities of networks cannot be predicted from the qualities of its underlying, individual components: “no amount of information at the level of the individual species or economic agent can hope to reveal the patterns of organization that make the collective function as it does” (2002, p. 16).

The inability to predict emergent network qualities from the qualities of underlying components is particularly crucial for sustainability, as it is in opposition to the commonly held view of each of us “doing our bit” for the environment – the typical attitude that if enough of us do what is needed, we will, as a society, be sustainable. From Buchanan’s perspective, an approach based on changing the behaviour of the individual will not necessarily transfer to the behaviour change of communities and societies. It may very well be that the behaviour of individuals with a high degree of social connection to local and distant groups which can lead for change. Ball (2004, p. 465) offers a postscript that Watt’s more recent research indicated that there was still scope for individual behaviour and responsibility to influence the outcomes of small world networks.

8.4.4 Paradigm Shifts, Tipping Points and Critical Mass

In reference to Kuhn’s concept of the paradigm shift, as discussed in Chapter 2, a paradigm shift is of a similar nature to a phase transition. Such thinking is reinforced by the observations of Ball (2004) and Surowiecki (2004) in studying social movements and crowd behaviour. Ball demonstrates the emergence of strikingly similar phase transition patterns or “landscapes” of the potential alliances in the pre-World War II

European political environment and the performance of multi-particle fluids on the verge of phase transition (2004, p. 367). Further, he demonstrates that group behaviour is not an extrapolated version of individual behaviour by referring to examples of unfettered choice leading to less social freedom and segregation (Ball, 2004, p. 395).

Gladwell (2000) develops the paradigm shift concept by proposing that ideas, products, messages and change generally, spread through social systems like viruses and epidemics. The characteristic of contagiousness is that little causes have big effects. That is, change occurs at a dramatic moment. Appropriating a systems term, Gladwell calls such dramatic moments of change the "tipping point". He proposes that there is more than one way to tip an epidemic and articulates three rules of epidemics: the law of the few (where key people become vehicles for change); the power of context (humans are more sensitive to their environment than they appear to be); and the "stickiness factor" (where new ideas have to be "sticky" to be adopted) (Gladwell, 2000, p. 29).

In his Law of the Few, Gladwell asserts that social epidemics are usually driven by a small number of exceptional people: sociable, energetic, knowledgeable and influential among peers. He describes such people as "connectors", "mavens" or "salesmen". Connectors have the capacity for making friends and acquaintances and develop weak ties across social groupings. Weak ties between social groups are vital for new information and ideas to spread (Granovetter, 1973). A maven is a connector who accumulates knowledge, usually of a deep and/or thorough nature, and passes it on through the various social networks. Salesmen are the ones who are able to convince their social networks to make the change or to adopt the idea. Without these players, it is harder to get an idea to stick. The "stickiness" factor seems to be the crucial part of the process from early stages of an innovation: combined with weak ties over large social networks, tipping points are reached, and the new idea is adopted more widely. Gladwell recognises that while this is an observable emergent pattern, it can be difficult to plan for an idea to stick. Stickiness is, therefore, an emergent quality in social change, hard to define and, as Gladwell (2000, p. 259) says, "That's why social change is so volatile and so often inexplicable, because it is the nature of all of us to be volatile and inexplicable."

In my view, Gladwell, using his observations of emergent patterns, develops simplistic formulas for social change processes. An emergent pattern re-applied does not necessarily work in reverse: the starting conditions have changed creating the

possibility for different emergent qualities. This note of caution complements Buchanan's view (2002), suggesting that individual action not only does not necessarily lead to cultural change, when and if change does emerge, it will not necessarily be successful when re-applied as a prescription in a different social context. This prescriptive re-application has implications for policy development: emergence is contextually sensitive. An emergent pattern may not be a good basis for an inflexible policy prescription.

8.4.5 Working with Patterns

Alexander's Pattern Language

The architect Christopher Alexander's seminal work *A Pattern Language* (Alexander, et al., 1977) is an early study of emergent phenomena in the form of patterns for application to the design of buildings and urban spaces. Over many years, Alexander and his research team looked at buildings and urban design across geographic and cultural boundaries to identify emergent patterns of human living preferences: he called this the "timeless way of building" (Alexander, 1979)[52] There are some similarities between the ideas of Doxiadis and Alexander – and they may have emerged as separate reflections on the nature of settlement. Alexander and his colleagues tended to focus on buildings and their urban placement, whereas Doxiadis appeared to be more attracted to the dynamics of towns and cities within regions.

Alexander's underlying philosophy was to give non-professionals the tools to make wise design choices for private and public space: the patterns could be modified, tailor-made and applied to building design anywhere, with the purpose of removing professionals from the process (Alexander, et al., 1977). The Pattern Language concept rests on the most notable emergent pattern: that most of the built environment traditionally has been designed and constructed in such a timeless way. Patterns even included furniture, fit-out and philosophies of decoration. Alexander believed that once internalized, the patterns can be expressed by designers in a natural, not a mechanistic, way. Alexander and his colleagues were not without their critics. Gelernter was critical of some aspects of Alexander's work, (1983, p. 21):

> The people in traditional cultures most probably learned their design language by living among, and attempting to copy, specific examples of buildings already created by the language, not by studying universalised descriptions of the buildings' constituent parts. Yet Alexander turns this completely upside down and has us study abstract patterns of form instead of specific examples of those

[52] This is also the title of the first volume in the *Pattern Language* series.

> patterns in use. This deprives the designer, I would suggest, of the essential guiding image which ensures that the parts make up a coherent whole.

Gelernter's critique rests on his concerns regarding the potential for inappropriate application of patterns: if the cultural internalization of the pattern fails, the result is a collection of parts, not a whole. As with Buchanan's contention that an emergent pattern re-applied may not be successful, Galernter's critique also guides us to be cautious when applying an emergent pattern to solving problems in different contexts.

In his more recent four-volume series, *The Nature of Order: an Essay on the Art of Building and the Nature of the Universe*, Alexander addresses the "static" nature of his patterns by situating them in dynamic processes or "sequences" where patterns are regarded as the emergent outcome of sequences (Alexander, 2001, 2002, 2003, 2005). He also extends the pattern/sequence concept to link geometric patterns in the built environment with similar patterns in nature to understand why some built environments have more "life" than others.

Eglash's African Fractals

Eglash extends the concept of emergent patterns in human settlements in his study of traditional African settlements (Eglash, 1999). In settlement layout, building design, and design and decoration of objects and fabric prints across different parts of Africa, he identifies patterns corresponding to the mathematics of fractals, demonstrating qualities such as recursion (a loop or circular process), scaling and self-similarity (similar patterns within different scales), infinity (for connecting fractals to the idea of dimension), and fractional dimension (infinite length within a finite boundary) (Eglash, 1999, pp. 17-18). Further, it appears as though the development of such fractal patterning has occurred through the processes described by Gelernter above. Thus Eglash concludes that: "Most important, there are indications that this pattern creation through group activity is supported by conscious mechanisms specific to self-organization as defined in complexity theory" (1999, p. 174). Eglash thus identifies that self-organization is the primary mode of pattern development.

Berry's Solving for Pattern

Another view of emergent patterning is from the American farmer, environmentalist, poet and author Wendell Berry. Through long years of agricultural philosophy and practice, Berry coined the term "solving for pattern" to describe his minimal impact approach to sustainable agriculture (Berry, 1981). Berry critiques the industrial approach to solving problems (1981, p. 134):

> A bad solution is bad, then, because it acts destructively upon the larger patterns in which it is contained. It acts destructively upon those patterns, most likely, because it is formed in ignorance or disregard of them. A bad solution solves for a single purpose or goal, such as increased production. And it is typical of such solutions that they achieve stupendous increases in production at exorbitant biological and social costs.

Berry's critique above adds a new dimension to our designed systems approach where we approach complexity with a single-issue mind-set that creates myriad second-order social and environmental consequences. In contrast, Berry outlines a systems view of a "good solution" (1981, p. 134):

> A good solution is good because it is in harmony with those larger patterns – and this harmony will, I think, be found to have a nature of analogy. A bad solution acts within the larger pattern the way a disease or addiction acts within the body. A good solution acts within the larger pattern the way a healthy organ acts within the body.

Berry's approach both identifies universal patterns as a framework for solving problems in other domains, and places the philosophy of solving for pattern in a context of multiple, nested patterns. Further, Berry states: "It is the nature of any organic pattern to be contained within a larger one. And so a good solution in one pattern preserves the integrity of the pattern that contains it" (1981, p. 146). In some ways, Berry's philosophy extends Alexander's approach by having a deep understanding that any emergent pattern, when applied to solving a problem, will interact with other patterns at different scales and other contexts, and must be approached with caution.

8.5 Proposal: A Model for the Emergence of Sustainability Culture

In my foregoing analysis of emergence theory and reflections on working with emergent patterns, I have been leading to this proposal of an Emergence Model of Sustainability Culture (referred to as the Emergence Model in the remainder of this thesis). The challenge in this proposal is how to frame it: as a theory; as a concept; as a mathematical model; as a metaphor; or a manifesto? Accordingly, the emergence model I propose is more than theory: it is at once metaphorical, conceptual, and can stand as a manifesto. It is not a mathematical model: mathematical interpretation of complexity is beyond my capacity. I leave the mathematical understanding of emergent change in social systems is for others to explore. However, in the same way that I am not a social or cultural theorist, nor a social scientist, not being a mathematician does not disqualify me from exploring the principles of chaos and complexity and speculating about how such principles unfold in the real-world domains of people trying to make change in the world. I believe that the narrative generated by chaos and complexity has power and resonance beyond its mathematical origins. It can become a metaphor for new thinking, and a conceptual basis to support better sustainability practice. The model, therefore, can be expressed in three ways:

1. As a metaphor: by invoking a mental image connecting to a real world phenomenon;
2. As a manifesto: by simple statements of cultural qualities with a sense of direction; and
3. As a graphic image: by expressing the metaphor and manifesto in visual language.

To be of value, an emergence model must have a holistic sensibility. An emergence model is not mechanistic: it is not a strategic plan or a set of tactics; it is not a management tool; and it is not a formula or a linear process; it is however, concerned with the prospect of a sustainability culture as a basin of attraction for a sustainable society. Thus, the model does not describe the levers to be pulled. Rather, it is concerned with the qualities that society and its people will need to internalize and express to maximize the chances of a sustainable society emerging from all our discrete attitudes, values, norms, behaviours, and our ideas and actions.

8.5.1 Emergence Model as Metaphor

For the purposes of illustrating the emergence model, I propose a rocky stream as a metaphor for human society and an emergent sustainability culture. The rocky stream

metaphor, through a description of its character as a natural system, informs the expression of the qualities of sustainability culture, as a changing, constantly forming phenomenon, as illustrated in Box 8-5 below:

In the rocky stream metaphor, human culture is represented by the flow of water, and the streambed and banks, with all its contents, obstacles and debris as the ecological setting. As with human culture, there are many ways for the water to flow: faster, slower, smooth, turbulent, calm, wild, contained or overflowing. Sometimes flow patterns can be predicted; at other times they cannot.

Flowing from high ground to lower ground, the stream may have obstacles affecting the flow, such as rocks and tree trunks. Stream banks shape and direct the flow, sometimes in a long-term pattern or sometimes for a very short period. Between smooth flows and obstacles, whorls and eddies form, trapping debris, foam and anything that was caught in that particular flow line. Sometimes calm spots are created, which can provide shelter for fish and other aquatic life forms that may otherwise experience the flow of the stream as too powerful.

There are times when the stream is in flood, changing the flow patterns. In such events, clear water can become dirty or cloudy. When the flood subsides, many features of the stream may re-emerge in similar pattern, yet it may take some time to return to clarity. A new pattern of flow may emerge from a whole new set of stream features: changed banks, rocks and stones, sand bars, deep holes and newly fallen trees as new obstacles.

In times of drought, flow can cease altogether, forming a series of unconnected pools. In the worst case, the stream can dry up completely. There can be times when a catastrophic event, such as a rock fall or earthquake, blocks its flow to form a new lake. Or a rare flood event changes the stream profile so that the course of the stream has changed direction, stranding water in billabongs.

Increasing confluence with new rivers and streams enlarges the river, as it passes through different landscapes and different altitudes, on its journey to a lake or the sea. It may pass from wild untouched landscapes, through places where its water is used for many human purposes. It narrows and widens, depending on the terrain, the speed of flow and the impact of tides once it reaches the coast. Flowing into the sea, the stream becomes part of a much larger system – as part of the global water cycle: to evaporate, condense and fall as rain on the high country to start a new cycle in a different place.

Box 8-5 Emergence Model of Sustainability Culture as metaphor

In emergence terms, the metaphorical stream exhibits dynamic equilibrium around a changing set of strange attractors. It demonstrates resilience and a capacity to adapt; it enters new phase transitions on a daily and seasonal basis, often broadly predictable, often sudden, with negative effects on stream life. Such dramatic change, over time, can settle into a new pattern of dynamic stability, a new basin of attraction. Catastrophe notwithstanding, it remains a stream, despite the apocryphal saying: “You cannot enter the same stream twice”.

Our social systems work like this: the broad stream of human culture has been flowing over deep time, developing in response to our complex, ecologically situated social interactions in the process of placemaking. A stable culture can be likened to the calm stretches, or the gentle eddies created by sheltering obstacles. Greater turbulence is mirrored in great change or unrest. Our culture needs to flow towards a more sustainable way: to be not too stagnant or too turbulent.

8.5.2 Emergence Model as Manifesto

The above metaphor creates a mental image to communicate the emergence model, and is open to the reader’s imagination to make meaning. Alternatively, the manifesto states the Emergence Model of Sustainability Culture in plain language through a set of simple interlinked statements as illustrated below in Box 8-6:

One
For the sake of humanity and the protection, preservation and restoration of Earth’s ecosystems, sustainability must become the pre-eminent cultural paradigm for the 21st Century and beyond.

Two
To achieve sustainability, we need new goals for human society and the ecosystems upon which human society depends.

Three
We need a new culture to support the pursuit of sustainability as the pre-eminent cultural paradigm and its social goals.

Four
To progress sustainability culture, we must recognise that human society and its many cultures are examples of complex adaptive systems with a socio-technical character.

Five
Human society and its many cultures are patterns created through the phenomenon of emergence.

Six
A culture of sustainability will develop only through the phenomenon of emergence.

Seven
Setting sustainability as a social goal will be inadequate to change the underlying culture to support sustainability, but it is a necessary step.

Eight
Myriad actions are necessary in pursuit of sustainability. These include the re-design of our cities, towns and communities, our houses and buildings, our methods of resource extraction and energy usage, our modes of production and transport, our management of waste, our processes of development, our modes of learning and our ways of relating to each other.

Nine
A sustainability culture may emerge from our myriad sustainability-oriented actions, but emergence theory shows that this cannot be guaranteed or even predicted.

Ten
Nevertheless, the effectiveness of any actions will be limited without an underlying sustainability culture.

Eleven
Sustainability culture must grow "on itself" as a reinforcing feedback loop to continue orienting the flow towards our sustainability goals.

Twelve
We must maintain awareness that there are many unsustainable actions operating in the world that may interfere with, or prevent the emergence of a sustainability culture.

Thirteen
We have no choice but to continue with our sustainability-oriented actions, as a sustainability culture will be less likely to emerge if appropriate action is not undertaken.

Fourteen
We must continue to act as if sustainability culture were likely to emerge from our sustainability-oriented actions.

Fifteen
We must re-orient our practices of sustainability to thrive in the uncertainty of complexity, mindful of the dynamics of emergence, and open to new patterns of practice to facilitate the development of sustainability culture.

Box 8-6 Emergence Model of Sustainability Culture as manifesto

8.5.3 Emergence Model as Graphic Image

Clear statements can be extremely useful to mark out a position, but for some, it may not communicate effectively: a graphic image is preferable. Therefore, the third expression of the emergence model is through a graphic image as illustrated in Figure 8-1:

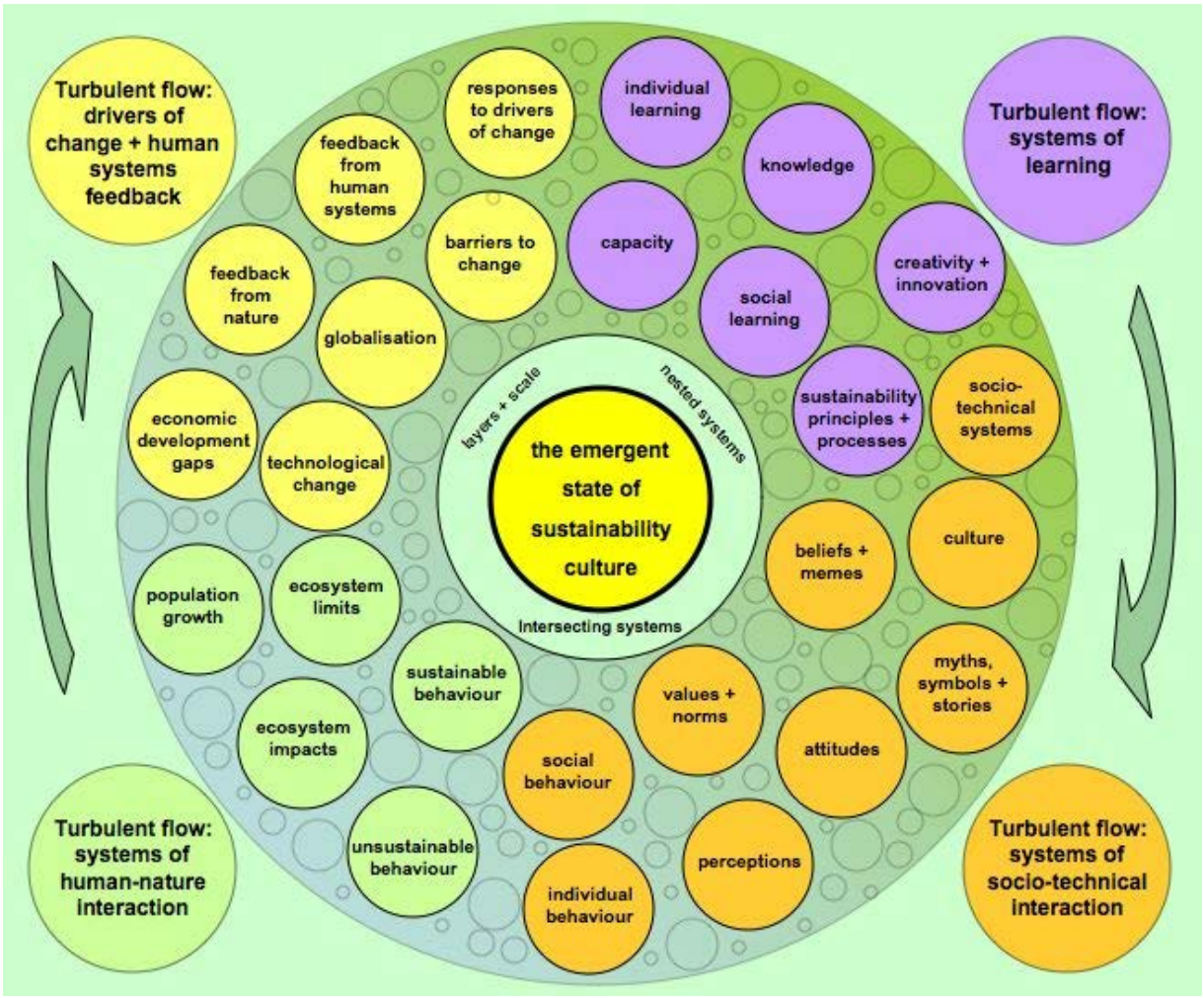

Figure 8-1 Emergence Model of Sustainability Culture as graphic image

The graphic image expression of the emergence model illustrates that our cultures, values and attitudes, communicating through our symbols, myths and stories, influence our individual and group actions in the social, material and natural worlds in response to the drivers of change to create emergent patterns of sustainability. As discussed in Chapter 4, drivers of change include ecosystem impacts and limits, population, technological change, globalisation and the developmental gaps between rich and poor. Through this system, emergent patterns as dynamic equilibria through creativity and innovation creates new learning, influencing our cultures, values and attitudes and changing our behaviour. This pattern is repeated as a cycle, with changing drivers, changing responses, new learning and new emergent patterns. It is scalable, nested and in continuous, turbulent flow. The dynamics of the model are tempered by an opposite course, through resistance to change, failure to learn and failure to respond to the drivers. Further, the drivers of change may become more serious, difficult to respond to, and amplified by our failures to progress sustainability culture.

Dysfunctional communities, ecological destruction, an insensitive and incapable culture, and decreasing sustainability become the emergent state.

By combining the emergence model as image with the emergence model as metaphor and manifesto, and by using the overall model to guide our practice of sustainability whereby we carry out pro-sustainability actions at every opportunity, we increase the prospect for society's sustainability goals to be achieved through new, pro-sustainability emergent patterns.

8.6 Implications for Sustainability

Our social systems are a story of inexorable flow, punctuated by calm, turbulence, catastrophe and social triumph – very little of our history has been predictable in the past, and it is thus implied that the future will not be predictable. Mostly our cultures have been emergent. Complex systems and their emergent qualities regularly confound human purpose. Sustainability culture is no different. If we conceive of the stream as something that can be cultured by the addition of a dam or by concreting the banks, or by dredging out the streambed, what results may no longer be the stream. Flow may cease, the dam could silt up and the downstream ecosystem could die. Likewise, our best intentions for a sustainable society supported by a culture of sustainability, if founded on the notion of a mechanistic approach to designing human culture, most likely will fail. We must accommodate the possibility that some new pattern of culture will emerge from any cultural change effort; and it may not be desirable or effective. At worst, we may not have the capacity to recognise a desirable new pattern when it emerges.

When we apply the rocky stream metaphor, we can see that our myriad actions will create a new dynamic. When our values, attitudes, norms and behaviours are applied to the development of our places the character of our systems will change, and so will we. Applying what we know and learn, mediated through our relationships with each other and our environments, while pursuing our livelihoods, using our technologies and building up our systems of governance and practice will be unpredictable. There will be times of stability and times of disturbance; we will be caught up in eddies, some that enable us to progress, others which sidetrack us into quiet and stable, yet possibly stagnant, reaches of the stream. At times, the flow and development of culture will be blocked by obstacles, and it may take until a catastrophic event affects us deeply enough for change to emerge.

While we cannot predict an outcome from our sustainability activities, what may save us will be the qualities we bring to our actions and our ways of connecting with each other. To take action towards sustainability is, I believe, fundamentally hopeful. As Capra explains (Capra, 2002, p. 104):

> After prolonged immersion in uncertainty, confusion and doubt, the sudden emergence of novelty is easily experienced as a magical moment. Artists and scientists have often described these moments of awe and wonder when a confused and chaotic situation crystallizes miraculously to reveal a novel idea or a solution to a previously intractable problem. Since the process of emergence is thoroughly non-linear, involving multiple feedback loops, it cannot be fully analysed with our conventional linear ways of reasoning, and hence we tend to experience it with a sense of mystery.

As with Capra's above description of the sense of awe and mystery, which many have experienced when a new pattern emerges from complex space, I have experienced such a sense, and I know that new, positive emergent patterns are possible.

8.7 Conclusions: Towards Better Sustainability Practice

Through an investigation into the field of chaos and complexity, I have responded to the questions posed at the beginning of this Chapter: Could the dynamics of complex systems contribute to the emergence of new cultural paradigms? And what are the implications of emergence for the development of sustainability culture? In response, I identified the fundamental aspects of complex systems, discussed them in terms of human systems (especially the socio-technical) and demonstrated that social change leading to new cultural paradigms emerges from the complexity of such systems. Further, I investigated the phenomenon of emergence and showed that it is the main pathway of change in any complex system, resulting in the proposal of a model of sustainability culture fully cognisant of the power of emergence. The model stresses that sustainability is about change: creating change and adapting to change as part of a complex, dynamic system at the meeting of the social and natural world. In dealing with the type of change needed to bring about sustainability, a way of thinking is needed that is flexible and resilient and in constant movement.

Much contemporary thinking about sustainability incorporates a mind-set that assumes that sustainability, when "achieved", will be a state of static equilibrium. Such a state of static equilibrium is not likely to occur because human systems do not work like that: the ideas explored in this Chapter attest to it. Aiming for a non-changing system is self-defeating because the energy in the system will transfer elsewhere in spite of barriers

and restraints. Static systems are also not resilient and have less capacity to cope with sudden external changes (Gunderson & Holling, 2002). We should be aiming for a dynamic equilibrium so that we resolve our need for a sustainability culture– our activities in the growth and development of our places and our economic activity must be informed by process of seeking better outcomes.

Sustainability practitioners are at work everywhere, in communities, organizations, institutions, corporations and governments. They are promoting sustainability, designing programs and technologies, educating and politicking. They are developing processes to build capacity and foster sustainable behaviour. All these contributions by individuals and small groups cannot be measured in a broad cultural sense. So is this enough?

On reflection, I have identified the following major barriers to developing a sustainability culture from a systems perspective:

- The “energy” input needed to raise the collective level of unconscious behaviour, especially against the trends of desire and consumption, and our co-evolutionary tendencies arising from our cultures, values, attitudes, norms and conscious behaviours;
- Finding appropriate points of leverage for intervening in systems, and then having the time, energy and capacity to direct efforts at these points;
- Sufficient time for systemic feedback in the form of reflective learning to demonstrate that energy levels and leverage is working; and
- Our personal and social capacity to engage in sustainability practice in complex situations.

The barriers identified above highlight how difficult it can be for practitioners to operate holistically in the chaotic business of human affairs. In particular, they highlight the importance of culture to sustainability, and how the emergence phenomenon is an ever-present aspect of any work with people and their cultures in any context.

The conclusion of Chapter 8 completes Part 2: Change and Emergence. In Part 3: Contemporary Sustainability Practice, I investigate the practice of sustainability. I do this firstly through a review of the contemporary practice themes, followed by reflections on three Action Research case studies in sustainability practice, and finally through the proposal of new patterns for sustainability practice based on the emergence model.

Part 3: Contemporary Sustainability Practice

Chapter 9 Themes in Contemporary Sustainability Practice

9.1 Introduction

In the previous Chapters, I discussed the theoretical basis of sustainability and change, and proposed an Emergence Model of Sustainability Culture. However, I am not content with simply expressing a new idea, as my focus is on action for cultural change for sustainability through personal and professional practice. The remaining Chapters of this thesis are practice-oriented, building on the reflections, theoretical foundations and contentions discussed in Parts 1 and 2. In Part 3: Contemporary Sustainability Practice, the third and final part of this thesis, I introduce themes in contemporary sustainability practice in this Chapter, review my Action Research case studies and reflect on their outcomes in Chapters 10, 11 and 12, propose new patterns of sustainability practice in Chapter 13 and offer conclusions and recommendations for further research in Chapter 14.

In this Chapter, I define my view of the scope of sustainability practice and review change processes and models from the fields of community and organizational development, and contemporary models of sustainability practice I have included the review of models of community and organizational change because these fields of practice are active in systems of change. My particular focus in the review of contemporary change processes and models is the application of the systems paradigm and demonstrated awareness of the emergence phenomenon.

Through reviewing such themes in contemporary sustainability practice, I have responded to the following question by identifying a range of conceptual and capacity gaps: Are there any conceptual and capacity gaps in contemporary sustainability practice? I conclude this Chapter, by describing the nature of these conceptual and capacity gaps as a preliminary step towards framing new patterns of sustainability practice.

9.2 The Scope of Sustainability Practice

Sustainability practice is both an art and a science and must be approached holistically rather than mechanistically. It concerns professional practice in working with others for sustainability outcomes: whether it be the voluntary community worker, activist or social entrepreneur, the staffer working within organizations and institutions, or the professional working for clients on specific projects and programs. Any field of human

endeavour is a field of sustainability practice: economics, governance, engineering, health, science, design, business, education and so on across the domains of environment, culture, knowledge, social systems, technology, livelihoods and institutions. Thus it demands that the sustainability practitioner has an appropriate capability for their chosen domains of practice. The scope of practice also includes personal practice, bridging between how the practitioner applies their skills both at work and at home. Although my particular interest is in professional practice, the patterns for practice are generally valid across community, social, institutional and organizational domains.

As practice is about a pragmatic and practical approach to change, I have considered whether social practice theory as introduced in Chapter 5 provides a guide to practice. As a holistic-oriented approach to describing social change, social practice theory and its variants offer a view of social change related to everyday social practice (Bourdieu, 1977, 1990; Giddens, 1979,1984; Schatzki, 1997; Reckwitz, 2002). Social practice theory is generally concerned with "practical knowledge, common understandings, rules and material infrastructures, and especially how they are established, sustained and changed through processes of reproduction and routinisation" (Strengers, 2010 p.5). Proponents of social practice theory generally only ascribe it to the social domain, with technology as inert "material", and seem content to use the theory of a way of explaining socially situated activity; but they are yet not explicit as to what this means for purposeful activity from the perspective of the practitioner. Thus social practice theory is not a model for real-world practice, and I have not treated it as such. However, it is only recently that the field of behaviour change for sustainability has begun to connect social practice theory to sustainability, with the implication that some guidance to sustainability practice may emerge (Gram-Hanssen, 2008; Strengers, 2010). This linkage has grown out of the sustainable consumption movement for which Tim Jackson and the New Economic Foundation (Jackson, 2003, 2004a & 2004b; Halpern et. al 2004; Dawnay & Shah, 2005) are the most well-known proponents (see my review in Chapter 7). Strengers (2010, p.14) cautions that the social theory approach divides practices into components for analysis, and "we cannot continue without once again reconceptualising them as an integrated and dynamic whole". Further, Strengers only identifies the analysis as the starting point for facilitating change, and not the actual process of change (2010, p.17). Nevertheless, it is too early to say whether a coherent guide to sustainability is possible from this particular theoretical perspective, yet the lack of consideration of the emergence phenomenon is problematic in my view.

Sustainability practice often concerns how decisions are made, their contexts, the methods applied, and what emerges from action. Some sustainability practice is situated within narrow boundaries, and generally simple, linear approaches are appropriate: the practice gaps are generally minimal, and can be readily dealt with by a normal professional mind-set. For example, much of my sustainability assessment work is compliance-oriented, applying codified tools to proposed built environment projects. This work is typical of that of many sustainability practitioners, operating in niches, and thus many of the sustainability practice gaps identified are not directly relevant. Such practice is mostly straightforward, except in situations where a client is hostile to the compliance regime or the principles underlying that regime. In such a case, the process becomes more complex, as the assessment is situated in contested space, where different cultural perceptions are activated. When practice contexts become complex, such as in working with people, communities, organizations and institutions, when the rules are less certain, or do not exist, or where the practice space is highly contested, the sustainability practice gaps become more evident, and the need for different practice approaches becomes more important.

At this point I must note that the models of sustainability identified in Chapter 4 are conceptual models and not models to guide practice. While there is an area of commonality and some ambiguity, models of sustainability practice are qualitatively different because of their being oriented to action. This Chapter focuses on such models of sustainability. The domains of my sustainability practice mirror these layers of complexity. Figure 9-1 illustrates the layers of practice from simple technology-based assessments through to working for cultural change:

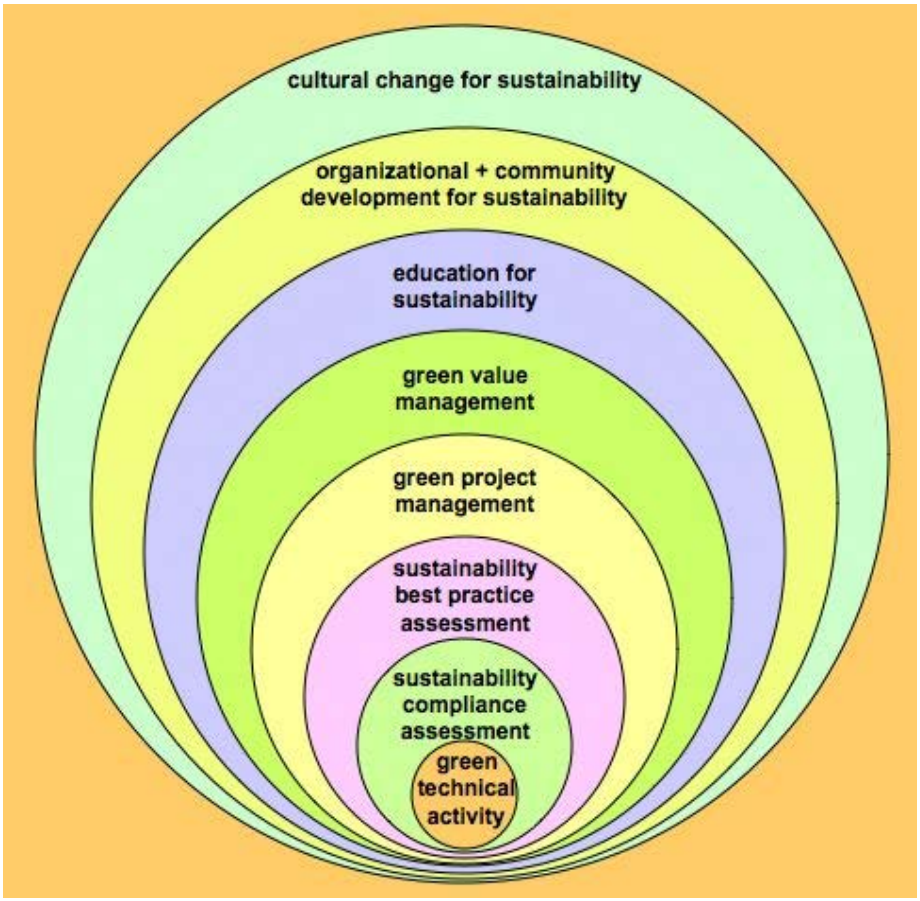

Figure 9-1 Conceptual layers in my professional sustainability practice

The different areas of my practice traverse the simple, compliance-based tools, to creative design of solutions for increasingly complex issues, to deeper more thoughtful approaches where there is no standard practice or professional guidance. In spite of the many sustainability assessment and measurement tools available, there is little guidance from the sustainability sphere as to how to practise across the layers of complexity: this is the greatest capacity gap experienced by sustainability practitioners. To link the conception of sustainability to practice, I have drawn on some practice-oriented models. However, I have also drawn much guidance to practice from community development theory and practice and organizational development theory and practice. I draw on these two approaches because of their maturity in approaching practice for change; they provide excellent insight into the types of practices required for holistic sustainability practice. Both approaches have examples of models and processes that are seated in complexity and work with systems dynamics. Recent practices in organizational development have applied complexity thinking and apply ways of looking for new patterns. In particular, community development approaches, from my experience, have an innate feel for complexity and openness to the discovery of emergent solutions.

9.3 Contemporary Community Development Practice

9.3.1 Introduction

Many of the common techniques applied in organizational and personal development, and in community engagement were initially derived from the community development paradigm, as pioneered in the Third World, initially by Western development practitioners, and later by local development practitioners. Community development-based methods have been used extensively in the developed world, developing countries and Third-World communities in the areas of health, settlement planning, enterprise development, technology design and transfer, and housing projects. Community development is centred on enabling local participation in projects and processes. As identified in Chapter 2, I have applied community development theory and practice as part of the methodological approach to this research.

The fundamentals of the community development approach are well documented (Chambers, 2000, 2002; Davis-Case, 1990; Guijt, et al., 1998; Guijt & Gaventa, 1998; Hamdi, 1991; Ife, 1995; Kelly & Sewell, 1998; Sarkissian, et al., 1997; Sarkissian, Perlgut, Ballard & Walsh, 1994; Walsh & Mitchell, 2002; Wates, 2000). Community development can encompass engagement, design, planning, decision-making, analysing and evaluation processes with the aim of mobilizing people as active participants in creating lasting change in their communities. In my opinion, such practice has been pursuing sustainability long before the term sustainability emerged.

The central tenet of community development is participation. Participatory methodologies were introduced in Chapter 2 as the guiding principle of the Action Research case studies. In Chapter 2, I referred to an early suite of community development approaches known by various names at different times. Rapid Rural Appraisal (RRA) developed as a means of quickly gaining local information in Third World rural development projects in the 1960s and 1970s. Many of the techniques pioneered in RRA are still in use, although RRA is now not viewed as holistic and participatory. Participatory Rural Appraisal (PRA) was an evolution of RRA, with an emphasis on participation. It is now more commonly referred to as Participation-Reflection-Action and Participation-Learning-Action (PLA) to incorporate the need for participants to reflect on a process as it unfolds. Participatory Monitoring and Evaluation (PME) is a particular application of participatory methodology, where community participants determine what is to be monitored and evaluated, and how. The PME process gives voice to people who are normally excluded from project

monitoring and evaluation; it also gives voice to those end users who may be consulted as part of conventional evaluations, and yet have no role in shaping and directing the values, statutory requirements, scope and process of monitoring and evaluation (Chambers, 2000, 2002). Participation is an open process in terms of its ethical and political implications, mirroring the realities of complex, open systems. It must be open to change from the participants (Chambers & Guijt, 1999). This essentially opens up any socio-technical process to the emergent properties of the activity.

9.3.2 Participatory Principles

The principles of participatory methods are many, iterative and fluid. Pretty et al.'s description of the nine shared principles is set out below in Box 9-1:

- **A defined methodology and systematic learning process:** the focus is on cumulative learning by all the participants;
- **Multiple perspectives:** a central objective is to seek diversity, rather than to simplify complexity;
- **Group learning process:** all involve the recognition that the complexity of the world will only be revealed through group analysis and interaction;
- **Context specific:** the approaches are flexible enough to be adapted to suit each new set of conditions and actors;
- **Facilitating experts and stakeholders:** the methodology is concerned with the transformation of existing activities to try to improve people's situation;
- **Leading to change:** the process of joint analysis and dialogue helps to define changes which would bring about improvement and seeks to motivate people to take action to implement defined changes.
- **Self-aware responsibility:** Individual responsibility and judgment exercised by facilitators, with self-critical awareness, embracing error;
- **Equity and empowerment:** A commitment to equity, empowering those who are marginalised, excluded and deprived, often especially women; and
- **Diversity:** Recognition and celebration of diversity.

Box 9-1 Shared principles of participatory practice (Pretty, Guijt, Scoones, & Thompson, 1995)

Participation can occur in different ways and to different degrees. There is a continuum from where people are kept informed of a process by those in control of a process through to where there is a high degree of autonomy and control over decision-making. This continuum has been described in different terms in a number of publications (International Association for Public Participation (IAP2), 2007; Pretty, Guijt, Scoones &

Thompson, 1998 p.79; Walsh & Mitchell, 2002 p.22; Wates, 2000 p.10), and is summarised in Table 9-1:

Level of Participation	Description	Role of local people
Passive or compliant	People are told what to do and what will happen	Spectators
Coercive participation	Participation through material incentives	Subordinates
Information gathering	Answering questions: extractive	Subjects
Consultation	Outsiders ask for local views	Clients
Functional participation	People participate in process with pre-determined objectives	Collaborators
Interactive participation	Shared responsibility between locals and outsiders	Partners
Self-mobilisation	Local people initiate and run processes	Directors

Table 9-1 Levels of participation

In contemporary Australian community development, participation, if it occurs, tends to be from the first band in Table 9-1. Consultation is also common, typical of processes employed by State and Local Government agencies and property and urban developers. In Australia it is less common for participatory actions to be a completely open, community-designed approach, as in the last two options; however, participatory approaches situated in the last two options have been used successfully in the development of Third World and Australian Indigenous communities (Black, 1998; Groome, 1999; UNDP-World Bank Water and Sanitation Program - South Asia, 1998).

Another framework for community engagement is the IAP2 Public Participation spectrum (International Association for Public Participation (IAP2), 2007). The framework is illustrated in Figure 9-2 below:

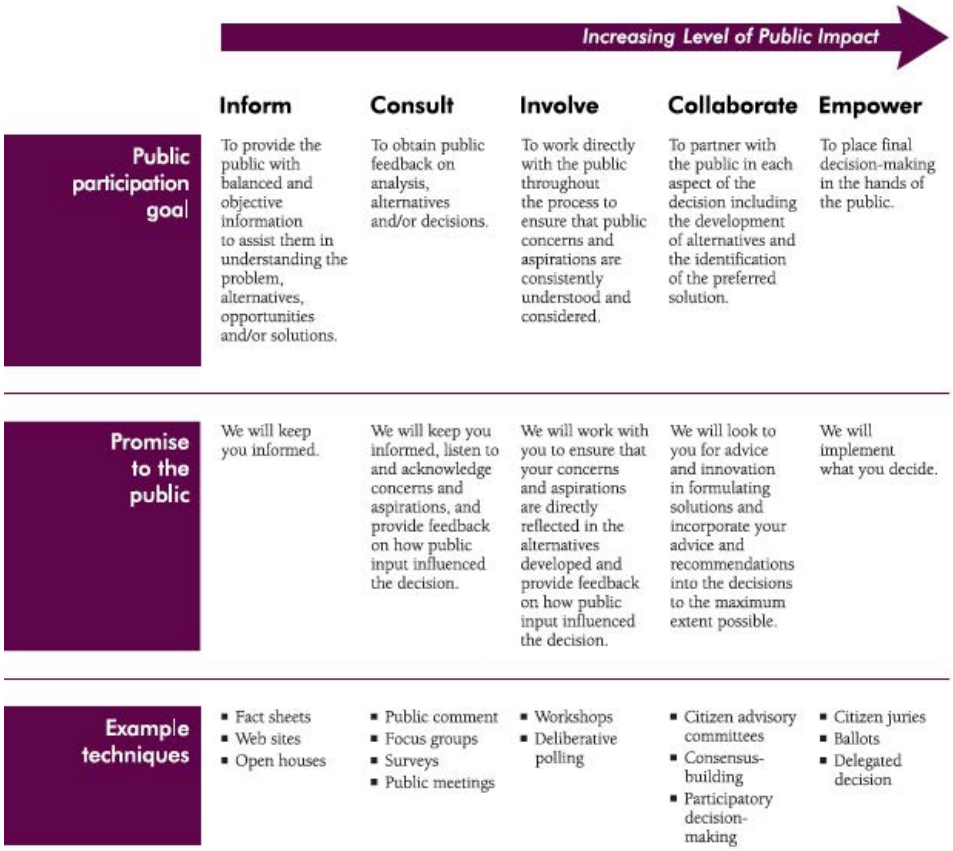

Figure 9-2 IAP2 Spectrum of Public Participation (IAP2, 2007)

The above framework is widely used as a guide to practitioners in the planning sector and applies a continuum of practice to inform, consult, involve, collaborate and empower to engender increasing levels of public impact.

9.3.3 Participatory Methods

Participatory methods are generally designed to be responsive so that methods can evolve in ways sympathetic to priorities of local people. An example of a model of community engagement and participation is Sarkissian's EATING Model (Sarkissian, et al., 2009), an expression of sustainability as a goal to be achieved by communities through on-going community engagement. This model explicitly connects the community development approach to sustainability as a social goal, and collects together many common approaches to sustainability.

EATING is an acronym for the six components or "food groups" of this approach: Education, Action, Trust, Inclusion, Nourishment, and Governance. The approach aims to "empower individuals to come together in community, to envisage, shape strategies, make decisions and take action for a more sustainable world." (Sarkissian, et al., 2009,

p. 5) The components of the EATING approach are a framework to which a range of existing participatory tools, methods, techniques and attitudes connect.

Participatory methods can often be highly visual, not only because of literacy and numeracy issues, but because visual presentations of issues and ideas can be more easily expressed to groups of people. Further, they can be effective with people and cultures with a strong orientation to visual-spatial communication methods (Wates, 2000, p. 21). Visual tools can be sophisticated in concept, but simple in implementation, such as simple diagrams drawn by a stick in the sand. There may be times when more sophisticated pre-prepared graphics are required, such as used in the Bushlight program operating out of the Centre for Appropriate Technology in Alice Springs. For Bushlight's Community Energy Planning Workshops simple symbols denoting different energy sources and quantities of energy were used as aids in communication of critical issues (Centre for Appropriate Technology Inc., 2003, 2004). Many of the tools involve verbal communication, particularly through storytelling. Resources produced by Wates (2000), Burnham (2002), Davis-Case (1990), Sarkissian (2009), Sarkissian and Wiwik (2009), Walsh and Mitchell (2002) and Holman et al. (2007) outline many different participatory tools for many different contexts.

9.3.4 Issues with Participatory Practices

The time taken to allow a participatory process to unfold can be seen by some as too slow, lacking rigour and generating unreliable data (Forester, 1999 p.115; Pretty, et al., 1998 p.80; Sanoff, 2000 p.22). Chambers (Chambers, 2002 p.5) states that participatory techniques are not immune from bad practice, and that lack of quality assurance has been of great concern. Sarkissian identifies why community engagement processes can fail in the community planning experience of developed countries (Sarkissian, et al., 2009, pp. 54-57) and she relates these failures to a lack of knowledge of the principles underlying the EATING Model as a basic need in community engagement. Her critique is summarised below in Box 9-2:

- Inadequate involvement of community at the strategic decision-making level
- Use of process to ratify existing decisions and actions
- Mismatch of techniques and needs
- Inadequate resourcing
- Inadequate succession planning /capacity building
- Lack of integration
- Fear of challenging the status quo
- Inadequate connection with communities
- Lack of respect for local knowledge
- The 'expert' problem

Box 9-2 Why community engagement fails (Sarkissian, et al., 2009, pp. 54-57)

To avoid the failures identified by Sarkissian, practitioners should act with caution and courage, and maintain a certain reticence when working with people and place. To me, the failures are representative of the lack of a whole-systems view and the usual outcome of a mechanistic, linear process.

9.3.5 Summary of Community Development Models

The unfolding story of community development demonstrates a pragmatic and empirical approach to working with people and their communities in an open manner, navigating ways through the complexity of interaction to achieve workable results. Even though systems, complexity and chaos theory did not shape the emerging community development schemas, the early community development workers, through their empirical approach to achieving sustainable outcomes, their openness, their capacity to communicate with people across cultural gaps, their ability to recognise and work with local patterns of behaviour, and their fostering of local decision-making, were among the first to understand the practical application of systems and complexity.

The tools of community development have significant capacity to foster emergence, but as with Gelernter's critique of Alexander's Pattern Language as discussed in Chapter 8, the use of specific tools can drive a process in a very mechanistic way. However, the problems with participation as described above reflect a range of potential problems when the lessons of community development are applied in conventional sustainability practice. The principal issue concerns the potential collapse of an open, holistic approach into a conventional mechanistic one.

9.4 Contemporary Organizational Development Practice

9.4.1 Introduction

The social and financial aspects of sustainability are the principal drivers of contemporary organizational development practice: that is, to stay in business by managing income and costs, and keeping the staff happy and productive. However, while contemporary organizational development practice struggles to connect social and financial factors with the natural world, its leading edge ideas can offer some useful models for adaptation to sustainability practice.

Cultural change is a contemporary theme in management. Leading-edge practice applies principles of complexity to processes of cultural change, and can directly inform the sustainability practitioner in their broader field of practice and confirms the applicability of systems approaches in sustainability practice. Cultural change for the purpose of building a sustainability culture is a valid application for any change process. Thus in this section, I review the main paradigms of organizational development practice, focussing on cultural change. Their application to sustainability practice is discussed at the end of this Chapter.

In organizational development, many approaches to practising cultural change are applied. As with sustainability, these can be described as models, processes, tools and indicators. These tools have a substantially different focus from the social theory approach to change discussed in Chapter 5, as most management theory is oriented to action and useful outcomes. There are many parallels with community development: indeed an organization could be defined as a formal type of community.

In a recent McKinsey and Company survey of global corporations, more than one-third of the companies surveyed identified that their motivation for change was to move from “good performance to great performance” (Meaney & Pung, 2008, p. 2). Other work by McKinsey also shows that most change processes fail (Isern & Pung, 2007, p. 2), principally due to the emphasis on re-structuring, policy change and a narrow behaviourist approach.

Ackerman (1986, cited in Block, 2001) identified three types of organizational change: developmental, transitional and transformational. For example, change in local government tends to be of a developmental, iterative nature, as they are community-focussed service delivery organizations, and not primarily profit driven. Transitional change is often experienced when two organizations merge, and different cultures require careful management. Transformational change tends to occur in the business

sector, as the external environment can change suddenly, causing businesses to adapt or fail.

In the many models of change in organizational development, there are some clear change paradigms emerging, allowing the different models, processes, tools and techniques to be arranged under some broad headings. Much of the literature on managing change is focused on the paradigms of structure and policy and leadership. De Caluwé and Vermaak (2004) describe an additional five broad change paradigms: competing interests, rational design, behaviourist, action learning, and systems. This taxonomy of change paradigms was introduced in Chapter 5, and mapped against the conventional social change theory. It is discussed in detail here. Further, many of the paradigms, tools and techniques used in organizational development have been derived from community development practice particularly tools used in action learning and systems change paradigms. All the paradigms identified retain validity across different contexts: the existence of the emergence phenomenon does not negate Newton's laws. Current knowledge allows us to work through different paradigms of change where appropriate. Generally, different paradigms appeal to different management styles, the widely varying capacities and biases of individuals, the culture of individual organizations and the particular forces of change.

In the course of my action-research case study at Coffs Harbour City Council, I undertook a review of many specific organizational change and sustainability change models. I have not included a full treatment of such models here, however, the full document (Parnell, 2010) has been included on the DVD in Appendix 1. The seven identified change paradigms from organizational development practice are discussed in the following sections.

9.4.2 The Structure and Policy Paradigm

The first paradigm usually considered in any organizational change process is structure and policy: there is an enduring belief among managers that a change of structure and/or policy will bring about a cultural change as a matter of course, and it may happen in an emergent way. However, reliance on structure and policy alone has often proven to be unproductive, especially since the change effort can end shortly after the new structure and policy has been implemented (Isern & Pung, 2007). In such cases, the change of structure is the change, and for some, that is culture change enough. Models and tools, such as the Australian Business Excellence Framework are usually based on the work activities and areas in an organization (SAI Global, 2004); they are

designed to fit the structure, with activities and outcomes framed according to visions, policies, and strategies and compliance requirements. Such frameworks provide an opportunity for embedding sustainability (Global Reporting Initiative (GRI), 2006). However, for these frameworks to engender culture change, a base level of sustainability culture is required to ensure that the visions, strategies and so on are oriented to sustainability principles in a meaningful and effective way.

9.4.3 The Leadership Paradigm

The leadership paradigm is centred on the belief that visionary people can drive change, often through force of personality and their capacity to influence others (Greenberg & Baron, 2000, p. 445). This provides a management perspective to the "heroic individual" view of social change (Sztompka, 1993). Conventional understanding of leadership usually locates such visionaries at the top of an organization's hierarchy, applying a top-down approach to change (Louis A. Allen Associates Inc., 1983, pp. 1-4 to 1-10). Greenberg argues that this type of leadership can be sympathetic, constructive, flexible, benevolent and exemplary (Greenberg & Baron, 2000, pp. 446-448); or it can be authoritarian, rigid, paternalistic or punitive (Greenberg & Baron, 2000, p. 449). Further, as much resistance to change can be exhibited by leaders in an organization, reliance on the leadership paradigm alone is potentially problematic. If leaders do not understand the change required, nor have the skills and capacity to lead the change, the change process can falter (Hsieh & Yik, 2005).

Leadership can also be delegated by supporting managers to lead in their departments and by fostering champions and change agents. A change agent, according to AtKisson, is a visionary leader usually located outside the upper echelons of management, who, through a compelling idea or exemplary behaviour, and excellent communication skills can influence those around them or above them (AtKisson, 1999, pp. 182-183). Through public support of change agents and champions, leadership for cultural change diffuses throughout an organization or a community. If it is the only approach applied, the leadership approach may have reduced effectiveness. However, when it is combined with other paradigms, it can foster change in a positive way. This paradigm is not so much a set of tools as a set of personal qualities that enable an organization's leaders to foster change, and to enable staff to "buy-in" to the organization's vision. According to management specialist, Peter Senge, the important lesson from the Leadership paradigm is that leadership can be demonstrated at all levels of the organization, preferably both through the management structure and

through more informal change leadership (Senge, 1996, p. 37). Senge suggests a diffuse leadership, which is potentially compatible with a networked organization or informal networks within hierarchical organizations.

9.4.4 The Competing Interests Paradigm

The competing interests paradigm is aligned to situations where change is highly contested, and subject to competing power bases, generally across an organization, between organizations or in a substantial part of an organization (de Caluwé & Vermaak, 2004). It can apply to competing groups in a community context. This paradigm could be commensurate with a dynamic organization or situation with highly capable, but divergent creative thinkers; or an organization where levels of trust, communication and connection are poor (Hirschhorn & Gilmore, 1989). Or perhaps there may have been a situation such as a merger where people that were once in competition have to find ways of working together. Given that these situations usually involve changes to structure, policy and leadership, the competing interests paradigm may not apply as a discrete activity. The primary process is through negotiation and conflict resolution, often overseen by independent facilitation (Greenberg & Baron, 2000, p. 390). Such processes are an everyday occurrence in organizations, as there will always be competing interests between individuals, even within the healthiest organizational and community cultures. This model may be applicable to some sustainability practice settings, such as a visioning process, where agreement among members of a client group must be negotiated before sustainability work can proceed.

9.4.5 The Rational Design Paradigm

The rational design paradigm is characterised by a belief in change as project management: the aim is to develop a plan, ensure appropriate resources are available, and then apply ingenuity to ensuring the planned outcome occurs, usually according to pre-determined indicators (de Caluwé & Vermaak, 2004). This paradigm has grown out of the earliest modern management ideas reaching back to Frederick Taylor in the early part of the 20th Century (Emery, 1971). This paradigm suits organizations with specific process outcomes and limited complexity: an engineering, construction or manufacturing firm, for example. Processes are usually linear and mechanistic in nature, and the participants usually commit to delivering the agreed outcomes or are compelled to deliver them. Change is focussed on productivity and can be incremental (Snee, 2007) or driven by an acute situation (Murphy, Kirwan & Ashkenas, 2007). When applied to cultural change, this paradigm can yield good results if there is congruence in the work culture of individuals (Isern & Pung, 2007). However, in my

view rational design is too simplistic in socially and culturally diverse organizations and community groups managing a complex portfolio of social responsibilities.

The rational design paradigm lends itself to simple or complicated settings where linear approaches to problem solving have generally proven successful. Many sustainability practice settings would be compatible with this paradigm particularly in technical or compliance-oriented settings,

9.4.6 The Behaviourist Paradigm

As reviewed in Chapter 5, the behaviourist paradigm pursues cultural change through a combination of education, training, rewards, incentives and penalties (de Caluwé & Vermaak, 2004). Such methods have yielded success in many organizations, particularly production-oriented or sales-oriented ones with cultures based on direct reward for effort and recognition of high performance. These approaches work well in command-and-control workplaces where process systems do not vary greatly over time. For many modern organizations, especially dealing with a complex mix of activities, behaviourist approaches may be inadequate for the scale of change, but can be an important part of the total approach. Behaviourist approaches can assist in changing beliefs and mind-sets to complement change where new structures, policies and leadership approaches have been put in place (Lawson & Price, 2003). Where there is already a high level of motivation to perform, simplistic approaches can be ineffective, and softer approaches may be more effective through, for example, the "choice architecture"[53] of Thaler and Sunstein's Nudge theory (Thaler & Sunstein, 2009). In my opinion, behaviourist options should always be included in change processes and used wisely, partly because they can be effective in certain situations and partly because participants generally expect to be offered rewards and incentives.

9.4.7 The Action Learning Paradigm

I introduced the action learning paradigm as a research framework in Chapter 2 and extended the discussion to include it as a learning-based behaviour change approach in Chapter 7 and as a significant component of the community development approach as discussed in this Chapter. The action learning approach has also influenced organizational learning processes in business and institutions. Communities-of-Practice (Wenger & Snyder, 2000) are an example of an action learning approach, featuring self-organizing informal groupings of people with shared professional practice interests, either physically situated or virtual. Another useful approach is through narrative and

[53] Choice architecture applies Kahneman's bounded rationality concept whereby participants are allowed to choose from a limited number of pre-selected options.

storytelling (Cleary & Packard, 1991; Dart & Davies, 2003; Sigsgaard, 2002; Snowden, 2010), an approach that is based on developing a narrative about the culture and practice of an organization over time, with reflection and re-orientation of activity. Foresighting and scenarios (Cocks, 2003; Inayatullah, 2005; Kleiner, 1999; Slaughter, 1999) belong to a suite of action learning approaches whereby common interest groups attempt to map possible futures, through construction of scenarios to develop strategies through a reflective, learning process matching possible actions to possible future situations.

The spiral nature of action learning increases the chance for individuals and groups to internalise new knowledge and changed behaviour, and when activated through organizational, community and group networks, action learning can accelerate the building of culture.

9.4.8 The Systems Paradigm

The systems paradigm enables practitioners to understand how parts of an organization connect, how information flows and feedback informs, and what outcomes emerge, especially the unexpected ones. Ideas from complexity theory help to explain what occurs when people with different biases, personalities, capacities, worldviews and levels of authority interact in a complex mix of activities. As Snowden explains, it becomes more difficult to achieve the expected results as modern interactions allow new patterns of behaviour to emerge (Snowden, 2005). In contemporary society, people are not so inclined to accept an authoritarian approach - people want to understand more why they do things and to be more self-motivated in their approach to their work. Many want to participate more than has been traditionally allowed in hierarchical command-and-control organizations (Wheatley & Kellner-Rogers, 1998). They also want to have more influence over how their own work is done. Complexity theory suggests that any organization embarking on a change process must understand that the complex interactions of people within the organization will create their own emergent pattern of behaviour around management-designed structures, policies and processes. Capra calls this a display of self-organization (Capra, 2002, p. 85). If there is limited congruence between the proposed change and the existing culture of the people in the workplace, there will be limited success. Thus any systems-oriented change must be a “bottom-up” and “inside-out” process as well as a conventional “top-down” process.

The understanding of social networks is an important aspect of working from a systems paradigm viewpoint, particularly those that exist in an organization independent of the formal structures and hierarchies. Such informal networks can be termed a “deep” structure (Eoyang, 2004) as, according to Cross et al., it tends to be expressed through hearts and minds (Cross, Parise & Weiss, 2007). In a dysfunctional organization the culture of deep structures can be quite different from the projected culture. Understanding of informal networks can lead to congruence between the hidden culture and projected culture and provide pathways for new information to flow. Informal networks usually create “small world” and bridging effects (Putnam, 2000; Watts, 2004), enabling different parts of the organization to connect, even though there is no formal connection through the hierarchy (Bryan, Matson & Weiss, 2007). Information, instruction and innovations can often flow faster through an organization’s informal networks than across silos. Similarly, staff attitudes, ideas and their own innovations can flow along such networks, to the benefit of the organization. Informal networks can be the vehicle for desired culture change to emerge rather than be created, with greater adaptability and resilience the result (Snowden, 2005). Positive experiences from the application of systems concepts in organizational development practice reinforce the need for an emergence model of sustainability and emergence-based practice.

9.4.9 Systems Models

Following the above summary of the organizational development perspective of the systems paradigm, some systems-based practice models for change are gaining currency in cultural change practice. Beck and Cowan identify that systems-based models of practice increasingly consider the emergence phenomenon (Beck & Cowan, 2006). However, most do not communicate how to effectively embed such ideas into patterns of practice, particularly when they must be activated with groups who have no understanding of the theoretical basis of emergence. I have selected five of these models to inform the development of patterns for sustainability practice and review them in the next sections, according to the following criteria:

- The model must have a basis in practice rather than theory;
- The model must demonstrate a deep understanding of the systems paradigm and the importance of networks;
- The model must effectively link practice to an understanding of the systems paradigm; and

- The model must demonstrate clear potential for informing the development of emergence-based patterns of sustainability practice.

The five models meeting the above criteria are summarised below:

1. Capra's Living Systems
2. Eoyang's Practice Landscape
3. Donella Meadow's Leverage Points
4. McKinsey's Informal Networks model
5. The Cynefin Framework

Capra's Living Systems

Fritjof Capra (2002) proposes a model based on organizations as living systems. He contends that an organization should "mirror life's adaptability, diversity and creativity" (Capra, 2002, p. 87). The model describes social networks in organizations as the main avenue of communication, particularly through the interplay of formal and informal networks, using metaphors and imagery. He argues that self-organized communities of practice are the location of creativity and innovation. Individuals are the source of knowledge: the task of the organization is to use networks to amplify such knowledge. Such an approach is required to promote the spontaneous emergence of novelty. However, Capra cautions that what works for any particular organization is not directly transferable, as the systems of tacit knowledge and context meaning are different (Capra, 2002, p. 104). Capra describes the process to harness the power of living systems as set out below in Box 9-3:

- Make the change meaningful to those concerned.
- Foster an openness and willingness to be disturbed in order to set the process in motion.
- Create an active network of communications with multiple feedback loops to amplify the triggering event.
- Understand that any point of instability will be experienced as chaos, uncertainty or crisis.
- Understand that the process will either break down or break through to new state of order, characterized by novelty and involving an experience of creativity that often feels like magic.

Box 9-3 Harnessing the power of living systems (Capra, 2002, p. 102)

To facilitate emergence effectively, practitioners need to undertake the following nine steps, as summarised in Box 9-4:

1. Recognise and understand the different stages of the process.
2. Identify a willingness to be disturbed.
3. Be open to new ideas and knowledge and encourage experimentation.
4. Facilitate emergence through creating openness and building connections.
5. Empower others.
6. Encourage continual questioning.
7. Reward innovation.
8. Foster activities at the margins.
9. Recognise emergent novelty.

Box 9-4 Capra's guide to facilitating emergence (Capra, 2002, pp. 102-112)

Capra's approach as represented in the above nine steps merges the thinking around chaos and complexity with an understanding of how organizations work. The critical aspect of this model is that organizations should be "disturbed" to stimulate emergence of novelty, provided that the organization has multiple networks for communication and feedback. It articulates the reality that complexity means that change efforts can "break down" before they "break through" and therefore involves some risk. The model, though inspirational, requires further articulation of the principles to promote action, opening the way for development of new patterns of sustainability practice in Chapter 13.

Eoyang's Practice Landscape

This a meta-framework for change, based on identifying organizational structures and appropriate tools for understanding and intervention (Eoyang, 2004). Management theorist and consultant Glenda Eoyang describes systems-based change tools and their role in terms of the "practice landscape" to avoid having "the library of powerful tools quickly becoming a graveyard of irrelevant approaches" (Eoyang, 2004, p. 55). The practice landscape consists of a matrix of "three phenomenological and four epistemological categories to define twelve clusters of complexity-inspired interventions" as shown in Figure 9-3 (Eoyang, 2004, p. 56). The practitioner, by identifying the emergent patterns, can apply appropriate tools. Applying this method implies a certain understanding of complexity principles and familiarity with many tools, their purposes and application.

	Tools for understanding and Intervention			
Phenomena	**Practice**	**Weak metaphors**	**Strong metaphors**	**Mathematics**
Surface structures	Act in response to the surface structures of human systems dynamics.	Describe patterns that emerge in human systems with metaphors drawn from complexity sciences.	Intervene using tools derived from complexity to influence the surface structures of human systems.	Represent complex relationships among variables of the surface dynamics of complex human systems.
Example	15% Solution	Butterfly Effects	Coupling	Balanced Scorecard
Evident deep structures	Act in response to the deep structures of human systems dynamics that are evident when I know where and how to look.	Describe subtle structures that shape human system dynamics using complexity metaphors.	Influence the self-organizing process in human systems by shifting the nonlinear dynamics that are visible.	Represent the more subtle nonlinear dynamics of human systems using tools of mathematics.
Example	Reflection	Attractors	Future Search	Network Analysis
Subtle deep structures	Act in response to structures that are so deep within the nonlinear dynamics that I am unaware of what the patterns are.	Support a system as it describes for itself the nonlinear dynamics that drive its tensions, productivity, and history.	Represent the system dynamics so that the subtle deep patterns are visible and accessible to influence.	Use mathematical tools to discover subtle structures in complex human systems.
Example	Intuition	Open Space Technology	Computer Simulation Models	Nonlinear Time Series Modeling

Figure 9-3 Eoyang's Practice Landscape (2004, p. 56)

The model described above in Figure 9-3 requires the practitioner to allow the context of a change process to determine the specific methods to be used, especially across the types of structures in evidence, from the surface to subtle deep structures. Some of the methods in the above table such as Balanced Scorecard, Future Search and Open Space Technology are well known in management practice (Holman, et al., 2007). This approach has relevance for new patterns of sustainability practice by showing a framework for categorising contexts as a basis for selecting practice methods and tools.

Donella Meadows' Leverage Points

This model of change arose from the proponent's reflection on experience with systems modelling. The late Donella Meadows, an environmental scientist and systems analyst, offers twelve key ways to intervene in a system (Meadows, 1997, 1999). One way of expressing the interventions is provided in Box 9-5:

12. **Numbers (such as subsidies, taxes, standards):** Numbers rarely change behaviour; they are manipulated according to unchanged rules and goals.

11. **Buffers:** The sizes of stabilizing stocks relative to their flows.

10. **Material stocks and flows:** Stocks and flows are generally limited by the system structure and design.

9. **Delays:** The lengths of time relative to the rates of systems changes.

8. **Balancing negative feedback loops:** Keep systems stable and self-correcting, and consistent with system goals.

7. **Reinforcing positive feedback loops**: Drive growth, explosion, erosion and collapse in systems; a system with an unchecked positive feedback loop ultimately will destroy itself.

6. **Information flows:** Adding or re-routing information can be a powerful intervention, usually easier and cheaper than rebuilding physical structure.

5. **The rules of the system (incentives, punishments, constraints):** Rules change behaviour. Power over rules is real power.

4. **The power of self-organization:** Self-organization means changing any aspect of a system lower on this list. The ability to self-organize is the strongest form of system resilience.

3. **The goals of the system:** The big leverage points are the goals of entire systems: and articulating, repeating, standing for, insisting upon new system goals.

2. **The mindset or paradigm out of which the system arises:** The shared idea..the great unstated assumptions … constitute that society's deepest set of beliefs about how the world works.

1. **The power to transcend paradigms:** No paradigm is "true". If no paradigm is right, you can choose one that will help achieve your purpose.

Box 9-5 Places to intervene in a system (in increasing order of effectiveness)

(Meadows, 1997, pp. 78-84; 1999, pp. 2-3; 2008, p. 194).

The above model was altered several times by Meadows, thus I have summarised and merged terms from the three versions sourced. Meadows' caveat is that the list is "… tentative and its order is slithery. There are exceptions to every item on it … The higher the leverage point, the more the system resists changing it (Meadows, 1997, p. 84)." While the terminology is about leverage points, Meadows clarifies the intent as "… an invitation to think more broadly about system change" (Meadows, 1997, p. 79).

I have included Meadows' model because it is a useful conceptual practice aid. The notion of "intervening in systems" is powerful: it acknowledges not only that systems are nested and interconnected, but also offers insight into ways of working with systems, especially guiding us where to "leverage" our efforts. According to Meadows,

identifying leverage points is not intuitive (Meadows, 1997, p. 79), thus, our challenge is to act appropriately on our perceptions of the key points in a system.

McKinsey's Informal Networks

This model, developed by global management consulting firm, McKinsey, is based on the proposition that a "structural fix" approach to change often fails, and that formal organizational structures hide the network relationships that cut across functional areas, hierarchical structures and silos (Cross, et al., 2007). The proponents also contend that much of the work in modern organizations is carried out through networks, and that evidence shows that understanding the informal networks of an organization helps change efforts by identifying "key points of connectivity where value is created or destroyed" (Cross, et al., 2007, p. 2). Such points can be influential employees, who can be supported to lead change efforts in their areas. The main steps in this model are to identify brokers in the organization and how they connect; and infuse change efforts with network understanding. Typically, this model activates small world network theory (Watts, 2004). Figure 9-4 illustrates how brokers can support network connectivity:

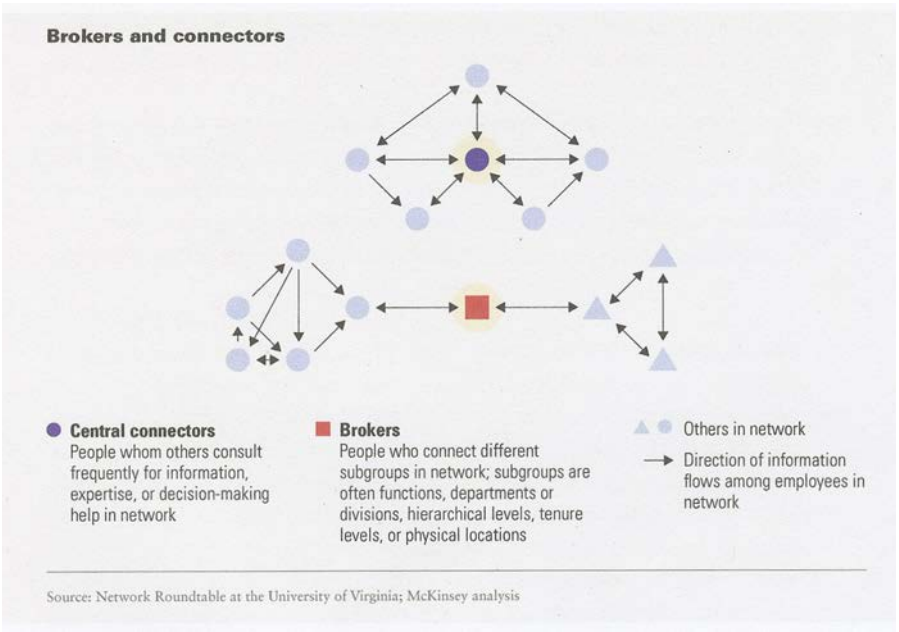

Figure 9-4 McKinsey's Informal Networks model (Cross, et al., 2007, p. 4)

The value of this model as illustrated in Figure 9-4 above is the acknowledgement of the power of informal networks, and the capacity to incorporate this understanding to support other change processes. The following example in Figure 9-5 shows two individuals are situated in different levels of an organizational hierarchy:

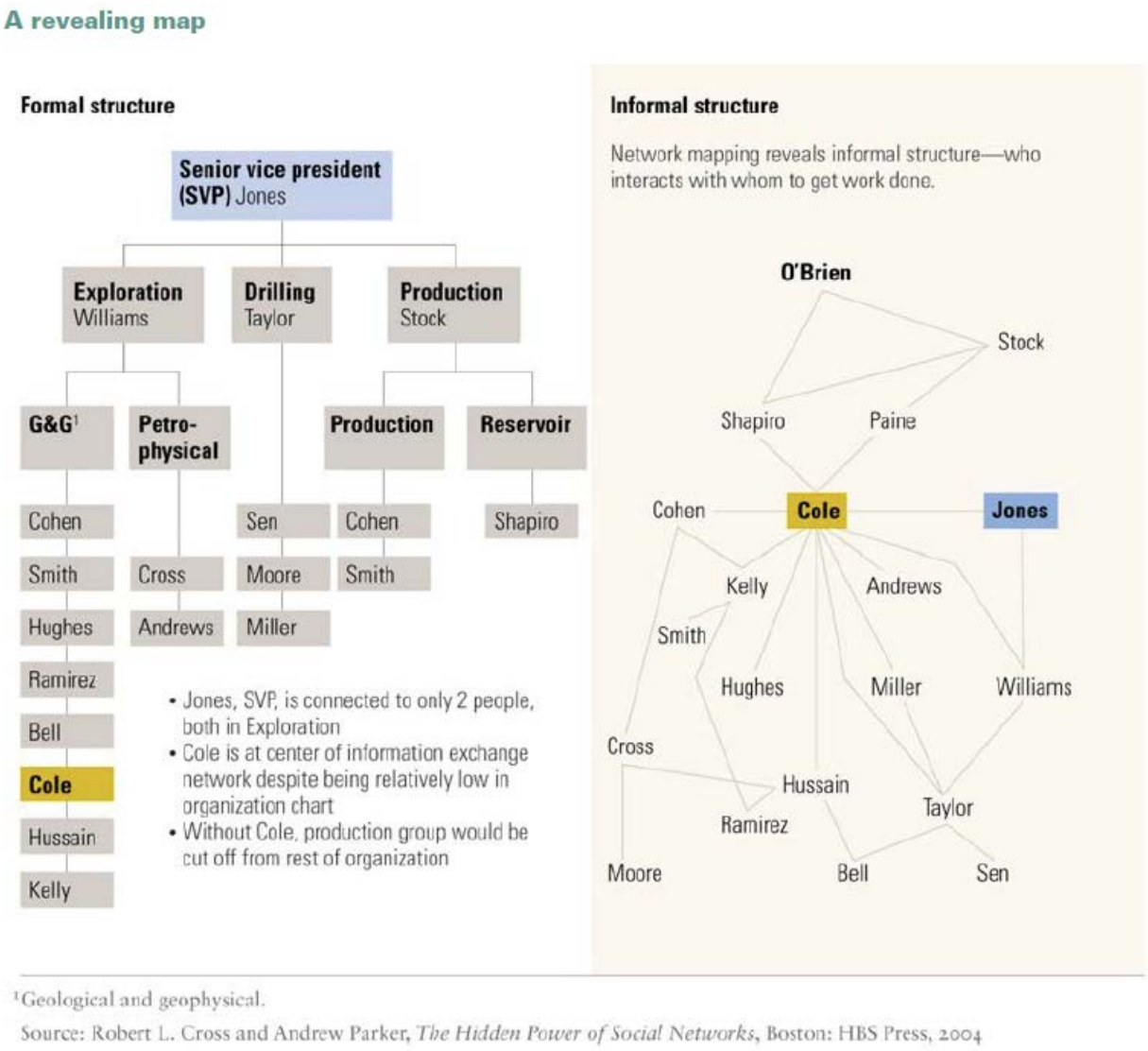

Figure 9-5 Formal vs. informal structures (Cross & Parker, 2004 cited in Bryan, et al., 2007)

In Figure 9-5 above, the relationships of Jones (at the top of the hierarchy) and Cole (a line staffer) are widely separated in the formal structure. However, when viewed according to their connectedness through the informal structure, a significant difference emerges. The informal connection promotes new opportunities for information flow along a shorter, more direct route than the long line of connections in their formal relationship, which may allow for leveraging of other change actions. Working though the informal networks in an organization or groups is therefore a critical task for the sustainability practitioner working with complexity.

The Cynefin Framework

The Cynefin Framework embraces the complexity of organizations, using an open source, emergence-based approach applying sense-making tools, networking and

narrative. The model was developed at IBM's Institute of Knowledge Management, and later the Cynefin Centre for Organizational Complexity at Cardiff University, chiefly by David Snowden. Cognitive Edge, based in Singapore, now manages the Cynefin Framework. The model incorporates the following sense-making processes as set out in Box 9-6:

- **Make sense of rather than assess the culture** — we collaborate with those who are part of the culture and have them describe it in their own language by sharing collective experiences and community artifacts.
- **Interpret through patterns** — trends, patterns and outliers all inform our understanding. The cultural landscape is mapped using narrative by members of the community who engage with us in the sense-making process.
- **Intervene to understand** — we probe, sense and respond. As the outcome of a complex system cannot be predicted in advance, we create small pilot interventions that we test extensive feedback, evolve and iterate.
- **Leverage the wisdom of the crowds** — a broad community is mobilized through techniques such as Social Network Stimulation. This increases connections between different groups in the community, leverages a diverse range of perspectives and empowers members of the community to own and address the cultural shift themselves.
- **Complex interventions for complex systems** — shifting culture requires a shift in behavior and perception. Effective cultural change interventions focus on getting people to want to change, not on changing them.
- **Monitoring of emerging cultural patterns** — as we cannot predict the outcome of any intervention and as the system is constantly shifting, strong and persistent feedback mechanisms that enable leaders to listen and respond to change.

Box 9-6 Sense-making processes in the Cynefin Framework (Cognitive Edge, 2008)

This model demonstrates an understanding of the role of people as part of a complex adaptive system in any organization or community. It incorporates an understanding that: outcomes cannot be predicted; the process of small interventions help to progress understanding of the systems concerned; and leaders must be sensitive to feedback. It has been applied to understanding and developing organizational and community culture; to solve complex problems; and to identify patterns in internal and external conditions, particularly in identifying "weak" signals (Kurtz & Snowden, 2003, p. 471):

> For example, groups might use the Cynefin framework to gain new insights on a contentious issue, plan interventions to move a situation from one domain to another, consider how they should approach or manage different formal and informal communities, or differentiate their strategies for knowledge retention based on multiple contexts of knowledge exchange.

The core tool in the Cynefin Framework is presented below in Figure 9-6:

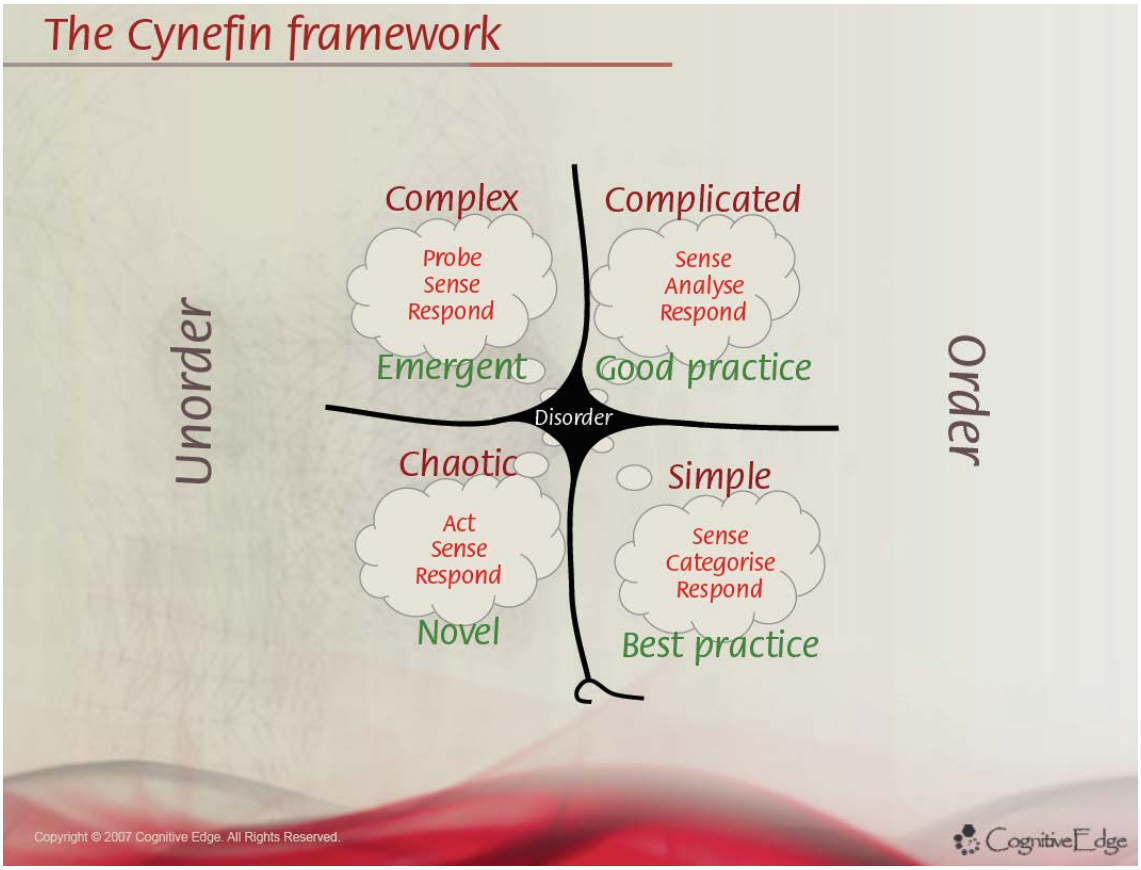

Figure 9-6 The Cynefin Framework (Cognitive Edge, 2010a, p. 18)

Figure 9-6 describes the model as having four quadrants representing four system spaces across three types of order: simple, complicated, complex and chaos; and order, disorder and unorder respectively. The system spaces could apply to an activity, problem or issue. Issues can be understood through their system types, with decisions and actions qualified by the character of particular actions. Thus, for example, a problem in complex space could undergo probing, or "safe-fail" experiments followed by sensing, before acting. In chaotic space, there is no clarity, so action must be taken with sense-making before responding coherently, and so on. The complex space is where emergence occurs – often after being generated by chaos, but only becoming a clear pattern once having migrated to the complex domain. A problem or issue may transfer across system boundaries at different stages of the process, for example, when a new pattern emerges from complex space, becomes understood, and can be managed in complicated space. The framework has a further development, whereby different boundary conditions have been identified, as illustrated in Figure 9-7 below:

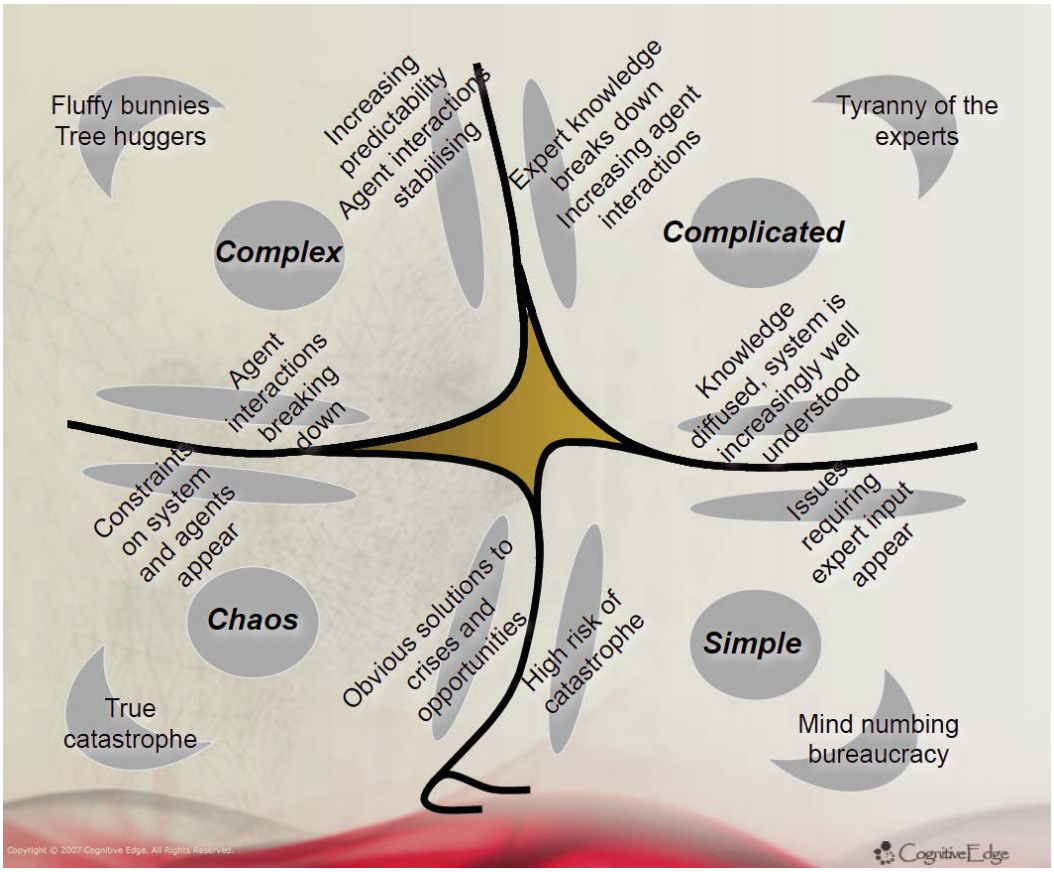

Figure 9-7 Boundary conditions in the Cynefin Framework (Cognitive Edge, 2010b, p. 8)

Figure 9-7 also illustrates the extreme manifestations of each system. The above arrangement enables participants to understand what actions are needed to move a problem or issue from one quadrant to the other, depending on their vision. It is important to be aware of the boundary condition between the simple and chaos domains because of the possibility of a simple situation tipping into chaos without warning, possibly with catastrophic outcomes. The core areas of each quadrant indicate the presence of attractors, which provide structure and coherence.

To be able to classify a problem or situation, data and information are needed. In the Cynefin Framework, the main source of information is through narrative, with emphasis on fragments, not storytelling. Through various processes, experience can be shared through the narrative fragments and the patterns of culture, values, themes and archetypes behind the issue at hand can be identified. Processes are designed to stimulate internal networks, and to bypass the effects of “pattern entrainment” (or habituation) caused by reliance on heuristics or “rules-of-thumb”.

Generally, the approach taken when applying the Cynefin Framework is: definition of signifiers (mapping broad issues and themes); fragment capture (narratives and

anecdotes); sense-making (looking for emergent issues, values, themes and weak signals); and interventions and monitoring (applying the learning from sense-making to decision-making and watching for new emergent patterns) (Cognitive Edge, 2008).

The Cynefin Framework applies complexity and chaos concepts in ways that contrast with concepts and terminology more commonly found in the mathematics and physics discourses (Rounsefell, 2001): this may be symbolic of the challenge of transferring ideas from one knowledge domain to another, where terminology requires clarification, translation or re-development. As the Cynefin Framework has been developed largely through experiential practice, rather than derived from theory, the differences in terminology are not, in my opinion, significant.

9.4.10 Summary of Systems Models

The models discussed above have attempted to integrate the systems paradigm in a practical way and have potential to inform an integrated approach to sustainability practice. In my view, Capra's Living Systems provides a coherent overview of practice principles; Eoyang's practice landscape provides a framework for applying appropriate methods in appropriate contexts; Meadows' Leverage Points leads us to understand our systems so that we can focus our efforts at appropriate points; McKinsey's Informal Networks reminds us of the importance of our connections as support for change; and the Cynefin Framework provides practical methods for working with complexity.

In my view, the Cynefin Framework provides a very detailed treatment of complexity and emergence and gives substantial guidance to the practitioner. While the Cynefin Framework has had little application to sustainability problems or projects to date[54], it has considerable promise for sustainability practitioners. I investigate its potential further in Chapter 13.

9.5 Contemporary Sustainability Practice

9.5.1 Introduction

As discussed in Chapter 4, much of the literature on sustainability describes sustainability models as static, incorporating the things that need to be accommodated in a sustainable society: the "what" of sustainability. Occasionally, such models reveal how the "what" are connected, and how resources and information may flow through a system. Rarely do the models provide guidance on the practice of sustainability as

[54] At the time of writing, the Cynefin Framework has been adopted to guide a project investigating sustainable water practices in rural South Africa (V. Read & C.Fletcher, personal communication September 22, 2010).

they fail to identify ways to implement the changes required. From experience, I hold the view that many sustainability practitioners believe that any required change is self-evident, and that self-evident nature should be motivation for participants to engage in change. This practice attitude is problematic in settings where participants do not accept that the need for change is self-evident.

9.5.2 Models of Sustainability Practice

In recent times, instead of applying static sustainability models to practice, specific models have emerged which include some measure of guidance to action: some by means of linear formula and some by incorporating an understanding of systems and culture as part of their dynamics. I have identified some exemplary sustainability practice/dynamic change models to inform my vision of sustainability practice. These models are situated in one or more of the corporate, knowledge, governance and natural domains. Unlike my assessment of the complexity models from organizational development (discussed in the previous section), I did not identify any coherent models of sustainability culture or practice with an embedded understanding of emergence and explicit ways of working with emergence. However, I have identified some models of sustainability practice, which make some reference to the Systems paradigm, explicitly or implicitly. The following models are reviewed in the next section:

- Doppelt's Wheel of Change Towards Sustainability
- Gunderson and Holling's Panarchy
- Dunphy's Pathways to Sustainability
- Hunting and Tilbury's Six Insights model
- Beatley and Manning's Strategic Interventions model

<u>Doppelt's Wheel of Change Towards Sustainability</u>

Planning consultant and academic, Bob Doppelt, proposes that change for sustainability can be achieved by working through the leverage points in any human system (Doppelt, 2003), similar to the Meadow's model, reviewed above. Leverage points are described as responses to the seven sustainability blunders:

Blunder		Solution
Patriarchal thinking that leads to a false sense of security	>	Change the dominant mind-set that created the system through the imperative of achieving sustainability
'Siloed' approach to environmental and socioeconomic issues	>	Rearrange the parts of the system by organizing deep, wide and powerful transition teams
No clear vision of sustainability	>	Alter the goals of the system by crafting an ideal vision and guiding principles of sustainability
Confusion over cause and effect	>	Restructure the rules of engagement of the system by adopting source-base operational and governance-change strategies
Lack of information	>	Shift the information flows of the system by tirelessly communicating the need, vision and strategies for achieving sustainability
Insufficient mechanisms for learning	>	Correct the feedback loops of the system by encouraging and rewarding learning and innovation
Failure to institutionalize sustainability	>	Adjust the parameters of the system by aligning systems, structures, policies and procedures with sustainability

Table 9-2 Doppelt's Seven Sustainability Blunders (Doppelt, 2003 p.88)

Doppelt later extended the summary of issues in Table 9-2 into a conceptual dynamics-based model for sustainability practice, in Figure 9-8:

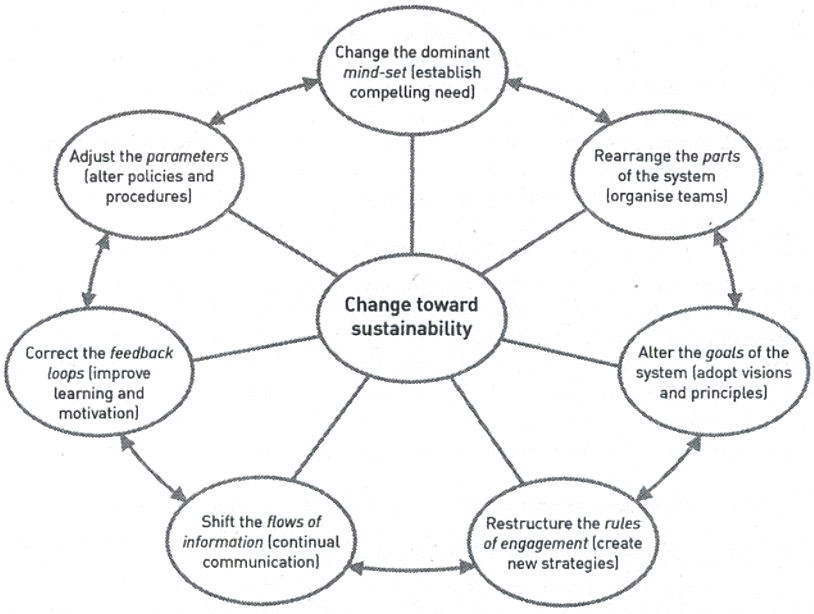

Figure 9-8 Doppelt's Wheel of Change Towards Sustainability model (Doppelt, 2003 p.89)

The process in this model flows between the different solutions and can commence at any point in the system, addressing any of the identified blunders. As each solution has a dynamic relation to each other solution, and even with a start at any point, all the

solutions must be worked through to achieve a sustainable change. The practitioner can use this wheel to identify an entry point into the change process and to map the cultural landscape to develop an appropriate change strategy. This is a holistic approach, providing many different opportunities for change through working on all intervention points concurrently. The main shortcoming in the model concerns the necessary guidance for the practitioner in managing the interacting effects of the various parameters. The model does not account for any emergent qualities arising from the connected actions, although the model suggests, by placing change at the hub of the wheel, that this will emerge from the interaction of the seven parameters.

Gunderson and Hollings' Panarchy

The Panarchy model (Gunderson & Holling, 2002) was derived from the study of ecological systems, particularly the concept of the adaptive cycle and evolutionary change. The model was developed through identifying similar patterns in the human management of ecosystems, as well as the ecosystems being managed. Thus the model has been extended to understanding human society, culture and systems (such as organizations and institutions), and has been used as a guide to sustainability practice. As a model of sustainability, change is described as a figure 8-shaped adaptive cycle of slow, incremental exploitation of resources (r), with a conservation stage where change is limited through overconnection (K), followed by a quick release process (Ω), such as ecosystem collapse or the creative destruction of an economy. This leads into a phase of reorganization (α), where new growth or innovation emerges, leading into the exploitation phase again, as per Figure 9-9:

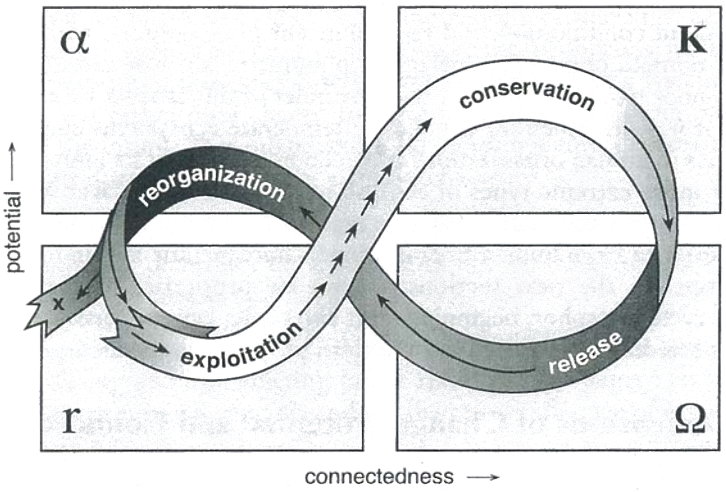

Figure 9-9 The panarchy cycle (Gunderson & Holling, 2002, p. 34)

There is another dimension in the model: resilience. Resilience expands and contracts throughout the cycle and is at its strongest throughout the release phase (Ω), as shown below in Figure 9-10:

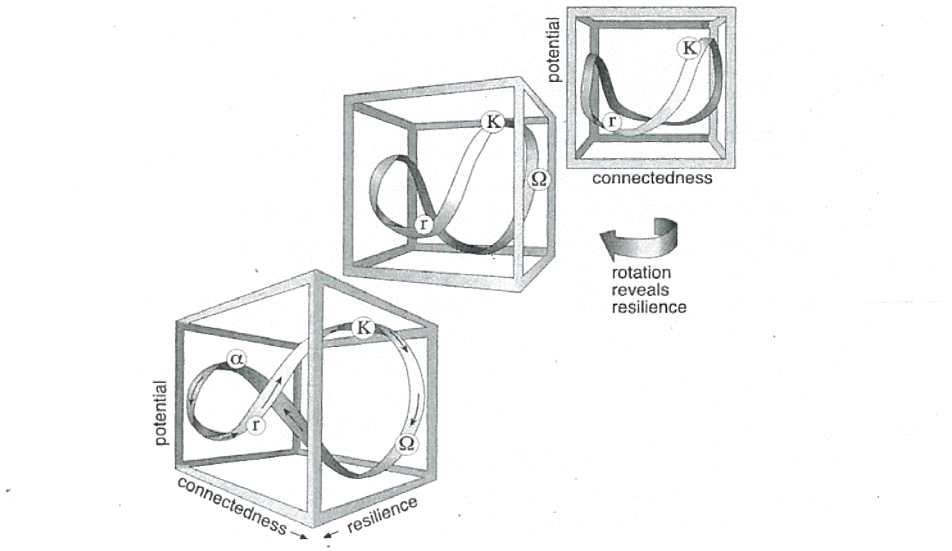

Figure 9-10 Resilience in the panarchy cycle (Gunderson & Holling, 2002, p. 41)

The new cycle is different from the previous cycle. The process of evolution/change through the adaptive cycle is termed a "panarchy". Panarchies can emerge across scales and systems, but can link with or be nested within other panarchies, as part of the energy of reorganization or as a driver of the release phase, as shown in Figure 9-11:

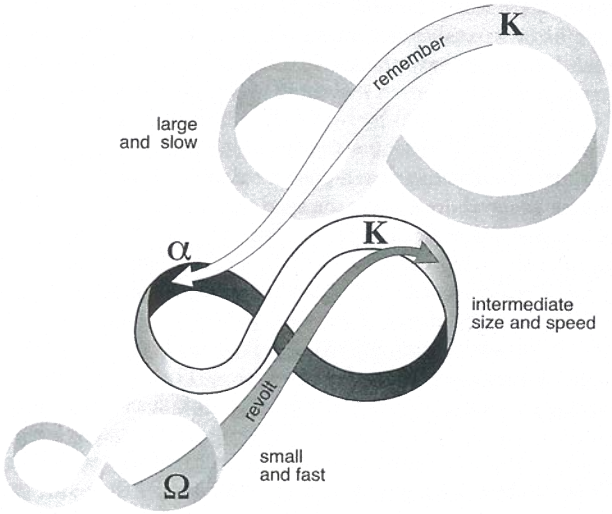

Figure 9-11 Panarchical connections (Gunderson & Holling, 2002, p. 75)

The Panarchy model is useful in understanding the adaptive cycle of organizations and social systems and may explain the difficulty in extending sustainability culture after a

number of cycles of innovation, exploitation, stability and release. This model explains why any system goes through cycles in achieving stability: it represents a view of the character of system behaviour around an attractor. It also adds the element of time, in the sense that any action or initiative, when applied in the right place, but at the wrong time, will be less effective. In this view, time relates to the phase in the panarchy cycle in the system, or as Rogers (2003, p. 421) identifies, “the openness” to external factors and the state of “organizational innovativeness”; or, according to individuals’ “readiness to change” (Desplaces, 2005).

The Panarchy model has been used to inform sustainability practice across a range of global land, water and ecological management issues and has been used to link the management of such systems with the communities exploiting or managing such systems. As a model, it informs the practitioner that change is never linear, and that energy ebbs and flows. The practitioner must be able to observe a system in motion and understand its state at any point in terms of the panarchy cycle as part of planning a change strategy. The main conceptual shortfall is how to identify the current emergent state or pattern of a community or organization.

Dunphy’s Pathways to Sustainability

The model proposes two broad practice pathways to change for organizations: incremental change and transformational change (Dunphy, Griffiths & Benn, 2003). It also includes a sustainability phase model which identifies phases of transition from business-as-usual to sustainability: “rejection”, where the dominant elite rejects any social or environmental responsibility beyond profit-making; “non-responsiveness”, where inaction is largely due to lack of awareness; “compliance”, where action is confined to meeting minimum standards; “efficiency”, where there is growing awareness of the opportunities for engaging in sustainability; “strategic proactivity”, where sustainability becomes part of corporate strategy; and the “sustaining corporation”, where sustainability culture has been internalized (Dunphy, et al., 2003, pp. 15-16) Incremental change can create new values, structures and processes (Dunphy, et al., 2003, p. 208). It allows time for change activities to achieve results, and achieves new stabilities by Eight Steps of Incremental Change, as summarised below in Box 9-7:

Step 1: Begin with future workshops/search conferences
Step 2: Assess the organization's position
Step 3: Evaluate the type of change program needed
Step 4: Identify change agents
Step 5: Pilot new practices and innovations
Step 6: Harness further resources
Step 7: Communicate and extend the program
Step 8: Align organizational systems

Box 9-7 Eight Steps of Incremental Change (Dunphy, et al., 2003, p. 230)

Dunphy et al. describe the benefits the following way: the development of small wins; allowing time for building support for change initiatives; capability development of staff for new technical and operational procedures; culture change programs; efficiency improvements; new organizational structures; and development of change competencies (Dunphy, et al., 2003, p. 230). External forces, such as changed community expectations and environmental pressures, drive transformational change. These forces can also lead to an increasingly demanding regulatory and business environment. The result is that some organizations have to change very quickly, just to stay in business. Alternatively, some organizations engage in transformational change through risk management and future-proofing processes. The ten steps in Transformational change are shown in Box 9-8:

Step 1: Know where you are now
Step 2: Develop the vision – the dream organization
Step 3: Identify the gap
Step 4: Assess the readiness for change
Step 5: Set the scene for action
Step 6: Secure basic compliance first
Step 7: Move beyond compliance
Step 8: Establish the performance criteria for "compliance plus"
Step 9: Launch and manage the transformational change programme
Step 10: Maintain the rage.

Box 9-8 Ten Steps of Transformational Change (Dunphy, et al., 2003, pp. 212-217)

For both models, Dunphy et al. propose that success is dependent on the capability of the change agents leading the change process, and they identify some fundamental factors in change agent competency (Dunphy, et al., 2003, p. 234): goal clarity, role clarity, relevant knowledge, relevant competencies and resources, and self-esteem. They highlight the relevant competencies in Figure 9-12 below:

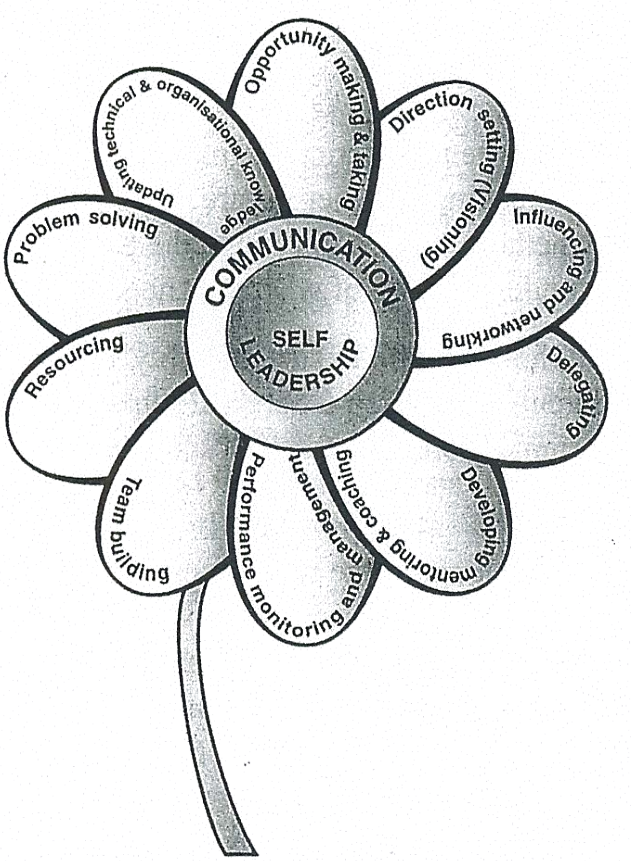

Figure 9-12 Competencies in the Dunphy model (Dunphy, et al., 2003, pp. 265-271)

The Pathways to Sustainability model proposes a useful framework for practice. However, while the list of competencies above is thorough, there is no guidance for how they interconnect as aspects of a whole system. Further, where the complexities of practice exist – launching and managing the change program, and "maintaining the rage" - are not covered in detail.

The Six Insights Model

The Education for Sustainability (EfS) model was introduced in Chapter 7 (Delgado, et al., 2007; Hunting & Tilbury, 2006). In addition to EfS providing guidance to applying a systems approach to education, the model is applicable to cultural change in the organizational setting. Consequently, Hunting and Tilbury proposed six insights into organizational change for sustainability (Hunting & Tilbury, 2006). They developed the

model through an Action Research project with ten major corporate and government organizations in Australia. The insights form the basis of the process to apply in any organization seeking a cultural change for sustainability. These six insights are shown in Box 9-9:

Adopt a clear, shared vision for the future: the vision must be developed through a participatory process.

Build teams, not just champions: establish cross-departmental teams for sustainability with participation in decision-making, staff engagement and support for capacity development.

Use critical thinking and reflection: understanding the impact that levers to change have on leadership, power, politics, hierarchy, structure, information flows and personal bias have on change enables practical steps to change.

Go beyond stakeholder engagement: build cross-sectoral partnerships and networks between industry, government and not-for-profits helps better understand different perspectives for sustainability and informs a shared vision for a sustainable future.

Adopt a systemic approach: see sustainability in terms of whole systems; accept ambiguity as part of change; look for multiple perspectives; recognise different ways of learning; and integrate decision-making.

Move beyond expecting a linear path to change: The process of change for sustainability needs to be more iterative and reflective, addressing issues as they occur and often taking a branch path for a while. The change process needs to be more flexible, and potentially more opportunistic too, and this may lead to more innovative, productive and unexpected outcomes.

Box 9-9 Six insights into organizational change for sustainability (Hunting & Tilbury, 2006)

The use of the term “insights” enables this model to mirror Doppelt’s approach where any point can be a starting point. The first four insights deal with vision, structure and strategy issues through a participatory process. These last two insights emphasise the importance of systems and suggests that a non-linear path is most likely. However, while this model generally promotes maintaining flexibility, a reflective capacity, and being opportunistic as the main practice capability, emergence is perhaps an implied systems quality and thus there is no further guidance. However, with these insights an emergence-aware practitioner could readily recognise new patterns and new ideas emerging from the participatory approach. The positive aspect of this model is that it prepares the practitioner and participants alike to cultivate an open and flexible mind-set in addressing problem. The importance of this model lies in its guidance to the practitioner to change their expectations beyond linear results and to cultivate openness to new patterns.

Beatley and Manning's Strategic Interventions Model

Beatley and Manning (1997, pp.208-211) have proposed a model of change in the context of community sustainability. Their model extends the Doppelt and Meadows' models, where the concept of interventions is applied in a strategic fashion. The model implies that a community is a system with significant intervention points that require stimulation over different time frames. This model acknowledges the role of culture, technology, institutions and governance, external drivers, costs factors and roles and personalities. While geared for a planning context, the model could readily be re-oriented with different labels appropriate for specific practice settings. The model is illustrated in Figure 9-13 below:

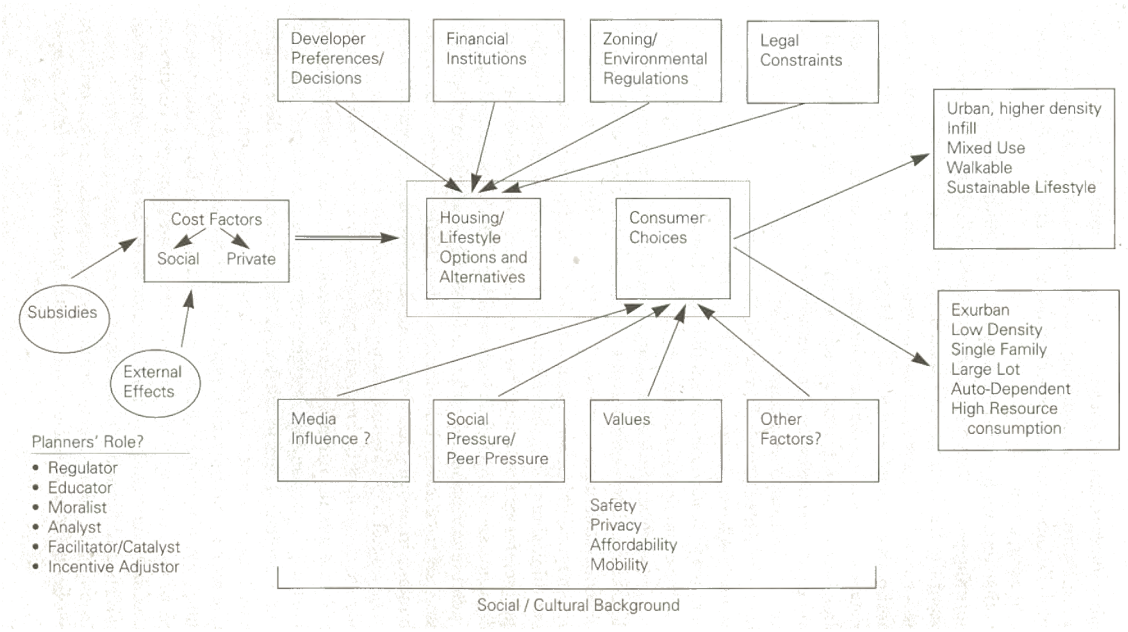

Figure 9-13 Beatley and Manning's Strategic Interventions model (Beatley & Manning, 1997, p. 209)

According to Beatley and Manning (1997 p. 211), the model draws on the potential of networks and alliances to further sustainability in the community setting. However, while a systems approach, a sense of dynamics and a complex context are implied in the model, emergence is not considered.

9.6 Gaps in Contemporary Sustainability Practice

In my view, a gap in a model or concept exists when it fails to identify certain criteria. In this thesis, I have argued that the systems paradigm (and the emergence phenomenon in particular) are fundamental concepts in the development of sustainability culture, and thus any model contains a "gap" if such fundamental concepts are not considered.

The models of contemporary sustainability practice discussed in this Chapter (including community and organizational development practice) have been reviewed because they apply the systems paradigm to sustainability practice, even if only in part. Most of the approaches do not include treatment of the concept of emergence as the central quality of complex systems and thus do not explicitly forewarn the practitioner about the need to identify and respond to new emergent patterns of behaviour in the systems with which they interact.

Invoking the systems paradigm in a model of sustainability practice is easier than actually putting the ideas into practice, especially if practitioners do not have the capacity to engage in complex and chaotic situations and if the models fail to give sufficient guidance. Without such capacity, it is likely that much action will be working without focus, direction and rigour, founded on imposing change rather than working with people to foster an emergent sustainability culture. These conceptual and capacity gaps are substantial: their existence means that such models need further development to achieve their clearly noble intentions. Through reflection on the purpose and application of the above models, I summarise the gaps most often demonstrated by contemporary sustainability practitioners in the sections that follow.

9.6.1 Conceptual Gaps

- Practising in a manner inconsistent with sustainability principles, often reverting to a mechanistic approach rather than a holistic one.
- Lack of appreciation that sustainability is contested and thus its intent, interpretation and application are highly problematic.
- Falling into the “greenwash” trap, where initial achievements and decisions are promoted as being sustainable without appropriate sustained action.
- Believing that the change needed for sustainability is self-evident and that that evidence should be motivation enough to drive change in any situation, regardless of whether people and their socio-technical systems are ready for change.

9.6.2 Culture Gaps

- Practising in a manner inappropriate to the cultural context, without awareness that both potential obstacles and opportunities to pursue change may emerge.
- Failing to identify and understand the existing state of the socio-technical system or culture of a particular group and designing an inappropriate change process.

- An unwillingness to engage with people, their cultures and their informal networks because of limited capacity for dynamic group work; this is especially true of sustainability practitioners with a technology focus.
- Failing to prepare people for change.
- Emphasising methods and techniques ahead of culturally appropriate behaviour, respectful attitudes and openness to client perceptions.
- Limitations resulting from the practitioner's attitudes, values, norms and behaviours: these limitations inform the design and development of models, processes and tools and their practical application.
- Inability to connect to place and to "listen to the land".
- Lack of self-awareness and responsibility for one's actions as a practitioner.
- Lack of motivation to apply sustainability principles to one's personal life and to the operation of the practitioner's own workplace: a failure to demonstrate a personal sustainability culture.

9.6.3 Learning Gaps

- Lack of higher order learning capacity commensurate with holistic thought and action within complex social systems.
- Designing programs that are not congruent with local learning styles and intelligences[55].
- Failure to learn about the local knowledge, experience, conditions and culture, because of limited practitioner capacity for self-directed learning.
- Speeding processes ahead of participants' capacity to change, particularly where funded by outside agencies or as part of projects with limited time-lines.

9.6.4 Technology Gaps

- Relating to technology as static artefact and not as a socio-technical system, leading to poor technology choice.
- Tendencies to apply a "technical fix" approach to solving sustainability problems.
- Failure to identify patterns of embedded culture and values in technology and to moderate technology choice in response.

9.6.5 Systems Gaps

- Lack of professional guidance about how to practise across layers of complexity.
- Failing to understand the dynamics of change: preferring to rely either on the apparent inherent benefit of any proposed sustainability initiative to drive change, to

[55] According to Gardner's multiple intelligences theory (Gardner, 2006).

impose change as a top-down action or too much focus on one approach to change at the expense of any other approach.

- Investing energy narrowly in a once-only/one-off program of change.
- Inability to interact with complex systems and appreciate their capacity for unpredictability.
- Failure to recognise the emergence of new patterns of behaviour within groups, organizations, communities and social systems.
- Failure to recognise systemic feedback, especially when affected by several degrees of separation from original causal factors or drivers of change.

9.7 Conclusions: New Conceptions in Sustainability Practice

In this Chapter I sought to answer the following question: Are there any conceptual and capacity gaps in contemporary sustainability practice? To answer this question I identified a series of conceptual and capacity gaps in the change paradigms, models and tools identified in this Chapter, sourced from the fields of community and organizational development and contemporary sustainability practice. My review reveals that cultural change processes commonly draw on more than one of the change paradigms identified in this Chapter. In conventional practice in organizational development, cultural change is driven by a combination of structural change, leadership, negotiation, rewards and incentives, and project management processes, as these are ways where management can clearly demonstrate that steps to change have been undertaken, if successful. In contemporary community development practice there is much in common with the action learning and systems paradigms of organizational development.

In organizational development practice, the change paradigms identified, when applied appropriately, can bring about desired change. However, recent experience demonstrates that conventional paradigms are subject to limited outcomes, particularly in highly educated and highly motivated workplaces. Alternatively, benefits may be limited if a sufficient number of people are against the change process and limit its effectiveness through avoidance, omission, obstruction and non-cooperation. As indicated, even in community development, poor professional practice can result in outcomes that are no better than a mainstream approach with its commensurate low success rates.

I have demonstrated that much contemporary sustainability practice fails to actively pursue cultural change. The unspoken aspect of change is that all the change

paradigms (including sustainability practice models) discussed in this Chapter contribute to cultural change. My view is that such a position is an implicit acknowledgement that cultural change is expressed through emergence, but indicative of a lack of explicit understanding. The phenomenon of emergence, then, is a missing dimension, indicating that dealing with complexity is difficult: for individuals, organizations, communities, and society as a whole. That most of these practice paradigms have proved to have limited effectiveness to bring about change reflects that people-centred, developmentally oriented, learning- and relationship-based change paradigms are better received and are more readily adopted and internalised by staff in the contemporary workplace and by communities generally. Thus, I believe that the best approach to change is to retain the usual mainstream change actions if appropriate to the context and local capacity, and interweave these with emergence-oriented processes. I explore this theme further in Chapter 13.

Much of the new thinking on organizational cultural change is situated in the systems paradigm. However, in spite of some of the features of the systems paradigm having been included in models of contemporary sustainability practice, current approaches to sustainability practice have not adopted the new thinking from management practice. Further, models of sustainability practice have not embedded the implicit “feel” for emergence that is evident in community development practice. By not incorporating an understanding of complex systems and their emergent capacities, contemporary sustainability practice may not be able to lead the change necessary for a more sustainable society. On this basis, I contend that parameters of sustainability practice must be extended to accommodate the emergence phenomenon.

In this thesis, the reviews of theory and the proposal of the emergence model have meaning for me only if they can inform my practice. It was therefore critical that I situate the research in a practice paradigm. In the three Chapters to follow, I present three case studies as the embodiment of the issues of sustainability practice in complex space. The general theoretical approach to the case studies was outlined in Chapter 2.

I selected these three case studies to explore issues of sustainability and related practice issues at different places, at different scales, in different processes and in different cultural contexts. The three case studies are:

1. Sustainability of Remote Indigenous Communities in Central Australia (2001-2008).
2. Community Learning for Sustainability in a Tasmanian Rural Community (2001-2002).

3. Embedding Sustainability at Coffs Harbour City Council, NSW (2005-2011).

Over the course of the research, I explored over twenty potential case studies in organizations and communities before settling on these three studies. The review of each of the three case studies responds to the following question: How does the case study experience contribute to the development of sustainability practice? Implicit in this question is the reflection on the implications for practice of the Emergence Model proposed in Chapter 8. During the course of undertaking these case studies, I produced a range of documents, such as project reports and academic papers. I have included full-text copies of these documents on the accompanying DVD in Appendix 2. These documents give full details of my activities and the processes of the case studies beyond what I have reviewed. In the following Chapters I focus on the process of my action-reflection-learning as a way of furthering the development of the Emergence Model and new patterns of sustainability practice.

In Chapter 13, after reviewing the three case studies, I complete my synthesis of the Emergence Model with sustainability practice by proposing new patterns for sustainability practice to explicitly accommodate the phenomenon of emergence.

Chapter 10 Sustainability of Remote Indigenous Communities in Central Australia

10.1 Introduction to the Case Study

This case study explores the sustainability of remote Indigenous communities in Central Australia, with particular emphasis on the sustainability of physical infrastructure and housing. In remote areas, community liveability is dependent on the physical infrastructure and thus a community that has the capacity for maintaining its infrastructure has the capacity to continue dwelling in place and pursuing other cultural, social, livelihood and environmental goals. My experiences involved helping remote Indigenous communities with technology choice and implementation projects aimed at sustainable settlement development.

I have learned much about sustainability in remote Indigenous communities through these activities and through my previous experience, and I consider there is great value in reflecting on that experience. In this case study, I have aggregated my practice experiences across five communities in Central Australia, located to the West and North of Alice Springs. The case studies focus on sustainability practice in settlement development generally rather than the settlement dynamics of one place. Therefore, by reviewing both place and process, I can use this case study to identify sustainability issues relevant to remote communities, and to tell a story with great relevance for sustainability in mainstream settlements. This approach highlights my experience as a sustainability practitioner in very complex socio-technical environments.

This case study has been included in this research project because it:

- Represents an aggregate approach to understanding the complex dynamics of sustainability in remote Indigenous communities;
- Highlights the relationship between culture and sustainability;
- Investigates the impacts of intersecting value systems;
- Highlights capacity gaps and their impact on sustainable settlement development;
- Contributes to an understanding of why people struggle with technology;
- Highlights how the technological fix approach can fail to deliver sustainable outcomes; and
- Reviews the remote context as feedback in the form of “reverse technology transfer” for the mainstream to understand its relationship to technology and its embedded culture.

This case study reflects on both my professional experience as a sustainability practitioner and my personal world-view. I make no claims to be speaking on behalf of the desert people of Central Australia. The identity and location of communities and community organizations have been omitted to protect their privacy. Some references and sources have not been cited for the same reason.

10.2 Community scale: A Western Desert Community

10.2.1 Introduction

I worked with this remote Western Desert community from 1995 to 1998, facilitating local participatory construction projects, health hardware surveys, housing upgrades, housing design, education and training, septic system investigations and community planning and development. In 2001, I returned as a team member on a Fixing Houses for Better Health (FHBH) project, spending nearly four weeks over two visits. My work was of a voluntary nature, with the second visit self-funded. The FHBH project applied the Healthabitat survey-and-fix methodology[56], resulting in immediate improvements to "health hardware"[57] in community housing. I also provided training to local people in diagnosing and fixing simple technical problems with housing services.

The following activities influenced my reflections and insights:

- Regular visits to the community from 1995 to 1998;
- Two visits in 2001 as part of the FHBH team;
- Historical information concerning the development of the community on file at the Centre for Appropriate Technology (CAT), Alice Springs, accessed during my period of employment;
- Access to similar historical information on file on site in the case study community;
- Images and file material sighted at the then Northern Territory Government Department of Community Development, Sport and Cultural Affairs (DCDSCA), Alice Springs, in 2006; and
- Personal communications and oral history arising from day-to-day relationships with local people, CAT staff (including CAT staff based in the Community, both indigenous and non-indigenous); Territory and Federal Government field staff; staff

[56] The project was managed by Geoff Barker of Practical Management + Development on behalf of the Fixing Houses for Better Health program.

[57] Health hardware describes any aspect of the hardware and fittings in a house which directly contribute to the maintenance of healthy living practices. It includes taps, drains, toilets, cisterns, shower heads, laundry tubs, light switches, food preparation and storage areas amongst other items (Department of Family and Community Services, Commonwealth of Australia, 2005).

of other agencies based in the community; and Community Council staff including outstation and Women's Centre co-ordinators.

10.2.2 Return To Country

As Meyers explains, the peoples of the Western Desert spent several decades living in and around government settlements and church-run missions within 200km North-East of Alice Springs (Myers, 1991, p. 28), as a result of a reduction of bush tucker because of prolonged drought, persecution by the expanding European population searching for grazing lands to exploit, and, in the immediate post-war period, the atomic weapons and missile testing at Maralinga and Woomera respectively (Walker, 2005). Government policy of the time involved people of many different tribal groups living in the one place on land traditionally owned by one particular tribal group. This policy caused major conflict, contributed to societal breakdown, loss of culture and language and was, according to Meyers, a driving force for voluntary separatism from the other tribal groups (Myers, 1991, p. 36). Many tribal elders sought to change this situation, perceiving the movement back to traditional lands or country (Folds, 2001, pp. 36-39) as an act of self-determination aimed at preserving culture and traditional lifestyles in opposition to the pressures of Western culture.

In the late 1970s and early 1980s, Western Desert people began to move back to traditional lands (Folds, 2001; Myers, 1991), in many cases, on foot. As roads to such places opened up access, more people returned to their traditional lands, resulting in the problem of assisting people to re-settle on country. From its very early days, the Centre for Appropriate Technology assisted the people of this case study community and its outstations in their development until the late 1990s.

10.2.3 Living On Country

For traditional indigenous people, "living on country" is the highest aspiration (Myers, 1991, pp. 40-46): it allows for maintenance of country in a physical sense, conduct of ceremonies and rituals (especially those of a compulsory nature), and for diet to be supplemented by bush tucker (Folds, 2001; Ganesharajah, 2009, p. 17; Myers, 1991). Further, the aspiration to live on country does not exclude Western technologies. Because of the remoteness of the Western Desert settlements (up to 650km West of Alice Springs – see Image 10-1), living on country cannot be a part-time endeavour. It requires support of permanent settlement of some nature to provide a range of services which people in remote communities demand, and which, as Folds explains, the

broader Australian community generally supports as an equity issue (Folds, 2001, p. 37).

Image 10-1 In the Western Desert, 400km West of Alice Springs (Parnell, 2001)

The country (as opposed to the settlement) is continuously occupied. The hottest time of year is the main time for cultural business including initiations and other sacred and secret rituals. Cultural business and other activities can also be interrupted by torrential rain periods affecting roads and preventing movement around country. The challenge of choosing and maintaining technologies to support living on country has been an on-going struggle for this remote community for more than thirty years, even though the local people see the value of technology (Rowse, 1992, p. 29).

10.2.4 Initial Settlement

Physical settlement began in mid-1981 (Myers, 1991, p. 41) at a place close to geological and sacred features of particular significance for this tribal group. The settlement was located near a watercourse with the capacity to maintain permanent water for long periods after rain. Artesian water was also available. Other cultural reasons for selecting the site were not clear to outsiders: the site chosen was exposed to summer and winter winds, which bring dust storms and wind chill factor, respectively. Other, more protected sites were available for development, but were specifically rejected for cultural reasons.

The first infrastructure built included a water bore with a hand-powered water pump, some ablution blocks and Ventilated Improved Pit toilets (VIPs). People lived in small, traditional hand-made shelters or “wiltjas”, made from a mixture of local vegetation and scrap building materials. These successfully operated for several years, providing a basic service for the small number of permanent residents and other visitors. As more

permanent facilities developed, the original facilities were abandoned and some building materials were salvaged and used elsewhere.

10.2.5 Outstations

At an early stage in the development of the community, some family/kin groups wanted direct access to their own country (Myers, 1991, p. 276; Rowse, 1992, p. 29). While a broad group of people of this language group identified with the country generally, specific kin groups had ownership of specific areas. Therefore, in order to maintain that country, there was a need to develop further settlements in those areas. In all, there were twelve outstations established and developed with basic housing and services (Sinatra & Murphy, 1999, p. 49), generally between 1981 and 1994.

When I became involved, most outstations were unoccupied for most of the year, with some permanently abandoned. The lack of occupancy resulted in significant degradation and failure of building stock, solar systems and water supply systems, limiting opportunities for any future permanent occupancy. In 1997-1998, the upgrading of outstations was investigated, but funding was not available for the purpose, even for those few families who wished to move back out to their country.

10.2.6 Settlement Layout

The layout of the settlement was driven by the relationships of the main family groups, with parts of the settlement oriented towards the directions of traditional lands, as well as the requirements of Northern Territory Government authorities, which required an urban street grid and positioning of housing lots to facilitate ease of installation and maintenance of centralised services, such as power and water. The need for large amounts of open space between the kin group areas for visitors' camps and for cultural business has resulted in a spread out community where some housing is situated close together, with approximately 10m between houses. The power house is located on the Northern edge of the settlement, close to a Community Council works complex, built in the early 1990s and now largely unused. The main bore is located on the hill above the settlement. A pump moves water to a header tank on a nearby hill, which gravity feeds to the settlement through a network of plastic piping. In 1998, a new water purification plant was installed on the hill above the settlement.

In the centre of the settlement are located the main public buildings – Council Offices, Community Store, Clinic, Women's Centre, School, Church and an Adult Education/Recreation facility. An aerial view of this community in 2000 is shown in Image 10-2:

Image 10-2 Aerial view of the Western Desert community

(NT Government Department of Infrastructure Planning and Environment, 2000)

The Community Council manages most houses[58], which provide residential accommodation for community members under a housing rental program funded under a variety of Federal and Territory Government Programs. There are also houses owned by the community's Health Service, the Northern Territory Education Department and the Community Council for relevant staff of the various organizations. Most of these are located to the North-West corner of the Community, with some Northern Territory Education Department staff houses adjacent to the school. An accommodation complex for visitors is located at one end of the Council works yard. A works yard has been located next to one of the Council staff's houses on the North-West corner of the settlement. The community's solid waste dump is located to the West of the settlement: a series of deep narrow trenches. Rubbish is collected and dropped into the trenches, although much waste gets deposited in the general vicinity of the trenches.

By 2000, a deep sewerage scheme had been constructed, with sewerage ponds to the West, intermediate pumping stations, and a main treatment plant. All houses and community facilities were connected into this system, and existing septic tank facilities were de-commissioned and removed under a National Aboriginal Health Strategy

[58] This may have changed since 2006, especially as a result of the Federal Government's intervention into Indigenous communities in the Northern Territory from 2007.

(NAHS) project. Changes have probably been made to the settlement layout and the modes of management since my last research visit to Central Australia in 2006, but I do not have access to this information.

10.2.7 Housing

Evolution of Housing Design

Housing has evolved according to available funding combined with improvements in housing standards. The first houses were simple shelters supporting a "camping"-oriented lifestyle – a couple of rooms either side of an open breezeway. A shower and toilet cubicle were included as part of a semi-enclosed ablution area. The next houses included verandahs with ablutions to one side of the verandah and two bedrooms on either side of a kitchen and living area. These houses were generally constructed with concrete block on concrete floor slabs. Subsequent development of the initial houses enclosed the breezeways for more internal living area, but with elimination of any covered area[59]. The second generation of houses underwent extension work in 1993-1994 aimed at increasing verandah and shaded areas, and adding an extra bedroom. These additions were subject to limited funding, and much of this work was still incomplete in 2001.

In the late 1980s and early 1990s there was a regular and intensive program of building, with larger houses, some with four bedrooms and verandahs to two sides of the house. Many of these houses had been renovated as occupancy increased; some of these houses built in this period were never fully completed, being without kitchens for many years.

There were also attempts to experiment with different housing forms based on the expanded house approach. Different materials were also trialled. Two houses were built on the expanded house concept using a steel-reinforced polystyrene foam panel as a base for sprayed concrete. While these houses were in poor condition for a long time, requiring extensive renovation, many local people indicated to me that they liked the expanded layout and extensive shaded outdoor areas of these houses. In my discussions with them, they considered these houses as the best in the community, because they provided good options for indoor and outdoor living and an element of privacy for occupants. Another expanded layout was trialled using concrete block living and sleeping areas and steel framed ablutions; these designs were similar to the Council accommodation in the works complex. During this period, there were some

[59] These houses still had no verandahs as of the time of my visits in 2001.

attempts to design houses or extensions in consultation with local people. These houses were generally of better quality than the earlier built houses, which were designed and constructed with minimal consultation and local participation.

I facilitated an extensive housing program for 1998-99, featuring housing refurbishment and construction of a new house, prepared in consultation with the community, based on information sourced from an extensive survey and-fix project involving the community in 1997. The new house was designed in consultation with the proposed occupants. This program was never instituted because of changes in community management. The change emerged during an unsettled period of community governance, with difficulties compounded by the reluctance of building contractors to work in this particular community. By this time, I had moved on to the Cairns office of CAT, and my successor in the job was not able to facilitate the construction of the house and other housing upgrades because no contractor would submit a tender. Funds were re-allocated.

As part of this project, with contributions from the then CAT Workshop Manager, I designed a new form of kitchen storage, workbench and clotheslines according to design criteria appropriate for remote community life. These items were to be installed in the houses without kitchens. On the return visit in 2001, I saw a pile of the components in the Works yard, apparently awaiting installation. Local informants said that they had been in that spot for at least two years; they did not know what they were there for as no one had told them of their purpose.

In 2001 a program of new house construction completed – four new identical, three bedroom houses were built, with internal and external ablutions and verandahs all around. An aged care facility was also constructed. These were the first new houses to be built in the community in eight years. According to local informants, the then Town Clerk selected the designs for the new houses and the aged care centre without consultation with the community.

Housing Programs and Local Participation

From the outset of the settlement of this community, until the late 1990s attempts were made to foster local participation in construction of buildings and infrastructure, where possible. This level of involvement reflects funding programs for housing, in as much as they allowed for flexible timeframes, flexible work programs and payment of wages to participants. Local people built most of the initial infrastructure (pumps/ablution blocks and so forth) with assistance from the Centre for Appropriate Technology. Early

housing development was contracted to Central Australian building contractors. A local building team carried out extension and renovation work. Until 1995, the house-building program allowed scope for local employment. The size of the local building team fluctuated from time to time according to the needs of cultural and family business, and community activities such a football games, which required travel to other communities. The local building team learned a range of skills: concreting, concrete block laying, septic tank construction, plumbing and drainage. They also acquired skills in maintenance.

The scope for local involvement was achieved only after much negotiation with funding authorities culminating in an extensive technical services scoping project in the late 1980s. This technical services process received sufficient funding to establish the Works depot and ensure staffing with trades-qualified staff whose role was to service community infrastructure and assets, and provide training in automotive and building skills. Despite the community's stated aspiration for local involvement, participation of local people was always under threat because of funding vagaries. The scope of work from several rounds of funding was never completed because funding ran out, largely due to a culturally different vision of the Western concept of productivity. During the mid-1990s, there were difficulties in maintaining numbers in the local building team. Many team members had been involved from the early days, and hoped that younger people would also participate. Their participation proved problematic. For some time there were rarely more than four people participating out of a community of 300 to 400 people.

In the 1997-1998 housing upgrade program, I facilitated a training program within the housing upgrade scope, delivered by the Education and Training section of CAT, to provide technical training to young women, with a focus on repairs and maintenance. This group successfully renovated one house during 1997 and 1998 and went on to build a women's museum (or keeping place) for storage of sacred and ceremonial objects over the period from 1999 to 2000. Despite the housing and infrastructure programs' aims of fostering local employment and training, it proved difficult to bring local people into a mainstream "best practice" project management approach with tight requirements for financial accountability. The question had to be asked: Who would employ local people from a complex cultural background in a situation of tight timeframes, risking time and cost overruns, other than on peripheral or inconsequential tasks?

Local Cultural Practice and Housing Usage

While I was working with the community, I realised that the concept of a Western-style town plan and its associated housing and infrastructure sits oddly with local needs and behaviours. There is an aspect of equity (albeit from a shallow interpretation) driving the process: Western-style housing is built within a town plan disregarding evident living preferences and practices. Local people are exposed to images of Western-style housing through the housing provided to community staff, on trips to Alice Springs and via satellite TV and videos. This exposure contributes to a local housing aspiration, creating pictures of what constitutes "housing", without consideration of the differences in lifestyles between mainstream and remote indigenous communities. Helen Ross explains these complex dynamics in an account of her experience with the Hall's Creek Community in Western Australia (Ross, 1987, p. 133).

In the case study community, houses are a focal point of the family camp, often serving merely as a cupboard and ablution facility and mainly providing shelter during rainy periods, cold weather and dust storms. Much of the living occurs outside the enclosed area. I observed a range of living practices at odds with the design of their Western-style housing including:

- Preference for spending most time in shaded and protected outdoor living areas and yard spaces;
- Overcrowding of houses caused by fluctuating numbers of occupants/users (depending on who is visiting, on whether a particular house is the centre for extended family business, or on the need to provide temporary security for people from elsewhere in the community);
- Insufficient toilet and ablution facilities;
- Inadequate laundry facilities;
- Lack of safe, secure and healthy food;
- Lack of personal storage space;
- Insufficient (and even non-existent) food preparation areas and storage; and
- Traditional bush tucker preparation and cooking on open fires (extensive and robust bench space is needed to effectively carve up a kangaroo).

Conventional housing also provides obstacles to the ability to keep a clear view of people coming or going. Thus it makes it more difficult for occupants to maintain control of access to their living space and yard areas, especially where housing lots were unfenced. Another consideration is the accelerated wear and tear caused by social

problems within the community: hardware and building fabric can become the safety valves and focal points for anger, frustration and anti-social behaviour brought about by family breakdown, petrol sniffing and alcohol abuse. Further, the lack of activities and programs to reduce boredom for children has a flow-on effect in creating behaviours contributing to damage of such items as glazing in solar water heater collectors. The result of this mismatch between housing aspirations and behaviours is that the majority of housing in this community rarely provides suitable support for local lifestyles. Things wear out, break down quickly and are not repaired or replaced when needed.

In contrast, the outstations fared better: housing was generally designed and built in close consultation with the relevant family groups. However, after some years, many families preferred to live in the main community with its services, rather than in the outstations. Most outstations were abandoned, and most of their housing stock, water supply systems and solar technology failed.

Problems with Housing, Water and Sanitation

During my work with this community, I witnessed many operational problems with housing and infrastructure:

- Poor design and specification of health hardware;
- Poor initial construction, particularly of plumbing, drainage and wet areas (often influenced by negative attitudes and racist behaviours of outside contractors and their workers);
- Insufficient council funds for maintenance;
- Toilet blockages caused by inappropriate personal hygiene materials such as material scraps;
- Removal of doors by occupants to promote ventilation for cooling during hot times of year;
- Aggressive artesian water which blocks pipes, shower heads and contributes to short life of water heaters;
- Vermin such as rats, mice and cockroaches who chew insulation on electrical, stove and washing machine wiring;
- Damage to external electrical meters;
- Ingress of desert dust into drains, window tracks, light fittings, stoves and washing machines; and
- Pooling effluent from failure of septic tanks (no longer a localised problem because of the commissioning of the deep sewerage scheme in 2000).

Problems such as these were not “one-offs”; they were regular, chronic occurrences. Given the local conditions and behaviours as described above, maintaining houses in a minimal functioning condition has been and continues to be a constant challenge for this community. During the life of this community there has been a chronic shortfall in funding as most funded housing programs are for capital works only, with buildings handed over to community responsibility on completion. The community is required to collect rents to pay for maintenance. However, even if the full amount of rent is collected for each house in a given year, the cost of maintenance always exceeds it. Collecting rent is problematic; tenants have been reluctant to pay rent on non-maintained houses that has led to, in some cases, total failure to maintain healthy living.

Each house in the community generally has a nominated householder who is responsible for rent payments, even though occupancy may reach thirty people at any one time. Not surprisingly, householders express even more reluctance to pay rents. A system of service charges, established in 1998, required a small fee to be deducted from wages or welfare payments in lieu of household rent. This innovation increased the funds available for maintenance. Typically, available maintenance funds in the community have been applied to replacement of doors and stoves: items most often requested by occupants. Repair of taps, drains, water heaters and toilets tends to be a second priority.

Occasionally, various housing and infrastructure programs provide funding for maintenance. In 1997 under the then Aboriginal and Torres Strait Islander Commission (ATSIC)-funded National Aboriginal Health Strategy (NAHS) and again in 2001 under the ATSIC-funded Fixing Houses for Better Health (FHBH) Program, this funding was provided. The latter two programs followed the Healthabitat methodology focused on repairing health hardware to support the Nine Healthy Living Practices (Department of Family and Community Services, Commonwealth of Australia, 2005; Pholeros, et al., 1993). I managed the 1997 program and selected fittings and technologies for health hardware with potential for longer life. I specified small, but significant, specification changes including: stainless steel tap seats; anti-vandal taps; retaining screws to light-switch assemblies; and sheathed elements to solar water heaters.

During the 2001 FHBH Program, I observed that the specification of improved health hardware that I instituted under the 1997 NAHS program contributed significantly to improved housing function, especially in supporting the Nine Healthy Living Practices.

Prior to the 2001 FHBH Program, funds were made available through ATSIC to top up community maintenance funds. The removal of the on-going maintenance requirements of the septic tanks (especially the older undersized tanks) as a result of the sewerage scheme also appears to have affected the general function of houses. The FHBH project managers kept detailed statistics from the 2001 FHBH program, but they are not publicly available.

Another major housing maintenance and upgrade program was carried out under an Indigenous Housing Authority of the Northern Territory (IHANT) Community Housing Program in 2004. The housing stock was extensively surveyed (39 of 61 houses) and maintenance lists prepared for the community. In addition to attending to some of the maintenance backlog, upgrading was undertaken to several existing houses in a very poor state of repair: new kitchens, toilets, showers, windows and doors, and re-painting of walls (Image 10-3).

Image 10-3 House in case study community after renovation in 2005
(NT Government Department of Infrastructure Planning and Environment, 2005)

10.2.8 Adult Education Centre

In late 1997 I was asked by the community to manage a project to refurbish the former adult education centre as a youth recreation and learning centre. The building was originally constructed in the late 1980s to provide a place for distance educators to use for block teaching. However, following the conclusion of that program the building was unused and became derelict and a haven for petrol sniffers. I devised a scope of works and a plan for undertaking most of the work with a local group of young men. This work included cleaning out, replacing windows, patching holes in the metal cladding, painting the concrete floor, installing new electrics and lights, upgrading toilets and the external

VIP latrine, demolition of damaged shade structures and fitting of security grille featuring a special CAT design. The project was successfully completed in 1998, not long after I relocated to the Cairns office of CAT.

When I returned in 2001 the building was derelict again, yet the signs of some of the previous work were still visible. A local informant told me the building had been very successful – it was being used as a recreation area, with some gym equipment and a pool table provided for the users. The local night patrol supervised the space at night. However, during the summer period when most of the community was out bush on cultural business, and most of the outside staff had left on holidays, the facility was broken into and trashed. When the Town Clerk returned, her response was to shut the centre down, and remove the gym and other equipment from the community. Thus for a second time, the building became derelict haven for petrol sniffers.

During my visit to Alice Springs in 2005, I found out from Northern Territory Department of Community Development, Sport and Cultural Affairs (DCDSCA) Community Development Officers that a recent round of renovation revitalised the building for its intended purpose as an education centre (G. Eatts & J. Kleiner, personal communication, February 18, 2005). The story of this is one of short-cycle growth, decay and re-birth. It is a microcosm of what often happens in communities and illustrates the difficulties in supporting any action or change. It will be interesting to see what happens to this building over time.

10.2.9 Septic Tank Upgrades

Between 1997 and 1998, I carried out an investigation of the septic systems servicing each house. The situation had deteriorated: the majority of the systems had failed. Many of the drains and toilets had backed up into the living areas of the houses and most septic systems were overflowing into the yard areas. The situation was exacerbated by the failure of most taps inside the houses; many were constantly running, delivering water into the septic systems at a rate beyond their capacity. Many of the septic systems were massively undersized for the housing's high occupancy rates. A very expensive service call from a plumber fixed the taps quickly (at a cost of approximately $80,000), which slowed down water flow problem.

One of the solutions was to de-commission the septic systems and install a deep sewerage scheme, which would cost more than $2,000,000. At the time (1997) there was no funding and no prospect of funding of a sewerage scheme, so $440,000 was

made available under NAHS to carry out upgrades to the septic systems. I prepared a cost plan based on an extensive technical and social investigation, and found that double that funding was needed to do the job properly. So a prioritized solution was proposed, which would have, within a relatively short period, replaced the worst performing septic systems and upgraded many of the remainder. The solution also involved carrying out a survey-and-fix of the housing (as described earlier) to improve systems to a higher standard than that undertaken by the plumbing contractor. This approach consciously focused resources on the "upstream" component of the system.

As we were seeking permission from the community to proceed with the septic upgrades, funding became available for a deep sewerage system because of the cancellation of a project in another settlement. Consequently, the septic tank upgrade did not proceed. However, another three years elapsed before the sewerage scheme was built. It was finally activated in 2000. The result has been successful; however, the community had to live with failed septic systems for three more years and the deep sewerage scheme had limited impact on the behaviour of users at the household end of the system. Blocked drains still occurred with sewage draining inside living areas.

This experience demonstrates that community dependence on outside funding results in loss of control over development processes, with greater difficulty created if the technology proposed is complicated and expensive.

10.2.10 Community Health and Sustaining Culture.

For many years, this community has had a clinic with its own incorporated health service. Working through the clinic and the Women's Centre, education programs in health, lifestyle and household management have attempted to inform local people, especially the women, about lifestyle changes for the maintenance of health. However, inadequate housing undermines this aspiration by undermining the health of community members. The physical health of people in this community is not good. While a poor diet high in sugars, fats and processed foods, and widespread tobacco smoking, petrol sniffing and alcohol abuse take their toll, illness and disease spread by overcrowding and failure of health hardware are significant contributors. The over-forty age group experiences kidney failure at very high rates, and the community has prematurely lost many significant elders in recent times. Kidney failure can be caused by skin diseases contracted early in life, directly because of overcrowding and lack of access to functioning health hardware. This loss of elders from disease caused by inadequate living conditions has significantly affected the maintenance of culture.

10.2.11 Procuring Technology Through Cultural Practice

The story of this community recently entered an interesting phase, involving the convergence of issues of local culture, sustaining "living on country" and technology. As discussed above, kidney disease has had a negative impact on the community's cultural life, especially since any community members suffering kidney failure could not continue to live in the community because of the lack of local kidney dialysis technology. To address this shortcoming, the community developed an initiative to raise funds for a community-based dialysis machine by conducting an auction of donated indigenous art works, along with special paintings made by prominent artists and traditional owners depicting stories of local cultural significance. The auction was held in Sydney in November 2000 (Western Desert Dialysis Appeal Committee, 2000). The new clinic with its dialysis facility was opened in 2004 (Friends of the Western Desert Dialysis Appeal, 2004).

10.2.12 Summary: The Community's Uncertain Future

During my involvement with this community, there was regular turnover of Town Clerks and other external staff, some of whom remained in the job for only a few days. After I left Alice Springs in 1998, there was a Town Clerk who remained in the community for several years. While this bought some stability, there was a pervading sense of paternalism and loss of control in the community until the local people had had enough and were able to bring about the dismissal of that person. After more instability, another Town Clerk spent several years in the community, and according to informal comments from staff at DCDSCA, did well. This case study community experienced its most stable period for many years until that Town Clerk left early in 2005 (G. Eatts & J. Kleiner, personal communication, February 18, 2005).

As I have no experience of this community and its status after 2006, I cannot pass comment on the community's sustainability performance. However, in Section 10.4, I report on recent changes to the structure and management of this community as part of re-structuring of community governance, which will have on-going issues for this Western Desert community. I fear that the trends described in this case study will continue through their cycles of ebb and flow, yet trust that the amazing good humour of the local people and the continued expression of their culture transcends the physical difficulties of maintaining settlement in the Western Desert.

My original intention with this case study was to link my experiences from 1995-1998 and my experiences from my visits in 2001 with continued research through

opportunities provided by my involvement in housing lifecycles research with the Desert Knowledge Cooperative Research Centre (DKCRC). The community was considered as a study site and verbal agreement had been given by the community for my colleagues and I to re-establish our relationships with this community to enable our fieldwork. However, before the fieldwork could commence, a change in research policy at DKCRC limited all case study research to communities located close to Alice Springs as a cost control measure. I was therefore unable to further my research project at this community.

10.3 Regional Scale: the Lifecycles Project

10.3.1 Introduction

In this aspect of the Central Australian case study, I contrast the experience working with the Western Desert community with issues concerning the lifecycles of housing and other physical settlement development issues, with a focus on the Central Australia region through my participation in a multi-method research project of the DKCRC. From 2003 to 2008, I participated in the Lifecycles Project as a member of the research team led from Southern Cross University. My role was as lead field researcher and designer of the Housing Stories Project – a subproject of the main research. The plan was to engage in a community-based values enquiry, returning service to communities, directly through Action Research activities and indirectly through development of lifecycle models to be used by the communities to improve their capacity to manage their settlements.

My main role was to meet with community representatives, to build partnerships, to understand their housing issues and to plan Action Research field activities, including a pilot process at a selected community. In addition, I edited all research Milestone Reports, contributing most written content and prepared two major reports on participatory methods of monitoring and evaluation of housing and infrastructure. I undertook a substantial analysis and synthesis of findings through workshop sessions with the Project Leader, Dr Kurt Seemann and other Lifecycles Project Team Members (see Image 10-4).

Image 10-4 The Lifecycles Project team at CAT: (l-r) Kurt Seemann (SCU), Steve McFallan (CSIRO), Bruce Walker (CAT), Selwyn Tucker (CSIRO) and myself (Jenny Kroker, 2005).

The Lifecycles Project approach was strongly informed by my experience and the experience of the project leader, Dr Kurt Seemann, in the case study community discussed above. The Lifecycles Project contributed to our greater understanding of the viability of remote desert communities, and the requirements for future sustainability. The understanding of the dynamics of physical settlement development, as reviewed in this research, contributed to further understanding of remote settlement sustainability. Such understanding potentially supports decision-making at both government and community level. The four main aims were the following (Seemann, et al., 2008):

1. To synthesise learning and understandings emerging during the course of the scoping stage;
2. To articulate new thinking in relation to sustainable investment in desert settlements;
3. To propose Keystone Strategies for exploring the new ideas in the next stage of research; and
4. To consider recent issues in public discourse and in the new policies for housing and infrastructure processes being proposed by the Federal Government.

10.3.2 The Housing Stories Project: Pilot Development

Introduction

The purpose of the community-level values enquiry component of the Lifecycles Project was to learn about the impacts of programs and processes which affect Indigenous peoples' lives according to their own values and priorities (not the values

and priorities of the outside funding agencies and their consultants). The purpose of this approach was to inform the design, development and trialling of lifecycle models. Another facet of the enquiry was to illustrate the real impacts of policy decisions and imposed socio-technical systems on the lives of desert people and to highlight the difficulties that desert people have in sustaining their communities through the collection of narratives.

Identification of Communities

Because the DKCRC would not fund field research in the Western Desert community discussed above, the research team targeted four settlements and settlement clusters closer to Alice Springs: two to the West and two to the North. The sites represented substantial variation in size, structure, governance and proximity to services:

- Community 1 was essentially a dispersed coalition of 44 outstations with a central council and resource centre;
- Community 2 was a long-established former mission with substantial infrastructure and a major new housing project;
- Community 3 was a regional Community Government Council which co-ordinated the resourcing and development of several communities and their outstations; and
- Community 4 was a town-based organization managing urban housing, town camps, outlying discrete communities and their outstations.

I made verbal agreements-in-principle with each of the Council organizations for research partnerships, subject to formal signing of Memoranda of Understanding (MOU) with DKCRC.

As part of the development of the pilot process and to develop formal partnerships, it was important to consult at community council level about the nature of the enquiry into local values of housing and settlement development, and the methods to be used. Between 2005 and 2006, I engaged in meetings, discussions and correspondence with staff, chairpersons, councillors and traditional owners at the four communities. I also made formal presentations to one of the then ATSIC Regional Councils and a local Community Council. I kept extensive notes of these meetings and discussions, demonstrating that validation of participatory methodologies and return-of-service had been received. These validation processes are outlined extensively in *The Housing Stories Project Validation Report* on the DVD attached to Appendix 2 (Parnell, 2005a).

Community-level Validation and Feedback

Community 1 – West of Alice Springs

I made four visits to this community between February and September 2005 to discuss the proposed research. I met at different times with many different staff, council members and traditional owners. I also followed up visits with correspondence, emails and phone discussions with the Chief Executive Officer (CEO). Many of the discussions, between myself and community people, confirmed that there are different values and perceptions about housing often ignored by outside agencies. The following image was taken in Community 1 on the first visit to the community in February 2005, showing a shared ablution block customised with murals:

Image 10-5 The author on country in Community 1 (Selwyn Tucker, 2005)

The main areas of concern expressed by informants were:

- Planning at the Council level, particularly regarding service delivery within available resources;
- Mapping occupancy patterns of outstations to help with planning and in dealing with government agencies;
- Housing management using Lifecycles tools;
- Low cost design ideas for extending the amenity of existing houses; and
- Managing staff turnover and continuing corporate knowledge;

Community 2 - West of Alice Springs

Between February and September 2005, I visited this community three times. Discussions with staff and traditional owners revealed that there was concern about the lack of contributions that both Council staff and local people were having into the

housing process. There was a perception that many problems inherent in the design process would become housing management and maintenance problems. Image 10-6 shows housing under construction:

Image 10-6 New housing in Community 2, constructed under the National Aboriginal Health Strategy (NAHS) (Parnell, 2005)

Other main issues of interest were the following:

- Assistance with maintenance planning to help spread available funds over the whole funding year;
- Advocating for community preferences and backing that up with the research;
- Providing more flexible models of funding and processes;
- Assisting in the computerisation of their housing management system, particularly using Lifecycle Assessment software; and
- Provision of training in using a computerised system.

Community 3 – North of Alice Springs

I visited this Community Council three times between February and September 2005 and delivered a presentation to a Council meeting, informing Council members about the project as well as a further presentation in September to the Regional Community Managers. I met with staff, councillors and traditional owners. Members of this Community Council were concerned about the following major issues:

- Identifying links between housing development and economic development;
- Understanding mobility issues and its effects on housing;
- Bringing choice back into housing design;

- Understanding cultural processes in the handing over of houses;
- Understanding the dynamics of the town camp and its relationship to housing choice;
- Living skills training for people to deal with the gap between what people need to do and what is actually done;
- Using DKCRC Projects to involve Councillors and Indigenous staff and to develop their capacity to organize and lead;
- Create a learning experience for the young men on Community Development Employment Program (CDEP) crews, based around simple housing maintenance through a learning-by-doing process to build capacity;
- Work with men with drinking problems (they have a big impact on the condition of houses);
- Research processes which produce short term outcomes as well as big picture outcomes; and
- Assistance with feedback on design ideas for the aged care centre.

The Council Chairperson, explaining that many other councillors were interested but perhaps did not understand the full extent of the research, suggested that we begin at the nominated site as a pilot to demonstrate processes and outcomes (especially if we could demonstrate more than merely a commitment to change). I explained a number of methods we could use in addition to the learning-by-doing approach:

- Games, using icons, focussing on values, service cycle episodes and local interventions;
- Sitting down and talking with small groups; and
- Making housing story video's with young people.

The Chairperson provided positive feedback about all of these methods and was keen to try the approach, particularly learning by doing and use of video. He suggested we could begin with the young men on the Community Development Employment Program (CDEP)[60] crew at the pilot community: to show them ways of understanding houses and simple things to keep technology functioning. We had agreed that, funding permitting, the pilot process at the selected community would begin in February/March

[60] Introduced in 1977, CDEP was a work-creation program for Indigenous communities. The program was abolished for non-remote Indigenous communities in 2009, and will cease to operate in remote communities in 2011 (Altman & Jordan, 2009).

2006 and proceed over several visits until June 2006. We would then extend the process to investigate the other sites.

Community 4 - North of Alice Springs.
I made two visits to this Community Council between February and September 2005 to discuss the proposed research with the CEO and council staff, to meet with officers of various government bodies in the region and to present to the former ATSIC Regional Council. Follow-up correspondence was sent, and many phone calls were made. I also met with the local representatives of many development and educational agencies. At our September meeting, the CEO confirmed that the proposal to carry out Action Research into housing issues had been tabled at a recent Council meeting and had been approved, subject to Indigenous Intellectual Property provisions and the signing of a Memorandum of Understanding (MOU). This was a major validation of our methodology. Because this Community Council was responsible for managing 100 houses in town and 140 houses in outstations and remote communities, the Council had many housing management and user issues. These are summarised in the following list:

- Housing maintenance:
    - Keeping on top of housing maintenance;
    - Introduction of power meters to houses, and the associated behaviour changes needed by occupants;
    - Cost of materials and related transport issues: building costs are more expensive in this region than Alice Springs, and it has a big impact on how far funds can go;
    - A workable system for back-charging tenants for any costs over and above wear and tear; and
    - Higher than local market rates for repair work by the Council's own works section.

- Housing management:
    - Ensuring available funds were appropriately prioritised;
    - Improve their systems of housing management;
    - Updating tenancy agreements to ensure that people only have one house, either in town or "out bush";
    - Problems if future funding is tied to the establishment of local building teams, where there can be difficulty in maintaining participant numbers;
    - External support and mentoring of housing management staff; and

    - Cross-subsidisation of maintenance funds between urban and remote housing.

- Broader Government issues:
    - Territory Housing failing to meet the demand for public housing in this region by building new houses, leaving this Council to meet the shortfall; and
    - The model of housing delivery does not allow for different styles of housing, and is too inflexible.

- User issues
    - Tenant knowledge of home management is a major capacity gap;
    - Tenants have unrealistic expectations for repair work in return for paying rent;
    - Damage caused by overcrowding of houses, which results from mobility between town and remote communities;
    - Cultural values that drive people to make decisions and to act in ways that do not fit with the embedded culture of houses;
    - Tenant learning processes, personal values and priorities, and their effects on lifecycles of housing; and
    - Fuel costs affecting disposable income: fuel costs are very high in some of the serviced communities and they have had a large effect on people's ability to pay for anything other than food and essentials; household management expenses (such as light bulbs) are a low priority.

The above list suggests that there is an on-going tension between the Council as housing managers, their capacity to maintain the houses within funding regimes and the behaviour and expectations of the tenants. The Council's agreement to participate in the research project emerged from their recognition that they were struggling with the above issues and appreciated any outside help in improving their capacity to manage. Discussions with the Housing Manager indicated that early activities could be based around piloting the Lifecycles software and supporting living skills development.

10.3.3 Summary: Completion of the Lifecycles Project

Through the field visits to Central Australia over 2005 as described, I met with many Indigenous and non-Indigenous people, talking through many issues of housing and settlement development. The notion of a local-values based enquiry struck a chord with most informants, validating the Housing Stories approach. By December 2005, with planning for the pilot activity in the early stages, we were focussing on a range of graphic materials to be used. We intended our first task to be a community workshop

with local people to contribute to the design of the process and to be made aware of potential tools and techniques. Unfortunately, as a major setback to the Lifecycles Project, and to my case study research in particular, the pilot process did not commence because of an indefinite moratorium placed on fieldwork in February 2006 by DKCRC, ahead of a restructuring of both the organization and the research project framework. By the time this impasse was resolved, funding for fieldwork had been withdrawn and the remainder of the Lifecycles Project reverted to "desktop" research. Since that time, my only role was to finalise reporting on the scoping stage of the Lifecycles Project. Project outcomes are discussed in detail in the full report (Seemann, et al., 2008).

The problems associated with managing housing and infrastructure in remote communities contribute to a consistent theme emerging across the four communities, and are consistent with my personal experiences in the Western Desert community reviewed in the first part of this case study. Putting aside the fundamental economic questions, the capacity demands made on remote communities by the standard approaches to remote community development and the commensurate demand for asset management are clearly beyond the capacities of such communities. There is a mismatch of competing systems: the technology of the mainstream settlement model versus the capacity of local people to maintain the settlement, even with substantial outside help. This situation is indicative of a failure to understand whole socio-technical systems. What is needed in my view is simpler, lower cost approaches to living on country that are more appropriately matched to local capacities and the local economy (even if it is largely underwritten by government funding). In my experience, the capacity and quality of outside help are sometimes good, usually poor, often negligent and occasionally corrupt, compounding the problems by some degree.

I am not aware if the final published report (Seemann, et al., 2008) has had any influence on decision-making or has been distributed to decision-makers. I may be the only person who has gained benefit from this exercise through my research experiences. My work may be seen by the community people whom I consulted as yet another example of the outsider who promotes an idea, process or technology that will help to improve their living conditions, yet does not follow through with action. It is possible that my standing in several remote communities has suffered, because I was not able to follow through with project proposals as a result of withdrawal of support by DKCRC. I am disappointed that I was not able to complete the values enquiry, even as a pilot exercise. I am even more disappointed that as a practitioner I have let down the

people I wanted to work with: people who welcomed me and opened themselves to what I was promoting.

10.4 Recent Events

As my work in the case study communities as described in the previous sections was generally completed by the end of 2006, some recent events place my experiences in perspective. In 2008, the Northern Territory Government dissolved the Northern Territory's 63 Community Government Councils to form eight new "super" Shire Councils to better co-ordinate community servicing at a regional level (MacDonnell Shire Council, 2011). Five Western Desert communities, including the Western Desert community reviewed above and the two communities west of Alice Springs discussed in the regional scale case study have been absorbed into the new MacDonnell Shire Council, based in Alice Springs. Of the remaining regional scale case study communities, the third community (to the north of Alice Springs) has been incorporated into the Central Desert Shire Council (also based in Alice Springs) (Central Desert Shire Council, 2011), and the fourth has been incorporated into the Barkly Shire Council, based in Tennant Creek (Barkly Shire Council, 2011).

The MacDonnell Shire area contains four Wards, with twelve elected Councillors, including two current Councillors representing the Western Desert community reviewed in Section 10.2. Former community Council offices have been turned into Service Centres. The new "super" Shires operate all housing management and maintenance, although MacDonell Shire Council, as of March 2011, is in the process of subcontracting the management role to a call centre based in Chennai, India. As reported, "For more than two years the Territory's super Shires, set up to replace 63 Community Councils riddled with corruption and mismanagement, have struggled to provide an effective alternative. Inquiries by the *Herald* over several months reveal that many of the problems endemic in the old councils have re-emerged" (Skelton, 2011). If this is indeed the case, it underlines the fact that a change of structure does not necessarily bring about real change if the underlying capacity issues are not addressed.

10.5 Reflections on Sustainability Practice

I often reflect on my experiences working with people in remote Indigenous communities in Central Australia, including many other communities not reviewed in this case study (Parnell, 1995, 1998a, 1998b). Such experiences changed my life, re-shaped my thinking about sustainability and set me on this course of enquiry into

sustainability culture and practice. They also help me to reflect on the following question first posed at the end of Chapter 9: How does the case study experience contribute to the development of new patterns for sustainability practice?

My two-fold experience as a practitioner in this aggregated case study, as an active facilitator in community activities and as a researcher attempting to assemble a community-based project, highlight the incredible challenges in helping remote Indigenous community people to live well on country. I learned that the consideration of the aspirations and worldview of local cultures is central to the process of technology transfer and settlement sustainability. Further, this experience in adopting Western technologies to meet the needs of a local culture has great lessons for the global sustainability agenda and serious implications for sustainability practice, especially when one is confronted with complexity and unknown, possibly unknowable, social forces. I characterise remote Indigenous settlement development as a “conveyor belt” approach, linear and mechanistic, with housing and infrastructure delivered by highly codified and standardized one-way systems into ill-equipped, highly complex, socio-technical environments, with the resulting “crash” off the end of the conveyor. This conveyor approach is not only still in operation but is also accelerating at pace. At its base, it is about housing units (and bedrooms) delivered at the lowest cost and highest delivery efficiency. It is certainly not about the value of housing (as a process) or the sustainability of settlements. It conforms to mainstream notions of “best practice”, as invoked by many funding programs. Best practice delivery implies that clients are capable of best practice asset management.

In my view, recent accountability-based approaches aimed at improving the efficiency of the delivery of housing units only exacerbate housing problems by accelerating the conveyor because the rate of improvement in housing delivery is not matched by a commensurate increase in community capacity. The more that funding agencies focus on efficiencies in up-front delivery (which is, relatively, the easier part of the process), the greater the crash at the end of the lifecycle is likely to be. While there may be awareness of this conundrum in some stakeholder quarters, this awareness has not affected processes to any great degree. Recent debate about problems of Indigenous housing rarely appears to consider the connections between rate of housing delivery and the capacity of housing management operations. This conveyor belt scenario arises from the overemphasis of funding and delivery stakeholders on the housing product and not on processes encompassing whole-of-life thinking and embracing the complexity of the remote Indigenous community context.

A fundamental problem that underpins this scenario is related to evaluation – or rather the absence of it. There have been few evaluations of remote housing and settlement development with extensive local participation (Fletcher & Bridgman, 2000). Work by Helen Ross at Halls' Creek in Western Australia in the early 1980's is a rare example (Ross, 1987), and although her analysis still resonates, it has probably been forgotten by most policy makers. Such evaluations have highlighted the difficulties of understanding local community perceptions, values, attitudes and behaviours towards housing especially with the limitations of direct, short-timeframe surveying methods (Spring, 2005). I believe that the viability of many of these desert places is very doubtful (based on Fisher's definition of viability for remote Indigenous communities)[61] and that the only way to sustain any semblance of functioning physical settlement is by massive injection of outside help. However, my experience leads me to believe there will never be enough outside help, external funding, sufficient local capacity and an economic basis to achieve a level of settlement viability commensurate with what we expect as a right in mainstream society.

Some commentators argue that continued funding of remote communities is a poor use of funds (Hughes & Warin, 2005), that development in such places should cease and that remote community people should move into larger settlements where they can be serviced economically (Johns, 2009). While people from remote communities have the right to move to any part of Australia for economic development, the obstacles are many. Few people are likely to move permanently beyond remote areas. Proposals based on ease of mobility to mainstream centres also deny the depth of connection to place. It is highly likely that such proposals have not been made accounting for the full human system at work, and the relative costs of people moving into the towns. Such proposals have forgotten the history of places like Papunya in the mission days, and the problems arising from different tribal groups living in close proximity. It also discounts the viability of traditional culture, especially those aspects out of view of the mainstream (Myers, 1991). I believe that remote settlements will continue to exist for a long time, and thus we must continue to address on-going community development and sustainability issues[62].

[61] Effective governance; expressed aspirations; reliable infrastructure; livelihood activity; assets and resource flows; access to services; low vulnerability (Fisher, 2004).

[62] I argue that this will remain the case in spite of the major social problems (such as anti-social behaviour, domestic and sexual violence, theft, and substance abuse), which have recently escalated in Alice Springs since the Federal Government's intervention in remote Indigenous communities. People from remote Indigenous communities, particularly young people, have taken up temporary residence in Alice Springs in larger numbers than is the normal case under typical mobility patterns, causing major problems within Indigenous groups. The situation has recently worsened, having extended into conflict between Indigenous and non-Indigenous people in Alice Springs (Anderson, 2011; McLeonard, 2011; Rothwell, 2011).

Perhaps the problem lies in modelling remote communities on more favourably located mainstream settlements, which enjoy a commensurate level of servicing. Living well on country can be achieved any number of ways, in a technical sense, but the means of living should match with cultural values and the lived experience of people in remote communities. The challenge is to negotiate this without distractions caused by conventional views of social justice and a form of equity based on conventional housing technology with its embedded culture, and not on the preferred life-ways in the desert.

Physical capital is delivered to remote communities with embedded mainstream culture and values (technological, financial, and social). Even mainstream society does not readily understand the embedded values inherent in any technology, let alone Indigenous people in desert communities. These embedded cultures run deep and are not readily adopted by desert communities in a short-term program sense. Our entrenched incapacity to understand and operate technology according to its embedded culture is a major shortcoming in capacity, which can only be bridged by deep cultural change at the interface between the traditional world and the technological society. Such a cultural change will not occur solely through piecemeal approaches of technical training, best practice housing delivery, more and better tools, software development and application, or indeed, threats to remote communities concerning their “non-viability”. All aspects of developing a remote indigenous community are problematic and complex, both in terms of making a capital investment and maintaining that investment: affordable healthy housing, a clean environment, public health, access to medical services, transport, food availability and nutrition, good water, affordable power, good education, stable family life, freedom from substance abuse, and the ability to keep all these socio-technical systems functioning. The challenge for the sustainability practitioner in such a context is, therefore, substantial and fraught with risk. The sustainability practitioner must work with local people, funding agencies and many other stakeholders to match the choice and scale of technology of settlement with a community’s capacity to pay for it. The practitioner must also match the capacity to maintain technology in good order with the capacity to use it so that it does not harm the environment or make a community an unhealthy place to live, now and into the future.

In my opinion, the mere fact that most economic activity in such places is government-dependent is an indicator of a lack of sustainability. Pragmatically, however, if government (and by extension the wider community) is providing some economic underpinning of settlement viability as a matter of social equity, and is willing to

continue, then the sustainability practitioner's work must be concerned less with economy *per se* and more in terms of value-for-money for government, capacity development for local people and sustaining technology through management. Sustainability practitioners also must be aware that not only might their best efforts be ineffective because of unfavourable emergent patterns, but also their actions may create conflict with local people and their life-ways, especially if they do not like the practitioners' development proposals or approaches to implementation. For these reasons I believe that sustainability practice generally in the sorts of contexts discussed above does not live up to its aspirations in remote Indigenous communities. Further, I believe that the complexity of the interface of natural systems, Indigenous systems and mainstream systems will continue to create emergent patterns of behaviour that are fundamentally different from the intentions of all people involved in remote community development. The potential for new, unintended emergent patterns may likewise be a reality for the sustainability practitioner across all contexts and scales: our best efforts and our noble intentions may not be enough in the face of complexity. As for myself, I consider that my efforts in working with remote Indigenous communities may very well have been futile.

Remote communities are distinct contexts for judging sustainability, but there are many parallels with the mainstream world. My experiences reveal that the impacts of failure in remote Indigenous communities are stark because their effects are localised. Are we in the mainstream world that much better? In our mainstream communities, we frequently hide our technological and ecological failures by externalising the impacts to "somewhere else". This externalising of our failures goes to the heart of how we can sustain appropriate behaviours in order to sustain our settlements and their supporting eco-systems and is a significant challenge for the sustainability practitioner.

The preceding case study represents an exercise in working with complexity across intersecting systems at multiple scales. The next case study in Chapter 11, in contrast, reviews sustainability practice in a small-scale setting to highlight key practice issues in a relatively simple context.

Chapter 11 Community Learning for Sustainability in a Tasmanian Rural Community

11.1 Case Study Introduction

Between 2001 and 2002, I worked closely with a small community group in a rural setting near Launceston, in North-East Tasmania. This group, the Mt Arthur Centre (see Image 11-1 below), was established to provide community-based learning and to support the spiritual, personal and capacity development needs of the local Mt Arthur and nearby Lilydale communities, as well as the regional and broader Tasmanian community. I worked as a development facilitator during a planning and project implementation stage while I was employed as an academic at the School of Architecture at the University of Tasmania at Launceston (hereafter referred to as UTA). This case study reveals how a small group of people can make a difference in strengthening their community, and how their aims intersect with learning cycles and the technology of sustainable place development. The case study also illustrates how even a small group of passionate people can only sustain major efforts for a limited time.

Image 11-1 The Mt Arthur Centre (Parnell, 2001)

The community group established the Mount Arthur Centre as a community-based learning and personal development centre. The Mt Arthur Centre Board and their supporters (referred to here as MAC) had been developing their vision between 1999 and 2000, following the opportunity to take over the management of the former Mt Arthur Family School. A local community group founded the school in the early 1980s and participated in its design and construction. Some of the original founders of the Mt

Arthur Family School are on the board of MAC. Students of the UTA participated in that original design process, thus establishing a precedent for current involvement.

The vision for the centre was “a place to grow” for children, young people and adults (Mt Arthur Centre, 2001) – a vision which incorporated a strong focus on environmental protection and restoration, and environmental education.

This case study experience demonstrates key aspects of the interaction of community groups (and students with minimal building skills) with environmental building technologies and the learning process arising from that interaction. This case study has been included in this research project because it:

1. Represents an approach to sustainability at a small scale;
2. Demonstrates how a group and organization forms links with its community;
3. Consciously promoted links and networking beyond the local community;
4. Allowed for application and comparison of formal and informal learning processes;
5. Included a high level of participant motivation;
6. Linked the application of sustainable technology to the community development process;
7. Allowed for experimentation with new ideas about organization, technology and community;
8. Contained a cross-cultural component for the participants; and
9. Was accessible and provided me with further opportunities for my personal and professional development as a sustainability practitioner.

From a theoretical perspective, I was particularly interested in how learning frameworks, local participation, intrinsic motivation, self-organization and appropriate technology interacted at the very small community scale as a contrast to the remote regional approach in the case study in Central Australia, and the larger settlement scale in the Coffs Harbour case study in Chapter 12.

My role was to participate in the following processes: strategic and physical planning, development of project briefs, the contribution of technical support for technology choice, broker the participation of UTA students in the project, mentor MAC participants, and facilitate construction processes. I provided these services to MAC in exchange for permission to report and reflect on the experience for this research project.

The project included the following six steps:

1. Community-based strategic planning;
2. Physical site planning;
3. Pilot stage: Design and construction of a prototype straw-bale structure;
4. Reflection on outcomes of the pilot stage;
5. Planning for the proposed healing space; and
6. Design and construction of the healing space.

The MAC Board understood that their enterprise contained an element of risk, and thus the general planning approach was chosen to allow flexibility and responsiveness to potential changes in circumstances, especially concerning varying levels of local participation and available funding. MAC regarded the levels of risk as worth taking, and understood that their strong vision would help them navigate through an unknown future.

11.2 Community-based Strategic Planning

From 1999 to 2000, the MAC Board members and their supporters engaged in dialogue, developing strategic approaches to how the physical development of the site would further their vision. Driven by their strong vision, they applied an oral/experiential approach to developing the strategies needed to act out the vision, reflective of the nature of personal development opportunities being offered by MAC. Much of the early visioning was done through sand play in the original school sandpit, for example.

As a result of these dialogues and visioning exercises, the group had developed a strategy to construct an administrative building with healing/counselling practitioner rooms, to be built largely from straw bale construction. The interest in straw bale construction was inspired by such buildings seen by MAC Board members on a trip around Tasmania. The MAC Board were focused on the idea of the new building to augment existing facilities and thus entered a partnership with a local architect who had a strong community development background in international development. He volunteered his time to facilitate design processes. A design process was commenced, with sketch plans resulting. However, it was not clear how the building would be funded and constructed. MAC and the architect invited me to participate in the planning of this aspect of the process. Planning workshops were held at UTA in January 2001, consisting of brain-storming sessions developing “mind maps”[63] of all the issues and

[63] Mind maps are a graphic tool for collecting information about any issue and identifying the relationships and connections between its components. Mind maps are especially useful for group work. Using combinations of text and image, complex ideas can be expressed and communicated (Buzan, 1995).

processes involved in funding, designing and constructing the building. This process included consideration of how the building process connected to a broader strategic plan. A separate strategic planning process developed in detail from 2001 to 2002.

The planning process applied some common community planning methodologies pioneered in the United Kingdom and developing countries over the last 20 years (Wates, 2000). The use of mind maps as a planning and learning tool helped MAC to focus on significant developmental issues and to make priorities. The mind-map from these planning workshops was placed on display at MAC to communicate to supporters and funding agencies the thinking behind the planning process (see Image 11-2 below):

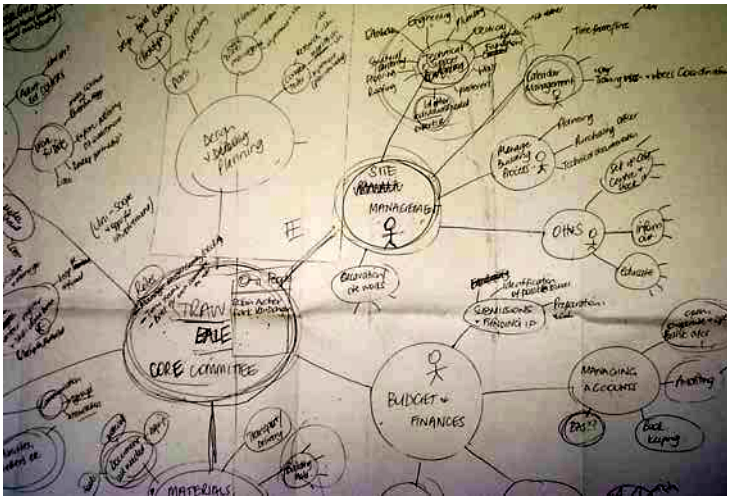

Image 11-2 Section of strategic planning mind map (Parnell, 2001)

A strong ecological building philosophy underpins MAC's mission, arising out of some members of the MAC Board having had extensive owner-building experience in bush and earth building. Members of the Board were highly motivated to use natural building techniques with low environmental impact, using recycled and waste materials, and ease of access to participants with a range of skills. These techniques were also seen as facilitating community building.

11.3 Project 1: Barbecue Windbreak and Seat

MAC Board members discussed the idea of building a small prototype barbecue windbreak and seat structure to enable pilot-testing of building techniques and participatory learning processes before undertaking any detailed building design process and application for funding. UTA staff and students were invited to participate in the design and construction of the prototype structure to enable MAC to make

informed choices about the next steps. A group of architecture students entered the partnership through the elective Specialised Studio process to facilitate joint learning in ecological and participatory building methods through a direct, hands-on learning-by-making experience (Carpenter, 1997; Dean, 2002). A detailed report and discussion of this activity is in the full text document on the attached DVD in Appendix 2 (Parnell, 2002b). The Pilot Stage was completed in June 2001 (see Image 11-3 below):

Image 11-3 Straw bale Barbecue Windbreak and Seat: Completion (Maggie Peart, 2001)

As a postscript to this activity, the wall was demolished in 2005 because the render failed, exposing the straw bales to the elements. Render failure was caused by the diurnal freeze-thaw cycle experienced in the Mt Arthur microclimate, whereby render cracked and spalled. There were several attempts to re-render the wall, but these were not successful. We envisaged render failure as a possibility at the design stage: nevertheless MAC wanted to see how an exposed version of a cement rendered straw bale wall would react to the elements. The initial spalling and cracking of the render lead us to review this external treatment in the following project.

The following project outcomes were achieved through the barbecue windbreak and seat project:

Outcomes for MAC

- The project was completed within the semester timeframe; and
- The experience of building the wall gave MAC an informed basis for future decisions about buildings and techniques, particularly the experience with the damaged render.

Outcomes for UTA Students

- All participants in the studio achieved the Studio Objectives because:
    - They gained experience and a working knowledge of common technical strategies for straw bale and earth building;
    - They developed an appreciation of how to plan and implement a building project;
    - Working alongside community people developed their appreciation of self-help building, local participation and community development;
    - They developed manual skills, especially those who had never done any prior hands-on building work;
    - They demonstrated a high degree of cooperation with each other over a range of different tasks;
    - The international students were exposed to a way of building that they had not known about before, and became more aware of a range of environmental building methods;
    - Participants grew in confidence in their own decision-making as the project unfolded;
    - Participants' self-esteem was greatly enhanced by the completion of the project; and
    - Participants enjoyed the time spent outdoors in a rural environment, and thus were more able to appreciate the environmental impact of design and construction.

Research Outcomes

- My participation fostered the following research outcomes:
    - Observation of the interaction of people and technology;
    - Insight into learning strategies guiding real work;
    - Experience of the drivers of technological choice;
    - Complexities of ecological commitment; and
    - The importance of a culture of motivation and innovation in sustaining a self-set course of action.

11.4 Project 2: The Healing Space Project

After completion of the barbecue windbreak and seat structure, MAC decided to proceed with a substantial building project: one that could be a community-focus project and "energy-generator", which would demonstrate a physical outcome of the

mission of the Mt Arthur Centre. A series of planning workshops with the participation of MAC Board members and an extended community group were held in November 2001 to review the planning of the new building proposals and to review the use of straw bale after the experience with the barbecue windbreak and seat prototype (see Image 11-4).

Image 11-4 Community planning workshop (Parnell, 2001)

UTA staff contributed to facilitation of these sessions, particularly where learning regarding technology and process was necessary to further exploration of options and decision-making. Some significant changes were proposed to the original administration building and healing space plan, particularly the separation of functions into separate, smaller buildings spread over the site. Alternative sites for different buildings were discussed. The main driver for this was the simplification of the process, making it easier for community workers to build functional spaces, as they were needed. The original plan was considered too large and complex for the community to take on as one project and the original site was too heavily shaded in winter. Smaller buildings also meant that costs were more manageable and that spaces could be constructed as funds became available.

Image 11-5 Design workshop: planning and design for the healing space (Sue Wilson, 2001)

Design workshops were held with MAC Board members in November and December 2001 (see Image 11-5), to confirm the proposed function and siting of buildings and to determine a brief for the first building to be constructed. Discussions focused around the relative priority of building an administration space versus a healing/practice space. MAC decided that the healing space was of a higher priority because of its deep symbolism for the on-going work of the Mt Arthur Centre. A series of workshops dealing with detailed planning and design, process and technology was held in November and December 2001. In the detailed brief, the healing space was to be used for private counselling and healing activities, with particular emphasis on gestalt symbol work. The space had to be private and quiet. If desired, it should be able to be opened to the sun and expansive valley views. The physical fabric of the healing space was required to embody a deep symbolism of learning and healing.

The healing space was sited to the north of the main building adjacent to the greenhouse structure and the west end of the old tennis court. This meant that the building would be oriented to West-of-North to maximise winter sun and exposure to the South-West valley views. The materials, in keeping with MAC's ecological building philosophy, were to incorporate low-cost, ecologically sound materials, recycled where possible. The broad palette of materials was to include timber (new and re-cycled), straw bale, recycled clay bricks, earth render and a sod roof. The building had to be "beautiful, inspiring and uplifting", but not obstruct views from the upper part of the site, where the administration building was to be located. It also needed shelving and "alcoves of conscious randomness" for storage and display of the objects used in symbol work. With this brief, the architect, Richard Burnham, developed a small model and some sketches for further comment in early December 2001. During the design workshops, planning and design were also discussed in terms of process of

construction. MAC wanted the project to be open to participation by as many people as possible and the choice of technologies, within ecological principles, to foster participation.

This healing space embodied considerable complexity in the expression of its symbolism. This included a skillion roof with slope variations and curved eaves; complex shelving for symbols; doors and windows with a variety of modes of operation. There were questions raised about whether this complexity created a good match for the skill levels of community participants, whether it would contribute to much more expensive building, and whether its construction would make unrealistic time demands which could affect community morale. These questions were considered by MAC, particularly the questions regarding ease of access for participants. As the value to the community of a highly detailed, uplifting space was regarded as of long-term strategic importance, MAC committed to the design in question.

This decision also opened the opportunity for UTA staff and students to be involved in detail design and construction, especially at the difficult structural stage. With the involvement of UTA staff in the planning and design process and, given the success of staff and students participation in the barbecue windbreak and seat project, MAC extended the invitation once again to UTA to participate in the construction of the healing space. We aimed to concentrate on structure, with community participants to increase their involvement through the fit-out and finish stage. This stage of development created an opportunity to explore the learning process in more depth and to explore how it connected with the technological system under consideration. The project represented a substantially higher degree of technical and organizational difficulty than usually attempted by students in the Learning-by-Making studios. Examples include the resolution of complex timber detailing (see Image 11-6) and off-site prefabrication of composite structural timber members (see Image 11-7).

Image 11-6 Construction of prototype by architecture students (Parnell, 2002)

Image 11-7 Prefabrication of structural beams in the Architecture Workshop (Parnell, 2002)

This type of project required an appropriate framework to foster different participants' learning needs. The range of knowledge and skills of participants varied more widely than experienced in the pilot and was quantified and acknowledged in the design of appropriate learning frameworks. Participants have different reasons for their participation: gaining new knowledge may be a central factor in their motivation, or it may just be a good way of getting important things done.

As discussed in Chapter 7, a learning framework is defined as the mix of motivations, aspirations and process outcomes that determine the style of learning, pedagogical strategies, the knowledge and skills needed, the process of application of acquired knowledge and skill, and the method and pace of feedback. It can incorporate the structures of formal qualifications or competency based education and a looser, informal approach. A learning framework in a practical process creates cycles of

learning. These cycles are directly related to the stages of the project as planned. The stages determine who is involved, their roles and learning needs. Figure 11-1 shows a conceptual framework for understanding the relationships between the different groups, their tasks and their learning cycles. It is expressed in a spatial sense as an overlay to the physical site plan, as drawn by the architect (Parnell, et al., 2003) as shown in Figure 11-1:

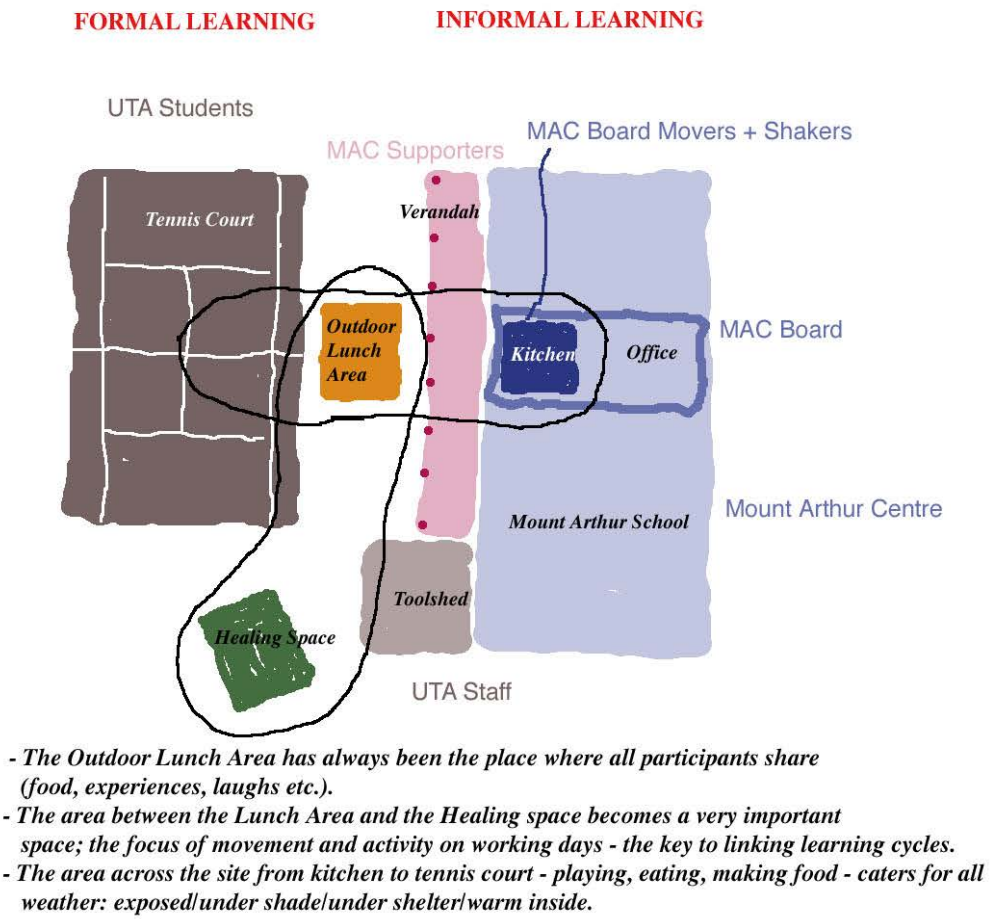

Figure 11-1 Learning frameworks and cycles expressed spatially (Parnell, Peart & Burnham, 2003)

The strength of a learning cycle is a function of motivation. This is a key factor for community partnerships, because if the partnership is not set up appropriately and acted out appropriately, the linking of learning frameworks to motivation becomes problematic, and the process becomes less sustainable.

The different groups of participants included MAC Board members, supporters, self-builders, young people, UTA staff and students. Each had different participation goals, learning frameworks, learning needs, motivations and motivation goals, demonstrating

that a diversified approach to learning was required. Some motivations arise from the formal: students must pass the Unit. Others may be simply a case of interest in what might be happening on a particular day. The core participants from MAC and UTA were motivated through both formal and informal learning frameworks.

Image 11-8 Construction of frame by architecture students (Parnell, 2002)

Regardless of the range of motivations in learning frameworks, there must be at critical points in the process enough people with sufficient motivation to create confidence in the process in order to motivate themselves and other participants, to strengthen their commitment, to foster others into the process and to sustain the process at an appropriate level of dynamic energy. Intrinsically motivated people know why they are participating, how they are participating, and value both the process and the outcome.

Construction began with UTA students in Semester 1, 2002, completing all groundwork and the structural frame by the end of Semester 2. Community supporters and students participated in the straw bale infill, wall rendering, waterproofing and sod roof placement by early December 2002. See Image 11-9, Image 11-10 and Image 11-11 below:

Image 11-9 Completing the structure (Maggie Peart, 2002)

Image 11-10 Community building workshop: staking bales (Parnell, 2002)

Image 11-11 Community building workshop: rendering straw bales (Deb Groves, 2002)

I left Tasmania to move to Coffs Harbour in New South Wales in December 2002, after having facilitated the project to the infill stage. At that point, the project slowed with the end of formal student involvement and having consumed much of the MAC participants' effort over the course of the year. Image 11-12 shows progress in early 2003. Through community workshops and further informal contributions of UTA staff and students, the project was finished in 2005.

Image 11-12 After completion of straw bale infill and first layers of render (Richard Burnham, 2003)

A detailed report and discussion of the period of my involvement is in the full text document on the attached DVD in Appendix 2 (Parnell, et al., 2003).

The Mt Arthur Centre flourished during several years of operation, providing a venue for community groups, counselling programs, courses and workshops in a variety of developmental areas. However, in 2009, the Mt Arthur Centre closed (M. Peart, personal communication, May 6, 2009). In recent discussions with former members of the MAC Board, I discovered the reasons for the closure of the Mt Arthur Centre (N. Walker & S. Wilson, personal communication, March 8, 2011). The core members of the Board who were running the centre as volunteers on a daily basis were not able to sustain their effort, especially as many of them had other developing professional interests which reduced their ability to contribute the time necessary to maintain operations. As a way of resolving this, the MAC Board borrowed funds to support the full-time employment of a co-ordinator for approximately one year. They had hoped that the co-ordinator could seek out and apply for sufficient continuing external funding to support the co-ordinator's position. Unfortunately, this did not eventuate, and the MAC Board reluctantly decided to close the Mt Arthur Centre. However, they also decided

that the property should be passed on to an appropriate community group. After some investigation, the MAC Board gifted the facility to Conservation Volunteers Australia (CVA), with the condition of paying off MAC's small debt. CVA took over the ownership of the Mt Arthur Centre and its property in 2009, and it is now known as the Mt Arthur Field Centre. This new incarnation provides training to conservation volunteers for projects across Tasmania, and is dedicated to protecting the local habitat of the rare Mt Arthur mud-burrowing crayfish, which is found in the small creek which runs through the property (Conservation Volunteers Australia, 2009, 2011).

11.5 Reflections on Sustainability in a Tasmanian Rural Community

Through the activities discussed in this case study, MAC gained considerable assistance with planning their future physical development and gained a symbolic building to support their mission of healing and community development. The failure of the straw bale barbecue seat and windbreak was unfortunate, but not entirely unexpected. As a process that led to a greater outcome, it was extremely valuable and served its purpose. The quality of the healing space was significantly improved and its approach to application of straw bale building methods resulted in a more robust building. The experiential aspects of the project were memorable for all participants. The UTA students, as a group, achieved the broad objectives of the Unit and they rated their experience highly in student learning surveys (Parnell, 2002a). From the broader research perspective, this project provided me with insights into how small community groups self-organize, grapple with technical information, foster their own learning and make technical decisions to support their community vision in an appropriate and sustainable way. The process developed on the prototype barbecue windbreak and seat project and further applied in the healing space project has demonstrated that partnerships between community groups and formal education institutions can satisfy a range of learning needs, while producing a desirable community asset and capacity outcomes. This experience helped me respond to the question posed at the end of Chapter 9: How does the case study experience contribute to the development of sustainability practice?

The contribution to sustainability concerns the values and behaviours reinforced by a project such as this and, as such, are a contribution to cultural development. As a means to establish Mt Arthur Centre as an integral part of the local community, it was very successful, with an increase in paid-up supporters, and the generation of much goodwill locally and across Tasmania. The level of motivation to achieve the vision, as

demonstrated by MAC members and supporters, is the major contribution to local sustainability.

The slowing down of the healing space project at the completion of the formal phase is not a negative occurrence. It does, however, indicate the importance of having capable people who can act in the middle of a process, especially where hard technological aspects demand attention. My observation was that, for a time, the group was too dependent on my colleague and myself as facilitators for such decision-making. I accept that, personally, I wanted the best result possible for MAC from the process. A significant challenge for sustainability practice, then, is what happens after the professional practitioner leaves the project or the community, and what can be put into place before that occurs to create a self-sustaining capacity in local sustainability practice?

The slowdown also allows time to reflect on the importance of scale, as well as motivation. The healing space project was a small, but complex building, requiring significant levels of commitment. The complexity of the structure needed to be commensurate with the formal learning needs of the students, but was perhaps too complex to be completed as a fully participatory project. I believe that the slowness of completion reflected the reality that, after all the intense activity, the group ran out of energy, at least for a while. To sustain a course of action is a critical learning from this process. This is a lesson that wider applicability to the broader sustainability agenda. Further, learning about what can be achieved, its scale and the demands of the process needed to bring something new into being and the appropriate amount of effort to apply to a process are all important outcomes. Nevertheless, the healing space project was eventually completed, is regarded by all participants as successful and was highly valued by the Mt Arthur Centre Board, members and supporters – as much for the quality of the process as the finished work. In my view, MAC created what Day calls an “ensouled” building (Day, 1990, p. 106), symbolic of their mission. In many ways the early part of the process, driven by highly motivated people, may, in hindsight, have been too forced. In process terms, it had many aspects that were very linear and mechanistic in process. The pause and slowdown enabled the building to be completed at a pace to allow MAC to develop other aspects of their mission. The process after the formal period is perhaps more reflective of an emergent property – the outcome developed along with a whole range of other important and interconnected activities.

The closing of the Mt Arthur Centre because of changing priorities of the MAC Board and supporters reflects changing human systems. The gifting of the facility to

Conservation Volunteers Australia should be seen as an emergent pattern and an example of the panarchy cycle[64] in action: a new user with a different vision, adapting the existing physical space, is an example of the quick release and reorganization phases of the panarchy cycle. From a sustainability perspective, the work carried out by the Mt Arthur Centre, and the Mt Arthur Family School before it, has moved into a different dynamic, and a new pattern, consistent with the MAC vision of environmental protection and restoration, and environmental education. It remains “a place to grow”. This small-scale case study stands in contrast to the larger-scale Coffs Harbour City Council case study to follow in Chapter 12.

[64] See Chapter 9.

Chapter 12 Embedding Sustainability at Coffs Harbour City Council

12.1 Introduction to the Case Study

In this Chapter, I review my participation in The Sustainability Culture Project at Coffs Harbour City Council (CHCC): an Action Research project aimed at strengthening the sustainability culture within Council focussed on understanding how an organizational culture around sustainability emerges, develops and matures, and the role of people in the process. I worked with several staff in different parts of the organization who were responsible for the integration of sustainability across the organization: initially in the Sustainability Unit, within Environmental Services; in Strategic Planning; as part of the Organizational Review team; and to the present in Strategy and Sustainability. This Chapter reports on progress to date from 2005 until the present time, outlines future actions and offers my reflections on the process of developing sustainability culture. In this Action Research project, my intention was to engage with many different people across all branches and levels of the organization in a reciprocal action learning activity. The opportunity for this kind of action was limited, and my role centred on assisting management staff in furthering sustainability. I participated in three distinct phases:

- Stage 1: Understanding Sustainability Culture (January to October 2005)
- Stage 2: Organizational Review and Re-structure (March to July 2006)
- Stage 3: Embedding Sustainability Culture (July 2009 to December 2010)

As the periods shown above indicate, there were long gaps between stages, reflecting changes within the organization and the capacity of the organization to fund cultural change processes. My activities within CHCC and reflections on the outcomes are reviewed in the following sections.

I conceived my work at CHCC as a response to the state of sustainability demonstrated by several Triple Bottom Line (TBL) Reviews conducted between 2003 and 2004 (Coffs Harbour City Council, 2003a, 2003b; ICLEI, 2003a; Nicolson, 2004). Many of the staff I worked with in the early stages of my involvement believed that a change management process would provide a renewed impetus to strengthening the organization's sustainability culture. I identified a variety of methods to explore the fundamental questions about how people in organizations with a responsibility to foster sustainable development internalise behavioural and cultural change. This project experience, in

concert with my reflections in Chapters 5, 6 and 9, provoked my investigation of current thinking about social and cultural change, and learning within organizations.

The Sustainability Culture Project reviewed the development of sustainability culture at CHCC since late 1993 and maps significant milestones achieved over this time. Emergent strengths and weaknesses were analysed and gaps between vision and action identified, especially in areas where Council promoted its achievements to the community. Four specific drivers for change influenced the framing of the Sustainability Culture Project, especially in its first stage:

1. Calls over several years by staff and the community for CHCC to develop a sustainability driver document and sustainability plan for the region;
2. The implementation and evaluation of CHCC's TBL reporting and decision-making process;
3. An interest within CHCC's then Sustainability Unit to validate two reports reviewing CHCC's TBL process (ICLEI, 2003a; Nicolson, 2004); and
4. An identified need to develop community-based sustainability indicators (Deville & Hankinson, 2004).

Supporting this case study is an assumption that culture is a significant part of any human endeavour and that anyone engaging in change processes must appreciate the role of culture in change. As concluded in Chapter 4, culture is sustainability's "overlooked dimension" – the influence of culture (and its associated values, norms, attitudes and behaviours) on our capacity to be more sustainable. For the purposes of this case study, and to communicate the core premise of the Sustainability Culture Project, I offered the following proposition (Parnell, 2010, p. 21): A sustainability culture at CHCC is a culture where sustainable behaviour is a normal and accepted part of life in the workplace, especially where situations are complex and difficult, and sustainable solutions are hard to find. Further, I proposed to CHCC that a strong sustainability culture will enable CHCC to (Parnell, 2010, p. 22):

- Be a more effective organization;
- Carry out compliance-oriented sustainability to the highest possible levels of performance;
- Continue to lead sustainability in areas where CHCC has operational autonomy and discretion and where compliance is not a baseline issue;
- Meet increased community expectations for sustainability;
- Position the organization to respond to increasingly complex drivers of change;

- Develop resilience to shocks in economic, social and ecological systems; and
- Resolve difficult and complex sustainability problems.

As CHCC is well advanced on the journey to sustainability, the challenge is not so much about developing a culture to support a change to sustainability, it is more about having a highly developed and mature sustainability culture, with deep diffusion throughout the organization. Most importantly, a mature embedded sustainability culture will enable CHCC to withstand the often substantial and sustained external pressures applied by developers in the corporate sector, whose financial interests may be opposed to the interests of the community and the goal of sustainability. Often these are the areas where sustainability becomes subject to characteristics of "wicked problems", where solutions are highly contested by developers and the community and data to support informed decision-making is not available (Brown, et al., 2010).

Typically, from my experience and research, change in local government tends to be of a developmental, iterative nature, as local councils are community-focussed service delivery organizations and not primarily profit driven. At first glance, sustainability in the local government domain might appear to be fundamentally simple in scope; however the diversity of responsibility clearly places Local Government agencies in what the Cynefin Framework[65] describes as "complex" space. A full treatment of my experience in this case study is available in several full-text documents and reports on the attached DVD in Appendix 2.

12.2 Background to the Case Study

Coffs Harbour is located on the east coast of Australia between Sydney and Brisbane. A city of almost 70,000, it is uniquely situated in the Southern end of the sub-tropical climate zone, sharing a climate zone that stretches as far as Mackay in North Queensland. However, the close proximity of the Great Dividing Range, with altitudes of over 800m at the escarpment of the Dorrigo Plateau and a climate similar to Tasmania, means that winters are cooler than other sub-tropical regions. Image 12-1 shows the coast, rainforest and escarpment in close proximity. The waters off Coffs Harbour are the meeting place for northern warm currents, southern cool currents, and the fish species that are usually only found either only further North or further South. The slopes of the escarpment are still clad with rainforest, some of which is quite degraded from years of pesticide use in banana-growing and weed invasions in former banana plantations. The natural environment has a big influence on life in the region,

[65] Refer to Chapter 9.

yet there are always problems caused by human habitation (Coffs Harbour City Council, 2010a), and thus the associated continuing struggle in progressing sustainability.

Image 12-1 Coffs Harbour, Muttonbird Island and the Jetty, with the Great Dividing Range in the background (Precision Helicopters, 2008)

Coffs Harbour City Council (CHCC) has been nationally and internationally recognised for its leadership in promoting sustainable development and creating a liveable city, through several Banksia[66] awards and the Nations in Bloom[67] awards, with particular commendation for its environmental performance.

CHCC has also progressed through the levels of the International Council on Local Environmental Initiatives (ICLEI) Cities for Climate Protection Program (CCP), having entered the CCP Plus program in 2004. CHCC was one of the earliest local government bodies in Australia (after Melbourne City Council) to institute Triple Bottom Line (TBL) reporting and decision-making. The awards and TBL processes are indicative of how CHCC and the broader Coffs Coast community value the local environment, and of widespread support to preserve, protect and restore it. This performance to date has set a high standard for future city expectations.

[66] Awarded by the Banksia Environmental Foundation: a not-for-profit body promoting environmental excellence and sustainability.
[67] An award of the International Awards for Liveable Communities, endorsed by the United Nations Environment Programme.

Over recent times, however, there is a perception that progress towards sustainability regularly stalls (G. Hankinson, personal communication, January 24, 2005; J. Green, personal communication, July 30, 2009). While CHCC has made sustainability-positive decisions about management and process, won sustainability awards, and is held up as an example of best practice, there are questions as to how deep the principles of sustainability have penetrated the organizational framework and its dynamic operations. That is, there are continuing questions about the depth of a sustainability culture. In some areas of activity and sectors of the CHCC organization, sustainability performance continues to fall short of CHCC vision and values (J. Green, personal communication, July 30, 2009). These areas experience a substantial performance gap, and limit the organization's capacity to lead in the field of sustainability. This performance gap has been a persistent theme over many discussions with a variety of CHCC staff and Councillors from 2005 to the present.

12.3 Vision 2020: Beginning of Sustainability Culture

The beginnings of sustainability culture are generally agreed by long-term CHCC staff to have developed out of the Vision 2020 process (Coffs Harbour City Council, 1993). Vision 2020 was a Council project during 1992-93 with the objective of developing a long-term vision for the city. It has not used the term "sustainable development", although many aspects of what would be in a sustainability plan have been covered. There was extensive community consultation via community workshops during May and June 1993. Environmental issues were strongly represented indicating widespread community feeling about the need to protect and restore the local environment.

Vision 2020 was an important vehicle for harnessing community opinion about future development of the Council area and a way of strongly linking environmental issues to such development. References to Vision 2020 are made in some of the reviewed documents, but not all. Vision 2020 is a "conscience" that appears occasionally, informing Council processes and decisions, and not always explicitly. It still retains some power to support fundamental sustainability principles, and its reference in the more recent Our Living City planning strategy documents is testament to its on-going after-effects (Coffs Harbour City Council, 2005a). The recent Coffs Harbour Vision 2030 (Coffs Harbour City Council, 2009a, 2009b) process was designed as a long-overdue extension of the original Vision 2020 process.

12.4 The Triple Bottom Line Process

A Triple Bottom Line framework and decision-making process was implemented during 2002 and 2003 to improve Council's economic, social and environmental performance and to drive cultural change; it achieves this by involving "all levels of Council (from Councillors to Officers)" (ICLEI, 2003b). This is the main vehicle for individual staff members to interface with and assess sustainability issues in relation to specific projects and activities. The development of the TBL reporting process in CHCC occurred as a truly emergent process, with no specific driver other than the one growing out of the relationship with ICLEI and a store of goodwill within the Council. It is also clear that, in spite of the long hiatus, the Vision 2020 process clearly influenced the development of the TBL process.

The TBL Framework allows for some influence from a "bottom-up" approach, where many individual staff assess their activities in accordance with sustainability principles. It means that staff must be acquainted with sustainability principles, as applied to their work areas. Interactivity of this kind on a daily basis is potentially the key advantage of the TBL Framework in terms of driving cultural change. The question is whether or not the TBL Framework actually works this way in practice. Thus, in order to evaluate the strengths and weaknesses in the use of the TBL Framework, it was reviewed, both internally and externally (Coffs Harbour City Council, 2003a, 2003b; Nicolson, 2004). I concluded from these reviews that the philosophy and intent of the TBL process represents a major leap in the development of a sustainability culture within CHCC. However, it needed a major re-working to make it user-friendly and to facilitate decision-making. To the present day, the TBL process within CHCC has not be revamped in line with the review processes. To a certain extent this in-house approach has recently been superseded by the NSW Government's Integrated Planning and Reporting Framework, built on the extended concept of Quadruple Bottom Line (QBL) or TBL-plus-governance (Parnell, 2010).

12.5 Stage 1: Understanding Sustainability Culture at CHCC

12.5.1 Scope: Stage 1

In Stage 1, my role was to work with the manager of the Sustainability Unit to validate the TBL review reports, to report on the current state of sustainability culture, to participate in the Sustainability Reporting Alliance (SRA) and to present my findings to the Council Executive. The SRA was a project of ICLEI, consisting of an alliance of several local government authorities across Australia and New Zealand investigating TBL implementation and the associated learning and cultural change issues.

12.5.2 Sustainability Reporting Alliance

This co-operative project involved staff from: Blue Mountains City Council, Penrith City Council, Coffs Harbour City Council and Gosford City Council (NSW); Melbourne City Council (Victoria); Thuringowa Shire Council (Queensland); and Environment Waikato and Hamilton City Council (New Zealand). The Alliance was assembled to investigate the following topics (Dickinson, 2004):

- Management and interpretation of information and data;
- Nature and scope of reporting frameworks;
- Creating a learning environment (internal and external): engaging to report; and
- Reporting to facilitate change: influencing decision-making.

Discussions were held at regular intervals during 2004 and 2005 via phone conferences. Background papers were issued by ICLEI before each phone conference. A conference was held in Sydney in May 2005 to engage in further discussions across the SRA topics. The discussions with other councils' staff and the ICLEI facilitators, was particularly helpful in framing the approach to the cultural enquiry within CHCC.

The significant learning concerned the difficulties experienced by each Council in embedding both the sustainability reporting process and the capacity required by staff to support the process. The use of case studies in the discussions helped support sustainability initiatives at several councils, especially where there was resistance to change. There was substantial agreement that a "dry" approach to reporting may not drive the change needed and that creativity and passion must accompany any change efforts (Dickinson, 2004, pp. 3.1/1-3.1/4). The SRA process reinforced the CHCC experience with sustainability culture, by demonstrating that achieving cultural change to support sustainability was difficult for all participating councils.

12.5.3 Mapping Sustainability Culture at CHCC

The "mapping" process reviewed the development of a sustainability culture within CHCC, through a selection of Council documents with bearing on Council's sustainability performance (Parnell, 2005b). The methodology implemented a "coarse graining" rather than a "forensic" approach to gain a global sense of the development of sustainability culture. The concept of a "marker" was used to highlight significant events or factors in the ebb and flow of sustainability issues, particularly if indicative of an underlying cultural change. In the mapping phase, only critical documents, mostly in

the public domain, were reviewed. The following markers of sustainability culture were sought:

- Inclusion: explicit and implicit mentions of sustainability, with emphasis on strategies and commitments as markers of sustainability culture;
- Language: the way sustainability is included and discussed;
- Depth: are sustainability issues covered in depth? What hasn't been included?;
- Frequency: how often are sustainability issues included in documents;
- Priority: how important were specific sustainability issues and processes?;
- Budget: were funds allocated to support sustainability inclusions?; and
- Action: did the sustainability action occur? What were the gaps and omissions?

Documents were accessed in three ways:

1. An initial package of documents compiled by the Sustainability Unit;
2. Documents accessed from CHCC web pages; and
3. Documents identified through reference in previously accessed documents.

In all, twenty-five documents dating from 1993 to 2005 were reviewed (Parnell, 2005b). The analysis identified where there was a strengthening and weakening trend respectively. Significant markers of the state of sustainability culture are shown below in Table 12-1:

	Strengthening	**Softening**	**Weakening**
1993	Vision 2020		Slow response to Vision 2020
2000	State of the Environment (SoE) Report: Sustainability as a core value		
2000	Implementation of environmental levy for work identified by SoE Reports		
2001		Management Plan 2001-2002: a lost opportunity	
2002		Bio-diversity Strategy: reduced levels of implementation	
2002		Environmental Awareness Strategy: disconnected from CHCC operations and very little achieved	
2002	Waste Resource Action Strategy: acted upon by CHCC and leading behaviour change in the community		
2002 - 2004	Greenhouse Action Strategy: achievement of all 5 milestones in the Cities for Climate Protection Program and CCP Plus program.		

	Strengthening	Softening	Weakening
2002	Incorporation of sustainability as a core value in the City Vision in the *Coffs Harbour City Council Management Document 2002 > 2003*		
2002	Development and implementation of the TBL Framework		
2003	Combination of TBL Framework and Strategic Management Planning in *Coffs Harbour City Council Management Plan 2003-2006*		
2003 - 2004	TBL Review: informal use of TBL tool outside the scope of Sustainability Assessments (SAs)	TBL Review: conflict between decision-making needs and cultural change needs	TBL Review: failure of staff to engage with SAs and TBL Tool
2003 - 2004			TBL Review: perceived lack of support from middle and upper management
2003 - 2004			TBL Review: perceived anti-innovation culture amongst some key staff
2000 - 2004		Allocation of environmental levy funds to pay for statutory environmental work that should be core funded.	
2004			Failure to relocate sustainability to a central role in the corporate arm of CHCC as recommended
2004			*Coffs Harbour City Council 2004/07 Management Plan*: major promotion of sustainability thinking up front without any related action in the Management Plan: almost "greenwash"
2004			*Coffs Harbour State of the Environment Comprehensive Report 2004:* major statement about sustainability, but still not linked to funding and core business
2005			*Draft Management Plan 2005-2008*: no reference to TBL
2005	Our Living City: sustainable settlement strategy. ESD and TBL core values and Vision 2020 invoked.		
2005	Commencement of Sustainability Culture Project		

Table 12-1 Analysis of CHCC documents for sustainability culture markers

The story revealed by the CHCC documentation from 1993 to 2005 is one of changing, growing, resilient systems. There have been moments of great achievement in sustainability culture and other less certain times, but the general trajectory was towards stronger culture. There were signs of deeper change emerging, even if the language to articulate sustainability was not used. There was evidence of struggle between two paradigms of thinking: reductionist and bureaucratic versus holistic and

innovative. The time of the completion of the Sustainability Reporting Alliance coincided with the sudden departure of the Sustainability Unit Manager and the long-term General Manager. With this change, the Sustainability Unit Manager was not replaced and the Sustainability Unit was closed down. This was a chaotic end to Stage 1 of my research program and inconsistent with the conclusions of my report: it certainly emphasised how vulnerable sustainability can be if it is solely dependent on individual champions.

12.6 Stage 2: Organizational Review and Re-structure

12.6.1 Scope: Stage 2

A new General Manager was engaged by early in 2006 and my participation with CHCC continued from March 2006 with an opportunity to work with the Organization Review Team set up by the new General Manager. There was no immediate plan to re-convene the Sustainability Unit, at least until after the new organizational structure was determined. My role in the Organizational Review (OR) process was to undertake the following activities:

- Advise the Organizational Review Team on sustainability issues;
- Contribute to the development of the sustainability component of the revised City Vision;
- Review documents produced in connection with the OR and other sources, from a sustainability perspective;
- Conduct a staff sustainability survey;
- Set up a sustainability page on the CHCC Intranet, as a point of contact with staff;
- Plan the next stages of cultural development activity; and
- Implement cultural development activity.

12.6.2 Organizational Review

The OR was a process set in motion by the General Manager. All aspects of the organization were under review: vision, strategy, structure, policies and processes. The General Manager convened an Organizational Review Team (ORT), consisting of selected division managers, and outside consultants, plus myself for sustainability contributions. Commencing in March 2006, I developed and proposed a plan of action for the development of sustainability culture for CHCC as part of my contribution to the ORT (Parnell, 2006a). This plan included the following components:

<u>Mapping and review activities</u>

- Document review: investigating more recent documentation;

- Organizational Review: Participate in Organizational Review Team;
- Staff attitude and behaviour review: conduct surveys and interviews;
- Mapping networks and related flow: identify opinion leaders, critical leverage points and barriers to change; and
- Targeting key Council activities: assess in terms of sustainability principles.

Education for sustainability support:

- Harness the knowledge of environmental education staff to develop capacity within other parts of CHCC; and
- Prepare and deliver a sustainability induction for new staff.

Monitoring and evaluation

- Identifying instances of sustainability culture/process failure: understanding what went wrong with specific projects and activities;
- Fostering and monitoring change through stories: develop new narratives for the organization;
- Develop internal sustainability indicators: to know if a culture of sustainability has developed;
- Analysis: reflecting on the impact of the above processes; and
- Feedback: reporting workshops and other learning activities.

I received approval to participate in the ORT, prepare and implement a sustainability survey and to prepare and deliver a sustainability induction presentation for new staff, but did not receive approval for the other components of the proposal as described in the list above. In addition, I received approval to set up a sustainability site on the CHCC Intranet as my point of contact with the organization, as an information base for staff, and to promote future cultural change activities. I proceeded to work with CHCC Information Technology and Media staff to set up the web page as one of my first actions.

Proposals for the new City Vision, organizational structure and strategies came from the General Manager. The ORT met regularly to discuss proposals, essentially as feedback to the General Manager who also conducted workshops with managers from all levels, and made several presentations to groups of general staff, largely to communicate his ideas and proposals. Between March and June 2006, the new City Vision, organizational structure and strategies were released, with the package of changes ratified by Councillors at the Council Meeting on 20th July, 2006 (Coffs

Harbour City Council, 2006). During this period, I prepared and conducted the staff survey. Its purpose was to investigate the extent of staff knowledge of sustainability principles and to assess the then current state of sustainability culture (Parnell, 2006b). The survey process is discussed in the following section.

In co-operation with environmental education staff, I also prepared a presentation for a new program of sustainability inductions for new staff (Parnell & Ryan, 2006). Sustainability inductions had been held at the time of implementing TBL in 2002, but had ceased some time before 2005. I presented at two induction days in 2006, and thereafter, passed the task on the environmental education staff. I later found that no further inductions have been held. Given my proposals, and the outcomes of the sustainability survey, this was a very disappointing discovery, as I considered an induction for new staff to be the first step to developing sustainability culture.

The new organizational structure made no allowance for the replacement of the Sustainability Unit, as the General Manager wanted sustainability to be implemented across the organization rather than situated in one place. The re-structure also closed some sections, merged other sections and generally resulted in re-location of large numbers of staff, creating considerable disruption over the second half of 2006.

I made my last progress report to the General Manager for this phase of the case study in October 2006 in hope of generating further activity in 2007. I submitted a revised plan (Parnell, 2007) for cultural development activities in April, 2007, after several meetings with CHCC staff and the General Manager. Due to the on-going difficulties of settling the new management regime, including low staff morale, the General Manager did not make a decision regarding my proposals. With no response to the revision, I considered that the case study was at an end, and ceased my participation, with only occasional contact with CHCC staff on an informal basis.

12.6.3 Staff Sustainability Survey

Introduction

As part of the cultural mapping process, I had proposed a program of enquiry founded on face-to-face discovery with staff. This enquiry was intended to support the OR and the new City Vision, by developing an understanding of personal values and attitudes towards sustainability and to assess the state of sustainability culture within the organization. My proposal for staff interviews rather than a survey was rejected by the ORT as too demanding of staff time. The ORT preferred to conduct a staff survey. I had expressed reservations about the value and depth of such an exercise, given the

mixed results of previous staff sustainability surveys, but the ORT still preferred a staff survey. With the co-operation of CHCC Staff, I prepared the sustainability survey of during May and June 2006 in co-operation with the ORT and distributed from the General Manager's office.

Response

The response to the survey was mixed, with the best response (in percentage terms) from the managers, although they were compelled to respond. All managers and acting managers responded – 23 in all. From Councillors, only four responses were received. The response from the general staff was less than expected, but was higher than the response rate for the previous staff sustainability/TBL survey in 2004. Thirty-five responses were received from general staff, bringing the number of staff responses to 58, out of an approximate total staff of just over 500 (approximately 12.5%). With the four Councillors' responses, the total response was 62. There were only two responses from depot and field staff. Some communication from depot supervisors was very negative, not only about the survey itself, but also about sustainability as a concept. Much suspicion was expressed about management's motives behind the survey. In essence though, one of the main reasons given for not responding were related to lack of understanding of sustainability concepts and applications. However, it is not clear as to how much the depot supervisors acted as gatekeepers and whether all field staff were given an opportunity to respond. It was not clear whether depot managers and supervisors promoted the survey in a positive way to field staff. On the other hand, the lack of response from field staff did not necessarily indicate a universally negative attitude; it may be more likely that the survey instrument was not the appropriate tool for that particular circumstance.

General Conclusions

At the time of the survey in 2006, the results, although not conclusive, told a story which allowed us to enable planning for more organizational development. The survey indicated that substantial work was still necessary in order to engage with the more than 50 per cent of the organization's staff operating from the depots. There still needs to be a tailored process, in full consultation with field staff, to break down some of the existing cultural barriers, to work with what they currently know and do, and seek their contribution to solutions to sustainability problems and processes. The results suggest the needs for more fostering of learning in the organization. Although many have called for more staff development programs, it will be important not to over-formalize this – the staff culture may be of the "learning-by-doing" variety. This means that there is

onus on management to lead, to give clear instructions and guidance about job tasks, and to do more to foster sustainable behaviours. Given that a large cohort of staff have learned about sustainability on the job at CHCC indicates that the Council is operating as a learning organization. I recommended that CHCC should take steps to strengthen that aspect of the organizational culture. I also recommended that job descriptions be reviewed to build in sustainability to daily tasks. Many staff requested a specifically tailored "how-to" guide to making sustainability work in their job. It appears to be a common difficulty for many staff to be able to connect the vision and values of sustainability to their day-to-day job tasks.

In 2006, the understanding of sustainability at CHCC was widespread, but shallow. There was near-universal support for sustainability values, processes and for the then new City Vision from administrative staff; this support was a very positive outcome, but one to be treated with caution. It appears that those who clearly have a deeper knowledge of sustainability (from their own private, formal study), and are practising sustainability as a large part of their daily work are generally more critical of CHCC's performance. Those who are less well informed and less committed appear to be less critical, and are generally positive in all aspects of their responses. Such people are perhaps less challenged by sustainability than those who have to make difficult decisions in their daily work.

In my report of 30th June 2006 (Parnell, 2006b, p. 11), I concluded that CHCC required the following seven activities, processes and outcomes to be implemented as a matter of urgency:

1. More sustainability leadership by Councillors, the Executive and managers;
2. More organizational learning, especially of the informal type;
3. A tailored, long-term participatory process with field staff and depot managers to increase their knowledge of sustainability and to apply this to their specific work areas, delivered in a non-threatening manner;
4. Closer attention by managers to foster sustainability actions in their areas;
5. Clearer job descriptions for all staff with sustainability built-in;
6. "How-to" manuals for each work area linking sustainability values and processes to specific tasks; and
7. More community outreach about sustainability.

12.7 Our Living City Settlement Strategy

Parallel to my involvement with CHCC in Stages 1 and 2 above, the Strategic Planning Department was developing the sustainable settlement strategy, Our Living City (OLC). Apart from reviewing the discussion documents (Coffs Harbour City Council, 2005a, 2005b, 2005c, 2005d) for my Stage 1 report, I did not contribute to the process, even though it represented, in my opinion, CHCC's strongest public support for sustainability. Assuming that my involvement was likely to continue into 2007, I assisted Strategic Planning staff at two of the three OLC public consultation[68] meetings in August 2006. These meetings did not proceed well, as the process became conflated in the public's mind with the parallel consultation process conducted by the NSW Roads and Traffic Authority (RTA) for the contentious Coffs Harbour and Woolgoolga by-passes. The OLC proposals suffered from a form of "guilt-by-association", with many in the community unable to see the issues as worth discussing, even with by-pass issues unresolved. Progress thus slowed for several years, with ratification of OLC only occurring after the Coffs Harbour 2030 process and the finalisation of the NSW Government Department of Planning's (DOP) Mid North Coast Regional Strategy in March 2009. CHCC ratified the OLC strategy in July 2010 and it was endorsed by DOP in November 2010 (Coffs Harbour City Council, 2010b).

12.8 The Coffs Harbour 2030 Process

The Coffs Harbour 2030 process began the long-recommended sustainability plan for the CHCC area. Recommendations for such a process had been made as early as the Vision 2020 process in 1993 and repeated in many documents and reports since (Parnell, 2005b). Commencing in mid-2008, the process was lead by an initial community visioning process involving written surveys, telephone surveys, public meetings and a creative art competition. Council adopted the Community Vision 2030 in March 2009, arising from the consultation process.

The process included development of draft visions and plans, culminating with the Coffs 2030 Summit in May 2099, with Professor Peter Newman of Curtin University as the keynote speaker[69]. Material collected during the Summit informed the development of the Coffs 2030 Plan. After a period of further public consultation, Council adopted the Coffs 2030 Plan on 17th December 2009 (Coffs Harbour City Council, 2009a). This period saw a revitalisation of sustainability within CHCC, with the confirmation of a new

[68] I use the term "consultation" to describe conventional community consultation processes commensurate with the definitions in Table 9-1 in Chapter 9.

[69] Although Professor Newman is my doctoral research supervisor, I had no involvement in bringing him to Coffs Harbour for the *Coffs 2030 Summit*: this was arranged independently by CHCC.

position of Executive Manager, Strategy and Sustainability and the employment of a Sustainability Officer. This change enabled CHCC to apply for external funding to conduct a range of internal and external activities to develop sustainability, both in the wider community and within the CHCC organization. For all of the Coffs 2030 period, I had no involvement with CHCC. I participated in the Coffs 2030 Summit, as a community resident and ratepayer.

12.9 Stage 3 Embedding Sustainability Culture

12.9.1 Scope: Stage 3

With the increasing strength of sustainability at CHCC arising from the Coffs 2030 process, an opportunity arose to continue my proposal for developing sustainability culture within the CHCC organization. This renewed opportunity grew from funding grant requirements for CHCC to review their internal sustainability culture. The programs and processes requiring internal cultural change included:

- Waste and Sustainability Implementation Payment Program (WaSIP);
- Our Living Coast Regional Sustainability: grant-funded program;
- Community Education and Engagement Driving Change for Sustainability in Local Government: (CEE Change Program): grant-funded program;
- The Coffs Harbour Vision 2030 Plan;
- The Integrated Planning and Reporting Framework for NSW local government;
- CHCC's new corporate planning and reporting system; and
- Other grant funding to support future sustainability implementation briefs.

The Executive Manager, Strategy and Sustainability, commissioned me to carry out a scoping process to identify models for embedding sustainability at CHCC. This process primarily aimed to review existing CHCC structures and processes and identify new models, processes and tools to enable the staff of CHCC, both individually and collectively, to have the skills and capacities to deliver sustainability outcomes for the Coffs Harbour community. Implicit in this is an understanding that the capacity to deliver on sustainability is best demonstrated by a strong sustainability culture within the CHCC organization. I prepared a major report on models for cultural change, including a review of experiences from other sustainability-leading Australian local governments, presented my findings to selected staff and the General Manager, and proposed a revised action plan for cultural change within the CHCC organization (Parnell, 2010). The report's findings are summarised below. The full text of this report is on the attached DVD in Appendix 2.

12.9.2 State of Sustainability Culture after the 2006 Re-structure

As part of my process for investigating ways of embedding sustainability culture at CHCC, I reviewed sustainability achievements and problematic performance areas since 2006, to understand the impact of the organizational re-structure and to map the status of sustainability culture. Notable achievements since the re-structure of 2006 included[70]:

- Establishment of positions for Executive Manager Strategy + Sustainability, and Sustainability Officer;
- Completion of Our Living City Settlement Strategy;
- Completion of the Coffs Harbour 2030 process;
- Some incorporation of sustainability issues into Draft Management Plans;
- Development and commissioning of the Coffs Coast Resource Recovery Park;
- Upgrade of Coffs Harbour Wastewater Treatment plant;
- Development of new CHCC policies and strategies improving sustainability outcomes. These include: the Water Sustainable Urban Design (WSUD) Strategy; the Local Food Futures Alliance; Rural Lands Strategy; Local Environmental Plans and Development Control Plans which are increasingly informed by sustainability principles; Bushland Friendly Nursery Scheme; and improved Trade Waste, Reclaimed Water and Urban Rainwater Tanks policies;
- Sustainable technologies incorporated in the Cavanbah Centre and Rigby House; and
- CHCC was awarded the Local Government Manager's Association Building NSW Regions Award in September 2009. This recognised sustainability initiatives such as the water reclamation facility and the Local Food Futures Alliance.

There have been some persistent problematic areas, many of which were identified in various reports and evaluations from 2002 and 2005, and my own investigations during Stages 1 and 2, as described above.[71] Continuing problems with embedding sustainability culture are indicated by the following:

- Triple Bottom Line (TBL) assessment and reporting is still in operation, but is not performing well or consistently across relevant areas;
- There was no action on:

[70] This list was determined through many discussions with CHCC staff during late 2009/early 2010 and my own observations.
[71] This list was also determined through many discussions with CHCC staff during late 2009/early 2010 and my own observations.

    - Further developing of CHCC as a learning organization to support sustainability;
    - A long-term participatory process with field staff to develop sustainable practice;
    - Modified job descriptions to include sustainability requirements; and
    - "How-to" Manuals for different work areas.
- Poor waste management at 35 CHCC properties (Coffs Coast Waste Services, 2009); and
- No internal CHCC program to carry on the process of the now-defunct ICLEI Cities for Climate Protection program.

The challenge arising from the above problems, therefore, was to address them in a plan of action informed by leading edge experience in local government and in organizational change.

12.9.3 Review of Cultural Change Activity across Selected Councils

The issue of the development of a sustainability culture is an important consideration for local government authorities that have been on a development trajectory similar to CHCC. I interviewed a number of sustainability staff at eight Australian local government authorities (councils) to discuss their cultural change processes. I also referred to case studies produced by the Urban Sustainability Support Alliance (Pillora, Blackburn, & Artist, 2009; Urban Sustainability Support Alliance, 2008a, 2008b) and a Perth City Council meta-study of sustainability in local government in Western Australia (City of Perth, 2008). The eight councils surveyed were:

- Randwick City Council, NSW;
- Hornsby Shire Council, NSW;
- Clarence Valley Council, NSW;
- Sunshine Coast Regional Council, Queensland;
- Brisbane City Council, Queensland;
- City of Melbourne, Victoria;
- City of Gosnells, Western Australia; and
- City of Mandurah, Western Australia.

This review identified many initiatives applied in the councils above, with many commonalities. I have organized these according to the change paradigms identified in Chapter 9, in Boxes 12-1 to 12-7:

Structure and Policy

- Sustainability frameworks to guide decision-making;
- Co-ordinating cross-council efforts around themes and activities;
- Implementation of sustainability management systems;
- State of Sustainability reports with reporting on internal culture change;
- Establishment of Sustainability Working Groups/Green Teams (of varying structures: some management only; some open to selected staff; some open to all interested staff, and thus self-appointed: these can encourage action learning as below, or can only be for command-and-control purposes);
- Situating sustainability management in the departments of the General Manager/Chief Executive Officer or the main corporate department;
- Applying sustainability measurement tools, with ranking scales;
- Upgrading Job descriptions (and Key Performance Indicators) with sustainability requirements, particularly for managers;
- Project/Task level sustainability toolkits to guide work teams; and
- Recruitment of new staff with existing sustainability capacity and commitment to sustainability principles.

Box 12-1 Councils survey: Structure and policy issues (Parnell, 2010, p. 42)

The structure and policy issues listed in Box 12-1 stress the importance of guidance to decision-making, appropriate evaluation, measuring and reporting, and managing staff job descriptions. CHCC has only fully implemented sustainability reporting. The other items were identified in Stage 1 and 2 reports as issues to pursue at CHCC, but were not implemented by the end of Stage 2. The implementation of the listed items by many of the surveyed councils demonstrates that they consider them important, contrasting with the lack of action by CHCC. With regard to the Leadership paradigm, the following issues were identified by the surveyed councils' responses in Box 12-2:

Leadership

- Strong leadership from Mayor, Councillors, General Manager/Chief Executive Officer, Executive Managers, managers and team leaders;
- Appropriate delegation of leadership through the organization;
- Skills in motivating staff at all levels;
- Identifying and supporting Sustainability Champions to advocate for change; influence behaviour; educate and inform; and contribute to problem solving; and
- Identifying and supporting knowledge leaders as the "go to" people and internal sustainability consultants.

Box 12-2 Councils survey: Leadership issues (Parnell, 2010, p. 42)

Strong leadership in sustainability and support for sustainability initiatives through appropriate delegation is the main finding under the leadership paradigm in Box 12-2. The findings under the competing interests paradigm were few, and largely concerned one particular council which had recently been formed through the merger of three smaller councils, as listed in Box 12-3:

Competing Interests

- Staff round-tables to explore local meanings of sustainability;
- Facilitation of cross-silo groups and teams to bring together different work cultures to negotiate sustainable work practices; and
- Merging of councils: allowing time for different cultures to adapt to new situation and preservation of staffing arrangements for an agreed period.

Box 12-3 Councils survey: Competing Interests issues (Parnell, 2010, p. 42)

The findings identified in Box 12-3 support the idea that individuals, communities and organizations generally struggle with the meaning of sustainability in the local context. Different meanings and understandings can be appropriate: at the local government level, it will be different for a manager as compared to an outdoors worker. Therefore, change efforts should target the development of shared meaning and understanding through conscious process as part of the developing organizational narrative. Such development can be a designed process within the rational design paradigm in Box 12-4 or in a more fluid manner in the systems paradigm (see Box 12-7 below):

Rational Design

- Catalyst or large sustainability innovation projects to focus sustainability efforts;
- Promotion of problem-solving to bring about sustainable outcomes;
- Use of Sustainability Planning Webs and Sustainability Health Check methodologies;
- Use of performance management tools.

Box 12-4 Councils survey: Rational design issues (Parnell, 2010, p. 42)

The rational design approach has yielded much success for the surveyed councils, and mirrored by the CHCC experience, with waste, water and energy management projects as significant sustainability projects. A common theme across the surveyed councils was that sustainability projects can galvanize action and build culture, however, continual focus on project delivery does not address aspects of sustainability responsibility not covered by discrete projects. Another issue is that areas of great complexity do not readily respond to rational design approaches, indicating that a different approach to solving complex problems is needed. The survey findings also established that performance management tools were common across the surveyed councils, although some diversity in the source, type and construction of the tools was evident, with several tools not specifically designed to incorporate sustainability measures. Likewise, the surveyed Councils placed much emphasis on behaviourist approaches to change as listed in Box 12-5 as follows:

Behaviourist

- Induction programs, including one-on-one interviews reinforcing council vision and sustainability expectations;
- Development of content knowledge for context-specific training in relevant activity areas;
- Formal Education for Sustainability (EfS) processes;
- Targeted on-going training;
- Training support for staff with TBL/QBL reporting responsibilities;
- Behaviour change/social marketing campaigns (turning off lights, double-sided printing, ride to work and so on);
- Acknowledgement and celebration of successes (for successful behaviour change, innovations etc) via council intranet, award/reward ceremonies, Council newsletters, and reports in local media;
- Community pressure on council staff to achieve sustainability outcomes;
- Enterprise Agreements, with bonus payments for contributing to achievement of environmental targets, especially water and energy savings and waste reduction; and
- Encouraging openness to change amongst staff.

Box 12-5 Councils survey: Behaviourist issues (Parnell, 2010, p. 42)

The belief that training, education and social marketing are the most effective ways to bring about behavioural change was a common theme across the surveyed councils. In particular, the celebration of success in furthering sustainability was significant in reinforcing behaviour change. Most of the councils conflated behaviour change with cultural change and tended to focus on individual behaviours at the small scale. Most education and training activities were situated in the behavourist approach rather than action learning. Action learning is perhaps less understood in organizations generally, as most perceptions of learning in organizations are based in formal processes. Some action learning approaches used in the surveyed councils are illustrated in Box 12-6 as follows:

Action Learning

- Fostering innovation activity;
- Introducing new approaches and new ways of thinking in real-time activities;
- Databases enabling staff to access information on sustainability for self-development;
- On-on-one interviews and mentoring to assess baseline sustainability culture;
- Staff discussions and forums;
- Teamwork training to develop capacity to work better in teams;
- Use of Sustainability Health Check methodology to identify ways of linking principles to practice; and
- Staff catalyst group to assist in staff capacity building through peer-to-peer learning.

Box 12-6 Councils survey: Action learning issues (Parnell, 2010, p. 42)

As action learning is a more fluid approach incorporating learning-by-doing and reflective practice, it demands less time in formal settings, more time in practice and in dialogue with managers and peers to understand the links between sustainability principles and practice. Action learning cannot be sustained in one-off activities. The list of actions applied in the surveyed councils (in Box 12-6) represents some significant and effective ways to create action-learning cycles. An effective action learning approach begins to harness the power of the systems approach, with examples from the surveyed councils listed in Box 12-7:

Systems

- Identifying and supporting internal networks (formal and informal) for organizational learning, sharing information, relationship building and engaging people in sustainability;
- Interactive web services with user-generated content (blogs, comments, multi-media, staff-generated images);
- Staff-generated project proposals, and feedback showing that serious ideas are taken seriously; and
- Supporting management to develop their own approach to meeting sustainability outcomes.

Box 12-7 Councils survey: Systems issues (Parnell, 2010, p. 42)

The range of actions applied by the surveyed councils under the systems paradigm as listed in Box 12-7 was substantially narrower than the range of actions chosen from the other change paradigms, indicating that an understanding of how to harness a systems

approach is conceptually difficult. Some of the councils demonstrated an understanding of the value of informal networks by creating scope for individuals to propose project ideas and to determine their own ways of activating sustainability in their areas of responsibility.

Through the above review of processes applied in the exemplar councils, it is clear that much of the effort is focussing on structure and policy, and leadership development, with some behavioural approaches applied down the lines of communication. Findings demonstrated limited application of the competing interests approach, as this is mostly only relevant to councils subject to merger or where there is major conflict between interest groups, such as between “indoor” and “outdoor” cultures. Action learning is represented across several councils, but appears to be little understood or applied. The systems approach is a missing dimension from most councils’ change processes (noting that implementing a management “system” is more of an example of the structure and policy approach), indicating that dealing with complexity is difficult for many organizations.

Given that much of the new thinking on organizational and cultural change is situated in the systems approach, it is possible that council actions have not deeply incorporated the new thinking on organizational change. It appears that much action is framed along the lines of “imposing” change rather than creating the conditions to enable change to emerge. Of the listed activities from the surveyed councils, CHCC has applied the following:

- Use of a sustainability framework to guide all decision-making: via TBL processes;
- Co-ordinating cross-Council efforts with organization around themes and activities: currently being implemented with the new performance management process;
- Applying sustainability measurement tools, with ranking scales: via TBL processes, but without ranking scales;
- Key catalyst or large sustainability innovation projects to focus sustainability efforts: Coffs Coast Resource Recovery Park and water reclamation.
- Behaviour change/social marketing campaigns (turning off lights, double-sided printing, ride to work and so on): recycling, vehicle rationalisation and energy efficiency activities;
- Community pressure on Council staff to achieve sustainability outcomes: the Vision 2030 process; and
- Encouraging openness to change amongst staff: people have become habituated to change and have developed resilience.

The findings from the survey of Australian councils identify many change processes that could be considered for application at CHCC. As part of my work at CHCC, I developed an Action Plan for change based on the successes of the surveyed councils and the processes identified in the research into new thinking in organizational change, and describe the approach in the next section.

12.9.4 Embedding Sustainability Culture at CHCC

The breadth of approaches to organizational culture change and the tools and techniques applied in the exemplar Australian councils as identified in Box 12-7, provided a sound basis for designing a process to embed cultural change at CHCC. The proposed approach is framed in terms of a graphic model and a palette of actions. Figure 12-1 represents the proposed model for embedding sustainability culture at CHCC:

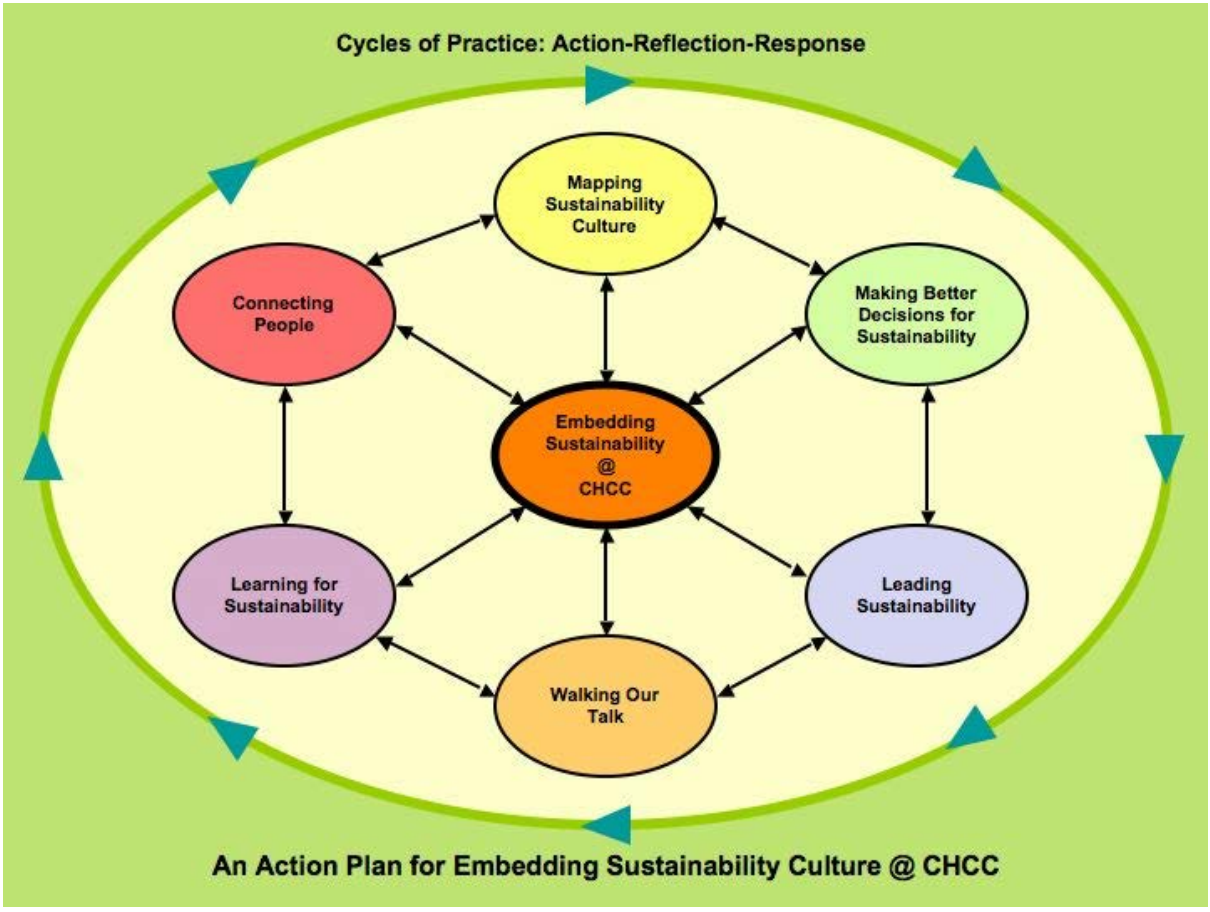

Figure 12-1 An action plan for embedding sustainability culture at CHCC (Parnell, 2010, p. 45)

The model connects the following six themes, which approximately reflect the change paradigms described above:

- Mapping Sustainability Culture;
- Making Better Decisions for Sustainability;
- Leading Sustainability;
- Walking Our Talk;
- Learning for Sustainability; and
- Connecting People.

I developed this model based on Doppelt's Wheel of Change Model (Doppelt, 2003, p. 87), and modified it to show that the dimensions of the action plan sit in a cycle of action, practice and reflection. The actions should be concurrent to the most thorough extent possible, or in any appropriate order, subject to a dynamic cycle of practice over time. This activates the systems approach and builds resilience in the organization by not relying on any one method at any one time. The six outer themes correlate generally with the change paradigms identified in Chapter 9, with some modification for local needs after comment and contribution by CHCC Strategy and Sustainability staff[72]. Each theme has an Action Plan, with associated strategies and actions. Many actions are concurrent with other requirements arising from current active sustainability grants. This Action Plan, including the actions timeline was presented to the new General Manager[73] in early December 2010 for approval. This milestone represented the completion of Stage 3 of my research case study. As a postscript, initial participatory cultural mapping commenced in March 2011 and other actions are planned for the first half of 2011. I have been engaged as a consultant in this mapping phase, and hope for future involvement in assisting in implementing the Action Plan.

12.10 Reflections on Sustainability Practice at Coffs Harbour City Council

Nothing can be taken for granted in the dynamic process of developing a sustainability culture. The business of running a local government organization combined with the responsibilities of environmental stewardship involves nested hierarchies of complex, dynamic socio-technical systems interacting with natural systems. As with natural systems, at CHCC there were periods of growth and decline, shocks and changes. Even my period as a sustainability practitioner at CHCC was subject to the same cycle. For example, I can understand why Stage 2 came to an end, because the time was not right for my enquiry after the Organizational Review. Yet, I cannot explain why, after my

[72] Jeff Green and Elisabeth Nicolson.

[73] Replacing the General Manager who initiated the Organizational Review in 2006, and who left CHCC in the second half of 2010.

work Stages 1 and 2, I was not invited to participate in the Coffs Harbour 2030 process. I just consider that at the time I occupied a different "basin of attraction" from CHCC staff responsible for implementing that process[74]. My personal response to this was to take a broader view: I certainly realised that as a practitioner, I was not indispensable to the process. The experience helped me to understand the necessity of resilience in the face of changing cycles. Likewise, to progress sustainability the organization needs to show resilience to cope with political change, change of personnel, loss of champions and periodic downturns of interest.

In the Sustainability Culture Project to date, it is evident that a sustainability culture exists within Coffs Harbour City Council and that it has developed substantially since the Vision 2020 process. However, it has ebbed and flowed according to a range of internal and external drivers, including changes in personalities, processes, hard environmental limits, management, elected representatives, legislative requirements and structure. It has not developed consistently through all areas of the organization, and there are naturally varying levels of commitment to sustainability principles over time. Nevertheless, the base level of commitment to sustainability is consistent, representing widespread understanding of the issues and a useful cultural grounding. It is only when sustainability becomes demanding, when people have to change the way they do things, when problems require more commitment and energy to solve them, that the base level of culture may not be strong enough. Learning how to deal with complex problems while maintaining sustainability principles is, in my opinion, the most significant challenge in furthering sustainability: this will demand the support of a mature sustainability culture.

The Emergence Model of Sustainability Culture, as proposed in Chapter 8, provides a framework for understanding the story of the development of sustainability culture at CHCC as an emergent quality of many actions, processes and programs since the Vision 2020 process in 1994. These actions build the organization's narrative, experience promotes learning, and the baseline culture moves to a different state and thus influences perceptions, attitudes and behaviours. Because change for sustainability has not been consistent across processes and activities over time, a fragmented view of present outcomes could potentially lead an observer to disappointment and cynicism, because it is easy and simplistic to dwell on the sustainability outcomes that CHCC has failed to achieve. The Emergence Model

[74] In later discussions with staff, there may have been an assumption that I would not be interested because CHCC did not support my research proposals for 2007after the budget-neutral work I had done for them over 2005 and 2006. However, I accepted it as part of the dynamics of working with organizations. As it happened, my work in Stage 3 was as a paid consultant, so at the end, it was a good outcome for all.

demonstrates that no single action has been responsible for creating sustainability culture: rather, CHCC's successes and failures have synergistic effects and both have contributed to the extant sustainability culture. Likewise, any future approaches to continuing the development of sustainability culture should not focus on any single action.

The Sustainability Culture Project was designed to assist CHCC staff to continue the long process of cultural change and to strengthen the emergent sustainability culture within the organization. The methods chosen along the way and included in the current Action Plan were gentle approaches, avoiding compulsion and bureaucracy, designed to stimulate thinking and discussion, to highlight successes, to remove obstacles, to encourage staff at all levels of the organization to engage with sustainability thinking and to incorporate such thinking into their daily work, all for the benefit of the community.

Because of the systems nature of change, there is no guarantee that actions taken under the Action Plan will directly lead to cultural change or that change will be as envisaged; nevertheless, the actions are contributing to the complex field of potential and a strengthened culture may yet emerge. Doing nothing is not an option for CHCC.

The 2006 organizational review was a significant event in the life of the organization. Understanding the outcomes of the review process is important for any future change process at CHCC because the way in which the organization handled past changes is generally indicative of how future change processes will be received. Consequently, the main lesson is that any new structure or process to support sustainability culture would have to occur as an iterative process to avoid negativity and hostility. Any processes to develop sustainability culture should be more "bottom-up" and "inside-out" to complement existing "top-down" processes.

There is an imperative for CHCC to act quickly on implementation of the recommended action areas to take advantage of the gains of the last two years and the widely expressed community support for sustainability. To achieve a synergistic effect, I stress that these actions cannot be approached in a linear fashion: the process must have multiple entry points and a cyclic approach of Action-Reflection-Response applied over time, as explained in detail in Chapter 9. If any one Action Theme is neglected, it will be much more difficult to obtain the synergies needed to stimulate the organization, grow the sustainability culture and leverage the change process. I

Everyone in an organization such as CHCC, and in particular, the decision-makers and managers, should consider themselves as sustainability practitioners. Therefore, the aspects of the Action Plan devoted to learning, especially higher-order creative problem-solving are important for developing staff capacity as sustainability practitioners.

The outcomes of this case study combined with my reflections on my experience at CHCC and my reflections on the case studies in Chapter 10 and 11 support the key aspects of the Emergence Model of Sustainability Culture and informed the development of new patterns of sustainability practice, as proposed and discussed in Chapter 13 to follow.

Chapter 13 New Patterns for Sustainability Practice

13.1 Introduction

My principal motivations in approaching this research were the following:

- To inform my sustainability practice;
- To become a better practitioner;
- To contribute to culture change;
- To inspire other sustainability practitioners; and
- To propose new patterns for sustainability practice based on the Emergence Model of Sustainability Culture.

My intention was to develop my abilities to make connections where others do not see them, to link good ideas from different domains to create a new synthesis, and to transcend competing interests and opinions. I wanted to develop my sustainability practice to the point where my actions become consistent with my holistic rhetoric, my theoretical framework and philosophical stance. My experience in the Action Research case studies tested my capacity to operate holistically and to think more deeply about the theoretical basis of this research.

The preceding case study Chapters (Chapters 10 to 12 inclusive) highlighted the difficulties experienced by practitioners attempting to operate holistically in the complex business of human affairs. In particular, they highlight the importance of culture to sustainability and how the emergence phenomenon is a key aspect of any work with people and their cultures in different contexts. Further, the case studies highlight that the capacity of any group or social system to sustain action over time in a sustainability-oriented program, process or activity is critical for furthering sustainability as a social goal, especially where activity is complex. The experiences also demonstrate that failure to account for whole systems and their emergent effects often results in mixed outcomes. I reported both failures and successes. A capacity to "sustain sustainability" is thus an outcome of an underlying emergent sustainability culture, the capability of participants and practitioners, and the complexity of the practice setting.

My experience in remote Indigenous communities (as discussed in Chapter 10), particularly in one community in the Western Desert of Central Australia, helped me to

focus on the fundamental approach to this research and to begin my enquiry into the problematic nature of sustainability when pursued in complex space. My reflections identified that development in remote Indigenous communities is rarely approached in a holistic way and that the emergence phenomenon appears to manifest in a pattern of dysfunction, at least as far as the sustainability of the physical settlement is concerned. Remote Indigenous communities are situated in complex space because of the physical demands of their location, their disconnection from mainstream economic life and their intersection between traditional and Western culture. However, the level of settlement dysfunction is not a justification for a sustainability practitioner to avoid taking action: action is less certain, of a higher risk, and less likely to achieve the outcomes proposed in any program of action than in mainstream settlements. I learned from this experience that sustainability practice in chaotic and complex space is of a higher risk, and thus purpose, process and expectations should be framed accordingly, taking into account a long view of the process.

I described my work with the Mt Arthur Centre in Chapter 11. While smaller in scope than the Western Desert case study, the activity was intense and consistent over the period of my involvement. While our actions in relation to the physical development at Mt Arthur Centre were experimental, much of the activity was centred in simple and complicated domains of activity. The planning processes, however, were more complex and the choice of building methods were doubtful in part; further, the number of people involved meant that there was always a potential risk of complications through emergent patterns. The most consistent emergent pattern was the conflict between the time needed to implement an action and the availability of participants to carry out the action. I also learned that in sustainability activity at smaller scales, it can be difficult to maintain a level of motivation to sustain a course of action: participants become exhausted and cannot maintain their contributions, especially if processes seem more lengthy than envisaged. The closure of the Mt Arthur Centre and its re-emergence as an ecological field study centre would not have been anticipated in the original vision for the Mt Arthur Centre, yet it is clearly a new pattern of use, and still furthering sustainability via a different pathway. My conclusion is that sustainability visions can persist over time and the results can be a manifestation of a new dynamic stability.

The Coffs Harbour City Council case study described in Chapter 12 is the major case study supporting this research. I identified a sustainability culture within Coffs Harbour City Council; it has ebbed and flowed according to a range of internal and external forces, including personalities, processes, hard environmental limits, changes in

management, changes of elected representatives, legislative requirements and organizational structure. Sustainability culture has not developed consistently through all areas of the organization and there are naturally varying levels of commitment to sustainability principles over time. Learning to deal with complex problems while maintaining sustainability principles is, in my opinion, the most significant challenge in furthering sustainability. That experience helped me to understand the necessity of resilience under the influence of changing cycles. While it is clear that a culture of sustainability has developed, it is not clear whether it has emerged from the totality of sustainability efforts from the early 1990s, from specific actions, such as the implementation of TBL decision-making, or from the persistent influence of local sustainability champions. All of these options are likely to have contributed, but a specific causal connection between any specific activity and the general cultural outcome is not obvious. This state is consistent with cultural change in complex space. The next phases of CHCC activity may indicate the degree to which a planned approach to stimulating emergent sustainability culture will be effective in embedding sustainability.

My reflections on the case study experiences have helped me to progress a synthesis of my initial reflections on my past practice, my review of broad theoretical themes and my proposal of an Emergence Model of Sustainability Culture, all with the aim to better prepare practitioners for understanding the demands of complexity in contemporary society and to recognize that “pattern” is the language of emergence. I place particular emphasis on the idea that sustainability practice inevitably means working with people to change their usual ways of doing their core work: a form of deep collaboration. In reflecting on the case studies, I have also resisted drawing a causal connection between any specific experience, any specific learning and any specific proposal to come to a synthesis of ideas around the Emergence Model of Sustainability Culture: to do so would be inconsistent with my understanding of emergence: my synthesis of the process of “practice-reflection-case-study-reflection-proposal” is in itself, an emergent and holistic view.

This Chapter, then, leads to the following question: How does the Emergence Model of Sustainability Culture contribute to new ways of sustainability practice? As my response to this question, this Chapter undertakes to do the following:

- Address the gaps in contemporary sustainability practice identified in Chapter 9;

- Propose a “pattern language” for sustainability practice after Christopher Alexander in Chapter 8;
- Identify the domains of sustainability practice as an emergent pattern to extend contemporary models of sustainability;
- Propose a pattern of desirable personal qualities to enable the sustainability practitioner to act holistically;
- Propose a generalist emergence-based pattern for sustainability practice; and
- Connect the Emergence Model of Sustainability Culture to sustainability practice through an understanding of the practice setting, whether in simple, complicated, complex and chaotic space across any of the identified domains of sustainability practice.

Thus the practitioner must have a conception of practice across different domains, at different scales, from a multi-faceted capacity, with an awareness of the potential for emergent phenomena, and applying practice patterns appropriate to the degree of complexity.

My proposals for sustainability practice are deeply cultural (rather than methodological) to allow sustainability practitioners to draw on their “inner sustainability culture” when faced with complex sustainability problems. I propose a deeply transformational and ideational internal guide in the individual so that they can pursue sustainability goals and principles at any point in the world system where they may practice: on specific projects, collaborating with communities and organizations, working with technology, or as a participant in any sustainability change process.

In particular, in this Chapter I have avoided specifying particular tools and techniques in the proposal of new patterns of sustainability practice to prevent a tool-driven approach. There are many tools for change, for group work and for developing people, organizations and communities, and many directories of change methods, some of which have been examined in this research and in the accompanying case study documents (Burnham, 2002; Davis-Case, 1990; Holman, et al., 2007; Sarkissian, et al., 1997; Sarkissian, et al., 2009; Walsh & Mitchell, 2002; Wates, 2000). Many tools used for group work have been developed through empirical processes before having a label or memorable title applied. They traverse the change paradigms described in Chapter 9 and incorporate emergent elements, but the pattern underlying their emergence is not clear. Thus, a tool-driven approach contains the risk that the underlying pattern may not be known or understood, especially if the tool is ideologically bounded. Therefore, my preference is to propose new emergence-based patterns, and then

select tools that appear to be congruent with the pattern, regardless of their genesis, their designer's intent and their common application. In this way, the sustainability practitioner is likely to make wise choices in use of specific change tools and techniques, and be more flexible and responsive. Further, I propose that a mismatched tool can potentially be transformed by applying it through an emergent pattern-based approach to practice.

Due to the limitations of communication via the thesis format, the patterns are expressed literally in lists and tables, and thus may appear as a reductionist form at first glance. It is critical to note that a pattern identified from complex activity is not a form of reductionism. However, inappropriate re-application of the pattern to a different context may result in reductionist outcomes. The underlying basis of the patterns is that they are neither sequential nor hierarchical and the practitioner should understand that they must be selected and applied holistically and informed by the practitioner's inner cultural core.

For the purpose of this Chapter, I refer to any participating organization, community group or client as the "client group" and the extent of the client group in their place or places of activity as the "local context" or "local system". For me, collaboration with the client group is inherent in this definition, as the role of the sustainability practitioner is largely collaborative and participative, especially in complex space. I also assume that "sustainability activity" includes any discrete activities, problems, projects, programs or processes intended to activate sustainability principles in the local context. Finally, I use the term "practice setting" to describe the scope of sustainability practitioner participation, similar to Eoyang's Practice Landscape (Eoyang, 2004) as discussed in Chapter 9.

13.2 Emergence Pattern 1: Domains of Sustainability Practice

13.2.1 Concept

Understanding the nature of the practice setting is critical for assisting the practitioner in framing an appropriate approach to any sustainability activity. From reflecting on my experience in the case studies and in my prior practice, I propose that sustainability practice is situated in one or more broad emergent domains. The pattern for the emergent domains can be summarised as follows:

- The ecological domain (the natural world and its preservation, protection and restoration);
- The social domain (community, social capital, networks, relationships, reciprocity and connectedness);
- The cultural domain (our underlying values, attitudes, norms and behaviours, individually and collectively);
- The knowledge domain (knowledge, learning, education, capacity, creativity and innovativeness);
- The technological domain (the physical development of our built and manufactured environments, and our socio-technical interface);
- The livelihoods domain (economics; finance; income; trade; exchange; individual livelihood; and place-making); and
- The institutional domain (politics; governance; policy; management; laws and regulations; and organizational structures).

These domains extend the models of sustainability identified in Chapter 4, especially those models based in TBL and its multiple-capitals derivatives. While I use terminology similar to the capitals descriptions in those models (natural capital, social capital, political capital and so on) the emphasis here is on the concept of domains as practice settings, rather than as capitals. From a conceptual standpoint, I propose that these domains are complex systems, operating at intersecting scales and hierarchies and that most of our actions as practitioners encompass these domains in some way.

The ecological and cultural domains are field-oriented; that is, they are the field wherein all the other domains are nested. This is an important distinction. One domain, the natural world, provides all the resources and eco-system services upon which we rely and is affected by our modes of living and development. The other is where our most fundamental, unconscious and conscious motivations are at play. The social, knowledge, technological, livelihoods domains are process-oriented. They are our "enablers": where we make our relationships, learn how to live, and apply our creativity through our tools to solving the problems of development. The institutional domain is equilibrium-oriented, concerned with the business of organizing and supporting our societies, communities and ourselves where we live through maintenance of stability: basins of attraction exhibiting dynamic equilibrium. The institutional domain, as a form of stability, is a pattern emerging from the field-oriented and process-oriented sustainability practice domains. Each domain influences both its sub-domain and supra-domain through dynamic interaction processes.

13.2.2 Pattern

In Chapter 9, Figure 9-1 showed a layered representation of my sustainability practice. Here I extend the concept to show that practice occurs within and across the sustainability practice domains (Figure 13-1):

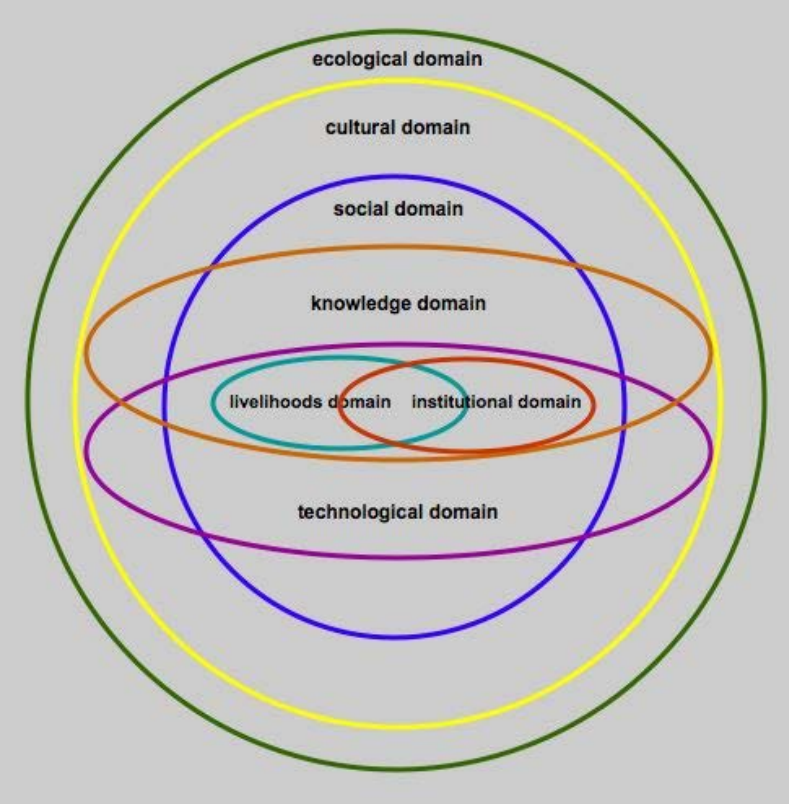

Figure 13-1 Emergence Pattern 1: Domains of sustainability practice

The domains have been listed separately, but that does not mean they function in a disconnected way. They operate systemically even when delivering unsustainable outcomes and even if the actors and processes involved are not conscious of the connections.

13.2.3 Pattern Summary

I believe that the challenge for sustainability practitioners is to understand their work in terms of the domains of practice. Many practitioners further sustainability by working in specialist areas: technologists, in solar power systems and social workers strengthening communities, for example. But many practitioners operate across multiple domains and scales: technologists working with communities for physical development to support social goals; economists working on systems to promote improved land-use; ecologists working with business to promote bio-diversity, for

example. However, as sustainability is holistic in scope, I contend that specialists should not act solely as specialists; they should develop capacity to be generalists across multiple domains, as a complement to their specialty. And the more domains that a practitioner can work across, the more they can contribute to sustainability outcomes.

For example, in my sustainability practice I have my technical specialties: building and project management, building technology, and thermal performance and energy assessment. And I also link these activities to higher scales: education for sustainability, and organizational and community development for cultural change. Thus, a sustainability practitioner should understand how their technical specialty connects within larger systems scales, and how to balance their specialty with the need to connect as a generalist across domains and scales. Because the intersecting practice domains vary with context, the practitioner should embody a range of personal qualities to facilitate responses appropriate to the context. In the next section, Emergence Pattern 2: Sustainability Practitioner Qualities, I discuss and map the emergent pattern of desirable practitioner qualities.

13.3 Emergence Pattern 2: Sustainability Practitioner Qualities

13.3.1 Concept

In Chapter 9, I summarised what I believe to be inherent gaps in contemporary sustainability practice. Many of these gaps relate to practitioner attitudes and behaviour and how practitioners conceive their approach to sustainability. I believe that appropriate attitudes and values, deeply embedded as a personal culture, are critical qualities for practitioners and not the tools we apply. Tools applied without the guidance of appropriate personal qualities leads to a mechanistic approach and limited progress to sustainability. In many fields of professional practice, ethical codes encompass practitioner qualities, attitudes and behaviours, so my proposals are not new; rather my purpose is to extend accepted professional ethics[75] into sustainability practice settings. Accordingly, a sense of professional ethics is implicit in my conception of sustainability practice.

Considering sustainability practice, the International Society of Sustainability Practitioners (ISSP) has proposed a series of skills and core competencies for sustainability practitioners (Willard, et al., 2010). These skills are essentially generic professional skills that could be applied across any industry. The context of the

[75] As in “Codes of Ethics” for architects, planners, engineers, legal and medical professionals for example.

proposal of such skills is, I believe, generally representative of practice within the mechanistic linear paradigm, with some acknowledgement of the role of systems thinking. Box 13-1 below sets out a summary of recommended sustainability practitioner skills:

Challenges

- Establishing the value of sustainability
- Climate change
- Building support
- Financing sustainability

Hard skill needs

- Strategic planning
- Systems thinking
- Project management

Soft skill needs

- Communication with stakeholders
- Problem solving
- Inspiring and motivating others

Box 13-1 ISSP recommended practitioner skills (Willard, et al., 2010, p. 2)

The above skills reflect the organizations surveyed in their research project and their understanding of sustainability. While they are useful in many practice contexts, they may be less useful in complex domains. The report expanded on these key skills in sample core competency matrices, classified according to knowledge (concepts, theories, ideas processes; skills (process dynamics, tools, methodologies); attributes (innate abilities); performance competencies (job, career duties, responsibilities); and intended outcomes (educational goal or job expectation) (Willard, et al., 2010, p. 36). Also included in the ISSP report was a set of skills recommended by the International Institute for Sustainable Development (IISD), which are summarised in Table 13-1 below:

Skills	Beliefs
1. Staff and team management	1. Global mindset
2. Long-term planning 3. Project management	2. Rooted in community 3. Thirst for global awareness
4. Financial skills 5. Donor or client relations 6. Communication skills	4. Equity 5. Sense of urgency 6. Passion for sustainability
7. Translating complex ideas 8. Analytical rigor	7. Capacity for innovation 8. Embracing a learning culture
9. Knowledge management 10. Influencing strategy 11. Awareness of stakeholder roles	9. Accept trade-offs 10. Tenacity 11. Warmth in human relationships
12. Geo-political awareness 13. Facilitation skills	12. Respect for diversity 13. Science as part of the solution
14. Network management 15. Systems approach 16. Understanding global institutions & processes	14. Value integrated thinking 15. Commitment to sustainable living
17. Understanding the private sector	
18. Managing unpredictability	
19. Bridging disciplines or sectors 20. Bridging cultures 21. Managing diversity in the workplace & socially	

Table 13-1 IISD skills and beliefs for the sustainability professional (Timmer et al. 2008 cited in Willard, et al., 2010, p. 8)

The IISD skills and beliefs in Table 13-1 and the ISSP sample core competency matrices expand on the ISSP summary. However, both sources do not refer to any philosophical basis supporting the recommendations. On the other hand, my proposals for new patterns of sustainability practice apply the Emergence Model of Sustainability Culture as its philosophical basis. I see my proposals as extending the ISSP and IISD competencies into complex space where much sustainability practice is situated.

As sustainability is holistic in concept, it requires an understanding of culture as emergent. While mechanistic approaches are appropriate in the right context, it is preferable to default to an attitude based in the holistic, and cultivate a capacity to identify opportunities to connect and to better observe emergent patterns that others may not see. I believe that sustainability practitioners should pursue this capacity as their "inner cultural core."

In Chapter 1, I proposed the need for a different type of thinker and operator to achieve holistic performance: a generalist as well as a specialist. In summary, generalists have a capacity to make sense of fragments of information, to have a basic "scaffolding"[76] across different areas, to know their strengths and weaknesses, to identify gaps in their

[76] As discussed in Chapter 7, scaffolding describes one's specific knowledge framework or network within an overall field of knowledge, thus providing a basis for extending one's knowledge within that field and for bridging knowledge gaps.

practice settings, to communicate and consult widely, to make connections between apparently unconnected domains and events, and to be prepared to take calculated professional and personal risks within an ethical sensibility.

I am not advocating against specialists and specialist work. Specialists are vital for the many specific tasks within the sustainability movement. However, I am cautious about sustainability practice in complex space being led by technical specialists. Nevertheless, I believe a capacity to think like a generalist while having technical specialty in an aspect of the task or project at hand is an optimum combination. Such a capacity gives the practitioner scope to change the scale of their thinking and to see how focused and specific activity connects to other activities at the same and different scales. Feedback patterns can manifest themselves at both the level of fine detail and the broad view.

13.3.2 Pattern

In acknowledgement of sustainability practitioners working in complex space and consistent with my proposal for an Emergence Model of Sustainability Culture, I propose an emergence-oriented pattern for the personal qualities of the sustainability practitioner, as set out below in Box 13-2:

1. Generalist and Specialist
Works coherently across different scales and contexts; collaborates with people across specialisations and different cultural backgrounds; develops a capacity to assess when to act as specialist or generalist; uses specialist knowledge to test small-scale potential outcomes within larger scale activities; relates coherently to other practitioners who self-identify as specialists yet can identify connections between apparently unrelated phenomena; has a mature understanding of technology as both artefact and social process.

2. Fractal-minded
Maintains awareness of scale, context and existing patterns at different scales; is capable of identifying new patterns of behaviour in local systems; respects current stabilities and extant patterns of physical and cultural development; understands that action at one scale influences outcomes at other scales.

3. Navigational
Develops their own roadmaps in any practice setting, especially the complex and chaotic; informed by their inner culture; discovers a system's state through probing and safe-fail experiments.

4. Self-aware
Maintains an inner sustainability culture and a self-aware responsibility in relationship with others; acknowledges their own strengths and weaknesses; appreciates cultural environments; knows how to behave appropriately for the context.

5. Intrinsically Motivated
Energises a process and inspires participants and collaborators about the prospects for change, through a high level of intrinsic personal motivation; applies specialist expertise with a high level of commitment.

6. Receptive
Listens to and learns from local narratives and responses of participants; finds ways to understand and work with local meanings of sustainability, especially where meanings are contested; understands learning cycles and frameworks and matches them to local learning styles and intelligences.

7. Flexible
Applies sustainability principles through fluid and flexible processes, to allow space for the range of human cultural expression; avoids applying processes of change that are rigid and ideologically based.

8. Connective
Stimulates networks to communicate and generate knowledge, opinions, ideas and stories; understands the significance of informal networks as a source of new ideas about local conditions.

9. Responsive
Displays a respectful and genuine attitude; regards participants and collaborators as experts in their own affairs; responds to the requirements of the situation rather than imposing their own agenda; seeks advice about the potential meaning of emergent patterns; stimulates progress at a pace appropriate to local capacity; acts in an inclusive way and models inclusive behaviour.

10. Resilient
Understands the unpredictability of complex systems and their tendency to ebb and flow through panarchical behaviour; demonstrates patience to continue with a process under adverse circumstances; understands that sustainability practitioners can be a focus for conflict in contested space and serve as a "relief valve" for a client group.

11. Reflective
Reflects on experience to review processes, patterns and meanings; monitors own reactions to events and self-checks for biases, ideologies and habitual patterns; cognitively reviews conclusions and syntheses before communicating them; learns through reflective practice.

12. Courageous
Takes personal and professional risks because of the uncertainty of outcomes; maintains the capacity to cope well when projects and processes fail to meet participants' expectations; is guided by inner sustainability culture when working in change settings where anti-sustainability attitudes are dominant.

13. Coherent
Lives authentically, with high-level coherence between sustainability principles expressed through both professional practice and personal life-style; avoids cognitive dissonance between theory and practice, by modelling sustainable behaviour.

Box 13-2 Emergence Pattern 2: Sustainability practitioner qualities

With the increasing complexity in the way we do things and our increasing connectedness and interdependence, drivers of change become inherently emergent, and scenarios for the future become increasingly problematic and beyond reasonable prediction. The sustainability practitioner will need to develop a feel for complexity and

emergence, as much of the journey to sustainability will traverse complexity rather than being a linear step-by-step approach. I believe that practitioners should learn to be comfortable with different meanings of sustainability, as these express the dynamics of a place or group. They should look for the common meanings as their starting point.

Sustainability practitioners often approach change believing that the change needed for sustainability is self-evident: that should be motivation enough to drive change in any situation, regardless of whether people and their systems are ready for change. Local participants may have different views of a sustainability practice setting compared to that of the practitioner, depending on their position and role in the local system. Participants may even understand the nature of the problems involved, yet such knowledge of a problem is likely to be insufficient to drive change, especially if people accept and adapt to the problematic situation. As a general rule, I believe that practitioners should never assume that sustainability is self-evident to all participants.

Practitioners may find themselves behaving in a manner inappropriate to the cultural context without awareness that such behaviour can create obstacles to change. Furthermore, such behaviour means that the practitioner may not be in a position to take advantage of emergent opportunities to pursue change. Ideally, practitioners should treat clients and collaborators as experts in their own affairs and seek advice about the potential meaning of emergent patterns, in their own terms. Critically, any self-described sustainability practitioner must be prepared to place people at the heart of any socio-technical process and deal with them in an authentic, genuine way. Any change process can be risky and communication of intentions is vital for creating appropriate conditions for conscious change. Rushing a process can be counter-productive and is indicative of a mechanistic approach, assuming change can be achieved through a simple sequence of steps. Sustainability practitioners with a technical specialty are not always good at working with people, having a clear concept of how to fully realise the social aspect of sustainability and working with local cultures. If the sustainability practitioner designs a change process based on limited understanding of the cultural environment, the tools selected are unlikely to be a good fit for a client group.

Sustainability practitioners must realise that a significant cohort of any client group may not want to change and may resist change efforts. This attitude is representative of a social system adapting to a threat by resistance or non-cooperation. This is where informal networks can help communicate change messages to the client group and communicate back the apparent reasons for resistance. People are more likely to work

with sustainability practitioners who are genuine and honest about a change process. Strategies, methods and tools can be useful, even liberating, but a practitioner expressing a respectful and genuine attitude and behaviour can of itself open up a change process more than any tool.

Sustainability practitioners will find themselves working in complexity without appropriate guidance, models or maps. In some cases it may be that the only guidance available is entrenched in the reductionist approach, and thus is inappropriate. This leads to an inability to appreciate that unpredictability is normal. Sustainability practitioners must understand the local system in order to identify patterns and respond to the requirements of the situation, through probing and experiment. When they are informed by higher order ways of knowing and acting combined with a capacity for reflection on experience (as part of an action learning cycle), the practitioner can both self-guide, and be open to guidance from participants. A self-aware responsibility leads a sustainability practitioner through unclear pathways, even if mistakes are made. In my experience and that of experienced community development specialists, people usually respect genuine effort and often forgive any cross-cultural misunderstandings (W. Sarkissian, personal communication, February 24, 2011). Sustainability practitioners should thus develop their own roadmaps in any practice context, centred on their inner cultural core.

Sustainability practitioners can play both the roles of facilitator and participant in any process. There is always the question, of how personally and emotionally involved the practitioner should be. The type of involvement will be different for each practitioner in any context. Nevertheless, regardless of such intent, the practitioner has substantial capacity to influence any situation, as they become part of the dynamics of the local system. Thus, practitioners must not only appreciate local dynamics; they must also be mindful of their own influence, and not assume that their noble intentions will produce noble results (Forester, 1999). Because most practitioners have areas of technical specialty, they may find it easy to concentrate change efforts in specialty areas at the expense of others and ignore the connections to areas outside the technical specialty. In this way, as Wendell Berry points out, the practitioner can revert to reductionist ways of thinking by identifying solutions that fail to connect with any other layers of complexity or disturb the patterns of the containing systems (Berry, 1981).

Having stated in Chapter 4 that the ecological aspect of sustainability is the qualitative difference between sustainable development and prior approaches to economic and social development, I believe that the sustainability practitioner should continually

review their methods and tools against what is needed to protect, preserve and restore local ecologies. Thus sustainability practitioners should develop a “feel” for place, its local cultures and ecologies, and the extant patterns of physical and cultural development, as this is a way of respecting a client group and what matters to them. As learning is the most significant form of feedback in complex human systems, the practitioner should approach any change effort with an understanding of learning cycles and frameworks and include them in the process. Also critical to good practice are self-motivation and self-directed learning: if the practitioner is not an intrinsically motivated learner, the same cannot be expected of any participants.

Investing energy narrowly in a once-only/one-off program of change has proven to be unproductive for change agents generally and for sustainability practitioners in particular. One-off processes do not allow time for reflection, learning and re-orientation of action for both participants and practitioners and can accelerate processes ahead of participant’s capacity to change and ahead of the practitioner’s capacity to identify emergent patterns. If a practitioner does not understand the concept of learning frameworks, programs that do not match with local learning styles and intelligences will result and the practitioner will lose opportunities to learn about the local knowledge, experience, conditions and culture. A problem with rushing a process is the tendency to greenwash where initial achievements and decisions are promoted as being sustainable, but without appropriate sustained action. Appropriate celebration of achievements is positive, but in this situation, the sustainability practitioner and their clients grasp the first bright hopes of change and project them forward through assuming initial achievements represent permanent change. This position is possibly delusional, and can result in negative responses from the wider community, especially if the community is well informed about environmental and sustainability matters. Sustainability practitioners should be capable of managing expectations and promote achievements realistically, by communicating that they are milestones on the journey to sustainability, not the achievement of sustainability. Ideally, sustainability practitioners should view achievements as emergent leverage points in a changed system dynamic, and respond from that point.

Perhaps because of my technologist background, I am concerned when I find sustainability practitioners demonstrating a lack of understanding about technology and in particular its socio-technical nature. Relating to technology as static artefact and not as a socio-technical system can often lead the practitioner and participant alike to make poor choices of technology, which may lead to unsustainable outcomes. As

much sustainability practice is situated in domains mediated through technology or where technology is an intimate part of the outcomes being sought, such practitioner tendencies lead to applying a technological fix approach to solving sustainability problems. Even more worrying is the case where the practitioner may be ignorant of technology as a significant force in a change setting: thus it becomes an “unknown unknown”. This ignorance can result in failure to identify patterns of embedded culture and values without any moderation of technology choice. I believe that a mature capacity to understand the role of technology as a dynamic, socially situated process is a significant practitioner quality: neither technophilic nor technophobic.

Underlying the above discussion of sustainability practitioner qualities is the demand for congruence between personal and professional life. Modelling sustainable behaviour, personally and professionally, is an important practitioner capacity, and can support a change process by creating confidence in the practitioner’s ability and commitment to sustainability. In my view, a failure to apply sustainability principles to one’s personal life, the operation of the practitioner’s own workplace, and in one’s choice of work represents a failure to demonstrate a personal sustainability culture.

In my opinion, the implicit mission of any sustainability practitioner is to foster the emergence of a sustainability culture, in addition to the specific sustainability tasks at hand. In my review of social change processes in previous chapters, and through my understanding of the implications of complex systems and the concept of emergence, I argue that a sustainability culture cannot be designed or created – it can only emerge from our myriad sustainability-oriented actions, and, as such, is a very high risk activity. There is no guarantee that our active efforts as practitioners will develop a sustainability culture.

13.3.3 Pattern Summary

With Emergence Patterns 1 and 2, I have outlined patterns for contexts of sustainability practice and for practitioner qualities. However, every sustainability practice setting requires a different practice approach due to its scale and complexity. To accommodate varying practice settings, in the next section I propose that sustainability practice is situated in phases of practice, and outline a commensurate pattern of emergence-based practice phases.

13.4 Emergence Pattern 3: Phases of Sustainability Practice

13.4.1 Concept

How does the practitioner approach any practice setting? In the absence of any framework or pattern, the guidance of Chambers (2000) is helpful: “At all times, use your own best judgement”. As a default position in difficult situations it may be the only approach. However, given that the practitioner operates in many different scales and contexts (and in complex space where emergence is possible), contexts demand some boundary condition in the practice approach. Thus, there is clearly a need for a generalist pattern for sustainability practice suitable for a range of practice settings, where multiple sustainability domains are present. I propose the generalist pattern as a conceptual guide, not as a rigid formula or set of rules. The implicit understanding is that the practitioner approaches a practice setting with an appropriate expression of their personal qualities: especially an inner sustainability culture, a navigational mind-set, a sense of adventure, an appropriate attitude and an adaptable conceptual framework.

In Chapter 9, I outlined the scope of contemporary sustainability practice and suggested that much practice exists in codified space, particularly for technology-focussed practitioners. Codified space includes places and contexts in which regulations, reporting standards and voluntary codes govern the trajectory of practice, where certain assumptions of what is sustainable have been designed into the process, and where there is no scope to challenge the assumptions. In a bounded, focused context, the navigational aspects have been mostly resolved. For example, in my practice an energy assessment for a new building or an energy audit of an existing business has a simple and direct range of responses, often involving the use of templates and protocols. However, working with an organization to improve their capacity to deliver sustainability outcomes demands a qualitatively different response. The former are mostly in simple and complicated space; the latter in complex space. While not discounting that sometimes the optimum technical solution is informed by a set of complex drivers, my purpose here is to propose a practice pattern that enables the practitioner to work in complex and chaotic situations, as well as the simple and complicated ones, and to accommodate their changing dynamics.

I argue that all settings that traverse or connect to complexity will demonstrate emergence. Many different outcomes are thus possible and because of the lack of apparent linear causality, there is a chance that a sustainability outcome will emerge (or not emerge) regardless of our activities, as the situation unfolds. A “do-nothing” or

"laissez-faire"[77] approach is thus implied by such a view, with participants across different domains pursuing "business as-usual": this approach may yet harness the long-cycle change approaches (such as demographic change) to play out in a practitioner-free environment. Alternatively, the practitioner can respond to the expressed needs of the client or a situation in a mechanistic, linear way, and simply allow the dynamics of the local system to unfold in response to their actions, implicitly assuming that the linear approach will achieve the desired outcomes. In my opinion this laissez faire approach is lacking, given the imperatives described in Chapter 4. So consistent with my personal belief that emergent sustainability outcomes are possible through fostering processes, I argue that we need more than a "laissez-faire" approach to maximise the prospects for achieving sustainability.

Some theorists contend that a designed approach to emergence is possible (Bánáthy, 1996; Capra, 2002), and that practitioners can intervene in systems to produce desired results (Doppelt, 2003; Meadows, 1999). While this approach is worth pursuing, it should be approached with caution. My preference is to apply a generalist pattern based on a multi-modal suite of nested practices, methods and tools, derived from the change paradigms identified in Chapter 9. The pattern consists of a graphic model and a palette of actions. The actions are classified as phases[78], linked together and subject to a dynamic cycle of practice, based on a spiralling learning model (where change processes are re-visited and re-applied). I consider that the critical practitioner role in working with emergence is a stimulating or "seeding" role, and not simply a designer's role or a "laissez-faire" approach. That is, in complex space the practitioner stimulates networks within a client group through probing questions, reflecting local narratives, seeking responses, connecting and collaborating with people, broadcasting of new ideas and fostering a learning environment. A stimulated system with active participant involvement through a multi-modal approach is more likely than a linear approach to create new patterns consistent with the vision of the client group because "chance favours the connected mind" (Johnson, 2010).

My conception of an emergence pattern for sustainability practice is a working pattern, which will adapt and change with use. As a dynamic pattern, it applies active expressions for a suite of twelve different phases of a process or activity. These phases are listed below in Box 13-3:

[77] From the French, general translation "let do": deliberate avoidance of intervention.
[78] As in "phase transitions", discussed in Chapter 8.

Activating
Understanding
Stimulating
Expressing
Orienting
Leading
Modelling
Experimenting
Creating
Learning
Connecting
Specialising

Box 13-3 Emergence Pattern 3: Phases of sustainability practice

The twelve phases should not be approached in a linear way, or carried out in any specific order, after initial activating. The practitioner and client group usually have a starting point such as a situation requiring attention, a vision to pursue or a problem to solve. It may however be possible that the practitioner enters a process after it has technically started. Once started, the phases apply concurrently to create a sense of dynamics, stimulate the client system and build resilience into the change process. There is no specified timeframe for the process – some aspects require decisions at certain times, but the deeper change methods are on-going and cyclic, reflecting the participation-action-reflection of Kolb (1984), Senge (2001) and Chambers (2002), the release, re-organization, exploitation and conservation as described in Gunderson and Hollings' Panarchy model (2002), and Doppelt's Wheel of Change model (2003). The following diagram in Figure 13-2 shows how these phases work in a synergistic way:

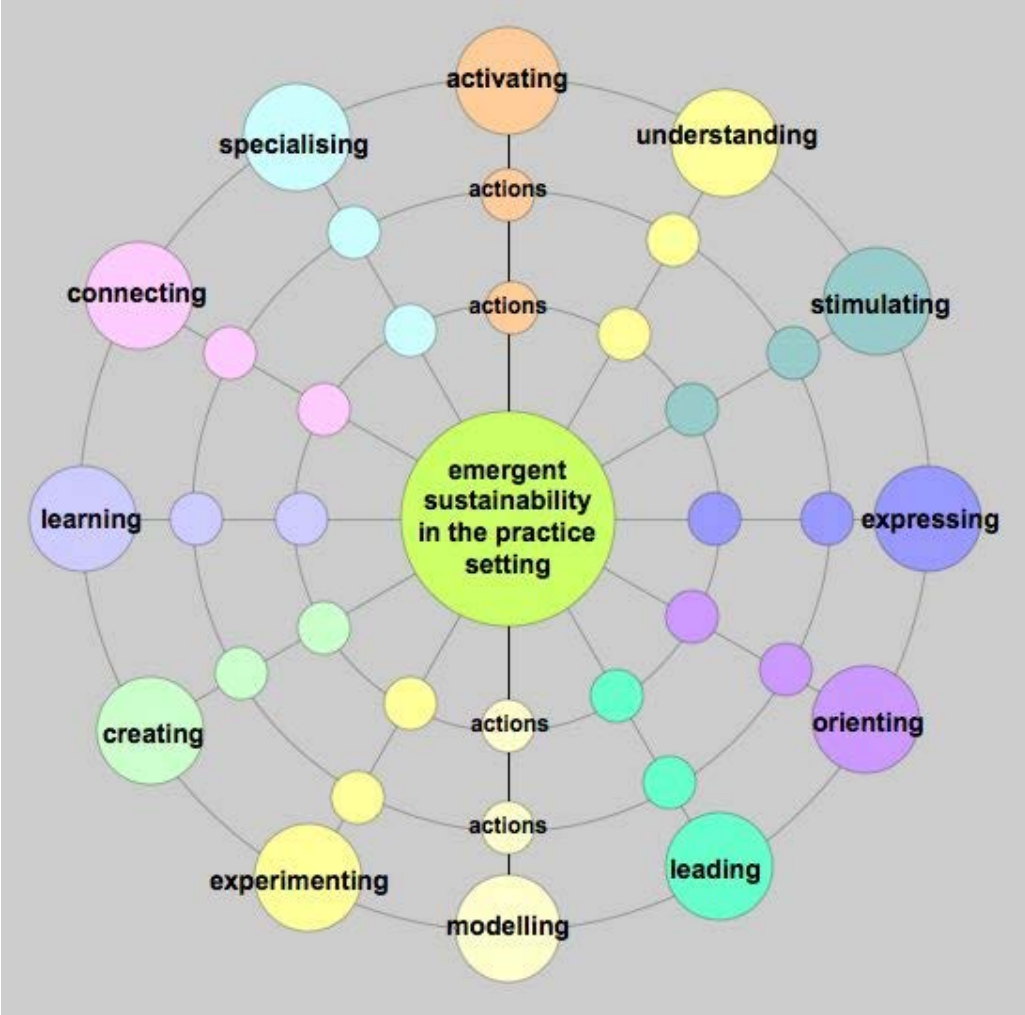

Figure 13-2 Emergence Pattern 3: Phases of sustainability practice expressed graphically

These actions illustrated in Figure 13-2 are situated within the client group (organization, community, project team), with members of the client group and the sustainability practitioner as the participants in the change activity. Sustainability practitioners can be members of the client group or can be engaged from outside the group. Ideally, any sustainability change activity should include practitioners from within the client group. However, the more participants that consider themselves as sustainability practitioners, the more embedded the sustainability culture is likely to be. Yet, the external practitioner can provide insight and advice from a different perspective, so their participation is likely to be useful. For the purposes of clarity, I have assumed that an external sustainability practitioner (which can be a single person or a team) facilitates each of the phases in the pattern, working with participants from the client groups. However, the pattern also applies to situations where sustainability practitioner is a member of the client group without outside facilitation. Specific actions under the twelve phases in Figure 13-2 are discussed in the next section.

13.4.2 Pattern

Activating

Purpose:

- Point of entry into a sustainability change process for the sustainability practitioner.

Participants:

- Client group representatives, leaders and decision-makers.

Actions:

- Activate the project or process;
- Frame the scope of involvement;
- Determine the degree of complexity;
- Modify the generalist pattern to suit the local context;
- Commence relationship building;
- Establish a change team with multiple perspectives on the issue, problem or process; and
- Commence the development of a supporting narrative.

Box 13-4 The Activating Phase

Most practice settings have a starting point, or from a complexity perspective, a set of initial conditions. Initial conditions may even be an emergent pattern newly identified and requiring a response. The sustainability practitioner may be the one who has recognised the pattern within the practice setting or has been drawn into the practice setting by local participants. The practitioner's entry, then, is into an existing dynamic rather than a clear starting point. Whatever the basis for engagement, the practitioner commences a process introducing the generalist pattern tailored for the local context incorporating as many phases as appropriate. Thus the process is loosely framed, with a developing scope, a sense of where the change process is going, and an understanding of who needs to be included in the process.

Determining the degree of complexity is critical, as it will determine if all phases in the pattern are required. As the relevant people should engage at the earliest opportunity, convening a change agent team to facilitate the cultural change efforts is critical. Ideally, this change agent team enables representation of multiple perspectives from different scales within the client group. The purpose of this team is the fostering of change: designing the participatory process; implementing cultural change processes;

and acting as the core connectors, catalysts, participants and action learners. The team should consist of people who are passionate about sustainability with capacity both to lead and to listen to the different voices within the client group. They should be people who represent different facets of the client group, who are well connected, particularly with strong relationships and who are able to contribute to the creation of a new narrative for the client group. It can also be prudent to include those who may have different views or are hostile to any change.

This phase presents considerable dangers. A client group may have limited knowledge and experience with change methods (such as conventional change methods identified in Chapter 9), and may not be able to embrace emergence-based methods. Further, as complex systems are sensitive to initial conditions, any decisions made in this phase can direct the trajectory of a process Thus, the sustainability practitioner must take great care to maintain flexibility, resilience, and openness to innovative ideas otherwise poor decisions result in undesirable habitual patterns.

Understanding

Purpose:

- To map the existing state of sustainability culture and knowledge within the client group to understand the context of the sustainability activity.

Participants:

- Selected or self-selected members of client group, representative of different aspects, layers, scales and silos.

Actions:

- Identify formal and informal networks;
- Identify natural connectors;
- Identify knowledge and opinion leaders;
- Identify extent of sustainability understanding at different levels and places within the client group, through one-on-one interviews, small group workshops, problem-based learning and other forms of group work;
- Identify barriers to change and weaknesses in the level of sustainability culture
- Identify attractors and stabilities;
- Communicate discoveries to client group; and
- Invite discussion about local context.

Box 13-5 The Understanding Phase

In this phase, the sustainability practitioner must strive to understand the existing culture concurrent with pursuing change. Further, any client group must understand its own culture and realistically assess the nature of any dissonance between group culture and individual values, beliefs, and attitudes. A working understanding of the existing cultural landscape will help in the design of specific actions as situated in the cultural landscape. An understanding will highlight the degree of difficulty of the change program and will make clear both opportunities for change as well as the barriers. It will also identify which parts of the social network need stimulating. Barriers to change can be structure-based and policy-based, and driven by the culture of the decision-makers, thus shaping how things may occur in the rest of the client group. Within a client group, there will be a mix of attitudes to change: some as change agents and others who may resist change efforts. Resistance to change can be expressed either as an active resistance, by acts of omission, or simply as not having the knowledge, capacity or confidence to change.

Cultural mapping involves identifying where both the formal and informal networks lie, and understanding how they operate. Attractors and stabilities can be identified. Such mapping can overlay existing norms, values, attitudes and behaviours. The mapping process contributes to building the local narrative and a basis of trust. Cultural mapping can be politically problematic, as being labelled as a “block” may be contentious (or as a mark of honour, in some cases). Thus, it must be carried out sensitively and not alienate people or appear to target specific people. Lack of co-operation from participants may result, if the discovery process is not open and transparent. Many tools have been developed to map culture in an organization or community, including Social Network Analysis (Scott, 1991); Future Search, Visual Recording and Strategic Forum (Holman, et al., 2007); and Sensemaker (Cognitive Edge, 2008).

Stimulating

Purpose:

- Stimulate social networks within client group, to facilitate the emergence of new patterns, themes and criticalities.

Participants:

- Selected or self-selected members of client group, representative of different aspects, layers, scales and silos of client group for communities and organizations and sustainability practitioners.

Actions:

- Convene small group meetings or workshops, and apply tools appropriate for group work;
- Extend opportunity to local stakeholders to participate;
- Ask prompting questions of an indirect nature to avoid responses situated in habitual patterns: these can be of a provocative nature to generate responses;
- Propose wicked problems to spark innovative thinking;
- Stimulate the telling of local narratives around known critical themes and issues; and
- Scan for emerging patterns, new criticalities and innovative responses.

Box 13-6 The Stimulating Phase

Stimulating social networks can create some discomfort for participants because it disturbs local systems in order to free them from stagnant stabilities and fixed patterns. Stagnant stabilities may no longer serve the purposes of the client group and in any change process they should not be kept in place for their own sake. Stimulation, then, fosters the creation of new patterns of behaviour, new themes and local narratives and a deeper understanding of critical issues. It can also open new pathways for knowledge flow and co-operative behaviour. Stimulating social networks can also serve group learning, generate feedback and help in problem solving. In breaking up entrained patterns, this phase can potentially open the process to greater participation. Such an approach is vital for stimulating innovation, but it may cause conflict rather than discomfort. Therefore in some contexts it may be a high-risk strategy. The sustainability practitioner must bring all their personal qualities to the process, in particular the qualities of openness, flexibility and a sense of perspective to increase levels of trust and strengthen relationships between the practitioner and the client group. Network stimulation can generate issues and conflicts that are difficult for the client group to deal with and which result in chaotic behaviour that may be difficult to resolve. An

example is the Cynefin Framework (as described in Chapter 9), which applies a range of tools and processes to stimulate networks, based around provocative questioning and safe-fail experiments.

Expressing

Purpose:

- To express the preferred vision of sustainability culture for the client group in the local context as a support for any specific sustainability activity.

Participants:

- Selected or self-selected members of client group, representative of different aspects, layers, scales and silos of client group for communities and organizations and sustainability practitioners.

Actions:

- Describe the local norms, values and attitudes needed to support sustainability or sustainability culture within the client group;
- Develop a flexible and adaptive cultural mental model: a meme or schema;
- Articulate appropriate people-oriented markers of sustainability culture to aid reflection on how the culture is changing as the cultural narrative unfolds;
- Acknowledge any contested meanings of sustainability and commit to on-going dialogue;
- Incorporate the preferred sustainability culture in the developing narrative;
- Reinforce the preferred sustainability culture through formal and informal networks; and
- Continue reflective learning processes to learn more about the developing sustainability culture.

Box 13-7 The Expressing Phase

Any vision for sustainability in any context requires an appropriate underlying culture of sustainability. Cultural change for sustainability begins with articulating a vision of a preferred culture: that is, the set of norms, values, attitudes and behaviours expected of people working to fulfill a sustainability vision on behalf of the community they serve or belong to. In principle, if a culture of sustainability has been embedded, people will demonstrate that culture in many diverse ways: through their use of language; how they solve problems; who they connect with and support; whether they actively facilitate sustainability actions; and through their levels of motivation to learn more about sustainability and apply what they have learned. A state of continual learning is needed: as sustainability is a developing culture, people will be adapting to new

situations all the time, and often improvising as they proceed. Things change, new ways of thinking emerge, new technologies become available, and people must be able to assess whether an activity is going to promote sustainability or drive the local system away from sustainability.

The articulation of what a sustainability culture would look like and what are the markers of such a sustainability culture should be developed through an action learning process. Such a process will then help to shape the preferred culture that can then be diffused through the client group as an unfolding narrative sharing the cultural meme or schema, as a deep-seated basis for on-going assessment of the change process. The main risk is that the vision for the preferred culture is too great a step for the present culture due to its demands on the available energy in the local system, and change efforts falter because the challenge is too onerous. This phase can draw on all the tools and methods commonly used in visioning and strategic planning in organizational and community development.

Orienting

Purpose:

- To orient the structure and policies of a community group, organization or project team to embed sustainability principles in decision-making and as core business.

Participants:

- Management or leadership teams; critical decision-makers.

Actions:

- Situate sustainability policy and oversight in a central position in any organizational or project structure;
- Adapt existing formal structures to accommodate sustainability principles;
- Develop sustainability indicators appropriate for the client groups' activities;
- Incorporate sustainability indicators in any reporting processes;
- Alternatively, adopt appropriate sustainability reporting processes developed for specific industries or community domains; and
- Incorporate a statement of the desired sustainability culture and sustainability performance expectations in role or job descriptions and any performance indicators where appropriate.

Box 13-8 The Orienting Phase

This phase of the emergence-based pattern embeds sustainability principles as deeply into the formal organizational or group structure and their codified processes as possible. Thus, the importance of any given structure over any other is diminished, allowing other phases in the model to have increased effect for change. As the other phases are activated, they can foster sustainability through soft systems, rather than defined structures. Further, incorporation of appropriate sustainability reporting can change existing practices. As most change efforts include changes to structure and policy, the emergence-based pattern also accommodates such changes, even though they are largely situated in the mechanistic approach. As many change processes overly focus on changing structures at the expense of other actions, care is needed to ensure that participants do not invest too much of the available motivation for change in the structure and policy paradigm. Further, it is important not to conflate changes in structure and policy with real change as evidenced by acted behaviour.

The main risks with orienting an existing structure towards an emergence-based approach is that the client group structure may not be amenable to re-orientation processes or it may become complacent and not apply its own policies to decision-making. It is also possible that the client group promotes itself as sustainable solely on the basis of changes to structure and policy, without any change to activities, projects and processes, or the underlying culture. As development of structure and policy in organizations is a normal activity, it is likely that successful re-orientation of structure and policies towards a sustainable basis will be strongly influenced by many of the other phases in this emergent pattern.

Leading

Purpose:

- To foster leadership to support sustainability throughout the client group.

Participants:

- Selected or self-selected members of client group, representative of different aspects, layers, scales and silos.

Actions:

- Publicly support the sustainability vision as core business for the client group;
- Clearly and regularly communicate the purpose of sustainability culture change and lead the on-going sustainability narrative process;
- Identify champions: the change agents, innovators, knowledge and opinion leaders, and decision-makers, preferably from key nodes in the formal and informal structures and networks;
- Create a coherent identity for a team consisting of the sustainability champions; and
- Make appropriate delegations to sustainability champions: from advisory to full decision-making.

Box 13-9 The Leading Phase

In this phase as described in Box 13-9 above, two forms of leadership are required: the conventional version, with leaders gaining formal authority through formal structures; and dispersed leadership, where individuals, usually self-selecting, at all layers and scales behave as natural leaders. Both are necessary for an emergence-based approach, as most people are used to leadership within formal authority structures, and will always look to their formal leaders. However, it is well known that people generally respond to natural leaders. Dispersed leadership can amplify sustainability principles in places where formal leadership is less effective in fostering change. Both forms of leadership must clearly demonstrate support for all the sustainability actions. Formal leadership should also encourage individual sustainability champions, publicly declare their support for their role, and treat their advice with due consideration.

Convening a team of sustainability champions to support cultural change will help to build sustainability culture across the client group. Champions promote change by listening to people, advocating new ways of working, proposing innovations, modelling the culture, identifying successes, mentoring peers, offering guidance, proposing solutions and reviewing new plans and policies. Where appropriate, decision-making

capacity should be considered. The leadership phase supports a culture of sustainability in the client group, and reinforces sustainability as a core value. Dispersed leadership through sustainability champions creates “both ways” avenues for communication of sustainability principles and learning from practice. The main risk is that sustainability champions may be ineffective or impotent because of limitations of structure, policy, communication or other issues, and lack of appropriate support and delegations from formal leadership.

Modelling

Purpose:

- To model sustainable behaviour, consistent with sustainability principles and the client group’s sustainability vision and preferred culture.

Participants:

- Leaders, decision-makers, sustainability champions and self-selecting group members.

Actions:

- Leaders, decision-makers and champions to model desired sustainability behaviours at every opportunity;
- Encourage all group members to demonstrate sustainable behaviour at their scale of activity;
- Recognise and reward behaviour change achievements publicly;
- Include changed behaviours in the on-going client group narrative; and
- Incorporate any emergent innovative sustainability behaviour in policy, role descriptions and expressions of preferred sustainability culture.

Box 13-10 The Modelling Phase

This phase should be applied with caution and should not be the main pathway to change. A strictly behaviourist approach can have limiting returns as the novelty of the approach diminishes. However, used wisely, rewards and incentives can reinforce sustainability change actions and promote to other group members the value of such behaviour. The major challenge is to create a desire within the client group to want to participate in change. Modelling of appropriate sustainability-oriented behaviour by the leadership and sustainability champions can have the effect of inspiring others to participate. This phase is situated in the behaviourist paradigm, with focus on changing behaviour as the pre-cursor to cultural change. Social marketing approaches to fostering behaviour change are useful in this phase.

Experimenting

Purpose:

- To conduct experiments to uncover workable options for responding to issues or problems situated in complex space[79].

Participants:

- Leadership, change team and sustainability champions.

Actions:

- Propose options for "safe-fail" experiments;
- Scope possible benefits if experiments succeed and possible impacts if the experiments fail;
- Propose a set of conditional indicators for success and failure;
- Carry out experiments;
- Assess outcomes, emergent patterns and new knowledge;
- Design an intervention in complex space based on the experiment outcomes; and
- Apply the intervention and reflect on the outcome.

Box 13-11 The Experimenting Phase

In complex space, it can be difficult to understand what is happening and thus proposing an intervention or solution can be problematic. Rather than mapping a course of action with a high probability of failure or high level of impact in the event of failure, a "safe-fail" experiment may help to chart a way forward. Such experiments should be designed with the purpose of maximising knowledge about the nature of the complexity while limiting the damage in the event of failure. Risk is therefore contained within what impact a group is prepared to withstand in order to gain the necessary knowledge to move forward. Pattern recognition is an important capacity for the practitioner in this instance: the experiment is likely to provoke some kind of emergent pattern that can suggest a more formal approach, if the practitioner can take advantage of these unique circumstances. Most likely, a cycle of experimentation may be needed to plan and implement an intervention based on emergent patterns.

[79] This phase in the pattern is derived from the Cynefin Framework.

Creating

Purpose:

- To create innovative and appropriate responses to sustainability problems through conscious design processes encompassing scale and complexity.

Participants:

- All members of the client group where practicable working with internal and external specialists and generalists.

Actions:

- Inform the creative process through learning gained via other phases, especially the experimenting phase: explore the emergent patterns;
- Understand the local context and the applicable domains of practice;
- Apply multiple perspectives to decision-making: all proposals should be considered;
- Incorporate appropriate design discipline specialists;
- Eliminate bias and pre-conceived solutions through emergence of local knowledge patterns;
- Generate multiple solution scenarios;
- Make decisions which do not destroy the integrity of intersecting systems;
- Be mindful of second-order and third-order impacts of design decisions and respond to potential adverse effects;
- Communicate “both-ways” through graphic methods appropriate to the client group;
- Engage with all members of the client group to maximise emergent innovation;
- Harness the energy of innovators, change agents and early adopters; and
- Respond to the concerns of those who resist innovation.

Box 13-12 The Creating Phase

The creating phase can traverse complicated, complex and chaotic space. It is the phase where real decisions have to be made: transforming the unknown into the known. While much design emerges from specialist activity, there is an implied trust that the designer understands the local context and will propose appropriate solutions. This is not always the case: in Chapters 4 and 6 I have demonstrated this design divergence through my discussion of the implications of our relationship with technology. Creation of new ideas to solve sustainability problems must go beyond the expert and incorporate local contexts and their emergent patterns and knowledge. Further, the design of a solution for a sustainability context will remain a design only if the full cycle of innovation (as described by Rogers in Chapter 6) is not set in motion.

To achieve that, the members of the client group or social system must be engaged in creating the process of adoption of the designed solution.

Learning

Purpose:

- To expand understanding of sustainability and its implementation, through creation of learning opportunities for participants, as a central aspect of local system feedback.

Participants:

- All members of the client group where practicable.

Actions:

- Encourage members of the client group, especially the champions, change agents and knowledge leaders, to engage in formal action learning processes;
- Encourage mentoring between sustainability champions, change agents and any formal sustainability team with other client group members with less knowledge of sustainability and less experience in activating sustainability;
- Observe where natural Communities-of-Practice (CoPs) form around sustainability practice within the client group and provide appropriate support to sustain them;
- Encourage mentors/mentored and members of CoPs to meet regularly to pool experience, discuss the "wicked" sustainability problems, gain insight into the practical application of sustainability principles to work areas and develop the client group's sustainability narrative;
- Design and implement a specifically targeted and participatory process to develop the sustainability capacity for specialist roles in complex space, including specialist CoPs;
- Develop "How-to" guides for sustainability practice in specialist work areas through a participatory action learning process with relevant participants;
- Provide a social networking medium for stories to be told, with emphasis on communicating stories arising from CoPs and individual reflective practice;
- Conduct Education for Sustainability sessions, through formal and informal processes, with a focus on developing skills to advance sustainability practice; and
- Compile useful sustainability resources or local "wiki"[80] for self-directed learning.

Box 13-13 The Learning Phase

In the learning phase, actions are designed to create the feedback loops needed by a learning organization, community or project team – through formal groups, reflective practice or knowledge sharing processes. These actions link experience to learning, and through reflective processes, sustainability practices in the client group can be re-

[80] An online knowledge base, either open source, or for the benefit of wiki subscribers or members.

oriented to accommodate new knowledge. Such feedback will develop and strengthen network-based activities, and support people at crucial nodes in the formal and informal networks. Linking experience to learning is the essential way for creating a narrative for the client group and to strengthen culture. Working with client group members in a participatory process to determine the local meaning of sustainability and the process of activating sustainability in their specialist work areas is a critical activity. Efforts should be made to include outlying group members in a way that authentically seeks their contributions. This phase is time-dependent and should be seen as a spiralling process developing people in different ways, using different methods over longer time frames.

This phase is possibly the most critical of the phases of sustainability practice. Without an active learning approach, there is effectively no feedback capable of identifying weak signals in the complex domain. Without learning, the client group is unaware of any feedback: whether it is significant, external, unseen and potentially catastrophic. A lack of learning is what can move a practice setting from simple to chaotic space without warning. An embedded approach to formal and informal learning enables the client group to be more resilient, more adaptable and less vulnerable to external shocks. If action learning is not well understood, this phase can revert to a mainstream training delivery exercise, with the result that authentic learning is subsumed by the modular, codified, skills-acquisition nature of mainstream education and training and the feedback link is lost.

Connecting

Purpose:

- To extend the initial social network stimulation and network mapping activities into a sustained process of connecting members of the client group internal networks

Participants:

- All members of the client group where practicable

Actions:

- Scan local networks for emergent sustainability-oriented patterns of behaviour, across scales and complexity domains
- Explore the opportunities created by such emergent patterns
- Scan for attractors of resistant behaviour, and increase support efforts through action learning
- Connect knowledge and opinion leaders into formal and informal networks
- Communicate the sustainability narrative, especially any new learning, information and guidance through formal and informal networks
- Allow new practices to emerge from the informal networks, and support any self-organizing action to develop new processes and project proposals
- Allow client group members to develop their own interpretations of the sustainability narrative and apply them to the development of innovative sustainability practice in their areas of participation
- Develop interactive web-based social media using member-generated content
- Extend internal networks into the wider community beyond the client group: stakeholders, interested parties and customers
- Keep everything loose and alive; avoid rigid, sterile methods
- Be prepared to re-craft the vision and goals as the organization develops its sustainability culture and narrative, and communicate the revisions through formal and informal networks
- Apply all the appropriate phases of the emergence-based pattern as concurrent activity to gain synergies, promote cultural change, change behaviours and practices, and build resilience
- Understand that change efforts do not create linear results: there will be stable activity, followed by collapse in intensity, re-energisation and exploitation of the new energy
- Convene social activities for members of the client group separate from core activity to help create greater social contact and thus build new informal networks.

Box 13-14 The Connecting Phase

This phase demands much of the members of a client group and their sustainability practitioners, as connections require maintenance. Connecting different parts of an organization or group is a core activity in the emergence–based pattern and cannot be taken for granted. It must be seen as the main way to prevent practice from reverting to a silo-based, linear, mechanistic approach, and the group capacity for sustaining internal connectability may determine whether the group can work with complexity. Sustainability practitioners must develop skills in detecting patterns of behaviour. In complexity theory, consistent patterns of behaviour are indicative of an attractor: an emergent form of behaviour where stability is demonstrated. Such stability can be around sustainability activity, in which case it is evidence of the culture change process gaining traction; or it can be a form of stability where change has not occurred, and the old behaviour patterns are demonstrated, representative of blocks, capacity gaps and resistance to change. The cyclic nature of attractors may also conform to the panarchy cycle. Change will not be linear in nature. It will come in bursts of new activity, and then slow down as people have internalised as much change as they can for the period of time; change will eventually regain energy and increase in pace in a new cycle.

Specialising

Purpose:

- To accommodate and respect specialist and expert activity in sustainability change activity.

Participants:

- Technical experts, knowledge leaders and external specialist consultants.

Actions:

- Initiate activities, projects and processes where technical experts and knowledge leaders add value through connecting to local sustainability culture;
- Connect technical experts to the formal and informal networks within the client group and include them in activities under other phases as appropriate;
- Apply specialist knowledge to solve technical problems and design interventions, of a material or virtual nature, or within the client group's soft systems;
- Assess the impact of technical decisions across all facets of the sustainability activity, process or project;
- Respond to local system feedback by adapting technical decisions to broader sustainability principles, local sustainability visions, policies and culture; and
- Maintain oversight of technical expert activity, though formal leadership, sustainability champions and sustainability teams.

Box 13-15 The Specialising Phase

The role of the expert is situated in complicated space where deep knowledge and experience of an activity area are needed. Much sustainability work is project-based and requires the contributions of technical experts. It can involve application of codified knowledge and design methodologies, such as in engineering, planning and architectural, urban or product design. In conventional sustainability practice, the expert or specialist usually leads the change effort, and thus such change efforts may often be framed according to the bias and interests of the specialist. Many specialists do not have a generalist capacity or experience to connect their efforts to the efforts of other specialists and activities in an organization or group. In the emergence-based pattern, the role of the specialist is just as valued as it is in mainstream practice, yet it becomes more connected to other perspectives and contributes to reduction of a silo mentality, depending on the degree of complexity of the practice setting. In this emergence-based pattern of sustainability practice, specialist roles can add greater value to a sustainability activity than occurs in conventional practice by incorporating knowledge gleaned from other parts of the organization, community or client group. Caution is required because experts can exert a substantial amount of influence over the direction and scope of decision-making. If specialist activity loses connection to the whole, then the synergies and emergent possibilities of a connected client group can be lost to a sustainability activity.

13.4.3 Pattern Summary

The twelve phases represent an extensive pattern covering the possible range of contingencies in any practice setting. Some practitioners may find it difficult to work with a large number of practice phases. Thus, it must be noted that all twelve phases may not be needed in any practice setting: they represent potential phases only, and selection of any phase should be guided by the complexity of the practice setting. In the next section, Emergence Pattern 4: Complexity of the Practice Setting, I outline some examples of adaptation of the practice phases to account for the complexity of the practice setting.

13.5 Emergence Pattern 4: Complexity of the Practice Setting

13.5.1 Concept

In Chapter 9, I introduced the Cynefin Framework as a model of organizational change situated in the systems paradigm (Cognitive Edge, 2010a). One application of the Cynefin Framework is in mapping the state of an organization and its culture: it allows the practitioner to understand whether the organization is functioning in ordered space

(simple and complicated), unordered space (complex and chaotic) or disordered space. The framework can also be applied to sustainability activity in any practice setting. Likewise, in any setting, the sustainability practitioner will encounter varying degrees of complexity requiring consideration of multiple action pathways under multiple scenarios.

Even though I contend that sustainability is essentially a matter of complexity, practitioners will encounter situations where simple solutions, with linear reductionist approaches, are highly appropriate. In Chapter 9 I proposed that many contemporary sustainability practices approach sustainability in a linear, reductionist fashion demonstrating little or no understanding of complexity and emergence. I made such a proposition to provoke a change of thinking to encompass complexity.

Therefore, just as Newton's Laws still apply and a mechanistic approach still serves us well in appropriate contexts, we should also retain the linear rational design approach based on simple interventions when situations are actually simple. To approach all situations as if they are chaotic or complex overcomplicates our task. We want to avoid the common practice attitude that all situations require a linear mechanistic response to any sustainability practice setting.

An understanding of the setting state, in terms of simple, complicated, complex or chaotic space, will suggest a strategic response to the current need or the aims of the proposed change activity. As a complement to the Emergence Model, the Cynefin Framework informs practice by categorising different patterns for sustainability practice. This approach situates actions in the four Cynefin domains: simple, complicated, complex and chaotic. Thus the practitioner can draw on actions appropriate to the practice setting and degree of complexity in such practice settings as community and organizational development; technology choice, transfer and application; and resource and place management to name a few examples.

It is arguable that any sustainability practice operates across most of the domains of sustainability practice, requires most practitioner qualities and applies most phases of sustainability practice. However, this final Emergence Pattern crystallises the predominant domains, qualities and phases for practice in simple, complicated, complex and chaotic space as a generalist guideline. The complexity patterns are described in the next section.

13.5.2 Pattern

Simple Space

Predominant Domains:

Ecological; Social; Cultural; Technological; Knowledge; Institutional.

Predominant Qualities:

Generalist and Specialist; Self-aware; Intrinsically Motivated; Receptive; Flexible; Reflective; Coherent.

Predominant Phases:

Activating; Understanding; Orienting; Leading; Specialising.

Example Practice Settings:

Solar photovoltaic system design; Bio-diversity mapping; Energy audit; Green skills training.

Box 13-16 Emergence Pattern 4: Pattern for simple space

The simple space complexity pattern described in Box 13-16 above is suitable for individual practitioners working in project delivery, generally with some kind of design process, using mostly known technologies and approaches in a practice setting that is fundamentally known and understood. It is also the approach for non-professional practitioners working on their own projects or activities. The ecological domain is common to all the patterns of complexity because the consideration of ecological impacts is what sets sustainability apart from other models of development, as I argued in Chapter 4. The social and cultural domains are also present, as even the simplest of technological activity should have a social purpose within a cultural context. The technological domain reflects the technical orientation of most projects in simple space (including hard and soft technology[81]) and the sequential steps in much technological activity in known conditions, indicating the presence of the knowledge domain. Often the simplicity is created by the codified nature of the interacting institutional domain.

The practitioner qualities of “generalist and specialist” and “intrinsically motivated” apply to work in all spaces as well as simple space and coherent personal behaviour can underpin any project. While the process of a proposed activity may be largely known, the practitioner must remain receptive, flexible and reflective, as any simple context can move to from simple space to chaotic space with new inputs or the impact of weak signals. Thus, a change of approach may be needed as a result of a sudden

[81] As discussed in Chapter 6, I described hard technology as “artefact” and soft technology as the designed systems of management, organization and regulation.

change of regulation or funding, or an economic crisis in the broader system, for example.

The identified predominant phases include activating and understanding in all degrees of complexity: all activity has an entry point and the local context must be understood to frame a response. Orienting and leading are critical, as there is usually a project structure to be set up and led by some management entity. And of course, simple space usually requires specialising, although in the simplest contexts specialising may be through inexperienced participants with qualities that enable them to engage with the knowledge base necessary for required tasks. Alternatively, the demands of simple space may be met by generalist practitioner qualities.

Complicated Space

Predominant Domains:
Ecological; Social; Cultural; Knowledge; Technological; Institutional.
Predominant Qualities:
Generalist and Specialist; Intrinsically Motivated; Receptive; Flexible; Responsive; Resilient; Coherent.
Predominant Phases:
Activating; Understanding; Orienting; Leading; Creating; Learning; Specialising.
Example Practice Settings:
Sustainable house design; Sustainability assessment; Environmental impact statements.

Box 13-17 Emergence Pattern 4: Pattern for complicated space

Complicated space is natural home of the specialist, drawing on expert knowledge and pragmatic experience to solve problems, generally through projects or defined actions. This pattern of complexity extends the pattern for simple space (as described above in Box 13-17), but tends to exclude the generalist and scope for direct project leadership by the non-professional. The complicated nature of problems does not mean they are unknowable: through research based on existing knowledge the complicated space becomes known. Problems may be difficult to solve, thus greater resilience is demanded of the practitioner. The phases are identical to those in the pattern for simple space, but the learning phase has been added to allow for deeper research into the nature of problems and the methods needed to bring about solutions.

A critical character of work in complicated space is that activity is highly bounded. As a construct, this bounded characteristic enables decisive action, and manages the

complicatedness of the activity. However, it tends to ignore any looming complexity. Thus activity in complicated space can readily migrate to complex space, by the nature of the activity or by external disturbing influences.

Complex Space

Predominant Domains:
Ecological; Social; Cultural; Knowledge; Technological; Livelihoods; Institutional.
Predominant Qualities:
Generalist and Specialist; Fractal-minded; Navigational; Self-aware; Intrinsically motivated; Receptive; Flexible; Connective; Responsive; Resilient; Reflective; Courageous; Coherent.
Predominant Phases:
Activating; Understanding; Stimulating; Expressing; Orienting; Leading; Modelling; Experimenting; Creating; Learning; Connecting; Specialising.
Example Practice Settings:
Organizational development; Community planning; Designing process systems; Innovation and technology transfer.

Box 13-18 Emergence Pattern 4: Pattern for complex space

The sustainability practitioner working in complex space is likely to draw on all the practice domains, using all the described practitioner qualities and the full suite of phases, as illustrated in Box 13-18 above. Essentially, this is the space where the truly complex and problematic aspects of sustainability are encountered. The complexity is engendered more by the social and cultural state within which a sustainability activity is situated, than the technical components of the activity *per se*. I propose that this pattern is the pattern for working with organizations, communities, institutions and other social groups where change is desired or where change is forced through outside drivers. Further, this is the pattern to apply in order to manage the emergent possibilities of a change context or practice setting.

Chaotic Space

Predominant Domains:

Ecological; Social; Cultural; Knowledge; Technological; Livelihoods; Institutional.

Predominant Qualities:

Generalist and Specialist; Fractal-minded; Navigational; Self-aware; Intrinsically Motivated; Receptive; Flexible; Connective; Responsive; Resilient; Reflective; Courageous; Coherent.

Predominant Phases:

Activating; Understanding; Experimenting; Creating; Learning.

Example Practice Settings:

Hostile organizational mergers; Community conflict; Disaster scenarios; Eco-system collapse.

Box 13-19 Emergence Pattern 4: Pattern for chaotic space

The sustainability practitioner, when recognising chaotic space, should apply the pattern illustrated in Box 13-19 above, and may apply it in two ways: take steps to move the activity into simple space to regain stability; or engage in activity to move the context into complex space, where the value of emergent possibilities can be gained. Moving to simple space may not be possible due to the influence of external drivers, so stabilising a context in complex space around attractors may be a more desirable course. As chaotic space has limited knowability, it demands action: immediate experimentation to clarify what's important and where to apply efforts. Thus the sustainability practitioner is likely to draw on all the domains of sustainability practice and all their sustainability practitioner qualities. Yet the action will have a much more limited set of applicable phases of sustainability practice when compared to the other three domains of complexity. The learning phase is critical: to determine the meaning of the context, the meaning of the action taken and the possibilities of the situation settling in complex space for the emergence of innovation and new directions.

13.5.3 Pattern Summary

The expression of this pattern is broad and coarse-grained and leaves space for further interpretation. I have resisted the extension of the pattern as tailored for specific exemplar practice settings, as I believe that even in similar practice settings, contextual factors will suggest variable approaches. I have taken such an approach because I believe that this pattern requires further trialling in different practice settings. I am content for other sustainability practitioners to apply the patterns to their practice contexts and make their own discoveries. It is possible that future development could result in patterns for specific sustainability activities.

13.6 Conclusions: A Set of Working Patterns

I have proposed the above four Emergence Patterns as new patterns for sustainability practice commensurate with the purpose of this research. These patterns clarify practice approaches from a conventional perspective yet extend the practitioner's understanding to enable and support sustainability activity within complex practice settings where emergence is possible.

I have proposed these patterns in response to the following stimuli:

- My reflections on sustainability practice in Chapter 3;
- The gaps in the typical sustainability models from sustainability discourse which I identified in Chapter 4;
- The gaps in contemporary sustainability practice which I outlined in Chapter 9; and
- My case study experiences as discussed in Chapters 10, 11 and 12.

Further, the Emergence Patterns draw on the Emergence Model as proposed in Chapter 8, which has, in turn, been derived in response to:

- The ways of social and cultural change as discussed in Chapter 5;
- The idea of learning as the critical dimension of feedback in human systems as discussed in Chapter 7; and
- An understanding of the systems paradigm and complexity theory as applied to sustainability (discussed in Chapters 6 and 8).

Mindful of the above trajectory of this research, in this Chapter I set out to explore the following research question: How does the Emergence Model of Sustainability Culture contribute to new ways of sustainability practice? I have responded to this research question by linking the Emergence Model to new ways of sustainability practice through the proposal of four Emergence Patterns of Sustainability Practice:

- Emergence Pattern 1: Domains of Sustainability Practice
- Emergence Pattern 2: Sustainability Practitioner Qualities
- Emergence Pattern 3: Phases of Sustainability Practice
- Emergence Pattern 4: Complexity of the Practice Setting

The four Emergence Patterns described in this Chapter should not be considered as fully formed: rather, they are working, or contingent, patterns. As essentially emergent, they should not be codified to the extent that they cease to be of value in complex

space. I believe that these patterns have a certain authenticity, having arisen from my general practice and case study experience, my reflective action learning, and informed by a range of theoretical perspectives. Other practitioners may find them useful as they are, or may use the fundamental concepts to develop their own Emergence Patterns of Sustainability Practice.

I fully expect the Emergence Patterns will develop over time in response to the on-going practice experience of myself and other sustainability practitioners, and I welcome the prospects for their further development. With the proposal and discussion of the four Emergence Patterns in this Chapter, my research thesis and its embedded arguments and narrative have reached an appropriate denouement. All that remains is to conclude the thesis and to propose recommendations for further research, which are summarised in the following Chapter.

Chapter 14 Conclusions and Recommendations for Further Research

14.1 Conclusions to the Research

In Chapter 1, I set out the case for conceiving of sustainability as a new cultural paradigm (a new "dreaming") and designed this thesis and its research process to investigate the following four themes:

1. Culture as an emergent quality of complex adaptive socio-technical systems;
2. The connections between human action and emergent system qualities;
3. The prospects for the emergence of a culture of sustainability; and
4. The implications of the emergence of sustainability culture for the sustainability practitioner.

In Chapter 1, I reported on my extensive enquiry over the period of this research project, engaging with many different people, cultures, places and social contexts. My argument centres on the proposition that sustainability is fundamentally a new culture, encapsulating the myriad visions, principles, processes and outcomes expressed through contemporary sustainability theory and practice. My proposition holds that, as a culture, sustainability is an emergent quality of our complex adaptive human systems, which are of a socio-technical character. I also contend that as sustainability is holistic in conception, it requires a holistic approach to practice, in addition to the mechanistic prescriptions common to much contemporary sustainability practice. To move towards a holistic approach to practice requires a different type of practitioner from the conventional practitioner: more generalist than specialist, drawing on an "inner sustainability culture" when faced with complex sustainability problems, capable of working across scales, open to discovery of new patterns, and mindful of the degree of complexity in any practice setting.

Therefore, through my guiding proposition, I argued that we need a model of sustainability culture that accommodates the emergence phenomenon as a quality of complex human systems. I further explained that the accommodation of the emergence phenomenon in sustainability discourse has significant implications for sustainability practice and we therefore need new ways of emergence-oriented practice.

In Chapter 1, I outlined two principal research questions and a series of supporting research questions framed to guide my investigation of relevant issues. The principal research questions are re-stated here:

1. What is the role of emergence in the development of sustainability culture?
2. What are the implications of emergence for the sustainability practitioner?

Further, the personal reflective process, which I described in Chapter 3, informed the development of these questions, helped shaped my research methodology (as discussed in Chapter 2), and stimulated my research enquiry into the theoretical knowledge (discussed and critiqued in Chapters 4 to 7 inclusive).

To develop the narrative of sustainability as a new culture, I explored concepts in social and cultural change, the systems paradigm (including chaos, complexity and emergence) and theories of learning (especially informal, reflective learning and intrinsic motivation), with chapters guided by supporting research questions. I engaged in deeper rounds of reflective thinking, culminating in the proposition of an Emergence Model of Sustainability Culture in Chapter 8. In developing an Emergence Model, I proposed a number of working contentions and reflections, as part of the learning cycle of the research program. My intent behind the working contentions and reflections in Chapters 4 to 7 was to weave my sustainability narrative to connect theory to reflective practice. In each chapter's summary, I progressed the argument towards the proposal of an Emergence Model of Sustainability Culture in Chapter 8.

In Chapter 4, I outlined the case for the need for sustainability to be the critical cultural paradigm of the 21st Century, by reviewing contemporary discourse on problematic ecological and developmental issues, and the consequent need for change. I placed contemporary conception of sustainability in the context of such a need, by investigating common perspectives, attitudes, models and frameworks, strategies and modes of assessment. I identified that contemporary conceptions of sustainability do not generally understand the social and cultural aspects of sustainability and proposed that this lack of understanding limits our capacity to implement sustainability holistically: sustainability's "overlooked" dimension.

In my investigation of ways of social and cultural change in Chapter 5,
I identified two paradigms of social change: social change theory and systems theory. I contended that there is a gap in understanding in the conventional perspective,

particularly the inability of social change theory to appreciate the dynamics of complex systems, to place technology at the heart of the change process, and to account for emergence-based change. I considered that change emerges as a new pattern of behaviour and understanding from the complex field of knowledge, values, attitudes, behaviours, agents, characters, relationships and events. I concluded that any desired social and cultural change supporting sustainability relates to the emergent possibilities of complex systems, and socio-technical systems in particular.

I thus placed the systems paradigm at the heart of my theoretical enquiry and explored the main systems theories and concepts in Chapter 6. I proposed the systems paradigm as a way of addressing the gaps in conventional understandings of change and contended that our actions towards change for sustainability are socio-technical in nature. To clarify the understanding of the nature of technology as socio-technical, I discussed the impact of technology in social systems, by means of a review of technology critique, particularly from the late 20th Century. I concluded that such critique did not account for complexity and the emergence phenomenon.

In my reflections on my growing understanding of systems and complexity, it became clear to me that learning, at the individual and social level, was a significant aspect of complex adaptive human systems: the pathway for feedback, reflection and response. Therefore, in Chapter 7, I explored the broad themes in educational psychology and the potential for both formal and informal learning to act as feedback in our human systems. I also described the differences between education and learning. I argued that while formal education creates the foundation for learning, it does not automatically lead to changed behaviour. Further, I argued that informal learning, situated in real-world experience, as an intrinsically motivated and reflective activity, provides us with the means of feedback that can lead to change in our behaviour, our social systems and the development of sustainability culture.

In Chapter 8, I extended the systems discourse into chaos and complexity theory and argued that the concept of emergence contributes to greater understanding of change beyond the values, political preferences and biases of conventional social enquiry. I concluded that change is essentially an emergent quality of complex socio-technical systems. Mindful of emergence, I proposed an Emergence Model of Sustainability Culture as a way to guide our thinking about sustainability as a new culture, and our continuing development of that culture. The proposal consists of three components: a metaphor with imagery of a rocky stream and its behaviour; a manifesto, with fifteen

proposals to support emergence-based sustainability culture; and a graphic image to aid in communication. I believe that this model contributes to a deeper understanding of sustainability culture and to on-going sustainability discourse. In concluding Part 2 Change and Emergence, and introducing Part 3 Contemporary Sustainability Practice, I cautioned that while an emergence model furthers understanding about cultural change, the emergence phenomenon would always represent a significant risk to the sustainability practitioner in pursuing their goals.

In Chapter 9, I reviewed the major themes in contemporary sustainability practice, supported by ideas from community and organizational development, and summarised change methods according to a taxonomy of change paradigms: structure and policy; leadership; competing interests; rational design; behaviourist; action learning; and systems. By means of this analysis, I identified a series of conceptual and capacity gaps in contemporary sustainability practice. I argued that the phenomenon of emergence was a missing dimension in contemporary practice, indicating that dealing with complexity is difficult for many individuals, organizations and communities, and society as a whole. I also argued that current approaches to sustainability practice have not absorbed new thinking from management and community development theory and practice and have not generally incorporated an understanding of complex systems and their emergent capacities into action towards sustainability. I therefore proposed that the best approach to sustainability practice is to retain the usual mainstream change actions (if appropriate to the context and local capacity) and interweave these with emergence-oriented processes.

In Chapters 10, 11 and 12, I reflected on my practitioner experience in three case studies. My experience in remote Indigenous communities (as discussed in Chapter 10) helped me to focus on the fundamental approach to this research and to begin my enquiry into the problematic nature of sustainability when pursued in complex space. I learned from this experience that sustainability practice in chaotic and complex space is of a higher risk, and thus purpose, process and expectations should be framed accordingly, taking into account a long view of the process.

Through my work with the Mt Arthur Centre described in Chapter 11, I learned that in sustainability activity at smaller scales, it can be difficult to maintain a level of motivation to sustain a course of action. Yet sustainability visions can persist over time and the results can be a manifestation of a new dynamic stability.

The Coffs Harbour City Council case study described in Chapter 12 is the major case study supporting this research. The experience helped me to understand the necessity of resilience under the influence of changing cycles. The next phases of CHCC activity may indicate the degree to which a planned approach to stimulating emergent sustainability culture will be effective in embedding sustainability.

My experience in the Action Research case studies tested my capacity to operate holistically and to think more deeply than I had previously about the theoretical basis of this research. The case studies highlighted that practising holistically demands a substantial degree of practitioner capability. In particular, the case studies highlight the importance of culture to sustainability, and how the emergence phenomenon is a key aspect of any work with people and their cultures in different contexts. Further, the case studies highlight that the capacity for any group or social system to sustain action over time in a sustainability-oriented program, process or activity is critical for furthering sustainability as a social goal, especially where activity is complex. The experiences also demonstrate that failure to account for whole systems and their emergent effects results in mixed outcomes: many failures and some successes.

The theoretical perspectives and the Emergence Model of Sustainability Culture of Part 2 in concert with the review of contemporary sustainability practice and the case study experiences led me to propose new patterns of sustainability practice in Chapter 14. I re-stated that my intention as a sustainability practitioner was to develop my abilities to make connections where others do not see them, to link up good ideas from different domains to create a new synthesis, and to balance out competing interests and opinions. I wanted to develop my sustainability practice to the point where my actions become consistent with my holistic rhetoric, my theoretical framework and philosophical stance. To this end, I completed this research by proposing four Emergence Patterns, as new ways of practicing sustainability, mindful of my proposal of an Emergence Model of Sustainability Culture and the underlying emergence phenomenon. The four Emergence Patterns are:

- Emergence Pattern 1: Domains of Sustainability Practice
- Emergence Pattern 2: Sustainability Practitioner Qualities
- Emergence Pattern 3: Phases of Sustainability Practice
- Emergence Pattern 4: Complexity of the Practice Setting

I developed the four Emergence Patterns to link the understanding of complexity and emergence, via the Emergence Model of Sustainability Culture, to synthesise all the reflections, contentions and theoretical frameworks discussed in this research in a way that will inform the ongoing development of my sustainability practice and that of any other practitioners. I hope that sustainability practitioners will find my Emergence Model and Emergence Patterns to be helpful in progressing to a more considered and deeper approach to sustainability practice than is the current situation, especially where sustainability problems are complex and difficult.

14.2 Recommendations for Further Research

In this research, I have developed the Emergence Model and Emergence Patterns to a degree of detail whereby they can be applied to the practice of sustainability. In my opinion, this is a first step. The model and patterns need to be developed further in real sustainability projects in different contexts and different scales, through a spiralling action learning process. I will continue to develop the models and patterns in my sustainability practice. I envisage that with further practical application the model and patterns can be tailored to specific activities, projects and processes, with more focussed mapping where specific change tools can be reviewed for their suitability to the fostering of emergence-based practice. I call on other sustainability practitioners to take up this challenge and develop my models and patterns for their own practice settings.

I fully expect that such a tailoring process will stimulate the development of more patterns for sustainability practice. The development of these new patterns for sustainability practice should be guided by practitioner action learning in real-world sustainability activity, as well as by further academic study of the theoretical basis of the models and patterns.

In Chapter 1, I argued that as this research has been approached in a cross-disciplinary generalist way, a detailed expert-level treatment of the following knowledge domains and their theories, models and processes, was beyond the scope of my research: social change theory; cultural studies; anthropology; indigenous knowledge; systems, chaos and complexity theory; complexity mathematics; educational, environmental and behavioural psychology; community and organizational development; participatory processes; and sustainability strategies, models and tools. I argued that the risk of my generalist approach to this research was that I was

vulnerable to negative critique by specific knowledge domain experts. I further argued that reliance on knowledge domain experts was a factor in our general failure to activate sustainability holistically.

In these closing sentences, I therefore call upon such knowledge domain experts to consider the arguments I have mounted to support my emergence-based proposals. If specific knowledge domain experts find value in the holistic nature of the propositions, in spite of my errors and misconceptions and the shallowness of my treatment of their expert knowledge areas, then I further call on them to apply their deep knowledge to the further research and development of the Emergence Model of Sustainability and the four Emergence Patterns of Sustainability Practice. In this way we may continue to develop a culture of sustainability as a new dreaming and the practice of sustainability will progress further to service humanity's compelling need.

Appendix 1 List of Case Study Documents Produced

Case Study 1: Sustainability of Remote Indigenous Communities in Central Australia

Refereed Reports

Seemann, K., Parnell, M., McFallan, S., & Tucker, S. N. (2008). *Housing for livelihoods: The lifecycle of housing and infrastructure through a whole-of-system approach in remote Aboriginal settlements*. Alice Springs: Desert Knowledge Cooperative Research Centre.

Refereed Conference Papers

Parnell, M. & Seemann, K. (2005, October 26-28). *Developing Lifecycle Models for Sustainable Investment in Desert Communities*. Paper presented to the National Housing Conference 2005, Perth.

Project Reports

Parnell, M. & Seemann, K. (2006). *Desert Knowledge CRC Project 2.104 Developing Lifecycle Models for Sustainable Investment in Desert Communities: Final Report.* Coffs Harbour: Desert Knowledge CRC-Southern Cross University.

Parnell, M. & Seemann, K. (2006). *Desert Knowledge CRC Project 2.104 Developing Lifecycle Models for Sustainable Investment in Desert Communities: Update Briefing Paper*. Coffs Harbour: Desert Knowledge CRC-Southern Cross University.

Parnell, M. & Seemann, K. (2006). *Desert Knowledge CRC Project 2.104 Developing Lifecycle Models for Sustainable Investment in Desert Communities: Milestone 2 Report*. Coffs Harbour: Desert Knowledge CRC-Southern Cross University.

Parnell, M. & Seemann, K. (2005). *Desert Knowledge CRC Project 2.104 Developing Lifecycle Models for Sustainable Investment in Desert Communities: Milestone 1 Report*. Coffs Harbour: Desert Knowledge CRC-Southern Cross University.

Parnell, M. (2005). *Desert Knowledge CRC Project 2.104 Developing Lifecycle Models for Sustainable Investment in Desert Communities: Participatory Monitoring and Evaluation of Housing, Infrastructure and Settlement Planning > The Housing Stories Project > Validation*. Coffs Harbour: Desert Knowledge CRC-Southern Cross University.

Parnell, M. (2005). *Desert Knowledge CRC Project 2.104 Developing Lifecycle Models for Sustainable Investment in Desert Communities: Participatory Monitoring and Evaluation of Housing, Infrastructure and Settlement Planning > The Housing Stories Project > Scope*. Coffs Harbour: Desert Knowledge CRC-Southern Cross University.

Seminar Presentations

Parnell, M. (2008, June 10-13). *Technacy + Sustainability*. Presentation to the Linking Desert Knowledge to Middle School Innovation Workshop for the ASISTM

Innovation, Indigenous Technology and Science Education Project, Alice Springs.

Parnell, M. (2007, May 18). *Sustainability Principles.* Presentation to the Linking Desert Knowledge to Middle School Innovation Workshop for the ASISTM Innovation, Indigenous Technology and Science Education Project Armidale.

Parnell, M. & Seemann, K. (2005, October 25). *The Lifecycles Project of Desert Knowledge CRC.* Presentation to Department of Housing WA, Perth.

Parnell, M. (2005, August 25). *Introducing The Lifecycles Project: Developing Lifecycle Models for Sustainable Investment in Desert Communities.* Presentation to Anmatjere Community Government Council, Ti-Tree.

Parnell, M. (2005, May 17). *Community Engagement*. Presentation to Southern Cross University Academic Staff Research Seminar, Coffs Harbour.

Parnell, M. (2005, March 29-31). *Community Engagement*. Presentation to Outcomes Workshop for the Desert Knowledge CRC: Lifecycles of Indigenous Housing Project, Coffs Harbour.

Parnell, M. (2004, April). *PLA-based Community Consultation Processes for Desert Housing Evaluations.* Presentation to ATSIS Housing and Environment Branch and Desert Knowledge CRC: Lifecycles of Indigenous Housing Project, ATSIS, Melbourne.

Community Learning for Sustainability in a Tasmanian Rural Community

Refereed Conference Papers

Parnell, M., Burnham, R. & Peart, M. (2003, September 27-October 2). *Formal and Informal Learning and Community Partnerships: The Mt Arthur Centre Healing Space Project.* Paper presented to the 3rd International Soul in Education Conference, Byron Bay Region.

Parnell, M. (2002b, July 2-6). *The Mt Arthur Centre Straw Bale Windbreak and Seat: A Learning Experience in Ecological Building and Community Participation.* Paper presented at the Australian Association of Environmental Education Conference, Griffith University, Brisbane.

Embedding Sustainability at Coffs Harbour City Council, NSW

Conference Papers (Accepted, not presented)

Parnell, M. & Hankinson, G. (2005, November 30-December 2). *Sustainability at the local level: pursuing cultural change in Coffs Harbour City Council*. Paper accepted to be presented at the 2nd State of Australian Cities Conference, Griffith University, Brisbane.

Project Reports

Parnell, M. (2010). *Embedding Sustainability – Creating a More Effective Organisation*. Coffs Harbour: Coffs Harbour City Council.

Parnell, M. (2006). *The Sustainability Culture Project at Coffs Harbour City Council: Stage 2 Interim Report: Sustainability Survey*. Coffs Harbour: Coffs Harbour City Council.

Parnell, M. (2005). *The Sustainability Culture Project at Coffs Harbour City Council: Stage 1 Report.* Report prepared for the Sustainability Unit, Coffs Harbour: Coffs Harbour City Council.

Seminar Presentations

Parnell, M. (2010, December 6). *Embedding Sustainability at Coffs Harbour City Council*. Presentation to the General Manager, Coffs Harbour City Council.

Parnell, M. (2009, November 20). *Embedding Sustainability at Coffs Harbour City Council*. Feedback Workshop for Management, Coffs Harbour City Council.

Parnell, M. & Ryan, G. (2006). *Sustainability Inductions for Coffs Harbour City Council Staff.* Presentation to new staff, Coffs Harbour City Council.

Parnell, M. (2005, June 17). *The Sustainability Culture Project: Stage 1 Report*. Presentation to Planning Department Staff, Coffs Harbour City Council.

General

Refereed Conference Papers

Parnell, M. (2003, September 27-October 2). *Connecting Meaningful Learning to a Culture of Sustainability: Some Possible Pathways.* Paper presented to the 3rd International Soul in Education Conference, Byron Bay Region.

Parnell, M. (2003, May). *Reticence in Action: Reflections on People-Centred Research*. Paper presented to the Action Learning and Action Research Process Management Association Annual Conference, Southern Cross University, Tweed Heads.

Parnell, M. (2002, July 2-5). *I Am Having Enormous Difficulty With My Lifestyle: My Struggle with the Culture of Ecological Sustainability.* Paper presented to the Environment-Culture-Community Conference, University of Queensland, Brisbane.

Parnell, M. (2001, July 4-7). *Hidden Synergies: The Way to Sustainable Community Is Not Clear - It Is Hidden Among Things We Know.* Paper presented to Community Technology 2001 Conference, Murdoch University, Perth.

Green, R & Parnell, M. (2001, July 4-7). *Community and The Student Vernacular: A Review of Six Years of Community Building at The University of Tasmania.* Paper presented to Community Technology 2001 Conference, Murdoch University, Perth.

Parnell, M. & Dewsbury, M. (2001, July 11-13). *DOME: Learning Through a Process of Enablement*, Australian Building Education Association Conference 2001, Hahndorf.

Refereed Journal Articles

Parnell, M. (2004). *Reticence in Action: Reflections on People-Centred Research.* Action Learning and Action Research Journal, 9(1) 65-80.

Seminar Presentations

Parnell, M. (2001, November) *Hidden Synergies: The Way to Sustainable Community Is Not Clear - It Is Hidden Among Things We Know.* Presentation to research seminar of the Centre For Research and Learning in Regional Australia, School of Education, University of Tasmania at Launceston.

Appendix 2 Full Text Case Study Documents

Please refer to the attached DVD for full copies of documents listed in Appendix 1.

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