Introducing systems approaches

Book Chapter

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Chapter 1
Introducing Systems Approaches

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1.1 Introduction

Systems Approaches to Managing Change brings together five systems approaches to managing complex issues, each having a proven track record of over 25 years. The five approaches are:

1. System Dynamics (SD) developed originally in the late 1950s by Jay Forrester
2. Viable Systems Model (VSM) developed originally in the late 1960s by Stafford Beer
3. Strategic Options Development and Analysis (SODA: with cognitive mapping) developed originally in the 1970s by Colin Eden
4. Soft Systems Methodology (SSM) developed originally in the 1970s by Peter Checkland
5. Critical Systems Heuristics (CSH) developed originally in the late 1970s by Werner Ulrich

The accounts of the approaches that follow draw heavily on the extensive experience of the contributing authors. They are more than experienced practitioners, they bring the added quality of academic rigour to the reflection on practice that characterises their work. Drawing on the extensive experience of these contributing authors, some of whom are primary originators, this volume is an accessible exposition of the fundamentals of five compatible but different approaches and in addition is an opportunity to update guidance on the use of each approach.

We begin by examining, first, the nature of the complex situations to which systems approaches generally make a claim towards improving. Second, we examine how systems thinking might help manage complex situations more effectively. Third, some perspectives on the nature and development of systems thinking underpinning

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contemporary systems approaches are explored. Fourth, and finally, we provide our own perspective and rationale for the selection of the five approaches chosen and a brief description of each approach.

1.2 The Way of the World

It is Easter week 2009. A quick glance at the news media reveals several stories arising from complex situations calling for better human intervention. Here are just three such stories:

2009 is the twentieth anniversary of the Hillsborough football stadium disaster. Many people in the UK are joining with the families of the ninety six football supporters who were crushed to death shortly after the start of a FA Cup semi-final match between Liverpool and Nottingham Forest at the Hillsborough football ground in 1989. Although in reaction to the tragedy many improvements in the safety of football grounds have been generated, there remains a considerable sense of injustice amongst the families and friends of the deceased that no one has been held to account. In 1990 an official inquiry, which many considered flawed because it failed to give due voice to junior police officers and eyewitnesses, handed down the verdict of accidental death. Harrowing stories about victims who might have been saved continue 20 years on amidst growing evidence of confusion, non-communication, and general lack of leadership amongst emergency services, of police mismanagement and a subsequent police cover-up (senior police officers vetting statements presented to the inquiry), as well as some misguided tabloid news provocation. Aside from the bereaved families, for many groups of people associated with the football industry including the police, the circumstances of that afternoon, remain highly problematic.

The second story relates to a continuing saga of sea piracy – apparently the biggest industry for the troubled African country of Somalia. Individual pirates are among Somalia's wealthiest men. Using sophisticated equipment and modern weaponry, the pirates hijack sailing boats and large cargo ships, treating the ship, its cargo and its crew as hostages for ransom. Given the open seas in which they operate, there appears to be little hope of such attacks being curtailed: there is little chance of an effective military reaction, and little chance of the sea bandits ever facing justice. Although the Easter headline news focused on the deaths and rescue attempts of European and American victims of piracy, the effects of Somalia's sea bandits are far reaching. For the Seychelles it involves the loss of fishing grounds. For Kenya, there have been significant effects on tourism. Cruise ships have begun avoiding East Africa because of the piracy risk, thereby rendering thousands of Kenyan tourism workers jobless. Longer sea routes around Africa to avoid using the Suez Canal have increased costs for shippers and consumers. And Somalia itself is affected because ship owners are reluctant to take on UN contracts transporting the food aid that feeds half of Somalia's eight million people. Only with an expensively deployed European Union naval force were ships' crews willing to make the dangerous aid run into Mogadishu.

The third story is at first sight, and in fresh contrast, more agreeable and hopeful. In the mountainous forests of Indonesia environmentalists have discovered a population of Orangutans – one of the world's most endangered species of apes. Since the 1990s the rainforests in Indonesia have been systematically destroyed by burning at an alarming rate as plantation owners want more land for the production of Palm oil. Palm oil has become very lucrative because it is classed as a clean burning fuel. This fuel is at a premium as an ever demanding global population wants a source of fuel energy not dependent on the politics of crude oil supply and/or having the 'label' of being environmentally benign. The discovery of the Orangutans brings in to sharp relief the politics of food production, energy production, local livelihood strategies (including the widespread very poor working conditions of plantation workers), and of course conservation. Some experts estimate that the animals could be wiped out within two decades given the current rate of habitat destruction.

1.2.1 Big, Big Issues

So what might we learn from these three contrasting stories about the situations in which systems approaches might be helpful? Firstly, they illustrate how localised issues have causes and consequences that have a much wider impact. The Hillsborough disaster represents not just 'a problem' or 'difficulty' of infrastructure design and safety, but invites concerns ranging from basic community relations and policing methods, emergency service training, right through to the responsibilities of the media, politicians, and those financially benefiting from the football industry, even including football sponsors. The Hillsborough story continues to unfold and its consequences on the culture of football are not bounded by national frontiers. Similarly, the localised 'problem' of piracy in a country torn by war and conflict over the past 20 years is not one confined to the offshore waters of Somalia or one that can be easily 'fixed' by military or policing actions. There are many interrelated and interdependent factors involved, with contrasting perspectives on the situation that range from the rights of law-abiding Somali citizens wishing to develop livelihoods, to traders and tourists wanting to travel freely and safely, to sections of a community brutalised and attracted by greed into criminal activity. For the threatened communities of Orangutans, and conservationists concerned with their survival, the 'difficulty' is not just located in the mountainous forests of Indonesia but extends nationally and globally; to national logging concessions and the displacement of villagers from their forest dependent livelihoods, to global trade agreements on fuel. The ongoing, and growing, international concern and high level conversations over climate change suggest that matters of nature and conservation can no longer be regarded as localised issues, but rather are matters that should concern all of us.

In short, our three stories taken from a single day's news coverage over an Easter week-end in 2009 illustrate how localised issues can be translated into many big, big issues. They also illustrate how big issues are characterised by multiple and often conflicting perspectives. There are of course other big issues confronting us

on a daily basis. As a backdrop to Easter 2009 we are continually reminded of the world crises of banking collapses, alongside increased abject poverty, and ecological dilemmas alongside increasing demand on natural resources. The G20 group of world leaders from the world's most powerful 20 economies attended an economic summit in London in March 2009. This was a meeting to tackle the worst economic situation since the 1930s Depression, a situation that is affecting both developed and less-developed countries. Also in the news are the increasingly familiar stories on the melting of huge swathes of the Antarctic ice shelf and predictions of growing shortages of fresh water supply that will have consequences more far reaching than the shortage of oil.

These are big, global issues and could be categorised as issues of sustainability and development, but that doing that does not give any indication about how they may be resolved. At the same time on a national level we face issues in our societies: children living in poor and violent neighbourhoods, an aging population with growing demands for care, how to manage policing in times of terrorist threat and still maintain civil liberties that have been hard won. In our organisations we are constantly trying to adapt to changing circumstances, whether it is for the public sector organisation new government legislation and/or targets forcing re-thinking of process, staff and structure or for the private sector organisation engaged in fierce competition beset by consumer demands and expectations. And for all, rapidly developing technologies can and do significantly change the environment for many organisations and their members.

And as individuals we face our own challenges, whether they be confronting our family concerns of 'what to do about grandpa' or overcoming substance abuse or, on a more fortunate footing, deciding where to go on holiday given some of the big issues above.

Human life is not often simple and straightforward, either professionally or personally. So what is the relevance of this to a book about systems approaches? To answer this, look at the kind of issues above; there are no obvious answers about what to do, different people will see different priorities, and when we begin to make changes unintended (and sometimes unwelcome) consequences emerge.

1.2.2 Messes and Difficulties

1.2.2.1 Is It a Mess or Is It Just Difficult?

Issues of concern to us vary enormously in terms of their complexity and seriousness, from minor hiccups to near-catastrophe, and we can think of all issues falling somewhere on a continuum between minor and straightforward to very complex and crucial. We can label one end of the continuum as being a 'difficulty' and the other a 'mess' (the term coined by Ackoff 1974). We can distinguish between the concept of a mess, and a difficulty, in several ways.

Messes usually have more serious implications; more people are likely to be involved; they include *many interlocking aspects* and may appear in different

guises. As our three stories illustrate, messes usually have a longer time-scale; and they are often more complicated in terms of having many interdependent factors, than a difficulty. In addition to these broad characteristics there is a crucial difference between a difficulty and a mess and that is the extent of *uncertainty*.

If a situation is a mess there is much about it that is uncertain. The uncertainty starts with the situation itself: a mess is hard to pin down; it's difficult even to say what the situation of concern actually is, or what the source of the unease is, and yet things feel not right. With a difficulty we know roughly what an answer will look like: with a mess, we are not at all sure, not least because there are likely to be multiple possible trajectories. Indeed, with a mess it usually doesn't make much sense to talk about 'an answer'. It's more a matter of coping with the circumstances as best one can. With a difficulty we can take for granted the overall context and purpose of the activity; it's simply a matter of how it can best be done. But a mess calls into question priorities and assumptions; and raises questions about how much weight to give to different elements and viewpoints. Moreover, with a mess more aspects are beyond direct control. In short, a mess includes many different and changing perspectives and consequential actions, which contribute towards the overall level of uncertainty.

Some authors characterise a mess in terms of two dimensions, rather than a single continuum. Firstly, there is the multitude of factors that contribute to the scale of the situation. All three stories above have considerable histories attached to them as well as invoking multiple dimensions in terms of interrelated and interdependent human and natural variables, ideas and events. Secondly, a mess is characterised by significant levels of uncertainty, and this in turn is associated with there being multiple and, as evident in the three stories, often conflicting, perspectives on the situation. The first dimension alone signals the continuum from a simple difficulty, where few variables are involved, to a complicated difficulty. When the second dimension comes into play – dealing with uncertainty and multiple perspectives – this signals an engagement with a complex mess. Whereas difficulties, no matter how complicated, can be conceptualized in a straight-forward way and then worked upon, messes are experienced as being much more difficult to get to grips with conceptually.

Systems approaches aim to simplify the process of our thinking about, and managing, complex realities that have been variously described by systems thinkers as messes (Russell Ackoff), the swamp (Donald Schön), wicked problems (Horst Rittel), or in relation to environmental issues, resource dilemmas (Neils Röling). Systems thinking provides ways of selectively handling the detail that may complicate our thinking in a transparent manner, in order to reveal the underlying features of a situation from a set of explicit perspectives.

1.2.3 Traps in Conventional Thinking

Before examining how systems thinking might help our engagement with messes, let us look at how more conventional thinking can be counterproductive in resolving complex issues. Many aspects of our traditional thinking stem from confusing what

is a mess with a simple or even complicated difficulty. For example, it is not unusual to approach the situations described in the three stories by adopting one or more of the following positions.

- Interconnections can be ignored – imagining that the survival of Orangutans has nothing to do with our own lifestyles – rather than looking at the bigger picture.
- A single cause may be assumed – tragic deaths of football supporters from inadequate physical football stadium physical infrastructure – rather than there being multiple interrelated causation.
- It may be assumed that an individual is to blame – a villainous pirate – rather than attempting to understand the ways in which a situation arose that led to a problematic outcome.
- There may be a focus on outcomes (and thus only on what can be measured) – numbers of Orangutans, all-seated football grounds, prosecution of pirates - rather than the processes by which beneficial change might best occur.

This last feature of traditional thinking has widespread relevance in Western societies blighted by the culture of targets, performance indicators and 'best' practice. Simon Caulkin, commenting on targets in the British National Health Service in a piece titled 'This isn't an abstract problem. Targets can kill' in the Observer newspaper on March 22, 2009 wrote:

> The Health Commission's finding last week that pursuing targets to the detriment of patient care may have caused the deaths of 400 people at Stafford between 2005 and 2008 simply confirms what we already know. … [T]argets distort judgment, disenfranchise professionals and wreck morale. Put concretely, in services where lives are at stake – as in the NHS or child protection – targets kill. Targets make organisations stupid. Because they are a simplistic response to a complex issue, they have unintended and unwelcome consequences – often, as with MRSA [infectious disease picked up in hospitals] or Stafford [hospital], that something essential but unspecified doesn't get done. So every target generates others to counter the perverse results of the first one. But then the system becomes unmanageable.

In summary, the traps of non-systems thinking lie in two simple dimensions; firstly avoiding the inevitable interconnectivity between variables – the trap of *reductionism*, and secondly, working on the basis of a single unquestioning perspective – the trap of *dogmatism*.

1.2.4   Systems Thinking Can Help

1.2.4.1   Systems Are Social Constructs

There are two major standpoints on the nature of *systems* that shape and distinguish different systems approaches. Cabrera et al. (2008) describe them in terms of the distinction made between 'thinking about systems' (e.g., accounting systems, personnel systems, ecosystems, health systems, legal systems, etc.) and 'systems thinking'. Elsewhere these traditions have been similarly referred to in terms of
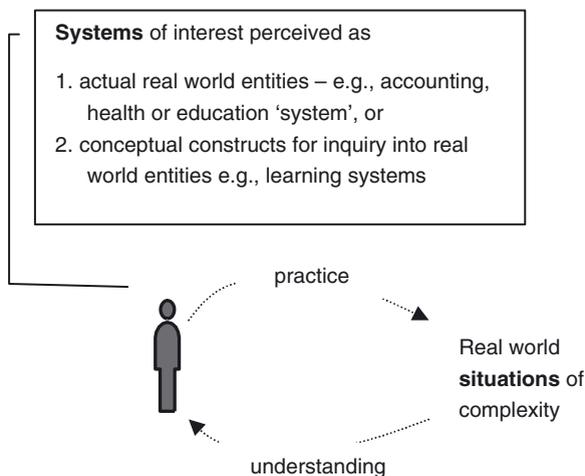
Fig. 1.1 Systems thinking and thinking about systems in a constructivist tradition

'hard' and 'soft' systems thinking (Checkland 1978 ; Jackson 1982). Both traditions have relevance and significance. More formally, the distinction is expressed in terms of the relative emphases of ontological traditions (systems as representing real world entities) and epistemological traditions (systems as learning devices to inquire into real world entities).

There is now agreement amongst systems practitioners that systems are *ultimately* conceptual constructs, and as such contemporary systems approaches can be regarded as belonging to a constructivist tradition. In short, 'systems' are constructs used for engaging with and improving situations of real world complexity (see Fig. 1.1).

Keeping this constructivist idea in mind, we can then examine two key aspects of systems thinking.

1.2.5   Two Aspects of Systems Thinking

> The core aspects of systems thinking are gaining a bigger picture (going up a level of abstraction) and appreciating other people's perspectives (Chapman 2004, p. 14)

The perspective on systems thinking that we use builds on this simple distinction made by Jake Chapman, which in turn builds upon the distinction made by Richard Bawden in identifying two transitions implicit in the history of systems thinking: one, towards holism, and another towards pluralism (Bawden 1998). The two transitions counter reductionism and dogmatism respectively. These two aspects are referred to in many guises by systems practitioners and writers. One of the most influential of

these is C. West Churchman (1913–2004). Churchman described systems both as a process of unfolding, by which he meant heroically 'sweeping-in' as many factors as possible to our systems of concern, and as a process of looking at things from different viewpoints or, as he first coined the term, 'worldviews'. In this latter aspect, his description of a systems approach – *"A systems approach begins when first you see the world through the eyes of another"* (Churchman 1968, p. 231) – remains one of the most frequently quoted descriptions of systems thinking.

So how might we characterize these two aspects of systems thinking? Firstly, systems thinking is about gaining understanding by looking at the relationships between things. Most formalised thinking, including most scientific thinking and indeed most academic endeavour, tries to understand something by pulling it apart. By focusing on relationships you discover how something works by its effects on what surrounds it. Most people recognize they have been in situations where they 'can't see the wood for the trees'. Systems thinking is precisely about changing the focus of attention to the forest, so that you can see the trees in their context. Understanding the forest gives new and powerful insights about the trees. Such insights are completely inaccessible if one concentrates on the individual trees. So, systems thinking is a way of looking at (and making sense of) the world. It is based on an understanding that if one considers a situation as a whole, rather than focusing on its component parts, then there are properties which can be observed which cannot be found simply from the properties of the component parts.

Secondly, systems approaches start with the situation, with its complexity and uncertainty, where an acknowledged part of the problem is to establish and agree what the problem is, and where there will rarely be a single 'right' resolution. So the language of systems is about problem-situation rather than problem, and of resolution (improving the situation) rather than solution (solving the problem). Within complex situations involving multiple interrelated factors including multiple human interests, progress can be made as part of a process of inquiry in searching for, or thinking of relevant wholes, what in systems terminology are sometimes referred to as *systems of interest*. These are *sets of activity which could be described as being organised around a single/particular purpose.*

Such wholes are not pre-determined or existing. Rather they are selected, or identified by someone for a purpose – generally to learn about the complex situation in order to do something about it (change it, improve it). Given that when dealing with a 'mess' what counts as resolution is not clear at the outset then progress in a systems inquiry comes partly from learning what will count as resolution as the inquiry progresses.

1.2.6   Perspectives on Systems Thinking

Systems approaches have a rich historical tradition. Systems thinking in terms of promoting holistic views – particularly emphasising the integral relationship between human and non-human nature – can be traced back to the ancient spiritual traditions of Hinduism (e.g., through ancient texts like the Upanishads and Bhagavad Gita),

Buddhism (oral traditions of the Dhama), Taoism (basis of acupuncture and holistic medicine), sufi-Islam (in translations of the *Kashf al-Mahjûb* of Hujwiri, and the *Risâla* of Qushayri), ancient Greek philosophy (particularly Hericles and Aristotle), as well as being prevalent through the oral traditions of many indigenous tribal spiritual traditions which have existed for tens of thousands of years. The term 'systems' as recognised in contemporary usage, predominantly in Western cultures, was explicitly used first in eighteenth century European philosophy rooted in the works of Immanuel Kant (Ulrich 1983).

Bawden's two aspects of systems thinking – being holistic and being more pluralist – can be used to review systems approaches themselves. There are many different strands of systems thinking, and different perspectives on how to group them. So much so that whilst professing to deal with the complexities of real world situations in a manageable manner, we may well have inadvertently created a complex clutter of systems approaches. There have been many publications about systems thinking and practice in the 60 years since Bertalanffy published his first papers on systems theory. The four volume publication *Systems Thinking* by Midgley (2003) has nearly 100 chapters each dealing with a particular method and in 2001 Eric Schwartz identified 1,000 "streams of systems thought" (http://www.iigss.net/gPICT.jpg). The 1997 International Encyclopaedia of Systems and Cybernetics (François 1997) had 3,000 entries. So in the systems field there is no shortage of approaches; it is diverse with many concepts, methodologies, methods and techniques.

With the large number of 'systems approaches' it is not surprising that there are several ways of thinking about how systems approaches relate to each other and doing this produces different typologies. Typologies can themselves be regarded as system models; particular perspectives on organizing the interrelationships between different entities, each associated with a particular purpose. Here we briefly look at four 'typologies' or perspectives. As with any model, viewpoints are inevitably partial in the sense of being both incomplete and of being viewed from a particular or partisan perspective necessarily based on its own particular purpose. The following short overviews of these four perspectives represent a gradual shift in focus from the systems approach itself, to the situations in which they are used, and finally to the user.

1.2.6.1 Perspective 1: Three Traditions of Systems Thinking (West Churchman, Peter Checkland, Werner Ulrich, Mike Jackson and Others)

That traditions of systems thinking categorized as three sets – 'hard', 'soft' and 'critical', is perhaps the most widely used way of classifying systems approaches. It is intended to recognise prevailing systems approaches whilst also legitimizing new ways of thinking. The distinction is one that builds on Peter Checkland's earlier distinction between hard and soft systems. Checkland (1978) suggested that systems thinking prevailing at the time had rested on an unspoken assumption that systems exist in the real world. Checkland's questioning, and subsequent abandonment, of this 'hard' systems assumption paved the way for an extensive and influential

Table 1.1 Three traditions of systems thinking

Systems 'type'	Selected systems approaches
Hard systems	General systems theory (Bertalanfy 1956)
	Classical (first order) cybernetics, 'mechanistic' cybernetics (Ashby 1956)
	Operations research (Churchman et al. 1957)
	Systems engineering (Hall 1962)
	Socio-technical systems (Trist et al. 1963)
	RAND-systems analysis (Optner 1965)
	System dynamics (Forrester 1971; Meadows et al. 1972)
Soft systems	Inquiring systems design (Churchman 1971)
	Second order cybernetics (Bateson 1972)
	Soft systems methodology (Checkland 1972)
	Strategic assumption surface testing (Mason and Mitroff 1981)
	Interactive management (Ackoff 1981)
	Cognitive mapping for strategic options development and analysis (Eden 1988)
Critical systems	Critical systems heuristics (Ulrich 1983)
	System of systems methodologies (Jackson 1990)
	Liberating systems theory (Flood 1990)
	Interpretive systemology (Fuenmayor 1991)
	Total systems intervention (Flood and Jackson 1991a)
	Systemic intervention (Midgley 2000)

program of 'soft' systems action research based on the position that systems are epistemological constructs rather than real world entities. Meanwhile Churchman's student, Werner Ulrich, and others including Mike Jackson and colleagues at Hull University, identified the need for a distinct third systems thinking strand. Critical systems thinking (CST) shares the same epistemological shift as the soft systems tradition but addresses some of the perceived inadequacies in both hard and soft systems thinking, most notably the inadequate consideration of power relations. Table 1.1 is an example of grouping systems approaches using this schema.

Gerald Midgley uses the three distinctions in Table 1.1 to describe the historical evolution of current ideas of systems thinking and practice as evolving through a series of three "waves", or phases of inquiry (Midgley 2000). Each wave relates to a particular focus of the systems field which brought with it a new set of methods. Wave 1 focused on concrete issues of 'problems' and problem solutions for issues where there was perceived unity of purpose. Wave 2 began with the wider soft systems perspective on people and their perspectives on issues. And Wave 3 introduced added emphasis to power relations and how they affect what problems are addressed, and how they are perceived.

Whilst the three-part model remains very influential, not least because it addresses similar discourses in other disciplines, particularly those sharing ideas from critical social theory and Habermas' three knowledge constitutive interests (Habermas 1972, 1984), some difficulties are associated with the terminology of 'hard' and 'soft' as these have particular gendered connotations which can be difficult to discard. Other terms from critical social theory like functionalist, interpretivist, and

emancipatory are sometimes substituted (cf. Jackson 2000). Another perceived difficulty is the limitation of defining systems thinking only in terms of these three categories. Does it not close up space for other potential synergies?

A question arising from this characterisation of systems approaches is what guidance would a practitioner find useful for using the different approaches in different situations. The focus here shifts towards the situation.

1.2.6.2 Perspective 2: Systems Thinking for Situations (Mike Jackson and Bob Flood)

The perspective here addresses the question of how might practitioners in different situations be guided in making use of the range of systems approaches available. System of systems methodologies (SOSM) builds on the triadic model associated with Perspective 1 with the primary aim to create a classification of systems methodologies that would allow for their complementary use in specified problem situations (Jackson 1990). The important shift in focus here is towards the situations in which systems approaches are applied. SOSM provides a matrix for classifying systems methods on two dimensions: one, the level of complexity of the problem situation (simple or complex), and the other, the degree of shared purpose amongst participant stakeholders (unitary, pluralist, or coercive relationships). It is this latter dimension that draws on the hard, soft, critical typology using metaphors as guiding principles – machine for the 'hard', living organism for the 'soft' and the metaphor of prison for the 'critical' situations. The classification yields a six celled matrix as illustrated in Table 1.2. Each cell defines a problem situation which then invites particular suitable systems methods.

The two dimensions of situations are helpful in delineating the two aspects of systems thinking described above. The simple/complex dimension relates to levels of interrelatedness and interdependencies, and the unitary/pluralist/coercive

Table 1.2 System of systems methodologies (Adapted from Jackson 2000, p. 359)

		Participants		
		Unitary 'hard' systems based on machine metaphor	Pluralist 'soft' systems based on organismic metaphor	Coercive 'critical' systems based on prison metaphor
'Systems' i.e., problem situations	Simple	Simple unitary: e.g. systems engineering	Simple pluralist: e.g. Strategic assumption surfacing and testing	Simple coercive: e.g., critical systems heuristics
	Complex	Complex unitary: e.g., systems dynamics, viable systems model	Complex pluralist: e.g. soft systems methodology	Complex coercive: (non available)

dimension relates to levels of engagement with multiple perspectives. Again such a model has been helpful in prompting systems practitioners to think more clearly about the nature of the problem situation – the 'mess' – in a simplified manner. It has helped with the appreciation that different systems methods might complement each other and indeed complement other approaches used for similar problem situations. Later, SOSM was adapted and became embedded in total systems intervention (TSI) by (Flood and Jackson 1991a, b) – a methodology for drawing different methods together through a three-fold process of (a) creatively exploring problematic situations, (b) choosing an appropriate systems approach, and (c) implementing it.

There are two significant difficulties in using this model. One is in assuming from the outset that a problem situation can somehow be easily identified as constituting one of the six 'problem situation' types depicted in the cells of the matrix. Another difficulty is in the 'fixing' or pigeon-holing of particular systems approaches as being only suitable for specific types of situation. First, there may be different opinions on where different systems approaches 'fit' based upon actual experiences of using the approach. Many approaches though understood as having roots in particular traditions can be used for different purposes. So for example, whilst some may classify VSM as a 'hard' approach – in the tradition of classic first order Cybernetics – others would describe the VSM as an interpretivist or even an emancipatory approach. Similar arguments may be expressed in relation to other approaches, particularly socio-technical systems and systems dynamics, both of which have many 'softer' and more 'critical' dimensions depending on the context of use and the user. Second, such pigeon-holing detracts attention from the potential for systems approaches to evolve and develop through use in different contexts by different users.

The perspective here and in the previous model prompt questions about other related traditions and approaches that might influence systems thinking, along with the influence of their domains or situations of interest. How might systems approaches draw upon and develop synergies with complementary traditions of practice and theory?

1.2.6.3   Perspective 3: Influences Around Systems Approaches (Ray Ison and Paul Maiteny)

This perspective illustrates some key relationships between different systems approaches and other closely related traditions. The authors were particularly concerned about the tendency of systems practitioners to be self-referential and insular. They wanted to recapture some of the wider influences and cross-fertilisation that continues to generate innovative development of systems approaches. The aim was to broaden the understanding and practice of spheres of influence both with respect to other *approaches* outside the traditional systems toolbox, and to other *situations* of interest in which such approaches were evident (Fig.1.2).
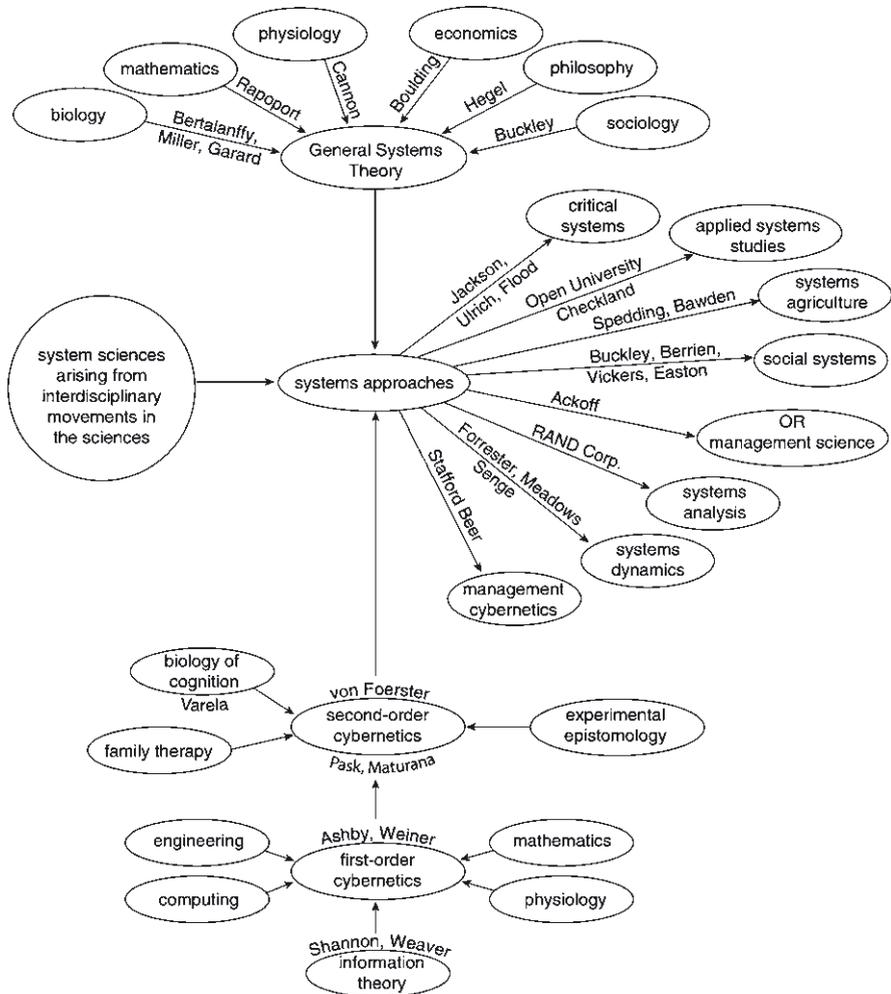
Fig. 1.2 An influence diagram of different systems traditions which have shaped contemporary systems practice (Maiteny and Ison 2000). Reprinted from Ison, R.L., Maiteny, P.T. and Carr, S., 'Systems Methodologies for Sustainable Natural Resources Research and Development', *Agricultural Systems*, p259, Copyright (1997), with permission from Elsevier

Some difficulties arising from such a perspective can be mentioned. Firstly, there are only one-way influences, whereas of course influences tend to be more dynamic (for example, family therapy has arguably been significantly influenced by systems approaches). Secondly, whilst arguably casting a wider net than prevailing perspectives (Tables 1.1 and 1.2), some significant contributors such as C. West Churchman appear not to be present. The difficulties raise some important questions though. A key question is how might systems practice develop synergies with other

practices in different domains in order to keep alive its essential dynamism, and to maintain or raise its profile as being relevant to a range of complex situations in contemporary society. How might we ensure that systems thinking is not just sectioned off as just another academic discipline amongst the number of candidates vying for attention in ever-more challenging circumstances? Another question relates to the role of individual users of systems approaches and the influences that they can bring to bear on contributing towards developing systems approaches.

1.2.6.4   Perspective 4: Groupings of Systems Thinkers (Magnus Ramage and Karen Shipp)

The question regarding the contextual influence of individual systems practitioners is one addressed in the fourth perspective presented here. In *Systems Thinkers* (Ramage and Shipp 2009) the authors uniquely focus on the life and work of individuals behind the systems approaches rather than the systems approaches themselves. It is perhaps for this reason that their demarcation of systems approaches using the diagram below might be even more controversial. The prime intent behind this typology as acknowledged by the authors is to provide a foothold for the readers' engagement with the 30 systems thinkers covered:

> We had arguments with colleagues about the idea of providing any sort of 'map' of the territory. Of course there is no 'true' map – an individual might lay out the connections between these authors in any number of ways, to reveal a different pattern. By providing a model we emphasise certain connections, but underplay others. Yet to offer no map at all – no structure – is to deny the explorer a vital aid to their journey. Without some sort of map, the learner cannot even start to lay down the interconnections in memory. This map, which over time they will refine, extend, amend, embellish, and colour with their own experiences, preferences and insights, can only ever be an approximation, a starting point from which the individual can set out. (ibid, Afterward, p. 309)

Figure 1.3 illustrates the seven groupings: early cybernetics, general systems theory, system dynamics, soft and critical systems, later cybernetics, complexity theory, and learning systems.

As the authors suggest, the perspective here is unconventional and provocative, but was made with the intention of privileging the individuals rather than some abstract notion of either *systems* approaches (schools of thought) or perceived *situations* of interest: "The groupings were created from the starting point of our chosen authors rather than schools of thought, and thus they do not represent a comprehensive guide to a particular school of thought (for example, there are many more thinkers who have contributed to general systems theory than the four we cover)" (ibid).

A few other difficulties might be mentioned. For example, the grouping of soft and critical systems thinking together may cause some discomfort amongst traditional advocates of critical systems thinking who may prefer to hold on to a clear boundary of demarcation. Similarly the grouping of early (first order) and later (second order) cybernetics may appear to mask a very distinctive traditional divide. However, the refreshing and appealing aspect is that the authors are very explicit
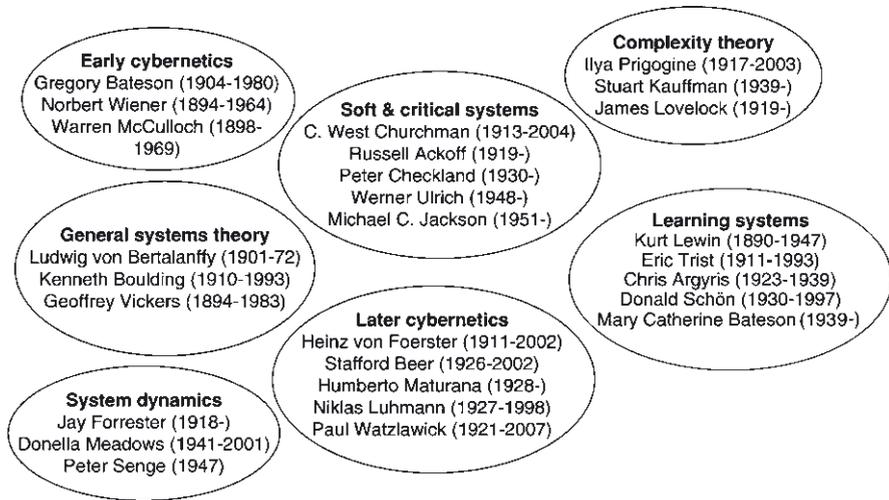
Fig. 1.3 The authors and groupings in Systems Thinkers (Ramage and Shipp 2009, p. 5)

about this being their own particular take on systems approaches. It is derived from a thorough reading around the personal circumstances and interrelationships of the systems authors in their context of practice. It raises questions regarding the role and circumstances of *people* in the development of practice.

There is a paradox here in any attempt at typography. Attempts to categorize tend to deemphasise links and ultimately break links, which arguably is the very problem that gave rise to contemporary systems thinking in the first place. So what perspective on systems approaches have we taken as editors of this reader? Moreover, what is the rationale behind selecting just five systems approaches?

1.2.7   Our Own Perspective

These four perspectives are all helpful in generating an understanding about how different systems approaches may be related to each other and to other schools of thought and practice, and also how they may be related to the situations in which they could be used. The five systems approaches presented in this reader have been chosen because they each demonstrate a rich interplay between the situation, the practitioner community, and the methodology itself. This interplay has generated a convincing and real sense of robustness and vigour for each approach. A second reason for selecting these particular five approaches relates to the different ways in which they take account of three motivations for the use of a systems approach in any systems intervention, namely: understanding interrelationships, dealing with different perspectives, and addressing power relations. All five approaches address each purpose in different ways and to a greater or lesser extent.

1.2.7.1 Systems Approaches in Practice

Peter Checkland identified three recurring attributes or entities relating to any inter-
vention (Checkland 2000): the methodology being used, the context of use, and the
user. The four perspectives outlined above provide different emphases on these
three recurring themes:

1. The methodology or *systems* approach itself (particularly Perspectives 1 and 3)
2. The perceived problem *situation* (particularly Perspectives 2 and 3)
3. The *users* of the systems approach (including local people participating in the
   intervention and the practitioner community who lead such interventions) in the
   context of use (particularly Perspectives 2 and 4)

It is the interplay between these three attributes that determine the effectiveness of any
approach to intervention. Figure 1.4 illustrates the dynamics of these attributes.

The approaches described in this book have each been internationally applied,
in a wide and diverse range of contexts by diverse sets of practitioners. They are
used in several languages and in countries with very different traditions of thinking.
They can be applied over different time-scales – some studies are done in 10–15
minutes whilst others may take several years. They are also used in different
domains of activity including organisational change, information systems strategy
and development, environmental planning, international development, business
strategy, etc. In short, they each embody a rich inheritance from practice.

The practices also have strong theoretical underpinnings which contribute both to
their robustness and credibility amongst practitioners from different traditions. But
perhaps the strongest attribute shared by these five approaches is their adaptability
to change and modification. They have each proved resilient and adaptable given the
challenges of different problem situations, involving different sets of users, bringing
along different traditions of practice involving other conceptual approaches conven-
tionally used for improving situations. Their value resides in their capacity to con-
nect to a variety of professional traditions and schools of thought of different origins
ranging from village-based participatory development initiatives in less-developed
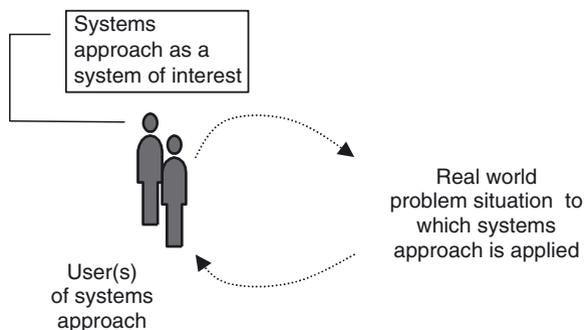countries to multinational corporate enterprises and government.

Fig. 1.4 Three aspects of using a systems approach: situation, user and system

1.2.8 Purposeful Practice

All five approaches in this book treat systems as social constructs. There is variation amongst them as to how much emphasis is put on the imperatives of *thinking about systems* as real world ontological entities, and *systems thinking* using systems more explicitly as epistemological constructs (see Fig. 1.1). Crudely, we might associate SD and VSM with the tradition of *thinking about systems* and SSM, SODA and CSH with the tradition of *systems thinking*, though in practice there is considerable variability amongst individual practitioners

But whether we consider systems as real world entities or not, we are reminded that *any* systems approach involving the conceptualization of systems might be characterized as serving some purpose (cf. Churchman 1968). We are also reminded by Churchman that purposeful intervention (where purposes can change and develop in the course of intervention) is preferable to purposive intervention (where purposes remain fixed). Drawing on Perspective 1 above, and a particular view of the *interrelatedness* between Habermas' three constitutive interests – technical, practical, and emancipatory – (Reynolds 2002) we suggest that any systems approach to intervention fulfils three generalised interrelated *purposes*. In serving these three purposes in an interrelated way, the input to intervention becomes purposeful (subject to change and modification). The outcome of purposeful intervention is systemic change. The three generalized purposeful orientations can be listed.

1. *Purposeful orientation 1*: Making sense of, or simplifying (in *understanding*), relationships between different entities associated with a complex situation. Notwithstanding the roots of some systems approaches in traditions of systems science, all systems approaches explored in this collection arguably present systems more as an 'art' form rather than as a 'science'. The prime intention is not to get some thorough comprehensive knowledge of situations, but rather to acquire a better understanding in order to improve the situation.
2. *Purposeful orientation 2*: Surfacing and engaging (through *practice*) contrasting perspectives associated with complex situations. The success of any systems approach discussed in these pages is ultimately dependent on the user, applying the ideas in a particular context rather than something inherent in a description of the approach. Whilst we may discuss different approaches in an abstract sense, any claims towards their value in creating beneficial change in a situation is dependent on the context of use, the purpose for which it is employed, and the skill and imagination of the practitioner.
3. *Purposeful orientation 3*: Exploring and reconciling (with *responsibility*) power relations, boundary issues and potential conflict amongst different entities and/ or perspectives. The aim here is not to provide yet another ready-to-hand matrix to offer clients through a consultancy, but rather to gently disrupt, unsettle and thereby provoke new systems thinking.

The five systems approaches are chosen for their particular strengths in serving one purpose to a greater extent over the other two purposes. So SD and VSM might be

considered as having a primary strength and focus on making sense of interrelatedness and interdependencies between entities in a situation. For SSM and cognitive mapping associated with SODA, the primary strength and focus is on surfacing and engaging with different perspectives. CSH prompts particular attention to reflective practice and the need to address issues of power implied though our boundary judgements.

These particular strengths are an attribute of the historic roots of each approach. They do not necessarily signal a prescribed way of using the approach. Individual users of SD and VSM may for example experience a value in using the approaches as primary means of engaging with different perspectives and/or power relations. Likewise, users of SSM and SODA may in particular circumstances value its use in understanding interrelationships and interdependencies, or with engaging different boundary judgements. Users of CSH can sometimes attach more importance to understanding interrelationships and interdependencies, and/or engaging with multiple perspectives, again depending on the situation or context of use by individual users. Our rationale for choosing these five approaches is based not upon a prescriptive idea of 'best' *practice*, but rather upon an *understanding* of their particular pedigree – including (a) the experiences of interplay between the approaches themselves, communities of practitioners, and the situations in which they are used, and (b) the original dominant purpose to which they were serve. It is up to you, the reader (and user), to determine the further value of each approach in the context of your own traditions of practice, amongst your own communities of practitioners, and with respect to improving whatever situations of interest you are engaged with.

1.2.9   Five Approaches Described

1.2.9.1   System Dynamics (SD) Authored by John Morecroft

System dynamics was founded in the late 1950s by Jay W. Forrester of the MIT Sloan School of Management with the establishment of the MIT System Dynamics Group (Forrester 1961). At that time, he began applying what he had learned about systems during his work in electrical engineering to everyday kinds of systems. It is an approach to understanding the behaviour of complex systems over time. It deals with internal feedback loops and time delays that affect the behaviour of the entire system. What makes using system dynamics different from other approaches to studying complex systems is the use of feedback loops and stocks and flows in displaying nonlinearity. Forrester started work on servo-mechanism devices to control radar in the late 1950s, and then significantly moved into the field of, first, industrial relations, and later modelling global resource depletion, both of which involved Forrester himself (Forrester 1971). Sustainable development involved modelling of 'world systems'; work complemented significantly through sponsorship by the influential Club of Rome (Meadows et al. 1972, 1992). System dynamics later provided the crux of the systems approach advocated as the *Fifth Discipline* in the celebrated book of the same title authored by Senge (1990).

1.2.9.2   Viable Systems Model (VSM) Authored by Patrick Hoverstadt

The VSM is a model of the necessary and sufficient conditions for the viability of systems. A viable system is a system able to keep an independent existence. To do so it needs to be organised in such a way as to meet the demands of surviving in a changing environment. One of the prime features of systems that survive is that they are adaptable. The model itself was developed by the cybernetician Stafford in several publications, mainly *Brain of the Firm* (Beer 1972) and *Heart of Enterprise* (Beer 1979) for the theory, and *Diagnosing the System* (Beer 1985) for the methodology required for application. Beer's ideas arose out of a synthesis of Eastern and Western thought. His time in India as a very young man and subsequently his interest in Eastern thought, particularly Indian cultural traditions, was a very important factor in the emergence of the VSM. Beer's own engagement with practicing VSM was most notably carried out under invitation to Allende's Chile in the early 1970s before the military coup. Beer effectively founded management cybernetics – now known as Organisational Cybernetics – which is being developed and used extensively by cyberneticians worldwide. VSM , like SD and each of the other approaches in this compilation, has been and is continually being moulded for a variety of different levels of contexts including contexts with disparate purposes. Aside from different organisational fields, it has been used in contexts ranging from promoting efficiency in small organizations and communities to guiding major environmental policy at national and regional levels (cf. Espejo 1990; Espinosa et al. 2008).

1.2.9.3   Strategic Options Development and Analysis (SODA, with Cognitive Mapping) Authored by Fran Ackermann and Colin Eden

Cognitive mapping is a technique for revealing and actively shaping the mental models, or belief systems (mind maps, cognitive models) that people use to perceive, contextualize, simplify, and make sense of otherwise complex problems. SODA was built on Colin Eden's interest during the 1970s in Kelly's psychological work on 'personal construct theory' (Kelly 1955). The notion of cognitive mapping is based upon a process of meaning construction to facilitate negotiation and arrival at some agreed plans of action. Whilst being appropriate at the individual level in clarifying thoughts around a particular issue, work on SODA encompasses much wider contexts of *strategic* thinking; neatly encapsulated through the software acronym JOURNEY making (JOintly Understanding Reflecting and NEgotiating strategY). SODA is the methodology used for cultivating organisational change through attention to and valuing of individual perspectives in a concerted manner. The importance of facilitation (process) skills in consultancy practice is thereby emphasised in tandem with conventional knowledge management (content) skills. The techniques are used in developing strategies for improvement based on three hierarchical systems levels: (a) goals (cf. ideal planning); (b) strategic directions (cf. objective planning); and (c) potential options (cf. operational planning). The two key source publications for SODA are *Making Strategy: Journey of Strategic*

Management by (Eden and Ackermann 1988) and *The Practice of Making Strategy: A Step by Step Guide* (Ackermann et al. 2005). As noted in these publications, the context of their application has varied from dealing with individual decision making to small and large enterprises. It has also been recommended for dealing with wider international inter-organisational relationships (Hewitt and Robinson 2000).

1.2.9.4 Soft Systems Methodology (SSM) Authored by Peter Checkland and John Poulter

SSM is an approach to organisational process modelling. It was developed by Peter Checkland and colleagues at the University of Lancaster Systems Department through a 20 year program of action research. The primary use of SSM is in the analysis of complex situations where there are divergent views about the definition of the problem — 'soft problems' (e.g. How to improve health services delivery; How to manage disaster planning; When should mentally disordered offenders be diverted from custody? What to do about homelessness amongst young people?). In such situations even the actual problem to be addressed may not be easy to agree. To intervene in such situations the soft systems approach uses the notion of a 'system' as an interrogative device that will enable debate amongst concerned parties. The major texts on SSM are: *Systems Thinking, Systems Practice* (Checkland 1981) *Soft Systems Methodology in Action* (Checkland and Scholes 1990); *and Information, Systems and Information Systems* (Checkland and Holwell 1997). The most recent book, *Learning for Action* (Checkland and Poulter 2006) is a 'a short definitive account of SSM and its use' provides the source material for this compilation. SSM has been used to examine organisational change in large multinational corporations, with several hundred participants in the study; it can be used by an individual to manage, for example, personal recovery from substance abuse; it has been used to research Inuit fishing in Labrador; by an NGO volunteer to engage local people in mine clearance after war in the Middle East; by members of a women's forum in Japan to make sense of the impacts of societal changes on their lives; by consultants working on information systems planning in the NHS – these are just some of areas in which SSM has been applied.

1.2.9.5 Critical Systems Heuristics (CHS) Authored by Werner Ulrich and Martin Reynolds

Critical systems heuristics represents the first systematic attempt at providing both a philosophical foundation and a practical framework for critical systems thinking. CSH is a framework for reflective practice based on practical philosophy and systems thinking, developed originally by Werner Ulrich. The basic idea of CSH is to support boundary critique – a systematic effort of handling boundary judgments critically. Boundary judgments determine which empirical observations and value

considerations count as relevant and which others are left out or are considered less important. Because they condition both 'facts' and 'values', boundary judgments play an essential role when it comes to assessing the meaning and merits of a claim. *Critical heuristics of social planning : a new approach to practical philosophy* (Ulrich 1983) is the principle text on this approach. CSH like SSM emerged from an ethical systems tradition promoted through the works of the American systems philosopher C. West Churchman. Werner Ulrich's own work in developing CSH as a means of supporting social planning was rooted in traditions of Churchman's systems philosophy (particularly Churchman 1971, 1979) along with American philosophical pragmatism and European critical social theory. Whilst the CSH case studies described in this compilation are rooted in environmental management, CSH has been deployed in a wide range of significant contexts ranging from health care planning, city and regional planning, and energy and transportation planning (Ulrich 1987, p. 276), enhancing prison service support (Flood and Jackson 1991b), towards promoting an alternative lens for corporate responsibility (Reynolds 2008a) and informing international development initiatives (McIntyre-Mills 2004; Reynolds 2008b).

1.2.10 Chapter Framework

The chapters in this compilation are summarized contemporary versions of the five approaches. For ease of comparison, each chapter is based on a template comprising three substantive sections:

 (i) *Description of whole approach in broad terms*: what it is (nature/ essence of method); what it looks like (basic characteristics/ attributes); and what is its significance (why use it)?
(ii) *Detailed descriptor of the parts*: how it works (tools, concepts) together with the basic techniques, procedures and traps.
(iii) *Descriptor of whole approach in context of use*: why it is significant; a retrospective review of the rules of skilled practice in the application of the approach. What are the minimum claims that might be made on the use of the approach by a skilled practitioner?

Whilst the restricted space does not allow detailed expositions of the theoretical underpinnings of each approach, we trust that the reader will gain an appreciation of both theoretical foundations and practice. The experiences provided in these pages cannot possibly encompass the whole user experience, let alone all users' experiences over at least the last 25 years. Additional experiences of the use of each of these methodologies might be sought from the many readings associated with each approach. But no experiences are more valuable than your own. The approaches described here are not suggested replacements for your own skills, but rather sources for enhancing your skills for managing complex situations.

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Part II Systems practice as juggling

Chapter 2
Introducing systems practice

Abstract

This chapter explains why what is accepted, or not, as systems practice arises in a social dynamic. In this unfolding dynamic, connections are made by systems practitioners who apply key systems concepts and practice different Systems lineages for understanding and managing situations. Some of the concepts and lineages are introduced and described. What constitutes system practice is exemplified by a short reading – an article by Simon Caulkin. The distinction between systemic and systematic practice, a central theme of the book, is introduced and explored.

2.1 *Systems thinking or thinking systemically*

I would like to believe that the ability to think and act systemically is more widespread than seems apparent. It is sometimes surprising for students of Open University Systems courses to discover that they are already systems thinkers. Many students describe an "Aha…" moment in the early phases of their study when they realise that their own way of thinking has a name and is a valid way of engaging with the world. Others take longer before the "aha-moment" arrives. For some it never materialises. The limited research on educating the systems thinker suggests that everyone can develop this ability but for some it is a demanding journey. For example, Helm Steirlin [35 p. 164], philosopher, medical practitioner and psychoanalyst, after a lifetime of systems practice said: 'systemic thinking can only be learned through one's work; it cannot be instilled into others; it needs time to gather experience and to make mistakes'. Following Steirlin, I invite you to consider how this book might help you to create the circumstances where it is safe to fail as you attempt to develop your systems thinking and practice. I phrase it like this as it is in circumstances where it is safe to fail that learn-

ing is maximised. Engaging with Systems is perhaps like learning a new language – I could refer to it as learning 'systems talking', where 'talking' involves thinking and doing, i.e. practice. It is the sort of learning that can challenge our sense of identity. It is as if 'systems talk' is 'talk that undermines the boundaries between our categories of things in the world, [and thus] undermines 'us', the stability of the kinds of beings we take ourselves to be.'[1] On this note, 'systems talk' can, depending on your perspective, be transforming or dangerous because of its ability to transform who we are.

If systems thinking and practice were more widespread then my task would be simpler; it would require awareness raising rather than the more difficult task of inviting you to consider how you currently think and act in relation to complex situations, something that can be challenging, resisted and in want of justification. Those who do not think systemically usually require explanations of what 'it' is and justification or evidence that 'it works' or that there is a 'value proposition' for engaging with it. There is also a tendency to require explanations of effectiveness in causal terms of the form: 'using systems thinking can cause X to happen' i.e., using a framework of linear causality in which a systemic view is lost because one cannot understand circularity by making it linear: after-all a matrix is a complex network of nested and intersecting circular relationships.[2]

Although a challenge, this book is designed for readers of all backgrounds when it comes to systems thinking and practice. This challenge can be understood as a set of interconnected factors that have to be addressed if one is to provide a reading experience, or build a curriculum capable of 'educating' a systems practitioner. It is even more demanding in a distance teaching setting (as in The Open University UK) because my experience, and that of many of my colleagues, is that systems thinking and practice is best learned experientially.[3]

If systems thinking and practice is best learnt experientially then that creates some design difficulties for the author of a book. The simplest challenge is to create the circumstances whereby those who already think systemically can be affirmed in what it is that they do, whether they are aware of it or not. One way to do this is to develop a language, including conceptual and methodological insights, to better understand the nature of their systems thinking. For those who fall into this category it should also be possible to become better at thinking and acting systemically and to be better able to make choices of when to use or not use

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[1]Here I am following positions espoused by John Shotter and Mary Douglass – see Shotter [32, p.4].

[2] Much can be said on this point: My prejudice is that those who demand answers to these questions often do not make the same demands on what they currently do…or, to rephrase it slightly, the systemic effectiveness of what it is that they do. I would further claim that it is not possible to provide arguments for effectiveness in one way of thinking in terms of another way of thinking. Thus, to impose inappropriate evaluative frameworks is to risk paradigm incommensurability or to conflate explanations across different domains.

[3] Even when one cannot in a course DO the real world application, one can do experiential activities that are isophoric. I will explain later what an isophor is and how it works.

this type of thinking. Regardless of where you would position yourself in your systems thinking capabilities it makes sense to invite you to engage actively with the ideas. This is a strategy I pursue. I do so by moving the focus of reading between different authors – my own text and that of other systems thinkers and practitioners. My motivation for doing this is to encourage you to look at what, how and why some systems practitioners do what they do and to compare this to what you currently do, or could do, in similar situations.[4]

If you have made it this far with your reading but do not yet regard yourself as a systems thinker then I would invite you to consider this question:

> What is it that you would have to experience that created the circumstances where you could experiment with thinking and acting systemically?

You may notice that this is a strange question, a bit like asking "what would you have to experience that created the circumstances in which you could experiment with falling in love?" Thus I cannot answer this question for you so I invite you to return to it at the end of the book by which time the experience that answers the question may have arisen. To begin I offer two pointers based on my own experience: (i) abandon certainty, or to phrase it another way, acknowledge the certainty of uncertainty and (ii) be open to your circumstances.[5] Both of these claims concern attitudes or predispositions, which if adopted realise a particular emotional dynamic in which *an other* arises as a legitimate other.[6] By *an other* I mean other people with different experiences, cultures, explanations, other species as well as the biophysical and inanimate world.[7]

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[4] My approach is limited by the format and structure of a book and the act of reading a text – your systems thinking and practice is something you have to 'live' i.e., do. What I write, and my references to other texts, needs to be understood as an invitation to experiment with your ways of doing – it is not a prescription or a demand to do as I say!

[5] When one is open to one's circumstances (surrounding conditions) there are generative or innovative possibilities.

[6] Among human beings this is best demonstrated when a conversation starts in which mutual engagement and exploration happens. My perspective is captured in part by Benjamin Whorf who said: 'it is not sufficiently realized that the ideal of world-wide fraternity and cooperation fails if it does not include ability to adjust intellectually as well as emotionally to our brethren in other countries' [6, p. 21]. To this I add future generations, other species and the inanimate, or biophysical, world.

[7] In making this claim it is important to note that I am not, in the process of legitimizing others, granting them legitimacy. The "arise as" means that we accept them to be already legitimate at the moment we become aware of them, it or circumstance. Legitimate does not mean you like or condone, its an acceptance of what appears as present as being what it is, without having to account for itself or justify itself to you.

2.2 Systems thinking as a social dynamic

At this point let me say that I have no intention of defining what systems thinking or practice is, or is not. In my experience definitions are constraining because (i) they are abstractions and thus a limited one dimensional snapshot of a complex dynamic and (ii) we do not appreciate how definitions blind us to what we do when we employ a definition. Instead I claim that systems thinking and practice arise as a particular dynamic in social relations as part of everyday life. So how might someone recognise systems thinking and practice arising as a social dynamic? The following are the most common:

1. when someone experiences what you say or do and claims that this is thinking or acting systemically;[8]
2. when you engage in some form of personal reflection and make the claim for yourself that you were thinking and acting systemically;
3. when your reflection is more formal as in writing a paper, report or book so that others who read this may agree or disagree to claims about acting systemically.

The key aspect of these social dynamics is: Would you, or someone else, agree that you are doing systems thinking or practice?[9] I suggest that the key to agreement in all of these dynamics is the nature and extent of the connection you and others in the social dynamic make with the history of systems thinking and practice, including the main concepts that have been developed and continue to be used (Table 2.1). In practical terms systems practice can arise when we reflect on our own actions and make personal claims in relation to a history of systems thinking (a form of purposeful behaviour) or when others observe actions that they would explain in reference to the history of systems thinking (a form of purposive behaviour).[10] [11] From this perspective what is accepted (or not accepted) as systems practice arises in social relations as part of the praxis of daily living.

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[8] As I will outline later I understand experience as arising in a distinction we are able to make in relation to ourselves – thus without a distinction no experience arises. To experience a systems practitioner I would claim involves being able to distinguish a manner of acting (or living, or being) in a situation that we choose to describe as 'systemic'. This is most apparent when we experience someone making a connection with lineages of ways of thinking and acting systemically in which congruence between what is said and what is done emerges. My claim does not preclude people acting systemically even though they may not distinguish it as such.

[9] Those interested in this question and its framing may find similarities with Wittgenstein when he said: 'It is what human beings say that is true and false; and they agree in the language they use. That is not an agreement in opinions but in form of life' [40].

[10] Two forms of behaviour in relation to purpose have also been distinguished. One is purposeful behaviour, which can be described as behaviour that is willed – there is thus some sense of voluntary action. The other is purposive behaviour – behaviour to which an observer can attribute purpose.

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Table 2.1 Explanations of some generalized systems concepts likely to be experienced when encountering a system practitioner (Source: adapted from [39]; [5]; and [25])

Concept	Explanation
Boundary	The borders of the system, determined by the observer(s), which define where control action can be taken: a particular area of responsibility to achieve system purposes
Communication	1. communication is understood by some as a simple feedback process (as in a heater with thermostat) involving information but this should not be confused with human communication, which has a biological basis;
	2. from a theory of cognition which encompasses language, emotion, perception and behaviour communication amongst human beings gives rise to new properties in the communicating partners who each have different experiential histories
Connectivity	The relationships between components or elements (including sub-systems) within a system based on factors such as influence and logical dependence
Difficulty	A situation considered as a bounded and well defined problem where it is assumed that it is clear who is involved and what would constitute a solution within a given time frame
Emergent properties	Properties which arise or come into being at a particular level of organization and which are not possessed by constituent sub-systems. These properties emerge from the operational or relational dynamics between the elements or subsystems that comprise a system
Environment	That which is outside the system boundary and which is coupled with, or affects and is affected by the behaviour of the system; alternatively the 'context' for a system of interest
Feedback	A form of interconnection, present in a wide range of systems. Circularity is inherent where the result of a process is taken as an input to the process so that the process is modified. Feedback may be negative (compensatory or balancing) or positive (exaggerating or reinforcing)
Hierarchy	Layered structure; the location, or embedding, of a particular system within a continuum of levels of organization. This means that any system is at the same time a sub-system of some wider system and is itself a wider system to its sub-systems
Measure of performance	The criteria against which a system of interest formulated by an observer is judged to have achieved its purpose. Data collected according to measures of performance are used to modify the interactions within the system
Mess	A mess is a set of conditions that produces dissatisfaction. It can be conceptualized as a system of apparently conflicting or contradictory

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[11] There is another dimension which I will address subsequently – that is the extent to which one experiences in one's own actions, or those of others, a congruence or coherence between what is espoused and what is enacted. I will relate this to the notion of authenticity which as a word has roots in 'self – doing' and 'accomplishment' which I argue can be seen as related to praxis (theory informed action).

	problems or opportunities; a problem or an opportunity is an ultimate element abstracted from a mess
Monitoring and control	Monitoring consists of observations related to a system's performance in the form of prescribed measures or data. When these observations are outside a specified range, action is taken through some avenue of management to remedy or "control" the situation
Networks	An elaboration of the concept of hierarchy which avoids the human projection of 'above' and 'below' and recognizes an assemblage of entities in relationship, e.g. organisms in an ecosystem. Networked entities may be totally parallel, embedded, or partially embedded (structurally intersected)
Perspective	A way of experiencing which is shaped by our current state and circumstances as these are influenced by our unique personal and social histories, where experiencing is a cognitive act
Purpose	What the system does or exists for from the perspective of someone; the raison d'être of a system of interest formulated by someone and achieved through the particular transformation that has been ascribed
Resources	Elements (e.g. matter, energy or information) which are available either within the system boundary or present outside the system in a manner that the system can access and which enable a desired transformation to occur
System	An integrated whole distinguished by an observer whose essential properties arise from the relationships between its parts; from the Greek 'synhistanai', meaning 'to place together'
System of interest	The product of distinguishing a system in a situation, in relation to an articulated purpose, in which an individual or a group has an interest (a stake); a constructed or formulated system of interest to one or more people, used in a process of inquiry; a term suggested to avoid confusion with the everyday use of the word 'system'
Systemic thinking	The type of thinking that arises from the evolutionary trajectory of cognition. In humans this form of thinking takes place through the systemic action of our own cognitive system in a manner that is not limited to language and logic (background systemic thinking). Within language (i.e. in the foreground) it refers to the understanding of a phenomenon within the context of a larger whole. To understand things systemically literally means to put them into a context, to establish the nature of their relationships
Systematic thinking	Methodical, regular and orderly thinking about the relationships between the parts of a whole or the stages of a process. Systematic thinking usually takes place in a linear, step-by-step manner
Tradition	A network of pre-understandings or prejudices from which individuals, culturally embedded, think and act; how we make sense of our world
Transformation	Changes, modelled as an interconnected set of activities or processes which convert an input to an output which may leave the system (a 'product') or become an input to another transformation. Transformations are sometimes referred to as "processes".
Trap	A termed derived through analogy with a lobster pot by Geoffrey Vickers; a way of thinking and acting which is difficult to escape

	from, and no longer relevant to the changed circumstances
World view	That conception or understanding of the world which enables each observer to attribute meaning to what is observed (sometimes the German word Weltanschauung, which refers to both attitude as well as concept, is used synonymously)

2.3 Exemplifying systems thinking as a social dynamic

Some may see my failure to define systems thinking and practice as an abrogation of responsibility or an intellectual 'cop out'. It certainly goes against the grain of most academic practice in which the mainstream perspective seems to be that definitional clarity promotes both operational and conceptual certainty (a position that contradicts my point about the need to acknowledge the certainty of uncertainty!).12 For this reason I want to introduce my first Reading to, hopefully, make my perspective more apparent. Please take some time now to read 'Dyslexic management can't read signs of failure' by Simon Caulkin [8]. The author is a well known journalist formerly with a major UK newspaper who has an espoused commitment to the use of systems thinking.

Reading 1:
Dyslexic management can't read signs of failure
Simon Caulkin
The Observer, Sunday November 25 2007

The real British disease is the unerring talent for putting together entities that are less than the sum of their parts. The comical inability to think in systems terms – call it management dyslexia – was on dazzling display last week, all over the front and back pages.

First up, the England football team. Management is supposed to amplify effort by providing a creative framework for individual expression that benefits the team. But defeat against Croatia was the reverse, the culmination of unmanagement that over several matches has diminished team effort and turned good players into turnips.

It was the opposite of management that left players individually and collectively bereft. At least the England rugby players, in the World Cup, took the initiative to create their own playing system that, although limited, suited the available talent and took them against the odds to the very brink of triumph.

England's Premiership is the wealthiest football league in the world. Its consistent failure to generate a satisfactory national team is deeply rooted and reflected in other systemic shortcomings. Only one of the top teams, Manchester United,

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12 John Shotter [32] has similar concerns when he poses the question (p. 19): 'why do we feel that our language works primarily by us using it accurately to represent and refer to things and states of affairs in the circumstances surrounding us, rather than by using it to influence each other's and our own behaviour?'

has a British manager; the starting line-up of the Premiership leader, Arsenal, contains just one, sometimes no, English player. Oh, and the new £800m Wembley stadium can't even produce a decent surface to play on. From grass upwards, English football is a system for growing anti-synergies.

Second up, a performance by HM Revenue & Customs that makes it hard to know where to begin – with the IT outsourcing that makes it an expensive extra to separate bank details from other personal data, to senior management's decision to dispense with encryption to Gordon Brown's repeated use of the 'one bad apple' excuse: the leak was the result of one individual's failure to carry out procedures – at the dispatch box.

The spectacle of a general blaming his troops is always distasteful, but in this case is also bankrupt. The HMRC leak is primarily the result not of human error, but poor or non-existent systems design which failed in at least three respects: not segregating sensitive from insensitive information, allowing the two to be sent out together, and omitting to encrypt it. If any of those steps had been followed, the further error, of leaving a junior to decide to put it in the post, would have been harmless. This is called fail-safeing – part of any good systems design.

And by the way, don't bother with a witch-hunt or a full-scale investigation to find out what went wrong: with the help of readers and the junior HMRC official, this column offers to find the root cause in a day, using a basic problem-solving technique called the 'five whys' (asking 'why' five times over) – and apply the answers to prevent the problem happening again. The five whys are at the heart of continuous improvement which, in turn, is the motor of systemic performance enhancement.

Last week's third outbreak of British anti-synergy syndrome centred on Norfolk and Norwich Hospital. On Wednesday, the hospital went into 'major incident' alert because it was chocker. At one stage, 10 ambulances (nearly half Norfolk's total) were immobilised waiting to unload their patients.

So the hospital's too small, right? Well, hang on a minute. Why was the hospital full? Because of high demand, coupled with high bed-occupancy rates. Why are bed rates so high? Partly because the hospital is 'efficient', operating at occupancy rates of more than 90 per cent. But also because 60 beds are occupied by patients who have finished treatment but can't be discharged. Why can't they be discharged? Because, for financial reasons, the Norfolk Primary Care Trust is busy closing down the community hospitals that would traditionally have taken recovering patients, and social care, as almost everywhere in the country, is utterly inadequate to cope.

And why is demand so high? An epidemic or major accident? Nope. The extra demand comes from within. It is largely generated by NHS Direct which, terrified of making mistakes, routinely directs callers to A&E or their GP – but since GPs are no longer available out of hours, as a result of the government-imposed contracts, that means A&E.

In other words, the Norfolk NHS crisis, like that of HMRC and team England, was self-generated, the result of complete and continuing system-blindness.

'Problems in organisations,' points out Russell Ackoff, one of the first and best systems thinkers, 'are almost always the product of interactions of parts, never the action of a single part.' Treating a single part destabilises the whole and demands more fruitless management intervention; management becomes a consumer of energy, rather than a creator.

Unfortunately, that's the hallmark of 21st century UK management. As last week demonstrated, it still shows no sign of recognising it.

Caulkin, S., 'Dyslexic management can't read signs of failure', The Observer, Sunday November 25th 2007. Copyright Guardian News & Media Ltd 2009.

As you worked through this reading you may have recognised that Simon satisfies my criterion of what it is to be a systems thinker, i.e., he connects, through a social dynamic, with the history of systems thinking and practice, including the main concepts that have been developed and continue to be used (Table 2.1). The social dynamic is played out in the relationship between a journalist and his offering of a systemic explanation about a set of complex situations. In doing this he connects with the history of systems scholarship, via a named scholar (Ackoff) and his use of systems concepts such as emergence, connectedness, purpose (Table 2.1).[13]

Let me say a little more about how systems practice arises in social dynamics through the analogy of family history research. Family history research (FHR), like systems thinking and practice, is a practice open to anyone. FHR could be seen as an inquiry process into who we are. Understanding who we are through constructing narrative explanations about our past creates a new present – perhaps a new sense of identity – and thus, as we accept new explanations, can create different futures. This overall process is something many people are interested in as evidenced by the television programs that have now developed based on family history research. The main products and processes of FHR involve the construction of lineages. Some stop with the lineage, the family tree, but often the most fascinating part is the stories about people, places, historical events and awareness about the contingency or luck of our own existence. As a form of practice family history research generally starts from the present and works backwards before coming back to the present. For those who engage in it, it invariably changes who they are and thus their future manner of living.

In a manner not dissimilar to family history research, Simon Caulkin referred to Russ Ackoff, an influential scholar in one of the many systems thinking lineages (see below). More importantly though he used stories with concepts based on Ackoff's work to make sense of the situation he was writing about. He thus drew on a particular lineage of systems thinking and applied it to contemporary circum-

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[13] When Simon speaks of 'entities that are less than the sum of their parts' he is referring to the systems concept of emergence; Simon's 'why' questions are associated with purpose and the systems notion of layered structure i.e., system, supra or sub-system (see Table 2.1).

stances.[14] Of course lineages are not static, they evolve and change producing innovative new insights and sometimes conserving unhelpful ideas or ideas no longer relevant to current circumstances.

You may have already realised that my analogy only partly works – in systems thinking and practice there are no genes and thus 'blood ties'. This does not particularly matter – in my experience family history research often reveals how weak 'blood ties' actually are[15] – but it does highlight how important social conventions or institutions (including those in politics, hospitals and academia e.g., through curricula, reading lists etc) are in constituting different intellectual lineages. More importantly in our living we each develop our own intellectual lineage which I shall call our 'tradition of understanding.'[16] I will say more about this shortly.

In my experience the word 'system' is difficult to come to terms with for many people. I know this from first hand experience when, for example, at a dinner party there is often a stunned silence or an awkward initial conversation when, in answer to the question: What do you do? I reply 'Well I am a Professor of Systems'! My explanation in these situations usually varies with context, but behind all my responses there are a few simple distinctions which I depict in Figures 2.1 and 2.2.

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[14] It is perhaps fair to say that the most obvious aspect of Caulkin's article is him complaining about a lack, something missing, rather than offering an alternative. This raises the question: "what good did it do?" My own response is to argue the following: (i) can a journalist do more than raise awareness? (ii) might it not be systemically undesirable to offer 'alternatives' developed out of context (i.e., without stakeholders etc)? and (iii) is not the alternative he offers, perhaps implicitly, the development of systems thinking and practice skills for more effective managing in similar situations? I will return to this issue in Part IV.

[15] Using DNA technology it is now easy to determine what geneticists call a 'non-paternity event.' It is reported that in any project involving more than 20 or 30 people there is likely to be 'an oops in it' [23, p. 9].

[16] Following Russell and Ison [29] I use tradition-of-understanding to refer to what arises in our living – our thinking and acting in the moment – based on our individual development and the history of our evolving understanding (ontogeny of understanding) situated in, or coupled to, a cultural context. From the perspective of an observer a culture can also be said to be evolving.
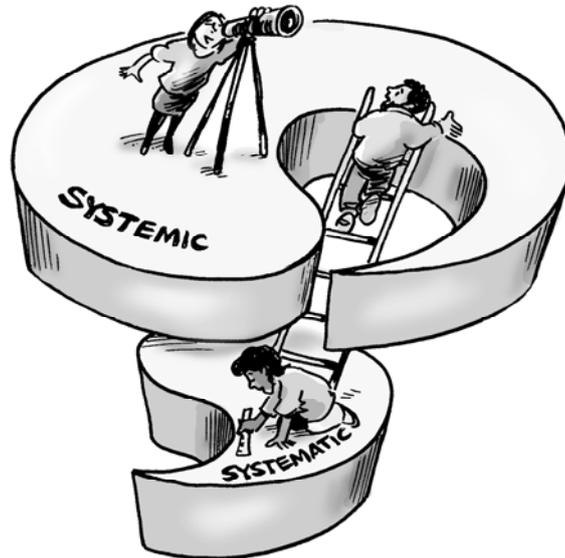
Fig. 2.1 My understanding of the relationship between systemic and systematic, the two adjectives arriving from the word 'system' – the systematic is nested within the systemic or, in other words the systematic is a special case of the systemic; together systemic and systematic form a whole, a unity, known as a duality.

The other distinction that informs my responses is how I understand the relationship between thinking and practice (Figure 2.2). The terms systems thinking and systems practice are different ways of being in the same situation. This can be understood as a recursive dynamic much like the relationship between the chicken and egg – they are linked recursively and bring each other forth – speaking metaphorically they can be seen as mirror images of each other. Understood as a recursive dynamic systems thinking and practice can also be described as systems praxis – theory informed practical action.
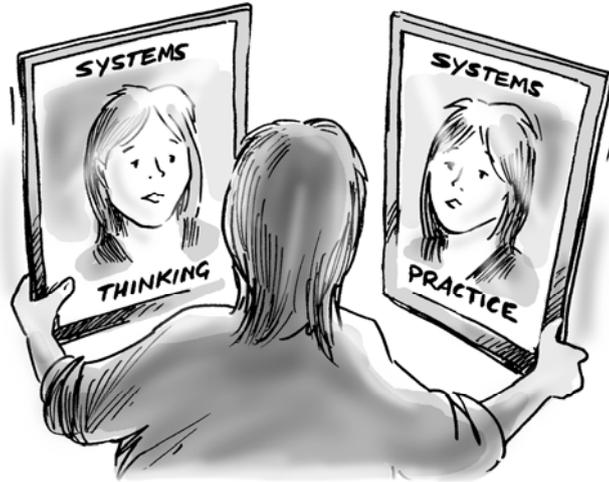
Fig. 2.2 An image of the dynamic relationship between systems thinking and systems practice.

On the basis of the distinctions depicted in Figures 2.1 and 2.2 it might be reasonable to understand systems thinking and practice as arising from the dynamics of systemic and systematic thinking and practice operating within a particular set of social dynamics as I have tried to describe. For me these sets of distinctions help to make sense of the word 'systems' when it is used in a wide range of contexts – such as 'systems approaches' or 'systems disciplines' or 'systems lineages.'[17]

2.4 Different systems lineages

This book is not about different systems thinking and practice lineages. On the other hand to be able to make the most of the book, you will need some awareness of the territory, a rough road map of the 'systems field'. The material in this section provides a short overview – if you are already familiar with this territory then you can pass it over. If you are not familiar with it there are also many books and websites available to explore this territory. When you do so I urge you to try to appreciate where different systems thinkers and practitioners are 'coming from' in what it is they do when they do what they do.

The word system comes from the Greek verb *'synhistanai'*, meaning 'to stand together' (the word 'epistemology' has the same root). A system is a perceived

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[17] Another term is that of 'systemics' which can be understood as an intellectual field – 'an open set of concepts and practical tools useful for gaining a better understandings of and eventual management of complex situations' [15 p.354].

whole whose elements are "interconnected" (Table 2.1). Someone who pays particular attention to interconnections is said to be systemic (e.g. a systemic family therapist is someone who considers the interconnections amongst the whole family; the emerging discipline of Earth Systems Science is concerned with the interconnections between the geological and biological features of the Earth). On the other hand, to follow a recipe in a step-by step manner is being systematic. Medical students in courses on anatomy often take a systematic approach to their study of the human body – the hand, leg, internal organs etc – but at the end of their study they may have very little understanding of the body as a whole because the whole is different to the sum of the parts, i.e. the whole has emergent properties such as 'life' (Table 2.1). Effective systems practice to change or improve situations of complexity and uncertainty means being both systemic and systematic when appropriate (Figure 2.1).

Illustration 2.1

Many, but not all, people have some form of systemic awareness, even though they may be unaware of the intellectual history of systems thinking and practice as a field of practical and academic concern (Figure 2.3)[18]. Systemic awareness comes from understanding:

1. 'cycles', such as the cycle between life and death, various nutrient cycles and the water cycle – the connections between rainfall, plant growth, evaporation, flooding, run-off, percolation etc. Through this sort of systemic logic water availability for plant growth can ultimately be linked to the milk production of grazing animals and such things as profit and other human motivations. Some-

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[18] There is an argument that all people have some form of systemic awareness, that it is inherent in our nervous system and is just not always recognised as such. People will refer to it as "hunch" or "gut feeling" or "insight" … or just act without noticing how they chose to do what they do [4]. This raises an interesting point about my meaning. I mean awareness of one's systemic thinking when I say "systemic awareness – my concern is how we become better at, or use more of, systems thinking and practice in our climate changing world. We cannot do this unless we can cultivate our abilities, however developed and to do so means bringing what systems thinking and practice is into awareness

times an awareness of connectivity is described in the language of chains, as in 'the food chain' and sometimes as networks, as in the 'web of life'. Other phrases include 'joined up', 'linked', 'holistic', 'whole systems', 'complex adaptive systems' etc;

2. counterintuitive effects, such as realising that floods can represent times when you need to be even more careful about conserving water, as exemplified by the shortages of drinking water in the New Orleans floods that followed hurricane Katrina in 2005, and

3. unintended consequences. Unintended consequences are not always knowable in advance but thinking about things systemically can often minimise them. They may arise because feedback processes (i.e. positive and negative feedback) are not appreciated (Table 2.1). For example the designers of England's motorways did not plan for what is now experienced on a daily basis – congestion, traffic jams, emissions etc. These unintended consequences are a result of the gaps in thinking that went into designing and building new motorways as part of a broader 'transport system'.

Systems thinking embraces a wide range of concepts which most systems lineages have as a common grounding. Thus, like other academic areas, 'Systems' has its own language as shown in Table 2.1. It is worth noting that the word 'system' can be used in a number of different ways: (i) the everyday sense as in the 'problem with the system!'; (ii) the academic use of the term as in the phrase a 'system of interest' or 'a complex adaptive system'; (iii) the academic area of study called 'systems' and (iv) a systems approach – practice or thinking which encompasses both systemic and systematic thinking and action.
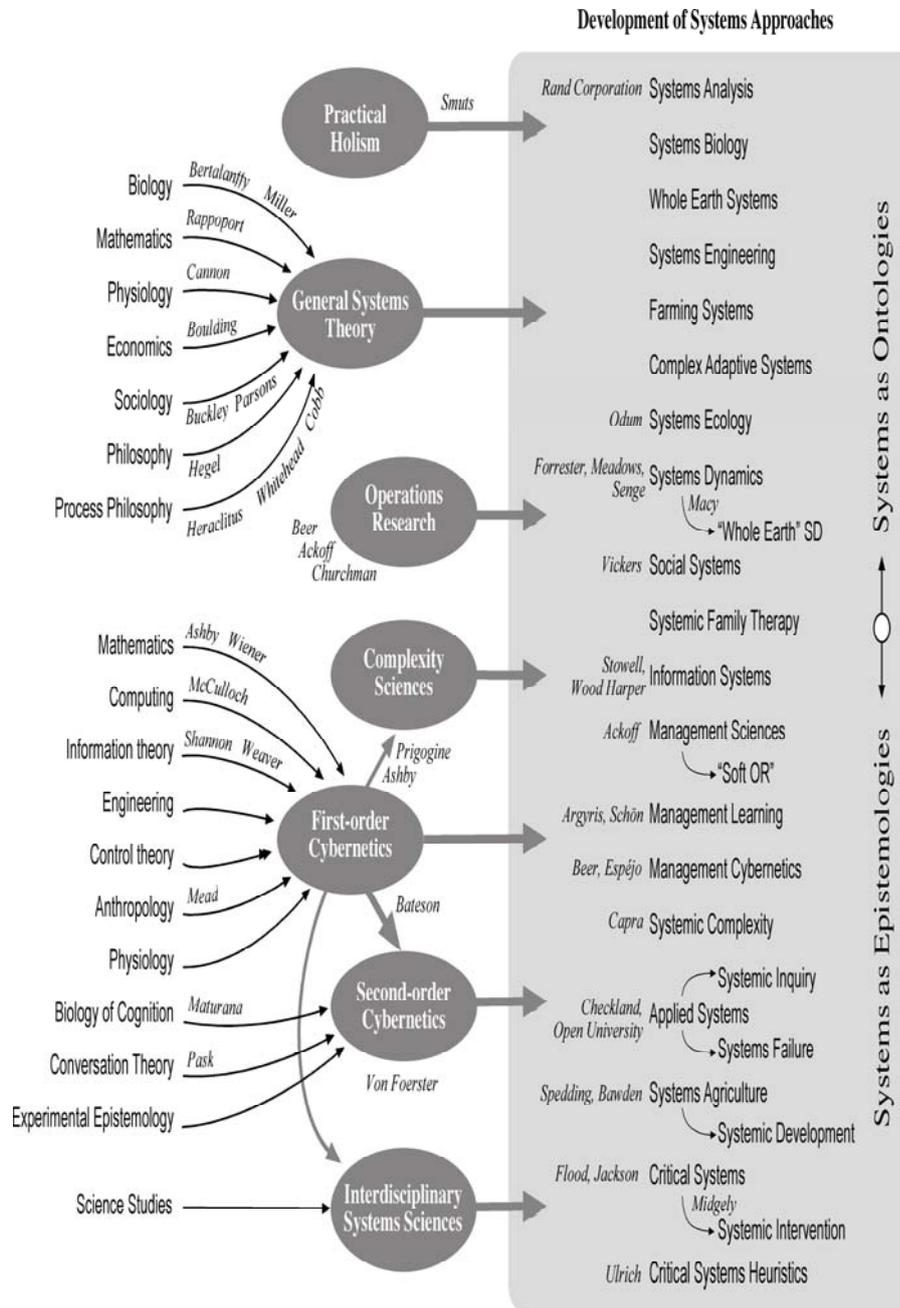
28

Fig. 2.3 A model of some of the different influences that have shaped contemporary systems approaches and the lineages from which they have emerged (Source: Adapted from [18]).

Many well-known systems thinkers had particular experiences, which led them to devote their lives to their particular forms of systems practice. So, within the field of systems thinking and practice there are different traditions, which develop or evolve through different lineages (see Figure 2.3)[19].

Figure 2.3 is best read from right to left in the first instance. Down the right-hand side are a set of contemporary systems approaches which are written about, put into practice and sometimes taught. I have added some names of people (systems practitioners) particularly associated with approaches and lineages though my choices are far from comprehensive. The approaches are also organised from top to bottom in terms of what I perceive to be common commitments, or tendencies, of a majority of practitioners within the given approaches to seeing systems as entities (ontologies) or heuristic devices (epistemologies)[20].

On the left I identify five formative clusters that have given rise to these contemporary systems approaches. By following the arrows backwards one can get a sense of some of the different lineages, though rarely are they as simple as depicted here. This figure has many limitations and it is not possible to describe all these influences nor approaches in detail but it does capture a way of understanding the 'systems field'.

There is a close affinity between systems thinkers and process thinkers. Some historical accounts of systems lineages start with the concerns of organismic biologists who felt that the reductionist thinking and practice of other biologists was losing sight of phenomena associated with whole organisms [3]. Organismic or systemic biologists were amongst those who contributed to the interdisciplinary project described as 'general systems theory' or GST [4]. Interestingly 'systemic biology' is currently enjoying a resurgence [24]. Other historical accounts start earlier – with Smuts' [33] notion of practical holism or even earlier with process thinkers such as Heraclitus who is reputed to have said: "You cannot step into the

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[19] I do not clam that this depiction is in any way definitive – a major limitation of it is that it does not include the many valid French, German and Spanish, and possibly other, contributions to contemporary systems approaches. This in itself also highlights how the different language communities give rise to intellectual silos. Many people have contacted me after seeing an earlier version of this figure to tell me that something, or someone, is missing. If this is the case then I am apologetic, to a certain extent; but in a way it also helps me to make the point that like all disciplinary fields Systems is not a homogeneous field – how it understands itself is contested. So, please feel free to take this figure and adapt it as you see fit.

[20] I expand on this issue in Chapter 3; some may have chosen to describe this in terms of positivist or constructivist commitments, respectively. My intention in this figure is not to label or classify any approach or practitioner – merely to organise, and reflect on, my experience. How others might order the various systems practitioners/approaches on these dimensions could produce an illuminating conversation. I also want to make it clear that placement along this spectrum is not an attempt to rank on my part.

same river twice, for fresh waters are ever flowing in upon you." Other historical accounts can be found in Checkland [9]; Francois [15]; Flood [12; 13]; Jackson [19]; Midgely [22]; Ramage and Shipp [27] or on Principia Cybernetica [26].

Some of the motivation for the 'GST project' in interdisciplinary synthesis can be explained by the realisation in many disciplines that they were grappling with similar phenomena. This project had its apotheosis in the interdisciplinary Macy conferences in the 1940s and 50s which did much to trigger new insights of a systems and cybernetic nature and subsequently a wide range of theoretical and practical developments [16]. So, although many now argue that GST, as an intellectual project, has not been sustained it has none-the-less left a rich legacy [5].

A good example of how the lineages have operated is that of the relationship between Kurt Lewin, the cybernetic concept of 'feedback' and the everyday concept of 'feedback' [19]. Checkland [9] established a connection with Kurt Lewin's view of 'the limitations of studying complex real social events in a laboratory, the artificiality of splitting out single behavioural elements from an integrated system' [14]. Checkland goes on to say: 'this outlook obviously denotes a systems thinker, though Lewin did not overtly identify himself as such...' (p.152). A central idea in Lewin's milieu was that psychological phenomena should be regarded as existing in a 'field': 'as part of a system of coexisting and mutually interdependent factors having certain properties as a system that are deducible from knowledge of isolated elements of the system' ([10], quoted in Sofer [34]). Whilst Lewin may not have overtly described himself as a systems thinker, he was none-the-less a member of the Macy conferences 'core group'. He attended the first two conferences but died in 1947, shortly before the third conference, and his influence was lost to the group (especially his knowledge of Gestalt psychology). His work was taken up however and has informed the study and description of group dynamics and he is also seen as the founder of 'action research'.

Below GST in Figure 2.3 the next two clusters are associated with cybernetics, from the Greek meaning 'helmsman' or 'steersman'. The term was coined to deal with concerns about feedback as exemplified by the person at the helm responding to wind and currents so as to stay on course. A key image of first order cybernetics is that of the thermostat controlled radiator – when temperatures deviate from the optimum feedback processes adjust the heat to maintain the desired temperature. Major concerns of cyberneticians were that of communication and control (Table 2.1). As outlined by Fell and Russell [11] the first-order cybernetic 'idea of communication as the transmission of unambiguous signals which are codes for information has been found wanting in many respects. Heinz von Foerster, reflecting on the reports he edited for the Macy Conferences that were so influential in developing communication theory in the 1950's, said it was an unfortunate linguistic error to use the word 'information' instead of 'signal' because the misleading idea of 'information transfer' has held up progress in this field [5]. In the latest theories the biological basis of the language we use has become a central theme' (see first and second-order communication in Table 2.1).

Fell and Russell [11] go on to describe the emergence of second-order cybernetics in the following terms: 'second-order cybernetics is a theory of the observer rather than what is being observed. Heinz von Foerster's phrase, "the cybernetics of cybernetics" was apparently first used by him in the early 1960's as the title of Margaret Mead's opening speech at the first meeting of the American Cybernetics Society when she had not provided written notes for the Proceedings' [36].

The move from first to second-order cybernetics is a substantial philosophical and epistemological jump as it returns to the core cybernetic concepts of circularity and recursion. These scholars applied the core concept of circularity to itself by recognising that there is a circularity between the observer and their world. An action on the world changes perception of the world which in turn changes the action, again. Action and perception develop as a circularity. This leads to the understanding that observers bring forth their worlds [21; 37]. von Foerster [38], following Wittgenstein, put the differences in the following terms: "Am I apart from the universe? That is, whenever I look am I looking through a peephole upon an unfolding universe [the first-order tradition]. Or: Am I part of the universe? That is, whenever I act, I am changing myself and the universe as well [the second-order tradition]. The implications of these two questions are addressed in Chapter 5. It is worth making the point that understandings from second-order cybernetics have been influential in fields as diverse as family therapy and environmental management. Some authors equate a second order cybernetic tradition with radical constructivism although not all agree.

Operations research (OR) is another source of influence on contemporary systems thinking and practice. OR flourished after the Second World War based on the success of practitioners in studying and managing complex logistic problems. As a disciplinary field it has continued to evolve in ways that are mirrored in the systems community.

A set of influences, recently popularised again, have come from the so-called complexity sciences (Figure 2.3) which is a lively arena of competing and contested discourses. As has occurred between the different systems lineages, there are competing claims within the complexity field for institutional capital (e.g. many different academic societies have been formed with little relationship to each other), contested explanations and extensive epistemological confusion [30]. However, some are drawing on both traditions to forge exciting new forms of praxis (e.g. Mackenzie [20]).

Other recent developments draw on interdisciplinary movements in the sciences, especially in science studies. These include the rise of discourses and understandings about the 'risk' and 'networked' society' [2; 7], and associated globalisation which have raised awareness of situations characterised by connectedness, complexity, uncertainty, conflict, multiple perspectives and multiple stakeholdings [17]. It can be argued that this is the reformulation and transformation of an earlier discourse about the nature of situations that Ackoff [1] described as 'messes' rather than 'difficulties' (Table 2.1), Schön [31] as the 'real-life swamp' rather than the 'high-ground of technical rationality' and Rittel and

Webber, [28] as 'wicked' and 'tame' problems. Schön, Ackoff and Rittel all had professional backgrounds in planning so it is not surprising that they encountered the same phenomena even if they chose to describe them differently.

Unfortunately the systems thinkers and practitioners responsible for the different lineages depicted in Figure 2.3 are more often than not remembered for a particular method, methodology or technique. These are not insubstantial achievements but an unintended consequence has been to divert attention away from the dynamics of systems thinking and practice as depicted in Figure 2.2 – or in other words away from systems praxis. Later I draw upon a particular lineage of systems ideas which is concerned with the relationship between a 'framework of ideas', a method, a practitioner and a context or situation. I will argue that this relationship is key to effective systems practice and also the essence of methodology. The point being that the ways in which all combinations of these factors are combined are unique to time and place – much like an actor's performance.

I do not know to what extent Simon Caulkin has immersed himself in the different systems lineages discussed above; in one sense it does not matter. What is clear is that he has a sufficiently profound understanding of some of these lineages to be able to write an insightful article about an important issue. And by his use of the concepts he shows, to me at least, that he understands what he is talking about.

In Reading 1 Caulkin also referred to a form of systems practice which he called 'system design'. I say more about this form of practice in Part III. A test of Simon's effectiveness as a systemic journalist is whether, as a result of reading the article, you now have: (i) a new (or more) systemic understanding that did not exist before of some complex situations, or (ii) an experience in which your own systemic understanding has been affirmed. A key element of this social dynamic is whether you found Simon's explanations satisfying (in the sense of accepting them) or not![21]

2.5 System or situation?

Simon Caulkin's article (Reading 1) can also be explained in terms of the dynamic depicted in Figure 1.3 which related changes in understandings to changes in practices for transforming situations. In his article Simon describes situations in which something is at issue and, although not strictly in these terms, he argues that the only way these situations can be transformed for the better is through changes in understandings and practices that are more systemic. But what is it about situations that make them more or less amenable to systemic description and improvement? Is this even a sensible question? In the next chapter (Chapter 3) I want to answer these questions.

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[21] I will say more about how explanations arise in a social dynamic in Chapter 3.

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Messy Issues, Worldviews and Systemic Competencies

Richard Bawden

Introduction

This chapter continues the story of the tradition of systemic praxis that emerged from Hawkesbury Agricultural College in Australia from the late 1970s. While *critical social learning systems* (CSLS) best describes this ongoing tradition at this present time of writing (2009), the concept of a critical learning system did not appear explicitly in the Hawkesbury literature until the mid nineties (Bawden 1994). The seeds of this powerful notion however can be traced right back to the seminal papers describing the logic and organization of the foundations of the initiatives in systems education at that institution (Bawden et al 1984; Macadam and Bawden 1985). Details of developments of the Hawkesbury initiatives over subsequent years appear in Bawden (2005) in which an extensive list of references to other publications that trace and describe intermediate developmental stages of the Hawkesbury endeavours, can also be found. While the word 'social' is not explicitly included in descriptions of the nature and development of critical learning systems in this endeavour, a strong emphasis on social or collective learning has been an essential feature of the initiative from the outset.

For instance, five particular aspects of the developments of the Hawkesbury initiatives – that are well worth noting at this stage – can be stated as a set of beliefs or tenets that came to be held collectively by the Faculty as a whole:

- Experience is a critical source of human learning and development
- Such experiential learning is essentially a multi-dimensional, developmental system of cognitive processing by which we make sense out of world around us as the foundation for the actions that we take as we live our lives in it
- What we learn about the world is markedly influenced both by the way we go about that learning and by the limitations that are imposed by the particular intellectual and moral perspectives (worldviews) that each of us (usually tacitly) adopts through which we 'filter' our 'sense-making'
- Worldview perspectives are themselves capable of development as reflected in transformations of basic value and belief assumptions which are achieved essentially through 'higher order', critical cognitive processing
- The ability to act systemically in the world, with an acute appreciation of 'wholeness', 'inter-connectedness' and 'emergence', is a function of particular

intellectual and value assumptions concerning the nature of reality, the nature of knowledge and of knowing, and the nature of human nature.

The significance of these five key assumptions to the emergence and character of Critical Learning Systems as they have evolved at Hawkesbury will become apparent as the narrative of this chapter unfolds.

Learning Systems creating Systems of Learning

A most compelling aspect of the emergence of the principles and practices of CSLS at Hawkesbury has been the sustained commitment, over many years, of some forty educators or so, to an enterprise which has led to the evolution of a radically unconventional system of learning: one which has been characterized by a systemic, experiential approach to social learning for collective development. The insights and practices that have come to characterize this enterprise have emerged over the years through the experiences, thinking, reflections and actions of those academics and through their co-engagement with hundreds of their students and scores of other stakeholder actors in the events and ideas of the times. In other words this has been a developmental project characterized by the social experiential learning and collective action of the academics that has led, in turn, to the development of their theory-informed practices as facilitators of social experiential learning and collective action. In essence, these academics have persistently walked their own talk on a path of social learning for change that they have been laying down even as they have walked! And as circumstances have unfolded, that path has taken many different twists and turns and developed many branches with many individuals eventually leaving Hawkesbury and going their own way while creating their own paths of systemic development.

Incredibly, what started out as a relatively circumscribed project to reform the curriculum at one of Australia's oldest agricultural institutions of higher education, eventually evolved into something a great deal more comprehensive, assuming as it did, a much greater degree of messy complexity itself.

Perhaps the most significant overall insight to emerge from this work in critical social learning systems as they relate to transformative development is captured by the following claim (Bawden 2005): Every systemic act of development in the material and social worlds demands the development of particular ways of 'seeing' the world from a systems perspective along with a set of practical skills that reflect this particular systemic view of the world. At first sight, there would seem to be nothing particularly challenging about approaching matters from a perspective that appreciates the nature of wholeness and of the inter-connectedness of parts; or of a practice that continually places problems into their wider, more complex contexts as a key aspect of the problem-solving process. Nor would it seem to be that difficult, to approach changing problematic situations in such a manner that those changes would reflect

an appreciation of the 'whole picture', as it were, with respect to moral concerns as well as to the facts of the matter. We all know that each of us has certain moral principles and aesthetic ideals that we like to see played out in practice, just as we like to believe that we are rational in the ways that we come to decisions. And yet in actuality, such systemic appreciation either of ourselves as integrated knowing valuing persons or of the world about us in all of its 'big picture' complexity, is far from common in our society. Indeed it might be said that the prevailing approach to problem-solving and situation improving across the entire globe, remains very un-systemic even when the issues under review are messy and complex and the inadequacies of conventional problem-solving approaches are there for all to see.

As it turns out, the ability to adopt a systems (or systemic) perspective to some issue or another in the 'real' world, and to use systemic practices to achieve changes to it, are not at all a straightforward matter, of simply learning systems theories or learning to use systems methods in practice. Rather, as the Hawkesbury initiatives have revealed, the transformation of complex situations in the world in a systemic manner will only effectively happen if those who need to act to achieve those transformations are themselves transformed in the way that they 'see' that world and 'act' in it. This self-transformation involves challenges and changes to those profound sets of beliefs and values that constitute the perspectives that we each use to make sense out of the worlds about us. These are our worldviews ,or our *epistemes* as Michel Foucault (1970) called them, from which word the notion of *epistemic development* is derived as an expression meaning the transformation of worldviews. This transformation of our abilities to view the world systemically and to act accordingly – the development of our systemic competencies as it were – is thus a function of our epistemic development. This process involves profound changes to the beliefs that we hold about a whole lot of aspects to do with the world about us, as well as to the values that we cherish, that together constitute our intellectual and moral 'sense-making' frameworks – also often referred to as paradigms.

It would appear that the essential reason for our intransigence in changing our prevailing ways of 'seeing' and 'doing', is fundamentally an expression of our prevailing unwillingness to even explore the character of the worldviews that we hold – as individuals and as whole cultures alike – to say nothing about our lack of preparedness to challenge and change them. Worse yet, we are, by and large, all abysmally ignorant of the fact that we even hold to particular epistemes or worldviews, and accordingly assume specific intellectual, aesthetic, moral and even spiritual perspectives. Let alone are we aware of the specific characteristics of these worldviews or conscious of the extent to which they influence the way we live our lives. If, for instance, we accept the word of the Bible that we have been granted dominion over the earth, then we will accept without question that we can do all that we can to control nature herself in every way possible to meet our own ends.

Yet raise awareness of, and mount challenges to prevailing worldviews is precisely what the Hawkesbury group set out to do: to first explore and challenge their own worldviews – both as individuals and collectively as an entire Faculty; and then, where appropriate, commit themselves to epistemic transformations where they would set out deliberately to develop their worldviews in a manner that allowed them to embrace systemic perspectives and effectively use systemic practices. Group members would then come to embed this practice of worldview review and development into their educational practices with a clear focus on learning to learn as a process of 'cognitive processing'.

This issue of facilitation of worldview transformation as a prerequisite for the development of systemic competencies became so important to the Hawkesbury Faculty that it was extended from its application to formal curricula, to a much broader endeavour that would come to embrace a much more inclusive range of stakeholders beyond the campus. In essence the group would introduce a new focus for development in shifting their primary concerns from concrete events in the world to processes of the mind that allowed systemic exploration of those events. This entailed a shift in emphasis from landscapes to mindscapes as it were, from 'systems in the world' to those 'systems of cognition'. These latter systems are learning systems or knowing systems that are responsible for the recognition of systems in the 'concrete world' as well as the construction of systemic abstractions, such as 'human activity systems' or 'thought systems' or 'value systems' or indeed 'learning systems' themselves.

The Faculty came to adopt two vital conceptual models related to learning and cognition which they integrated together to create the organizational structure (and hence dynamic and disparate functions) of a critical learning system:

1. An experiential model of learning developed by the American organizational psychologist David Kolb which portrayed learning as a perpetual cycle between the four cognitive activities that fluxed between the concrete and the abstract, and between reflection and action (Kolb 1984).
2. A three-level model of cognitive processing developed by another American researcher, Karen Kitchener, that discriminated between cognition, meta-cognition and epistemic cognition (Kitchener 1981). The integration of these two models together led to a framework for developing learning practices that focused in turn on:

    (a) learning about the matter to hand and how to transform that for the better,
    (b) learning about the learning processes that are brought to bear to learn about the matter to hand (meta-learning), and how to improve them, and
    © learning about the limitations to learning that are imposed by prevailing worldviews (epistemes) (epistemic learning), and how these can be appropriately characterized, challenged and, where indicated, transformed.

So, in marked contrast to a number of other contemporaneous initiatives in systems education around the world, where the emphasis was being placed on mastery of particular systems methodologies or the development of systemic compe-

tencies with a range of different methodologies, the Hawkesbury approach focussed very specifically on the nature and development of systems of learning. The model of a critical learning system as a social, critically reflexive, developmental process emerged through such a focus. Learning was not seen an outcome from the use of any systems methodology to explore particular messy complex issues, but was the key system of interest itself.

The Hawkesbury project thus developed into a major intellectual and moral assault on conventional approaches to dealing with complex, multi-dimensional, messy issues – especially those at the interface between people and their bio-physical environments. The particular relevance of this project is that such messy complexity has come to characterize life in general these days. There are a whole host of messy problematic issues emerging that are truly global in their character and impact as exemplified by such phenomena as climate change, infectious disease pandemics, biodiversity reduction, deforestation and so on. While they go by many names – 'wicked problems', hybrid matters of concern, complex situations, mixed-up affairs, imbroglios, or just sheer messy issues – they are everywhere we look while increasingly becoming the major concerns of scientists, policy-makers, and the citizenry alike. They represent the most pressing of the pressing issues of the day and they demand the urgent and critical attention of all of us acting collaboratively in a systemic manner that reflects our collective yet critical judgements for improvements or 'betterment' based on shared beliefs, shared values and shared interpretations and knowledge of what is happening 'out there'. And while we might not all agree with everything that we are sharing at any given time, we must do all that we can to accommodate our differences in seeking consensus on what needs to be done – and we need to do this urgently and effectively.

There is an urgent imperative that we need to learn how to organize ourselves and to act as critical social learning systems, with each one of the four elements – critical, social, learning, and systems – having very considerable application in the circumstances.

- We need to learn how to be rigorously *critical* of the way that we are currently living our lives and we need to learn how to harness that criticism to achieve constructive changes in our ways of being-in-the-world – our lifeworld as it were.
- We need to *learn* how to act collectively as families, tribes, communities, organizations and societies, as it is only through such *social* collaboration that our circumstances can be improved on the scale that present circumstances dictate.
- We need to learn how to transform our shared new experiences into new knowledge that we can then use as the basis for our collective, consensual judgments about desirable, feasible and defensible actions to take in the name of responsible and sustainable improvements.
- We need to learn how to approach these issues *systemically*, with a sense of their wholeness, their patterns of inter-connectedness, their dynamics, their embeddedness, and their emergent properties.

The Nature of Critical Social Learning Systems

As recently described (Bawden 2007) a CSLS is a group of people that have decided to collaborate in order to seek systemic improvements to some messy complex situation that together they regard as critically problematic. Rather than thinking of themselves as a group of decision-makers or researchers, or as a task-force or a committee however, they embrace the notion of 'being and behaving as a reflexive system'. In this manner they imagine themselves to be a coherent 'whole' entity in which each individual participates as an embedded inter-connected component of the whole, so contributing to both the organizational form of that system as well as its functions.

The essential function of this system is to seek critical improvements or 'betterment' with respect to:

- (i)   the issue that it has identified as critically problematic,
- (ii) (its own integrity and functions as a critical learning system and its development in these regards, and
- (iii) the quality of its relationships with the environment in which it recognizes it is embedded.

In other words a CSLS is a collection of individuals who agree to act together as a coherent group of people who are prepared to 'collectively learn their way through' an issue that they all agree is problematic in some way or another to them all. They accept that in addition to learning all they can about that issue as 'the matter to hand' as the prerequisite for taking informed action to improve it, they will also address, and respond to two other 'levels of learning' as they proceed: In essence they will be learning in three dimensions concurrently. So even as they are investigating the matter to hand they will also be critically reflecting on the processes of learning that they are bringing to bear: their 'meta-learning'. These reflections will include (i) their own impressions on the actual processes that they are using to generate shared knowledge and understanding from their experiences, (ii) how they are testing the quality or validity of that knowledge, (iii) how they are designing plans for action in the face of the knowledge that they are generating and decisions that they are beginning to formulate in response, and (iv) how they might actually put those plans into action for change. In this manner, they are seeking improvements in the way that they are learning even as they go about that learning. Most essentially, they go further yet, and engage in the most difficult learning of all – at the epistemic level where they will be exploring the nature of the beliefs and values that each of them bring to bear that have relevance to both of the other two 'levels of learning'. At this level of learning, they are engaging with each other in examination of similarities and differences in the beliefs and values that they hold as individuals, that are relevant to the matter at hand. For it is these differences in epistemes or worldviews that are so often the cause of tensions between people as they seek consensus on understanding and, most particularly, on their judgements with respect to the 'the right and proper thing to do' to

change the circumstances in which they find themselves. It is epistemic differences that most frequently test the coherence of any group in the face of the quest for consensual action thus representing the greatest threat to the integrity of the CSLS that they have formed.

Criticality here is vital: A critical social learning system is characteristically critical in three aspects:

(a) It is inherently critical of the conditions of the environments in which it identifies itself as being embedded and to which it seeks improvements.

(b) It is critically reflective (reflexive) about its own structure and functions and is consistently monitoring itself and adapting its behaviours in response to those reflections.

(c) It is critically conscious of the character and implications of each boundary judgment that it makes with particular reference to what and who it includes and excludes from its activities as an improvement-seeking social learning system.

The system is also critically conscious, as already articulated, of the three dimensions of its cognitive processing capabilities: Firstly it sees itself as a sub-system within a 'system of interest' (an institution or a community or any set of human endeavours) that is, in turn, embedded within a higher-order environmental supra-system. It is this learning or 'knowing' sub-system that effectively brings each particular 'system of interest' into being. Secondly because it is a learning (sub)system, it is conscious of the three levels of its own cognitive functions as learning, meta-learning, and epistemic learning.

It is impossible to over-emphasize the significance of worldviews in the context of dealing with messy issues or indeed with any learning for that matter. For the particular worldview perspectives that we hold at any given time, both as individuals and collectively as cultures, have a very profound influence on the way that deal with the world about us – including each other!

Worldviews and their Influence

It has long been accepted that what each of us 'does' in (and to) the world about us in the course of our everyday lived experiences is a reflection of the way that, as individuals and members of particular cultures alike, we 'see' or perceive that world. In other words, our everyday actions in our environments, in the broadest sense of that word, are greatly influenced by the particular mental models or worldview perspectives or mindsets or epistemes that we rely on, to help us make sense out of our day-to-day experiences of what we hold to be the reality about us as well as what we consider to be the right and proper things to be doing. It is our worldviews that act as the 'filters' to our understandings, our frames of mind as the contexts for our judgments, our fundamental beliefs as the foundations for our morality.

Importantly the worldviews that we hold, as individuals and as social collectives, can be transformed to a greater or lesser extent. The so-called Enlightenment Movement of 17th 18th century Europe for instance, where reason trumped tradition, represents such epistemic transformation on a very grand socio-cultural scale indeed. Other, much more modest transformations are represented by individuals 'changing their own minds' about such matters as capital punishment, cigarette smoking, stem cell research, carbon emissions, animal welfare and a host of other epistemic positions that reflect changing beliefs and values. Such changes are often triggered by the arguments of others as well as by the sheer weight of previously ignored or newly generated evidence.

Given their significance, it is quite amazing that worldviews do not attract much attention by educators: Most of the time we are not even aware that our behaviour is a reflection of a particular set of essentially tacit assumptions that each of us holds about the world about us, about the universe, and about our own human characteristics and how we relate to the world and to the greater universe beyond. Succinctly, worldviews – or *Weltanschauungen* to use the German expression which is commonly employed in the systems literature – can be seen to comprise a set of personal presuppositions about:

(a) the nature of nature (or ontology, philosophically speaking),
(b) the nature and origins of the universe, of life itself and, especially, of the spiritual essence of mankind (or cosmology),
(c) the nature of knowledge (or epistemology) and
(d) the nature of human nature especially as it relates to motivations, dispositions and values, especially ethics and aesthetics (or axiology).

Interacting together, these constituencies of beliefs greatly shape our personal perceptions and, when reflective of our particular culture, our collective views of the world about us. They are thus the major determinants of the decisions and judgments that we make and the actions that we take. They play a major role in defining the goals that we set for ourselves as well as the goals that we believe we could set for ourselves, and indeed should set for ourselves as expressions of what we hold to be good or bad, right or wrong, virtuous or vicious.

Is it possible that we are ill-equipped to deal the complex messiness of life today because of the perspectives that we hold as a culture. Have we become prisoners of a collective worldview that is proving to be hopelessly inadequate and inappropriate to the circumstances that are unfolding all about us? Are we even aware of the nature and significance of our own individual worldview or epistemic perspectives or conscious of how these are expressed collectively as the prevailing and pervasive set of shared beliefs, values and assumptions that characterize our Western culture with its almost obsessive commitment to economic growth through modernization?

Appreciation and the Origins of the Hawkesbury Initiatives

Geoffrey Vickers was fond of portraying the march of human history – the history of our lived experiences – as a 'two-stranded braid' of *events* with *ideas* each interacting with, and mutually affecting the other, as time unfolds. As he saw it, in response to some concern or another, more often than not a shared concern, we human beings focus on some issue or another from this binary flux and make two forms of judgements about it – with regards to (a) what seems to be the 'facts' (reality judgments) and (b) what we regard as good or bad (value judgements) – before contributing, if appropriate to the circumstances, both to the stream of ideas and thence to the events through our idea-informed actions. This ever-recurring, iterative and reflexive process Vickers referred to as 'an appreciative system' (Vickers 1965) which constantly revises or confirms itself by attention to three needs:

(i) that it should "correspond with reality sufficiently to guide action",

(ii) that it should be "sufficiently shared by our fellows to mediate communication" and

(iii) that it should be "sufficiently acceptable to ourselves to make life bearable" (Vickers 1983).

Without being aware of it at the time of their earliest initiatives, which were launched in 1978, the behaviour of the Hawkesbury academics would come to embrace and reflect all of the key characteristics of what Vickers had ascribed to 'appreciative systems' (Vickers 1965). Somewhat unconventionally, they agreed that rather than following the usual 'rules' for curriculum design which emphasized knowledge and skills long considered to be essential to an agricultural scientist or technologist, they would first experientially explore the conditions prevailing within the Australian rural sector and how those conditions had evolved over recent preceding decades (past and present events). They would also investigate the principles, concepts and theories about agricultural development that were currently in vogue at that time and their intellectual foundations (the *ideas* – again past and present).

Through these atypical experiential observations, the faculty soon came to appreciate that the overall events that were prevailing in rural Australia at that time were cause for very considerable concern: Furthermore they came to appreciate that the conventional ideas about agricultural development in particular, and rural development in general, that were being promulgated in response to the conditions were at best inadequate and at worst, downright counter-productive and even destructive.

Many of the theories and principles that were being used to justify particular actions by the 'experts' of the day – be they concerned with actual farming practices, agendas of research, or policy-formulations – were seen to miss the 'wholeness' and complex messiness of the situation at large. Many of the specific 'factual' details of the nature of the events were well-known to researchers and to

policy-makers alike and also, to quite a considerable extent, to the public at large through various media reports on different aspects of the prevailing conditions in rural Australia. However, little to no attention was being given by any institution to what might be termed 'the systemic well-being' of rural Australians and of their environments taken together as a whole; in all of its complex messy entirety. Like the fable of the blind individuals trying to establish the character of an entire elephant through their exposure only to its specific parts, so too were the discipline-based experts missing the whole picture by concentrating their investigations and observations only on particular aspects of it. This situation arose through the limitations of their own specific disciplinary expertise and the different 'worldview perspectives' that characterized each particular discipline in isolation from others.

Furthermore, while 'reality judgements' abounded, voices proposing 'value judgements' especially with respect to ethics and moral positions, were noticeably mute or extremely limited with respect to what constituted improvements to existing circumstances and what actions would be necessary to achieve them in practice.

The impact of different ways of seeing the world on different proposals for actions for change were there for all to see. Yet nobody beyond those of the Hawkesbury group seemed to actually see that.

From economists the unequivocal message to farmers was 'get big (or at least get far more efficient) or get out'. They were urging farmers to adopt intensive production methods to improve the efficiency of their operations in the face of declining economic conditions. Within that spirit, agricultural scientists and technologists of all shades were out and about peddling their wares of scientifically designed technological innovations that 'progressive' farmers could/should adopt as productivity enhancers. As for the laggards – those who were regarded as 'insufficiently scientifically or technologically literate' to grasp the significance of the innovations available – then that was just too bad for them. On the other hand, a few sociologists were expressing their concern at the negative impacts that many such labour-saving productivity-intensifying technologies were having on employment levels in rural areas. They were also worried at the socio-cultural impact on all affected by the associated outmigration of people from rural communities, as displaced farm workers and their families headed for larger metropolitan areas in search of employment. Social workers, in turn, were having to cope with the ever-increasing levels of stress in those families and individuals who were remaining in the rural areas as unemployment rates began to accelerate, levels of indebtedness began rapidly to increase. Paradoxically, as the level of services to rural areas, by public service institutions and corporations alike, these social workers were being increasingly withdrawn. All the while, environmental scientists were becoming increasingly vocal about the degrading effects of many agricultural practices on the quality of the natural environments and on the sustainability of resource extraction to support increased production. These observations were, in turn, nurturing support from, and emerging expressions of activism by, a wide range of citizens concerned about the impact of intensive agricultural practices on

the integrity of the rural landscape. Consumer groups were also beginning to talk of the potential threat to public health of many of the new farming practices based on chemical pesticides and other biocides. These voices of public protest were further amplifying the objections and actions of other citizens concerned about the lack of attention to the land title rights of the traditional Aboriginal occupiers of the land for instance. There were yet other citizens, who were calling for legislation to protect the welfare of livestock animals not just in the face of increased intensification of housing, handling etc, but also from the perspective of the potential of emerging bio-technologies to cause harm to animals or in other ways to assault their integrity.

It was not all surprising that farmers themselves, as well as the many other rural Australians for whom agriculture was the basis for their livelihoods, were feeling that their integrity as individuals and communities alike, was also under severe assault with high levels of anxiety prevailing across the entire sector.

Deeply impressed and significantly depressed by the messy complexities that their investigative experiences in rural Australia were revealing, the members of the Hawkesbury School of Agriculture took a number of decisions (made a number of both 'reality' and 'value' judgments, in Vickers' terms) that would lead eventually to the principles and practices of what can now be described as Critical Social Learning Systems. Three foundational decisions that were taken were (a) to recognize that any education for agriculturists needed to be placed in the broader context of the development of inclusive rural well-being; (b) to accept that the essential pedagogy for such a focus needed to embrace the concept of personal and shared experience as the basis for learning and development; and (c) to embrace and further develop the fundamental principles of the so-called 'systems sciences' as the conceptual core for the development of competencies relevant to the complexities and messiness of unfolding events in rural Australia.

These decisions represented a number of key ideas that were generated by what can now be seen as a Critical Social Learning System, as critical reflections on events that the members of that system were experiencing: Subsequent actions by that CSLS in collaboration with other such systems then represented attempts to transform the events that were prevailing in rural Australia. While this is not the occasion to enumerate or evaluate any of these particular actions there is wide and growing acknowledgement of the contributions that the Hawkesbury initiatives in CSLS development have made to the emerging discourse about the sustainability and sustainable development of agri-food systems and of rural livelihoods that is increasingly patent in Australian society.

Some Concluding Remarks

The pressing issues that we currently face as human kind have much in common with each other and, as events, they deserve, in fact demand, the generation

of innovative ideas with respect to improvements to the conditions that they reflect. As mentioned earlier, these events are often truly global in their scale and profoundly systemic in the complexity of their inter-connectedness. They are typically hard-to-define in their details and invariably unstructured, multi-causal, and multi-faceted: In sum, they are really, really messy situations. Witness the pervasive complex and unpredictable changes that are happening to the world's climate, or the growing ubiquity of sectarian terrorism throughout the world. Witness too our current experiences with grossly distorting instabilities in world financial systems, and the mysterious dynamics of emergent disease pandemics that are spreading to all corners of the planet. Then there is the looming global energy crisis associated with peak rates of oil discovery and production that soon we must face, a potential planetary catastrophe caused by gross reductions in bio-diversity through deforestation and other human activities. Perhaps above all, there are the impending threats to global security through the relentless demands for non-renewable resources by an ever-burgeoning human population that, by 2050, is estimated to reach a level that, staggeringly, will be almost four times what it was a mere century earlier at the outbreak of the Second World War in Europe.

The tragedy is that the root cause of the majority of these threatening issues lies with much of what we ourselves have been doing in and to the world about us in the name of the development of our Western industrialized civilization: While they may be classified as the unintended consequences of the process of our quest for modernization, they have, for the most part, certainly not been unforeseeable to any thinking person.

Yet paradoxically, while we are increasingly aware that we are in large part responsible for fouling our own nest, as it were, we are seemingly fundamentally loathe to do very much about changing our ways of being in any socially coordinated or profoundly necessary manner as citizens of the world. While the global scale and reach of these issues might be new, events of this kind are certainly not unique to our current era. So why is it that we seem to have learned nothing from history? Why is it that we are not moved to change what it is that we are doing as we can clearly foresee what could happen to future generations of our own kind – to say nothing of the myriad of others species on earth – if we do not change our current behaviours and lifestyles? Why is it that we are not collectively 'learning our way forward' out of the mess that we ourselves continue to create? Is it possible that we have not actually learned how to learn in a manner that would allow us to collectively learn our way forward'? Are we so intellectually and morally immature that we don't even recognize (or worse yet, admit) that indeed we tend to be intellectually and morally immature – or at least continue to behave as if we were?

Most seriously of all, are the ways by which we make sense of the world about us and make judgements about the right and proper things to do, limiting our creativity in designing better ways of doing things – and indeed, seeking better things to be doing? Are we victims of our own particular, culturally embedded way of 'seeing' what is happening about us and as a consequence, helpless to grasp the

full severity of the matters to hand – or to do anything about them in any coherent, collaborative, cooperative way? Do we appreciate that there is a clearly significant mismatch between the events that are unfolding about us and the ideas that are being generated in response as the frameworks for responsible, systemic, sustainable, and defensible actions for change?

The establishment and conduct of Critical Social Learning Systems would represent a highly appropriate medium for addressing urgent and crucial questions of this kind.

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