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Managing complexity: a systems approach – introduction

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Managing complexity: A systems approach – introduction

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Contents

Introduction

This course aims to develop skills of thinking systematically and creatively about issues of complexity. It enables you to appreciate and manage these issues in ways that can lead to improvement. It adopts the most recent and innovative advances in systems thinking and applies them to topical areas of concern. It is designed to help build your capacity to manage complexity and to develop a deep understanding of contemporary systems thinking. It may be helpful to study OpenLearn units T551_1 *Sytems thinking and practice* and T552_1 *Systems diagramming* before tackiling this unit.

This unit is from our archive and is an adapted extract from Managing complexity: a systems approach (T306) which is no longer taught by The Open University. If you want to study formally with us, you may wish to explore other courses we offer in this subject area.

Learning Outcomes

At the end of this free course you should be able to:

- use reflection to understand some of your own preferred styles of working
- draw a systems map, review it, and use it to prompt further questions
- evaluate your diagramming skills
- develop, and take responsibility for, your own understanding of complexity
- appreciate some ethical implications of being a systems practitioner.

1 Overview of the unit

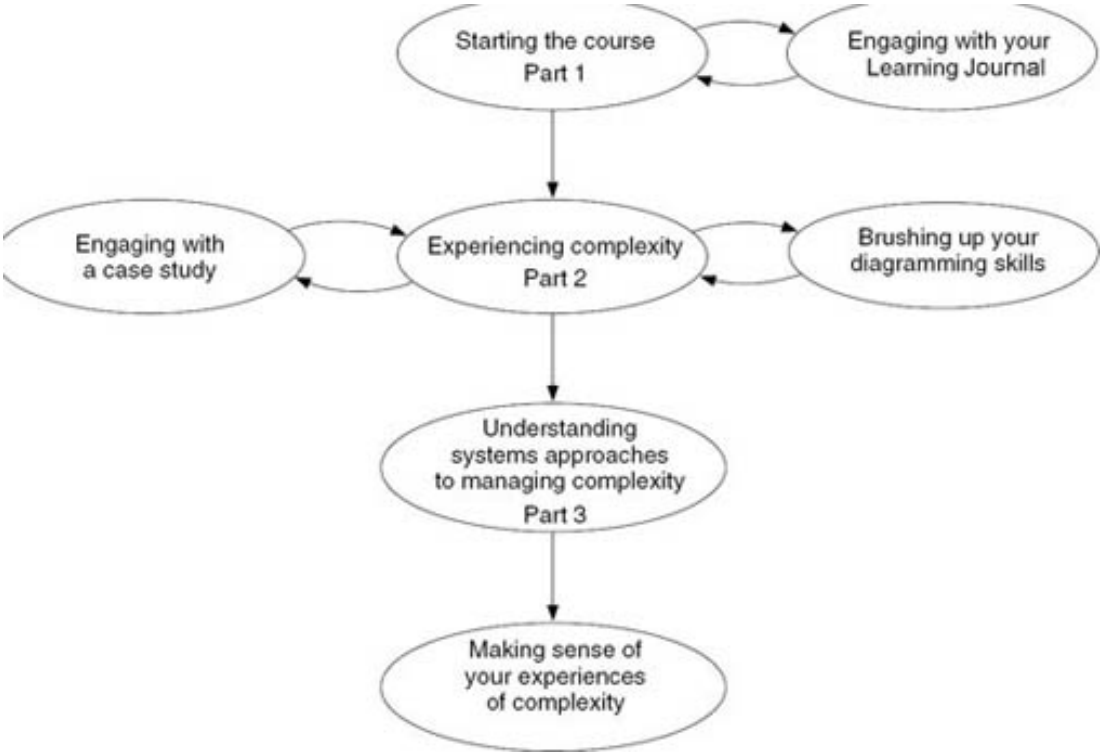

Figure 1 An activity-sequence diagram showing the structure of the unit

When you meet with a situation you experience as complex you need to think about yourself in relation to the process of formulating a system of interest. Only with this awareness, can you increase your range of purposeful actions in the situation which are ethically defensible. To do so is the hallmark of systemic thinking and practice compared to systematic thinking and practice. The metaphor of the systems practitioner as a juggler of four balls is introduced as a device to explore skill development for effective systems practice – the balls are being, engaging, contextualising and managing.

Part 1 Starting the course

To start, you will be invited to think carefully about yourself in relation to the course itself – as an introduction to thinking about yourself in relation to any system you devise.

Part 2 Experiencing complexity

Next, presented with a situation you experience as complex, you will be offered powerful systems-thinking tools for devising systems of interest that will support you in making sense of the situation.

Part 3 Understanding systems approaches to managing complexity

You will then be invited to consider your own role in becoming a systems practitioner through the lens of an ideal model and the metaphor of the systems practitioner as juggler.

Part 4 Making sense of your experiences of complexity

At the end of the unit, you are invited to reflect on the sense you have made of systems practice and ‘managing complexity’ together with your own role in making this sense.

2 Part 1 Starting the unit

Welcome to T306_2 *Managing complexity: a systems approach – introduction*. As I write, I experience a sense of excitement. For me, as for you, this is the beginning of the unit. These are the first few sentences I'm writing and so, although I have a good idea of how the unit is going to turn out, the details are by no means clear. Nevertheless, the excitement and anticipation I, and maybe you, are experiencing now is an important ingredient in what will become our experiences of the unit.

The structure of the unit is illustrated in Figure 1. You will find a number of activity-sequence diagrams in this unit. In an activity-sequence diagram activities at the pointed end of the arrows can only happen after the activity at the other end of the arrow has been completed. The sequence of activities for Part 1 of this unit is shown in Figure 2.

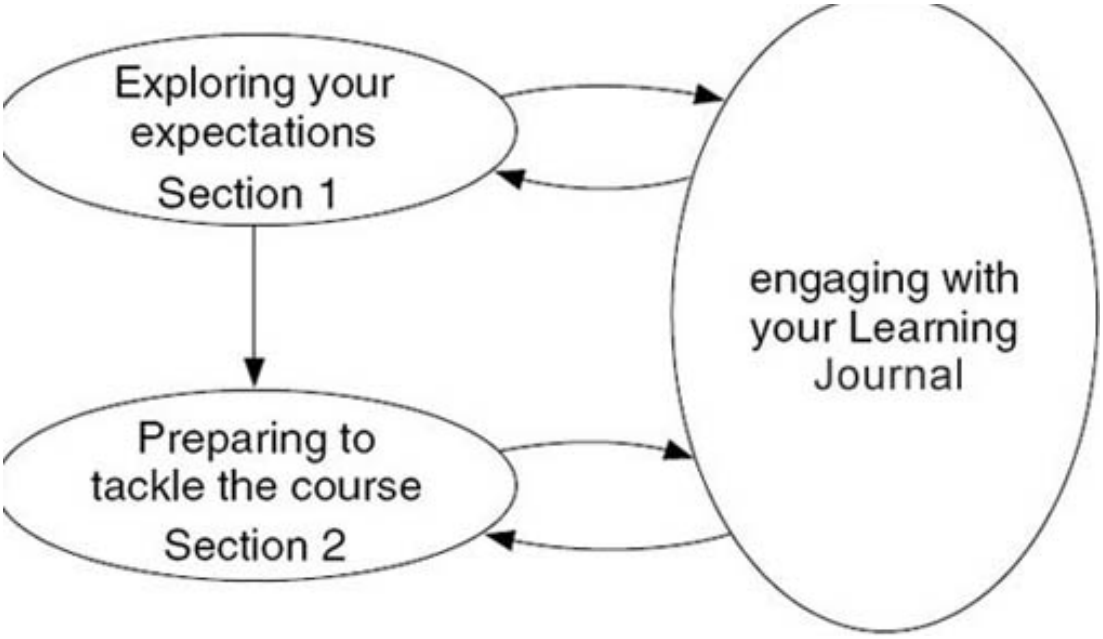

Figure 2 An activity-sequence diagram showing the activities in Part 1

3 Part 1: 1 Thinking about expectations

3.1 What are you hoping to learn?

Anticipations and preconceptions are an important determinant of how people learn, so before you read on, I would like to you to record some of what you are experiencing now as you begin the course.

It's important to get these impressions noted down now, because new ideas and new impressions will quickly overlay the experience. What you are experiencing now will be re-interpreted as new understandings emerge. You are also likely to form some judgements about your expectations. So before any of that can happen, make some notes on your responses to the questions in the activity below. I suggest you make your notes in your Learning Journal. You will need to keep referring back to them as the unit progresses. It will also be helpful later if, as you make notes, you date them and leave space for later thoughts and jottings.

The notes you make for this, and some of the other activities, will be important so you should do them as conscientiously as possible. Their role in developing your skills will become more evident as you work through the unit. Your notes should capture as many elements of your responses as possible.

I anticipate you might spend around **90 minutes** on this activity. It may take longer. This may seem like an enormous amount of time, but thinking about the issues carefully is likely to take that long.

Your Learning Journal will be an important resource for your study of this unit.

Activity 1

What is your purpose in doing this unit?

What do you hope to get from the unit? I imagine you might have some expectation that you will enjoy, or benefit from, doing the unit. What benefits do you expect? What was it in what you heard about the unit that suggested you might benefit from it? What was it about the unit or its descriptions that appealed to you? What is it about you that the unit appealed to? Not everyone chooses to study this unit so there must have been something about you that connected with what you heard, or read, about the unit. Make a note of any specific items that appeal to you. Make a note too of any items that worry or concern you.

What is your emotional state as you approach the unit?

Are you excited, bored, eager, puzzled, expectant, tired? What is your present body posture? Does it tell you anything about how you feel? Is it right? Can you improve your physical comfort?

Are you comfortable with your workspace? Are there things you can do to improve it?

You may be aware there is a project as a part of this unit: what anticipations do you have about doing the project?

Again, I imagine you might have some expectation that you will enjoy or benefit from working on material of your own choosing, or perhaps not. How do you feel about the prospect of the project?

What sort of skills and capacities do you think you might need for the project? How many of these do you have already? What skills will you need to pick up? What will you need to look for in the unit to acquire these skills and capacities?

And finally, how do you rate your overall capacity to succeed in this unit?

You first need to decide what, for you, would constitute success. Are there other criteria important to you? What are they? When will success become apparent?

How does your answer compare with your notes on what you hope to get from the unit? Are they congruent or does the answer to this question throw new light on what you hope to get from the unit?

When you make a judgement about how you rate your capacities, what are you basing it on? Are you taking account of external factors such as the time you have or the circumstances in which you study? Are you basing your judgement on your own evaluation of your intellectual capacities? Do energy, enthusiasm and commitment come into the evaluation?

What would it take to improve your prospects of success, measured by whatever criterion is important to you? Can you act to improve your chances of success?

The activity you have just engaged in is the first of several such activities. It is an example of a pattern of activities that constitute reflective practice or reflective learning. This style of learning is based on the notion that the understandings most useful to us, and that most readily become part of us, are learnt by experience. The activities are designed to enable you to discover your own learning by experience.

There will be a lot about reflective practice in this unit but for now I want to introduce you to some basic ideas about it.

3.2 Learning by experience

It's a familiar idea but it implies two activities: learning and experiencing. Both activities need to happen if I am to say that learning from experience has happened. Experiencing seems to have two components. The first is the quality of attention that allows me to notice the experience and its components. The second is memory. Calling experience to mind allows me to examine the experience and to think about it in ways that were not possible at the time. Learning is what I take away from that process that influences my behaviour or thinking in the future.

But huge amounts of experience escape without being consciously experienced; I am insufficiently aware at the time to notice what's going on. Later I am too busy to recall the experience and so little conscious learning takes place. Of course, it's useful to carry out familiar activities ‘on auto-pilot’ – without conscious attention. It's easy to miss out on important learning from unfamiliar activities too. I may become wrapped up in the activity itself or simply not notice the range and quality of the experience. Either way, a conscious attempt to recall the experience and to think about it, gives the opportunity to learn from the experience.

So, what was my purpose in asking you to do Activity 1? I wanted you to experience the starting of this unit as richly as possible. I was asking questions that I hoped would prompt you into awareness of what you were experiencing. It may be you discovered something new about yourself; your expectations of the unit; what you hope to gain from studying it; or about your capacity to succeed in it as a result. If not, don't worry. The point of the

activity was raising awareness rather than discovery; and recording material that will be useful in future learning and reflection.

Spend a total of about **15 minutes** on the next two activities.

Activity 2

What do you understand the unit title to mean?

The title of this unit is *Managing complexity: a systems approach*. Before you go any further, and so your Learning Journal contains a record of your starting point, make notes about what you understand by the term ‘managing complexity’.

What do you understand by a systems approach? Don't worry if you feel you only have vague ideas at this stage, record all your ideas as fully as you can by listing all the things you think it might mean. You may also wish to distinguish ideas you feel confident about from those you are not sure of.

Activity 3

Add any further thoughts about your expectations.

You may feel some of the expectations you had have already been changed. Add any postscripts about this to the notes you made earlier. Make it clear in your notes these are postscripts and what has happened to change your views.

This is an advanced level Systems unit. This carries certain implications about its level and its likely content. You are likely to have drawn some conclusions about what these implications are. Recognising explicitly the presuppositions and assumptions you carry into a situation allows you to examine them. Presuppositions can get in the way of understandings. For example, if I assume a book is just about koalas, and don't notice it's about koalas in their eucalyptus habitats, I am quite likely to experience the text about eucalyptus forests as a distraction. This might lead me to misunderstand what the text is saying about eucalyptus habitats and, almost certainly, I would misunderstand its importance to the koalas. At the very least this will make me an inefficient reader and may make me an inefficient learner.

The next activity will help you to think through your expectations, assumptions and presuppositions about this unit.

Allow yourself about **30 minutes** to do Activity 4, making notes as before.

Activity 4

What activities do you expect to undertake in studying an advanced level unit?

You may already have some *experience* of Open University courses. You may have other experiences of studying. What sort of activities do you expect to engage in when you study a course? What sorts of activities have in the past been most effective in enabling you to learn? These questions are easier to answer if you think back to a specific course or other learning *experience*. What did you actually do? What were the components of that course? What was their relationship to each other? If you have studied only intermediate level courses before, what differences do you expect in an advanced level unit? If you have studied at an advanced level before, can you identify any differences between those courses and other, lower level courses?

Which components of your previous learning *experience* have you enjoyed most? Why?

Some people enjoy the initial meeting with new material most. Others enjoy testing their newly acquired understandings in exercises. Still others enjoy their new perspectives on things quite external to the course that their new understandings give them. Do any of these match your previous *experience*? If not, what was it for you? You may also like to explore the question of what you *didn't* like. Have you changed in ways that might make your *experience* of this unit different?

What were you, as the student, expected to do as you worked through previous courses?

Many courses follow a fairly steady pattern of a bit of theory, followed by an example of what the theory means in practice, followed by an exercise where the learner applies what they have just learned to another situation. Do you recognise this pattern? Have you experienced it? Have you experienced variations on this theme? What were they? Have you experienced alternative approaches? How successful have these patterns been for you? Success, in this sense, might mean examination success or it might be a success criterion you have set yourself, or one you want to apply now. It may parallel the criteria for success you identified for this unit.

4 Part 1: 2 Preparing to tackle this unit

4.1 Something different

Perhaps it will not surprise you if I say you may experience this unit as rather different to any you may have previously encountered. Like any course of study, you are likely to find surprising and interesting material in it but there are three specific ways this unit may surprise and even challenge you. These three ways are concerned with:

1. The nature of systems thinking and systems practice;
2. A style of learning where you have to take most of the responsibility for your own learning;
3. The way you know about the world; interpret information about it; and construct mental models. These are epistemological issues. The bases for knowing about, and acting in, a situation is different to that encountered in most other units with a 'T' (technology) code.

Each of these will be discussed briefly below.

2.2 The nature of systems thinking and systems practice

There are no simple definitions for either systems thinking or systems practice. It's difficult to find definitions that capture all the perspectives that the ideas carry for people who think of themselves as systems thinkers and systems practitioners. Most systems practitioners seem to experience the same kind of difficulty in explaining what they do or what it means to be systemic in their thinking. Through experience I've developed some criteria by which I characterise systems thinking, but they seem to be quite loose in the sense that those characteristics are not always observable in what I recognise as systems thinking. In any case, they seem to be *my* list of characteristics, similar to, but not the same as, other people's lists. This issue will be developed but, for the moment, I would like you to hold the idea that systems thinking and systems practice arise from particular ways of seeing the world.

My hope is, through interacting with the course and asking yourself questions about your experiences, you will discover at least some of these characteristic ways of seeing the world. If you have previously studied Systems courses, you will already have experienced forms of systems thinking and perhaps 'caught' it in some way. You may even have developed your own understanding of systems thinking and what it means. If you have not studied Systems before, you need to be aware this unit cannot make you into a systems thinker or a systems practitioner. It can only provide you with a framework through which you can develop your own characteristic ways of being a systems thinker and a systems practitioner.

You may already have encountered in previous Systems courses some of the central ideas of systems thinking.

Gather up your ideas of what these central ideas are by spending around **15 minutes** on the following activity.

Activity 5

Make notes on what you think are the main features of systems thinking.

This is not a test question. There are no right or wrong answers. I am simply inviting you to explore what you already understand about systems thinking. Try to make your answer as comprehensive as you can. You could use diagrams if they're a more convenient way for you to represent your ideas.

If you have already studied Systems, you may find this task quite demanding because you will have to abstract these general ideas from what may be quite detailed understandings. Don't be afraid to spend slightly longer on this if you need to.

If your only *experience* of Systems is through any background reading you may have done, you may want to base your answers directly on your recent reading. That's fine but try to ensure that, in doing this activity, you are building *your* understanding and not just abstracting a list from someone else's ideas.

As before, date your notes and leave room for later additions. Put your notes with the rest of your Learning Journal.

Your notes from this activity will form a powerful basis from which to build your understanding of, and capacity for, systems thinking. You will develop your own ways of working with the notes you take as you work through the unit. My own way is to add new material in a different colour, indicating the date of the new colour. When making paper-based notes I've also sometimes photocopied the notes and added new notes to the photocopy, which I photocopy again for yet more amendments and crossings out, dating each one as I go. This saves completely re-writing and I only need to rewrite when I have a different appreciation of something, or when it has developed so far the old version is no longer helpful as a foundation. Other people use computer files in a similar way. I prefer not to throw away any old version, even if it gets superseded. It provides me with a record of my developing understanding, especially if I note down what I now understand and why I now think the old understanding is unhelpful. Even notes I think are redundant can prove to be the anchors for new insights.

You don't have to do it my way but I would urge you to find a way that suits you. You will need to be able to record your own learning. Perhaps even more importantly, you will find these notes invaluable as you take responsibility for your own learning.

My own answer to Activity 5 follows. You should not treat this as the right answer. You should certainly not make judgements about your own performance in the light of my response. My notes arise from my experiences, yours arise from your own. I would like to think you and I were both engaged in an activity that gives rise to new experiences and thus builds our own understandings from our own experiences. So I would much rather you treated the following as if we were in a conversation and use my ideas to develop your own.

The important features of systems thinking, as I see them, are these.

1. Systems thinking respects complexity, it doesn't pretend it's not there. This means, among other things, I accept that sometimes my understanding is incomplete. It means when I experience a situation or an issue as complex, I don't always know what's included in the issue and what's not. It means I have to accept my view is

partial and provisional and other people will have a different view. It means I resist the temptation to try and simplify the issue by breaking it down. It also means I have to accept there is more than one way of understanding the complexity.

Complexity can be quite scary. But it need not be: complexity becomes frightening when I assume I ought to be able to 'solve' it. Systems thinking allows me to let go of this notion and allows me to use a multiplicity of interpretations and models to form views and ideas about the complexity, how to comprehend it, and how to act purposefully within it.

2. Systems thinking attends to the *connections* between things, events and ideas. It gives them equal status with the things, events and ideas themselves. So, systems thinking is fundamentally about relationship and process. It is often the relationships between things, events and ideas that give them their meaning. Patterns become important. The nature of the relationships between a given set of elements may be manifold. They may be causal (A causes, leads to, or contributes to, B); influential (X influences Y and Z); temporal (P follows Q); or relate to embeddedness (M is part of N). These relationships spring to mind immediately but there are many others, of course.

   This attention to relationships between things, events and ideas means I can observe patterns of connection that give rise to larger wholes. This gives rise to *emergence*. Thinking systemically about these connections includes being open to recognising that the patterns of connection are more often web-like than linear chains of connection.

3. Systems thinking makes complexity manageable by taking a broader perspective. When I was studying engineering as an undergraduate, we were taught to break down problems into their component parts. This approach is so deeply entrenched in western culture it seems natural and obvious to anyone brought up or educated in this culture that this is the way to tackle complex problems.

   While this approach is powerful for some problems, it's hopeless for others. For example, it now seems clear that climate change induced by human activity is likely to have major impacts on the planet, its environments, and its living organisms, including people. But all of these effects are so interdependent it is impossible to discover what the effects are likely to be by breaking the problem down.

   Systems thinking characteristically moves one's focus in the opposite direction, working towards understanding the big picture – the context – as a way of making complexity understandable. Most people recognise 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 wood, so that you can see the trees in their context.

Understanding the woodland gives new and powerful insights about the trees. Such insights are completely inaccessible if one concentrates on the individual trees. Figure 3 illustrates this sort of shift of attention vividly.

Figure 3 This well-known puzzle picture only reveals its secret if you allow yourself to see the pattern of relationships between the black blobs. Studying individual blobs reveals nothing. If you really cannot see anything other than the blobs, don't worry. It doesn't imply anything about your capacity to be a systems thinker. You can sniff out a meaning to the blobs at the end of Part 1

Systems thinking seems to come more naturally to some people than to others. Others have to learn to think systemically. People trying systems thinking for the first time find it quite tricky in the early stages. The temptation to break down the situation of interest into smaller bits is strong. The systems approaches you will encounter take account of this and are designed to enable you to capture the complexity before you move on to exploring it.

During the 1980s and 1990s, there were significant advances in Systems theory. There were two main drivers for this. One was the tremendous advance in computing capability. This allowed the behaviour of fluid, chemical, biological, and other phenomena to be modelled through time. This generated wonderful new insights into what came to be identified as chaotic phenomena. The second was the renewed synergy between biology and Systems. Both these stories are exciting, and there are a number of well-written books for the general reader that describe some of this work (*Would-be Worlds* (Casti, 1997, John Wiley & Sons Inc., New York) arose out of the computer exploration of systems behaviour. James Gleick's classic *Chaos* (1987, Penguin, London) is also in this tradition. Fritjof Capra's *The Web of Life* (1996, Harper Collins, London) explores some of the developments in biology that arise from a systems perspective).

Regarding the second driver, the synergy first emerged in the early 20th century among biologists concerned with the properties of whole organisms. This led to an exciting phase

of synthesis of ideas from many disciplines that gave rise to General Systems Theory. Since that time, biologists who look at living systems as a *whole* have turned to systems theory for new insights and, in response to their findings, systems theorists drew new insights from biology.

For me, the practicality of Systems is even more exciting than these developments. This unit is as much about systems practice as it is about systems thinking. There is an exciting synergy between systems theory and attempts to find better ways of engaging with problems and opportunities.

This is what this unit is about. It is an invitation to engage with systems thinking in such a way that you are better able to address the problems, complexities and opportunities that *you* encounter as you engage with the nitty gritty of whatever you do. Systems thinking provides me with tools-for-thought and the opportunity for a powerful way of looking at the world, whatever the context. The contexts stretch all the way from international issues such as global warming to the day-to-day problems that arise in work, in domestic life and in the local community.

Systems practice in the context of this unit refers to the practice of Systems within whatever profession or calling you follow. You can be a systemic medical practitioner, a systemic wood turner, a systemic technician or a systemic manager by applying systems thinking, insights and approaches to the complexity that you encounter in any of these or other domains.

2.3 Taking responsibility for your own learning

Not much of this unit conforms to the traditional pattern I mentioned earlier – the theory-example-exercise pattern. In particular, you will find you are expected to discover much of it for yourself. Why is this? This is a legitimate question and deserves a full answer. One year, a student at a residential summer school complained I had not taught him properly. I was, he told me, an expert and so why did I not demonstrate how to tackle the problem he was working on and pass my expertise on to him. He felt the tutorial was ‘a wasted opportunity’. I could understand why he felt aggrieved. But I think he had missed an important feature of learning a skill such as systems thinking.

More and more, I've come to realise that whatever expertise I may have in systems thinking and practice, it is *my* expertise and it only works for me. In this I find myself in agreement with C.W. Churchman (Churchman (1971) *The Design of Inquiring Systems*, Basic Books, New York), who was one of the first people to write about what systems thinking might mean in practice, when he said ‘there are no experts in a systems approach’. When I look at the people whom I believe to be experts in this area, I realise there are many ways of being good at systems thinking and many ways of being good at systems practice. Each systems thinker seems to be good in their own way. I believe this is because Systems is about ways of experiencing the world, ways of thinking, and about ways of dealing with the complex situations I encounter.

Consequently, systems expertise is unique to each person. I cannot tell you how it's going to work for you or how you should understand it. You have to find your own ways. All I can do is to invite you into experiences that are likely to help you create your own meanings from the material. As well as being the only logically consistent way of learning systems thinking, there is plenty of research evidence (for example, see *Using Experience for Learning* (Boud, D. Cohen, R. and Walker, D. (eds) 1993, Open University Press, Buckingham)) to show that understandings and knowledge that one acquires through

discovery is retained and developed much more readily than the understandings one acquires through being told, or even shown.

Taking responsibility for your own learning in this way is challenging but it need not be difficult. It requires a preparedness to experiment with ideas and styles of learning that may not initially feel right or comfortable.

All this means learning Systems is an intensely personal business. Don't worry if you're not used to reflective learning, you will be able to develop your capacities for learning this way, as you go. This is why it was important to think through what you want to achieve from the unit. It can operate at a level beyond acquisition of skills and knowledge. Because it is about different styles of thinking, the process of thinking systemically can itself give rise to new forms of learning. It has the capability of bringing understanding into being from sources inside oneself. This is the process known as reflective learning.

For some people, systems thinking will be something they practice from time to time. It will be a set of tools-for-thought they use when the need arises. This is a powerful and important potential outcome from the unit. The unit can also lead you towards becoming systemic, as well as being about systems. You can use it to become a different sort of thinker.

Either way, I strongly urge you to tackle the activities. They are designed to enable you to discover your own learning by experience. They are much more important than practice-makes-perfect activities. They will support you in making systems thinking and systems practice your own. Without them, systems thinking and systems practice remain ‘out there’ – something you may know about (description) but not know how to use (competence). This unit has aspirations beyond that, which I hope you will come to share; to support you in becoming a systems thinker and a systems practitioner. This is why the activities so far appear to be focused on you. You might see them in terms of preparing the soil in which skills, competencies and confidence can grow.

2.4 Appreciating epistemological issues

Common sense tells me my experience and understanding of the world are limited. I am 173 cm in height. That limits my view of the world. It may not matter much that I cannot see what my house looks like from above but it does mean there will be things going on in the roof I may not notice until they impinge on areas that I can experience.

More significantly, there is a real limitation on understanding the experiences of other people. You might tell me about your experience but your description is likely to be only a partial representation and, however good your description, I cannot share your experience. I can only construct my own mental representation of what your experience might be like. But the limitations on my understanding of the world are even more fundamental than this.

My mental image of the world is a model. It is a partial representation of reality based on the partial knowledge I have of the external world. So, when I think I am thinking about the world I am thinking about my model of the world. This model of the world is built up in a way that is itself a model. So I am using a model, built by a model, to represent the world I think I see.

This has important implications. The model that represents the world tells me what I see and tells me what to see. The model both limits what I see and reinforces itself. When I think about the world, I am thinking about my own thinking; I have no direct access to the world at all.

Many people find this idea unsettling when they first meet it. It seems to defy common sense. It raises the question of how real the so-called real world really is.

Many people think of the brain as very similar to a computer. Both have a similarly large proportion of ‘processors’ operating on internally generated signals. But there is an important and absolutely fundamental difference. The computer does not create its own meanings. The computer has no capacity for deciding, for example, which are its favourite paintings in the National Gallery. I do. I have a history of interacting with external stimuli that generate new ways of interacting with further stimuli and the internal structure of my brain changes as a result. The computer's ways of dealing with data are not the result of its own self-production. The way the computer works remains the same, whether it is processing pictures from the National Gallery or whether it is processing letters of the alphabet. The rules that relate input to output are constant over time.

The question of what I can know about the outside world is an ancient one and has always been central in philosophy under the theme of *epistemology*. Epistemology is the branch of philosophy that deals with knowledge and knowing: how do I know about the outside world? how do I know my senses are not fooling me? what constitutes evidence about the world?

Neither discussions about modelling, nor the insights of philosophy, can tell me how true my internal representations of the world are, but neurological studies seem to suggest the outside world is unknowable as it is. This unit considers this important issue. Epistemology becomes a central concern. This contrasts sharply with many other courses where epistemology is never addressed. The world is assumed to be ‘out there’ and more-or-less as it appears.

Recognising the world is unknowable as it is presents me with a choice. How do I deal with the day-to-day observations and events that seem to emerge from it? Each person, once they become aware of this unknowability, is confronted with, and needs to make their own choice.

Each choice is individual but seems to cluster around three main poles. The first of these is to adopt a stance that the world is more-or-less as I see it, and to ignore the incompleteness of my viewpoints and my representations. This is equivalent to saying ‘there is no epistemological problem about the world as I see it’. The second is to decide that the world is more-or-less as I see it but to recognise that my viewpoint is limited and the view-from-here may be misleading because it is only partial – there is no view of the roof, to use my previous metaphor. This is a stance that accepts that I must be careful to explore the world as fully as I can because I cannot see everything and may be misled. The third pole is to take on fully the implications of the world's unknowability. This stance demands that I always carry an awareness that I will never know the world and must therefore always be trying to account for my own role in my perceptions of the world. Consciously making the choice between these poles, and all the variants between, is an act of epistemological awareness.

Later in the unit this theme will be explored more fully – the choice one makes has profound implications for one's ranges of thought and action. Of course, knowing most of what I'm aware of is actually generated within my own brain does not mean I can make up any version of reality I choose. But it does mean I have to recognise my knowledge of, and understanding of, the world is partial and provisional and depends to a significant extent on my internal processes of constructing representations. This theme will come up repeatedly but for now it seems to suggest a number of attitudes or mental stances will be helpful.

Some of the mental attitudes I try to adopt are:

1. Being open and sensitive to all kinds of information about a situation: not just so-called factual information but impressions, intuitions and hunches, including other people's when they express them;
2. Being willing and able to see the situation from all kinds of points of view in addition to my own;
3. Being as open as I can be to seeing the situation and not letting my theories, presuppositions and assumptions tell me how I ought to see it;
4. Not taking terms of reference, boundaries or constraints too seriously; I try to assume they may not be as rigid as they seem to be;
5. Trying to find out how other people see the constraints and boundaries;
6. Being wary of any solution to a complex question (including my own solutions);
7. Enjoying diversity and complexity in a situation; resisting the temptation to discard inconvenient bits of information; paying more, rather than less, attention to awkward facts, impressions or ideas;
8. Not minding too much if there are areas of uncertainty in my understanding, or bits of information I don't have; being sceptical about the facts I do have.

Adopting a set of stances isn't necessarily easy so here are some suggestions about things you can actually do when you are looking at a complex situation that mystifies you in some way. (There are likely to be times when the unit itself looks like a complex situation that mystifies you.) Practising these will help you to develop the open, enquiring style that can make systems work so exciting.

Make sure you include in your thinking about the situation:

1. The preceding history and the wider context of the situation;
2. Information about how people (including you) involved in the situation feel about it; what are the hunches, intuitions and suspicions they, and you, have about it;
3. Information about the dynamics (procedures, flows, communications, feelings) of the situation as well as the structure (roles, organisation framework, boundaries, materials, components) and how the process and structure fit together;
4. Information about how the situation appears to other people, including those around the situation as well as those directly involved;
5. Attention to what is *not* going on and what is *not* present.

2.5 Review

The title of this unit could have been *Juggling with complexity: searching for system*. This title seemed to capture something essential about the unit. Juggling is a rich metaphor and will be used explicitly in Part 3. But it also carries the idea of a skill that needs to be practised and that might seem incredibly awkward to begin with. You may find this idea helpful as you review your work in Part 1. Juggling is also a skill that, once practised, becomes second nature. This too may be an important idea to carry forward to Part 2 as you begin to work on the search for system.

In working through this section, you have identified some of your initial expectations and I have explained some of what I think you will discover as you work through the unit. It would be appropriate at this point to look at some of the questions I asked you about your expectations again and note ways your expectations have changed.

Spend a total of around **30 minutes** on the next three activities.

Activity 6

Looking through your previous notes and my previous questions, identify and record any ways your expectations have changed.

Have any new expectations emerged from your reading of this new section? Do any of your expectations look less realistic now? Do your previous expectations seem more, or less, likely to be met.

Do you have any new ideas about what you would like to get from the unit?

Activity 7

Do you feel able to adopt any of the attitudes I have suggested?

Most people move into and out of the attitudes I described earlier. The difference I am proposing is that you consciously try and adopt them as you improve your capacities as a systems thinker. Do you think these attitudes will be useful to you? Have you adopted them in doing this activity? How successfully? You may like to record some judgement about whether you like the idea of these attitudes. Notice that I referred previously to 'a willingness to experiment with styles of learning that may not initially feel right or comfortable'. Does this reflect anything you are experiencing at this stage?

Activity 8

How do you understand the focus on your own responses in the activities and in the reading you have done so far?

Notice your intuitive responses as well as your intellectual responses. Are you puzzled? Stimulated? Surprised? Excited? Hoping it will get somewhere? Eager to find out more? Suspending judgement? Frustrated?

Any or all of these responses, even if they are a little difficult to live with, are likely to enable you to make good use of what comes in the rest of this unit.

It may also be you are unused to, or uncomfortable with, the focus on yourself and your own *experience* in an academic course of study. This need not inhibit your learning, provided you recognise your discomfort. If you stick with it, the unfamiliarity of this type of approach is likely to disappear. The payoff: you can become a person who can think and practice systemically. Without engagement with your self, Systems is likely to remain, for you, a collection of techniques that are never really your own.

It would be unreasonable for me to expect that you would instantly recognise this is an effective way of starting studying Systems.

Make a note of your present understandings and responses.

Given up already?

Figure 3 can be seen as a Dalmation (spotty) dog. The dog is facing away from the viewer, sniffing the ground with its black ear falling forward. Its head and dark collar are half way

up the picure and about one third of the way across the frame. Its rump is near the right hand edge of the frame.

Part 2 Experiencing complexity

Part 2: 1 Introduction

I have a number of purposes in mind as I write Part 2. You can read these in conjunction with Figure 4.

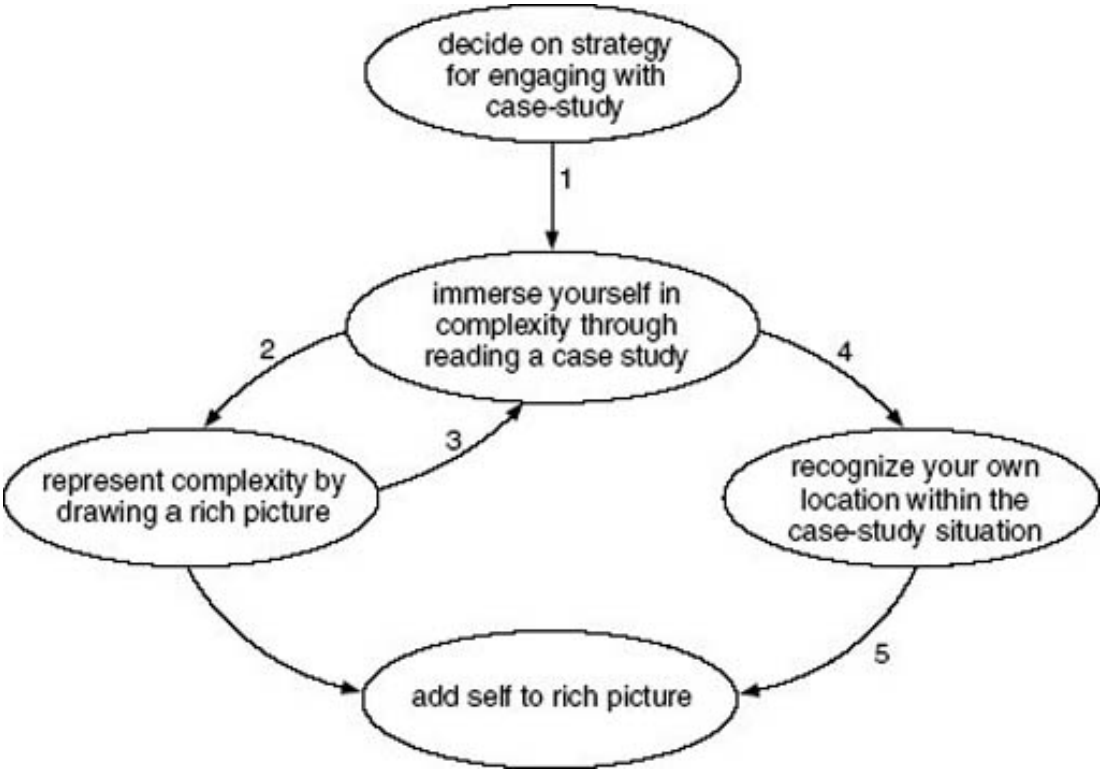

Figure 4 An activity-sequence diagram for experiencing complexity and working with it. As before, the arrows imply activities at the back end of the arrow must necessarily happen before activities in front of the arrow can be completed. The actual sequence of activities, as presented in this unit, is represented by the numbers against the arrows

Firstly, I want to give you the opportunity to get on with it – actually getting stuck into an experience of a complex situation. Through that experience, I want to exemplify the process of getting to grips with the complexity of the situation by looking for systems, or elements of systems, within it. I want you then to have the opportunity to use these systems to understand the situation.

My **second** purpose is to allow you to draw together some of your previous understandings of Systems with some of your systems skills and to consolidate them. They will then form a firm foundation for proceeding with the unit. In particular, since diagrams will be really important throughout the course, I want you to have an opportunity to practice and develop your diagramming skills.

Make good use of OpenLearn unit T552_1 *Systems diagramming*. This unit will explain the theory and 'rules' for each diagram type and how each diagram type is constructed and refined.

If you have previously studied a Systems course, Part 2 will function as a kind of work-out, allowing you to 'get fit' with a new coach in a new gym. You will need to develop systems-diagramming skills for the first time. You should pay particular attention to understanding the purposes and conventions of each diagram type, as described in T552_1 *Systems diagramming*. Whether or not you have done systems diagrams before, T552_1 is an important resource in working through this part. You will need to refer to it later in your work on this case study.

My **third** purpose is to support you in acquiring the skills of assessing the quality of your own diagrams. The case study you will be engaging with is very complex and it would be possible to draw an enormous range of diagrams of each type, each highlighting different features of the situation and each taking a slightly different perspective. This means that, if you are truly to engage with the complexity, you are unlikely to produce a diagram similar to any of mine. How are you to know if your diagram is any good? The answer is first to recognise there are many ways a diagram can be good. The second is to develop a series of questions, or several ways of looking at your own diagram, which will prompt you to improve your diagram if it needs it.

As you work through the diagramming activities later in this part of the unit, I suggest you make a point of noting the criteria I suggest for evaluating your diagram in your Learning Journal. They will come in useful as you do further diagrams. Being able to evaluate your own diagrams is likely to be a hugely more effective way of developing your skills than comparing your diagram with mine – especially when mine is unlikely to be addressing the same issues as yours.

My **fourth** purpose is to convey something of the flavour of the unit. At the end of Part 2 you will probably have formed your own sense of what flavour has been conveyed. For me, this flavour has to do with the way a complex situation can be understood by interacting with it in a number of different ways, taking different viewpoints or perspectives.

It is as if, with a telescope, I observe the situation from a number of different vantage points. This will reveal images of the situation from different directions so that different parts and sides become apparent. But I also take the trouble to view it at a number of different magnifications, including more or less of the situation and its environment in each image. I might also change the focus, examining both foreground and background. Later in the unit, the telescope itself (if I extend the metaphor) is examined to discover what it is good at showing and what it tends not to see so well.

6 Part 2: 2 Immersing yourself in complexity

The first three activities in Figure 4 are to plan a strategy, then to immerse yourself in an example of complexity, and then represent that complexity through drawing a rich picture. I've selected a rich picture as the focus of this task because it is a means of bringing you into a rich encounter with the complexity of the situation described. The rich picture is a representation of your encounter with the situation, and so drawing a complete rich picture needs you to have represented the situation to yourself. The rich picture allows you to see the whole situation at once – something that would be very difficult to do in your head. My purpose is to offer the encounter, and then to consider the experience of the encounter, between you and the complexity. The rich picture is simply the means and the evidence of this happening. Bear this in mind as you work through the sequence of activities represented by Figure 5. Figure 5 is an unfolding of the first two activities of the overall task of experiencing complexity described by Figure 4.

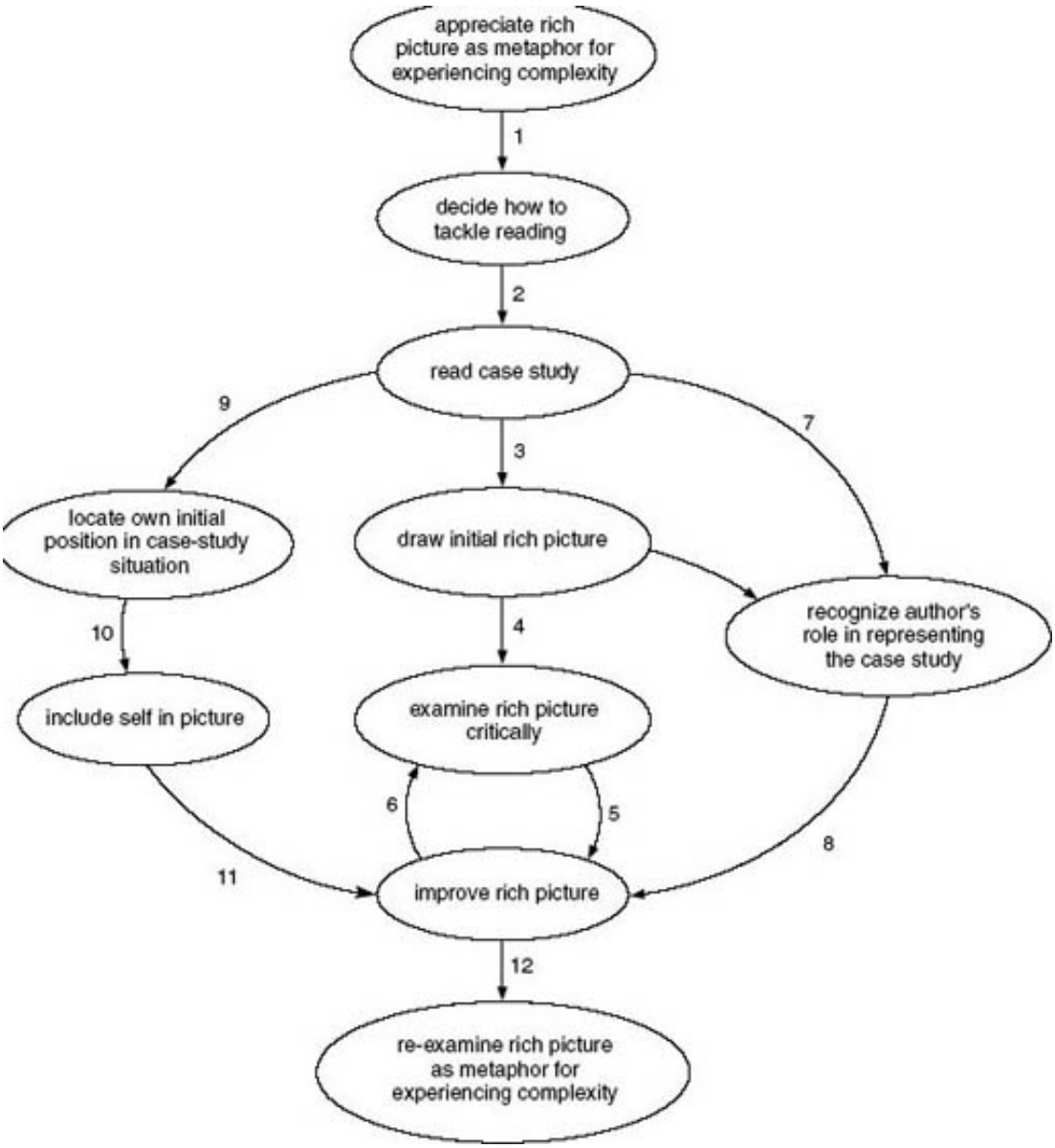

Figure 5 Activity-sequence diagram for experiencing complexity through constructing a rich picture of a case study. The numbers beside the arrows indicate the order I have chosen to discuss the various activities

At this point, I would like you to prepare for reading the case study, the second activity in Figure 5. Your task is simply to grasp as much of the case-study complexity as you can. Notice that, at this stage I am not suggesting you do any analysis of the situation described. At the end of this task you should only aim to have a general impression of the overall complexity and a representation of that complexity. Detailed study and analysis will come later. The case study is about 9500 words long. The next activity should help you decide how to tackle this reading.

There are a number of things in planning how to deal with this amount of material. Firstly, you may not be able to grasp all the detail at the first reading. Don't worry about this. The case study was chosen, in part, because the feeling of being overwhelmed is quite a common one in systems practice and the I thought this would give you some of that experience. Even if you feel overwhelmed, don't be discouraged. The later activities are proven ways of dispelling the sense of being overwhelmed. A bit of determination to get through it all will help.

Spend about **five minutes** on this activity.

Activity 9

How do you read most effectively?

It may be helpful to think of a specific *experience* where you were trying to understand a detailed piece of text. Did you have a strategy for reading it? What was that strategy? Does your strategy involve skim reading first to get an overall sense of the shape and returning to the beginning for a more careful read and then, finally, a third pass taking notes about the development of the narrative? Or perhaps your strategy, completely different from the first, involves a process of careful reading taking notes, followed by a second read-through to check the notes are as complete as they can be. Be as specific as you can in identifying a strategy that works for you. Make a list of the sequence of processes you anticipate will work well for you.

You should also assemble materials for drawing a rich picture.

Once you have identified a style of text-reading you think will work well for you, move on to the task of reading the case study. The case study was chosen because it is a real-life example of a complex situation where an attempt to put right a problem had results nobody intended. It also contains lots of soft complexity. So-called soft complexity is often the hardest to deal with since it involves human values, beliefs and emotions. In this case study, all of these collide.

Expect to take a total of around **5 hours** to complete the next activity but if this unit is your first serious engagement with systems work, allow rather longer. You will need to get to grips with the concept of diagramming and, the concept of drawing rich pictures in particular. Don't attempt to tackle the task in one long session. You may get more out of it if you take it in two blocks of time, perhaps on consecutive evenings.

Activity 10

Read the case study ‘Financial support for the children of lone parents’ by Joyce Fortune (attached below) and draw a rich picture. (You can find some extra guidance on how to create a rich picture at this link.)

Using your chosen style of reading, read through the case study and represent the situation in a rich picture. Make sure your rich picture is as rich as you can make it. Remember a rich picture is not intended to be an analysis. If you have any thoughts and ideas about the situation, or your rich picture of it, make a note of them so you won't forget but concentrate on the main task of representing as much of the situation as you can in the rich picture.

Click on the link below to read Appendix B.

File attachments are not available in this format.

View document: Appendix B

7 Part 2: 3 Representing your experience of complexity

7.1 Introduction

The last activity was a demanding task. People I asked to do it during the writing of this unit, found it took a lot of concentration but it brought up lots of ideas, feelings and suggestions for action. Most of them were also concerned their rich picture might not be good enough. I imagine you will share some of these reactions. If you share any of these concerns, remember there are lots of ways of drawing a good rich picture and almost all rich pictures can be improved. Improving your rich picture, and your appreciation of the complex situation it represents, is the next task.

Activity 11

Review your rich picture.

When you come back after a break, spend about **5 minutes** taking a good look at the rich picture. Is it as complete as you thought it was? Are you pleased with it? Are you stuck for ideas about how to improve it? Do new features strike you as you look at it? Do questions arise about it, or the complex situation it represents?

Make appropriate additions to the picture if necessary and record any thoughts or questions that occur to you in you Learning Journal.

Taking a break seems to be an important part of the process of drawing a rich picture. It is almost as if one of the characteristics of the process is to generate thoughts and ideas that only become apparent when you see it afresh.

You have now completed the fourth activity in the central spine of Figure 5.

7.2 Complexity and rich pictures

This section is mostly concerned with thinking about your rich picture and the complex situation it depicts.

There are lots of ways of drawing a good rich picture and very few ways of drawing bad rich pictures. So my next strategy in supporting your learning, and your experience of this complex situation, is to propose a number of checks you might use to ensure you have not fallen into the trap of the less-effective rich picture.

Although my discussion will focus on rich pictures, I am also talking about the complexity the rich picture represents. I am using the task of generating a useful rich picture to illustrate the process of experiencing and capturing complexity.

7.2.1 Trap 1: representing the problem and not the situation

This trap is one of the most fundamental mistakes you can make in systems thinking. There are lots of metaphorical phrases in English that can entice you into the trap. We can talk about ‘the nub of the problem’, ‘the key issue’, ‘the basic problem’, ‘the real difficulty’ and so on.

Like all traps, once it has sprung, it can be very difficult to get out. The trap seriously limits one's ability to think about the situation in its full complexity. This is precisely because, by identifying every problematic feature as stemming from one single interpretation of the problem, you limit your possible ways of dealing with the situation to those that might be answers to this single problem. You have imposed simplicity on the situation, which does not reflect the very complexity that makes it problematic.

In contrast, one of the reasons this case study seems to be complex is precisely the difficulty of identifying anything that could be described as the key issue. It seems to be a tangle of interrelated key issues.

The whole point of a rich picture is to represent *all* you can about the situation. To identify the problem within the picture, or to include only the elements that seem problematic, is to prune out potentially important elements of the complexity.

So, the check for avoiding this trap is to ask:

- Does this rich picture represent the situation or is it just my interpretation of what the problem is? Does it include all the features noted as problematic?

7.2.2 Trap 2: the impoverished rich picture

A distinguishing feature of rich pictures that turn out to be useful seems to be they are just what they say they are, rich. If I take usefulness as the criterion, the useful rich pictures are the ones bursting with interest and activity. They don't seem to tell a single story, there are lots of stories going on simultaneously. They reveal stories you didn't consciously build into them.

How is such a rich picture to be achieved?

Use everything you find in the situation. This means incorporate everything you know about the situation. Either put things into the picture as you re-read the description; or make lists of the protagonists, the organisations, the structures, and then put them into the picture. Include people as well as the roles they inhabit.

Indicate the connections. Where the structural entities you listed above have connections and relationships between them, indicate what they are. There are all sorts of ways of doing this, especially if you ask yourself about the nature of the connection. You could use physical proximity (or distance) or representations of the nature of the connection (hearts, daggers drawn, telephones, deafness, walls of silence). Lots of people quite unconsciously use visual metaphors in their everyday language. (‘Every so often they *drop a bombshell* on this department.’ ‘We're *swamped* with memos.’ ‘We're *drowning* in paperwork.’) Talk to yourself about the situation and you may pick up clues about how to represent features of the situation. Arrows and lines tend to be less useful but they're not

forbidden. Don't force the images, use the ones that seem to come naturally. There is no library of approved symbols.

Use all the geographical locations, if this is relevant.

Use all the processes. Include all the changes, and activities. Include impressions as well as reported facts.

Some people use computer clip-art to draw rich pictures. It rarely works in my view. Some essential quality seems to be missing. This quality might be ownership or engagement or it may be the very act of sitting at a computer keeps the activity at a rational level – it does not allow for the impressions and half-formed awareness to express themselves through the act of making marks directly on to paper.

The check for avoiding the impoverishment trap is to ask:

- Have I included everything I know about the situation in my representation of it?

7.2.3 Trap 3: interpretation, structure, and analysis

If you deliberately impose an interpretation or analysis on your picture, you preclude the possibility of seeing other, potentially more interesting, features later. Remember the rich picture is a representation of the complexity. If you structure that complexity, you are no longer representing it as *you* experience it. You also lose the possibility of using the drawing process itself as a means of encountering the complexity in all its fullness.

The trap takes a number of forms. Beware of representing events in their chronological sequence, either explicitly or implicitly. Also, organisational structure may take over and become the structure of the whole picture. Elements of other diagram forms may creep in. (Systems maps and influence diagrams can be quite a temptation.) Watch out for the temptations you are susceptible to. Artistic abilities, if you have them, can represent their own temptations – they too can be a part of the structuring trap.

It may be inevitable that interpretations suggest themselves as you draw. Stop yourself thinking ‘this is really about …’ One way of stopping this is to jot the idea down somewhere – not on your picture – in the form of a question. Once you've written it down, the idea is much less likely to keep popping up as if it were trying to ensure you won't forget it.

So, the check for avoiding this trap is to ask:

- Is this rich picture telling just one story or is it rich enough to suggest lots of stories about what's going on?

7.2.4 Trap 4: words and wordiness

I have seen some effective rich pictures with lots of words in them but they are quite rare in my experience. More often, lots of words make the rich picture less rich. Part of the later use of a rich picture might include looking for patterns. Words inhibit your ability to spot patterns.

If you do use speech bubbles, use what people say, not your interpretation, unless the bubble is about some general attitude. Examples might be ‘Aaagh!’, ‘Help!’, ‘Oops!’ – the sort of things found in comic books.

The check for avoiding this trap is to ask:

- Do I have to do a lot of reading to see the relationships between elements in the picture?

7.2.5 Trap 5: the final version trap

Ironically, the biggest mistake you can make, having got this far, is to assume your picture is finished. New realisations will crop up. Add these to your picture as you appreciate more and more of the complexity.

So, the check for avoiding this trap is to ask:

- Have I had any new insights about the complex situation since I last added something to this picture?

SAQ 1

List the main traps you can fall into when you draw a rich picture of a complex situation.

Examine the rich picture you have just drawn and identify any remaining traps in which your picture may be still be caught.

Answer

The main traps you can fall into are:

- representing the problem, or your interpretation of the problem, and not the situation;
- the impoverished picture trap – not including everything that seems important to, or related to, the situation;
- including your own analyses, interpretations and structuring in the rich picture;
- too many words; they can obscure or diminish the richness of the picture;
- assuming the rich picture is the final version.

The rich pictures that follow give an indication of some common traps.

Figure 6 seems to me to fall into several traps. It is certainly impoverished; there are a lot more things that could, and should, have been drawn. In part, this impoverishment is due to the fact that the drawer has chosen to structure the picture in terms of money moving about, so anything that cannot be represented that way has been left out. The rich picture almost looks like a flow diagram for money. The picture also contains some rather superficial analyses by making judgements. The drawer might also have been alerted to this trap by the words that appear; there are quite a lot of them for such a simple picture.

This picture has also broken one of the rich-picture rules; it should have a title. Also, it does not include the drawer.

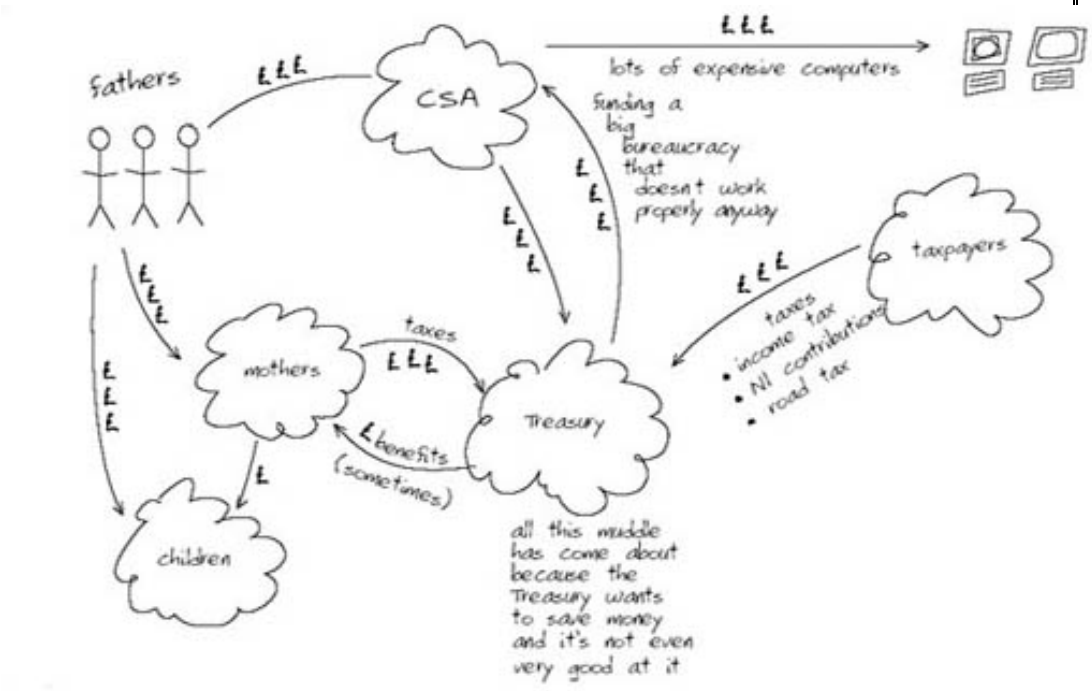

Figure 6

Figure 7 also seems to be rather impoverished. Lots of the situation is missing. The picture also seems to be an organisational chart of sorts. The lines seem to suggest it's a disguised representation of the activities of the CSA. Of course, those activities do need to be included, but to include the lines is an element of structuring that will get in the way of the eventual usefulness of the picture. The picture also suggests, by its central position and the spokes coming out of it, the CSA is somehow the problem, an interpretation that should not be there. The drawer might have spotted this trap as they gave the picture its title. The picture should be about the situation, not just components of it.

Like Figure 6, the drawer has forgotten to include themselves in the picture.

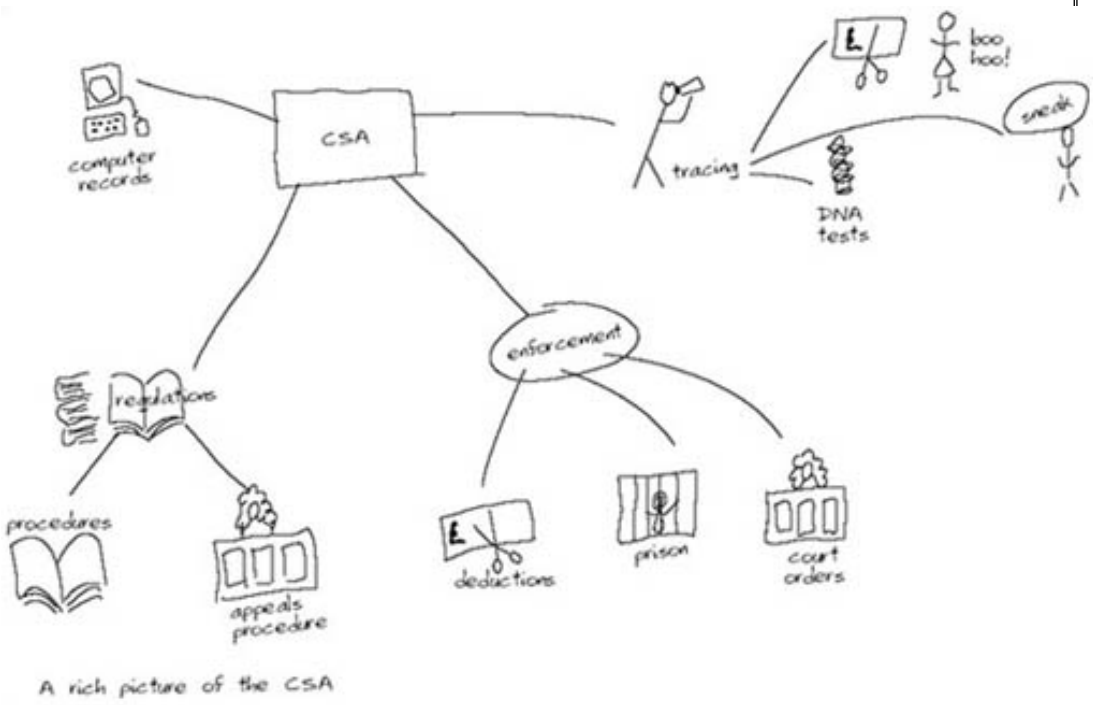

Figure 7

7.3 Getting out of traps

Remember to date your rich picture and not to throw away any previous versions. Old versions of rich pictures provide you with a record of your developing understanding.

The next activity is an invitation to improve your rich picture by digging yourself out of any of the traps you may have fallen into. In this activity, I suggest a certain ruthlessness in reviewing your efforts so far. You should not, however, see this as an evaluation of your performance in the task. My experience is that knowing about the traps is only part of the skill of representing complexity. Sometimes one simply falls into them.

The worst possible result is falling into a trap and not realising it has happened. So, the next bit is about learning to recognise the traps when you've fallen into them and learning to get out of them. With that experience behind you, falling into any of the traps isn't a disaster. My hope, without being malicious, is you've fallen into at least one trap and in the next activity you'll get out of it. The next activity may take only **15 minutes**. If you need to re-draw it will take longer – but not as long as the first drawing took.

Activity 12

Look at your rich picture.

Check you have not fallen into the trap of an over hasty identification of the problem. It is not easy to spot this trap if you have already fallen into it, so be ruthless. Be prepared to re-draw your picture if you discover yourself in this trap. It may be possible to add the necessary elements but the trap is such a disabling one that often it's better to completely re-think your representation. I've fallen into this trap, and still do, many times. In my *experience*, redrawing is never a waste of time.

Check you have not fallen into the trap of impoverishment. It's fairly easy to spot if your representation of the situation is rich or poor. Compare it with the example rich picture in T552. Has it got that same quality of buzzing with activity and interest? Use the tips for getting everything in described above. Make your picture as rich as you can.

Check you have not fallen into the trap of structuring, interpreting or analysing the situation. If you have, re-drawing may be worthwhile. Once structure, interpretation or analysis is there, it's hard to disguise them and they become a distraction.

Check the richness of your picture isn't swamped by words and the words are not structuring your representation of the situation. Make the necessary improvements. Add anything else that seems to be part of the situation.

You have now completed the activities connected by arrows 1 to 6 in Figure 5.

7.4 Complexity from someone else's perspective

You may already have noticed, and included, the author of the case study in your rich picture. The clues that this is necessary are in Figure 5 and in my comments about epistemology in the introduction to the unit. Just how important the writer of the case study is becomes obvious when you consider almost all the detail you have access to in this situation probably comes through that person's writing. Even if you have first hand experience, and are aware of all the intricacies of the situation described, it is the author of the case study who has largely defined the situation – an element of pre-structuring that needs to be recognised.

At this stage, it is not appropriate to try and evaluate just how much this person's view of the situation – whatever that view is – has influenced yours. But it undoubtedly has. Including the author in your picture is simply a recognition that, in writing the case study, she went through a process of deciding what was relevant; sorting what she would include and what she would leave out; she ordered it into a readable bit of text; and she made some judgements about when to use quotations and when to simply report. Just include the writer as an element of the picture, don't try and impose structure or i

7.5 Summary

I hope that, by now, you have a rich picture you are pleased with. This is a considerable achievement because, despite the informality of the rich picture's style, a rich picture that effectively captures the complex situation takes a lot of effort to achieve. It depends crucially on being prepared to enter into the experience of the situation of interest and to interrogate that experience thoroughly. Noticing is not enough. Each feature of the situation has to be carefully captured by representing it in the rich picture.

My point in inviting you to draw a rich picture was not just to give you practice in rich-picture drawing – useful as that will be for the unit. The drawing of the rich picture is also a means of enabling you to enter into relationship with this complex situation – to experience complexity.

This completes the first three activities in the activity sequence depicted in Figure 4 and the activities linked by arrows 1 to 8 in Figure 5. One essential element of the rich picture remains to be added, and for this, the focus of attention must be changed to experience another component of the complexity. This happens in the next section.

8 Part 2: 4 Being inside complexity

8.1 Loose ends

Before moving into a discussion of the missing element of the rich picture, I want to direct your attention to all the thoughts and ideas I have encouraged you not to put into your rich picture. I imagine you might have collected quite a list of loose ends. The next activity will involve some of these.

Expect to take about **half an hour** to do the next activity.

Activity 13

Identify and record any stake you hold in this situation in your Learning Journal.

First, identify any stake you hold in the situation described in the case study. Such a stakeholding might arise in any one of a number of ways.

Are you a lone parent, a parent who lives (or has lived) away from your children, or a parent with sole (or most) care of your children (or child)? Are you a child of a single-parent family? Do you have professional or other interests in the Child Support Agency; the Benefits Agency; or charitable or campaigning organisations working in these areas? Do you have a role in an equivalent agency outside the UK? Do you have any role in forming government or political policy? Do you subscribe, through membership or otherwise, to a political-party view on these issues? Do you have family members, friends, neighbours or colleagues, in any of these roles? Perhaps you have a stake as a tax-payer.

Record your current thinking about this situation.

In particular, record any ideas about what the core issues are, people or agencies that you might hold responsible for some of the problems described in the case study, areas where you feel clarity is missing, and so on. Are there places where you feel tempted to say things like, ‘if we could just deal with X then Y might be better’.

What passages of the case study seem to represent particular clarity or do you particularly identify with?

Make notes on your own view of the extent of parents’ rights and responsibilities with respect to their children, and the role the state should have, if any, in ensuring that children are adequately supported.

Record your current feelings about this situation.

Are you angry? cynical? amused? amazed? Do you have any feelings on behalf of any of the protagonists? Do you feel it's not fair? (Be specific about what's not fair, not fair to whom.) Do you have any positive emotions? Do you feel compassion (for whom?), empathy, approval (of what?), pleasure?

It's easy to censor feelings, especially perhaps in the rational activity of studying a unit. The censorship arises from the idea that irrational emotions have no place in rational discussions or from, for example, the desire to avoid passing judgement on someone else's behaviour or attitudes.

Feelings are not necessarily politically correct either. While political correctness can challenge us to examine the basis of our feelings, gut reactions are generally not guided by intellectual principles. Get past this censor as much as you can.

Another block to recognising feelings is the idea the feelings have to be justified in some way. You don't have to do this in this context. You should simply record the emotions that are there. Be as specific as you can about what you feel.

If you have no direct stake in the UK's arrangements for child support, perhaps because you live outside the UK, record your feelings and questions about the situation described. Include your impressions about the social arrangements that give rise to the situation described. Include also, any judgements you make about these. Does the text give rise to any questions concerning arrangements and social conditions in the country where you live?

If you pay taxes in the UK, or live in a household that pays taxes, what are your feelings about the situation as a tax-payer?

Record your initial views about what should be done to improve this situation.

Don't worry if these are based on gut reactions. Any ideas you have about what should be done, or about what you feel should be explored, should be recorded. They may be more or less feasible, or more or less long-term. Use the language that first springs to mind, even if it's in the form of, for example, ‘A and B need their heads banging together’, or even, ‘people should be stopped from having babies’.

In particular, if you have any ideas that take the form ‘X could …’, ‘X should …’, or ‘X ought to …’, record them because these word forms usually disguise some judgement about someone's culpability.

Some people find it quite easy to record their emotional responses to a situation – indeed, they might even find it quite difficult not to express their feelings forcibly. Others find it difficult to express, or even to recognise, any emotional response to a situation such as this. Other people are, of course, either somewhere between these two extremes or somewhere else altogether. Neither is good or bad. The point is, if I am to start thinking deeply about a complex situation I have to recognise I do have emotions, even if I'm not fully aware of them. They contribute to the complexity of the situation because they condition the way I perceive and evaluate the situation. Your own values are important. The point is not just simply to record your values and responses, and then ignore them, but to *acknowledge* them.

I and, I suspect, many other people, find it impossible not to have emotional responses to most situations. Indeed, without emotions I would not be interested in the situation at all. I would be less than fully human. The question then becomes, ‘How do I think sensibly about any complex situation I care even slightly about?’ The answer to this conundrum, I believe, lies in learning how to account for one's emotional responses as part of the complexity of the situation.

Professionalism, in Systems as in any other practice, assumes the practitioner will endeavour to set aside purely personal preferences in favour of attaining good resolutions in problematic situations. (Of course, a resolution has to be recognised as ‘good’ by somebody but that is another discussion and will come up later in the unit.) I'm not suggesting this professional standard be abandoned by systems practitioners. But, it seems to me unlikely anyone could be a good systems practitioner without having some views on, and opinions about the situation of interest.

So, as a systems practitioner, I need to be able to *manage* these views and opinions. This may involve setting them aside but at the very least it involves accounting for them. I can only manage what I know about and so, as a responsible practitioner, it seems to be important I acknowledge any prejudices so that I can take account of them. I can also be aware of the ways initial views, feelings and opinions condition what I am able to observe, what I am able to enquire about and what I am able to do.

This theme will be taken up later in the course. For the moment, I want to propose the activities described in Figure 8 as a way of managing the complexity that you, as a person with experiences of, stakeholdings in, and feelings about the situation, bring to it. You have already completed the four activities at the top of the diagram.

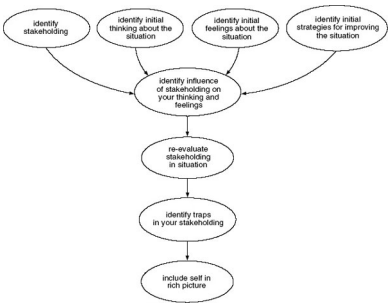

Figure 8 Activity-sequence diagram for locating your own position in a complex situation and representing it in a rich picture

The next activity addresses the role your stake in the situation has in supporting some of your initial reactions to the situation, including your emotional ones.

Expect to take around **10 minutes** on this activity.

Activity 14

Examine the initial responses you identified in the light of the stakeholding you identified earlier in Activity 13.

Are they related in any way?

Even if you did not identify a specific stakeholding, do your initial responses form any pattern? Do they suggest you identify with any individual protagonists in the situation, or groups of protagonists? Do they suggest you have additional stakes, even if simply emotional ones, in the situation?

8.2 Stakeholder traps

I've found it's not at all uncommon to discover I have a stake in a situation. Complex situations often spread their tentacles into all sorts of areas, so that the number of people touched by them can be very large. This increases the chances of an individual acquiring a stake, even an indirect or second hand one. The human capacity to empathise draws me into a situation so that I form pre-judgements about fairness, blame and so on without really trying. In many ways this is to be welcomed – a direct stake can, for example, mean I have access to additional information.

But stakeholdings can also set traps. The principal one of these is the trap of getting caught in one perspective. If I am to be able to respond to a situation in a way that

respects its complexity, I have to be able to see the situation from more than one point of view. Any view is always a view from somewhere. Staying with one viewpoint will mean some aspects of the situation will remain hidden. I have to move between viewpoints.

SAQ 2

Imagine some friends read the case study and they recorded their initial reactions as follows.

Jane: I've experienced exactly what this is all about. I've had no end of problems ever since Billy's father left. And the CSA has been no help at all.

Martha: Mmm! It doesn't really seem fair that fathers who've been very responsible and have met all the conditions of their court orders should suddenly find themselves having to pay out much more than they'd planned for.

Pete: This is all motivated by the government's drive to save money. It's fundamentally dishonest to dress it up as help for families.

Liam: I don't really have an opinion. If people chose to have children then their problems are all of their own making – and nothing to do with me. I just have to pay up through the tax system.

How would you help your friends to identify any traps to do with their first thoughts before they start to think more systemically about the situation? *Hint:* Whether your friends' reactions are right or wrong, in your opinion, is not important.

Answer

Jane may be in the trap of thinking she knows all about it. She is certainly likely to know lots about it from the point of view of someone in her situation but this is not the same as knowing all about it. She may get trapped in her own perspective too. This perspective already seems to include the conclusion that the CSA is 'no help at all'. She may need to make a conscious effort to include other perspectives as fully as possible and be open to seeing alternative views of the CSA.

Martha may need to make sure she is open to alternative opinions, even ones that could change her mind.

Pete seems to be identifying a single source for the problem. This is a trap. He is also making a judgement about a component in the situation, and that too makes him less open to seeing other perspectives on the problem. He may be right, he may be wrong, but moral judgements of this sort tend to obscure the multiplicity of motivations and issues that make up the situation.

Liam does have an opinion. It seems to be a strong one too. He's also a stakeholder, through the tax system. He may find he gets stuck in the trap of feeling disengaged, by being engaged in what seems to be a 'blame story' that attributes the whole problem to parents. This is a pre-judgement that will get in the way of thinking clearly and systemically about the situation if he is not aware of it.

The next activity asks you to make notes of traps you think may be inherent in your initial evaluations of the situation. The notes you make will serve as an alert as you continue to work through the case-study material. Often, simply being aware of initial evaluations and being determined to treat them sceptically and open-mindedly is enough to avoid them becoming traps. Be prepared to change your mind.

Expect to spend about **15 minutes** on the next two activities.

Activity 15

Identify traps that may arise from your initial evaluations of the situation, for example, traps set by stakeholdings or identification; the ‘core issue’ trap; the ‘unacknowledged feelings’ trap; the ‘gut-reaction solution’ trap, all discussed above.

Make notes on any traps you identify as a result of studying your notes from Activities 13 and 14.

Finally, having done all this, you can locate yourself in the rich picture. Take a few minutes to do this in Activity 16.

Activity 16

Locate yourself in your rich picture.

Decide how you are going to represent yourself in your rich picture. Where do you stand in this situation? You might, for example, see yourself as a student, eager to see what can be done to improve the situation. You may want to represent yourself avoiding traps (or using some other metaphor, you don't have to use mine). You may want to represent yourself as a lone parent. Give it some careful thought but also listen to your instincts, and be prepared to change or add to your representation later.

9 Part 2: 5 Exploring complexity

9.1 Making sense of complexity

This section is about finding ways of thinking about complex situations – making sense of complexity. This is a process of discovery. It involves thinking about complexity in an orderly way that allows you to enter a deeper understanding of the complexity. It goes beyond immersion in, and representation of, complexity.

The invitation I am making in this section is to move into the possibility of *structuring* complexity. Notice I am not suggesting there is structure *in* the complexity I can discover. Rather, it is about discovering ways of structuring the complexity in ways that make sense to you. By structuring the complexity, I can think more effectively about it and possibly discover ways of improving the situation.

To discover ways of thinking about the complexity in the case-study situation, I am going to use systems diagrams. If you have used systems diagrams before, this is a useful opportunity to revise and hone your skills. If you have not encountered systems diagrams before you will need to spend rather longer on the case-study exercises. In either case, time spent studying OpenLearn unit T552_1 *Systems diagramming* will be a good investment. The whole unit makes extensive use of diagrams and, unless you become skilled in using them, you will miss out in important ways.

You may have already noticed the situation described in the case study has already been ordered. Completely unstructured, it would have been impossible to understand. The case-study author chose to describe the situation by ordering events chronologically. Thus, although she is describing a present mess, she does so by ordering events that led to the present situation, and describes the features of the complexity in the order they occurred. In some ways, the history of the situation could be said to inhere in the current situation and histories can be a powerful way of understanding complexity. Histories throw useful light on situations where a multiplicity of interpretations can be imposed. You will see examples of this later in this unit where histories and the related idea of tradition are used to explore some of the central concepts of the course. In the next few sections, I will use the idea of history as a starting point for structuring the case-study situation.

9.2 Systems maps: searching for system

A simple definition of a *system* is an assembly of components interconnected as if they had a purpose. I am going to use the idea of purpose to look at the situation as I understand it.

Presented with the complexity of this situation it may be hard to know where to start. I have often found it helpful to start with the notion that somewhere in all this complexity there is, or was, some purpose. It is quite common in situations like this to find the mess has arisen because somewhere at some time someone had a purpose, tried to achieve it, but their intentions got lost in the unintended consequences of what they did. In the following activity, try to find as many answers as possible in the time.

Take about **10 minutes** to do this activity.

Activity 17

What was the perceived problem (or opportunity) to which components in this situation seemed to offer a solution?

Identify at least two organisations, processes, activities or ideas in the situation that might be perceived as attempted solutions to some issue, problem or opportunity. Preferably, identify several more.

Identify the issues, problems or opportunities to which these might be said to be attempted solutions.

For each of these issues, suggest the person, persons, or organisation that had the power to bring each of these attempted solutions into being.

This question, and others like it, seems to offer a powerful way into understanding the situation. First, it prompts me to ask what components in the situation have been brought into the situation by conscious design. I am then prompted to ask who brought them in and why. The question *Why*? thus leads me to some conception of purpose within the situation, and the *Who*? identifies potential owners of the solutions.

I can exemplify the way this question enables me to make these distinctions. Please don't assume this example answer is a model answer, let alone the right answer. As you will see, the answers I identify are constructions I put on the situation – they are not, in this case, directly drawn from the case study material. Sometimes in complex situations purpose is explicitly stated, but more usually it has to be inferred.

Within the case study material, I can identify a number of elements that have been brought into the situation by human agency. The first one that struck me was the Department of Social Security. The DSS was brought into being well before the events that led up to the current situation. I can also infer, even if I do not know, a number of purposes may have been present at the time it was set up: the provision of social security for the citizens of the UK; the alleviation of poverty within the UK; the redistribution of income. It is possible a number of purposes were present, both implicit and explicit. I can infer that, as a government department, it was set up by a past government perhaps acting on behalf of the electorate. In this case, the DSS seems to be rather peripheral to the situation described in the case study. It is likely that exploring other, more central, entities will produce more insights. The Child Support Agency and the Child Support Act are more obviously central to the situation.

Spend about **five minutes** on the following activity.

Activity 18

Identify a potential system-with-purpose from your previous notes.

Rewrite each issue statement you identified in Activity 17 in terms of a system intended to address the issue. For example, an issue framed in terms of ‘a perceived need to encourage responsible parenting’ becomes ‘a system to encourage responsible parenting’.

Check the system you have identified is one the system owner could have seen, in principle at least, as being represented by the entity in the system they introduced. If not, look again at the possible problem you identified. Notice there is no need to establish whether the system actually worked, or whether it actually exists today.

The process you just went through for each of these systems is illustrated in Figure 9. Figure 9 is one possible schema for finding a system through which to explore a complex situation. I can refer to such a system as a *system of interest*. A system of interest is one on which a systems thinker chooses to focus their interest.

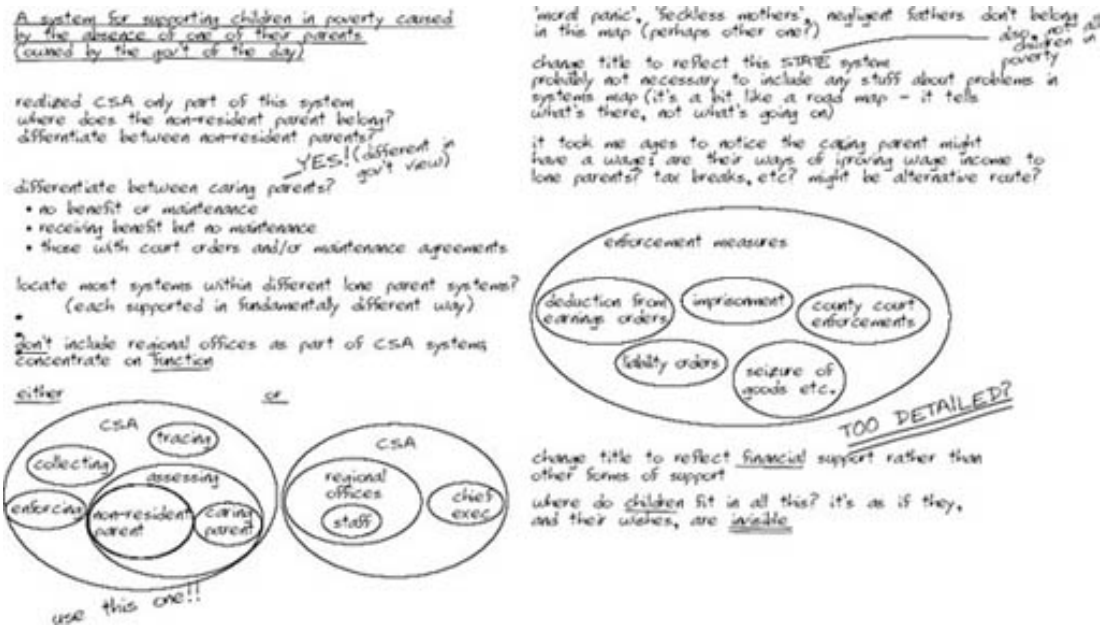

Figure 9 An activity-sequence diagram for identifying systems of interest, and their owners, in an unstructured complex situation

The output from these activities is a list of systems and their owners. At this stage, there is no judgement about whether these systems actually exist in the situation; about whether they work; about their desirability; nor about their relevance to the purposes of their owners. They are lenses through which to look at the situation. I can now ask myself: *if* there is a system whose purpose is, say, to encourage responsible parenting, *then* what relationship do other entities in the situation have to this system, and to each other?

9.3 Systems maps: Drawing systems maps

The next step is to draw some systems maps. The art of drawing effective systems maps lies, I believe, in finding an appropriate balance. The balance lies somewhere between the learning, which comes from the process of drawing the maps, and the uses I might make of the end product.

If you have already had some experience of drawing *systems maps*, you will know the process generates insights and understanding by itself. This comes from having to decide what to include and what to exclude; deciding where components are located; redefining boundaries; and sometimes starting again.

It is often tempting not to bother with the final drawing once these insights emerge. It is usually worthwhile pursuing the process to a final version of each map, however. Some insights only emerge once the map seems to be complete. It is equally possible to be so focused on the final map all the insights get lost or forgotten, even if they are incorporated into the map. In the activities that follow, it would be useful to pay equal attention to both the process and the product.

SAQ 3

State the main defects in the systems maps relating to the case study shown in Figures 10(a) and 10(b).

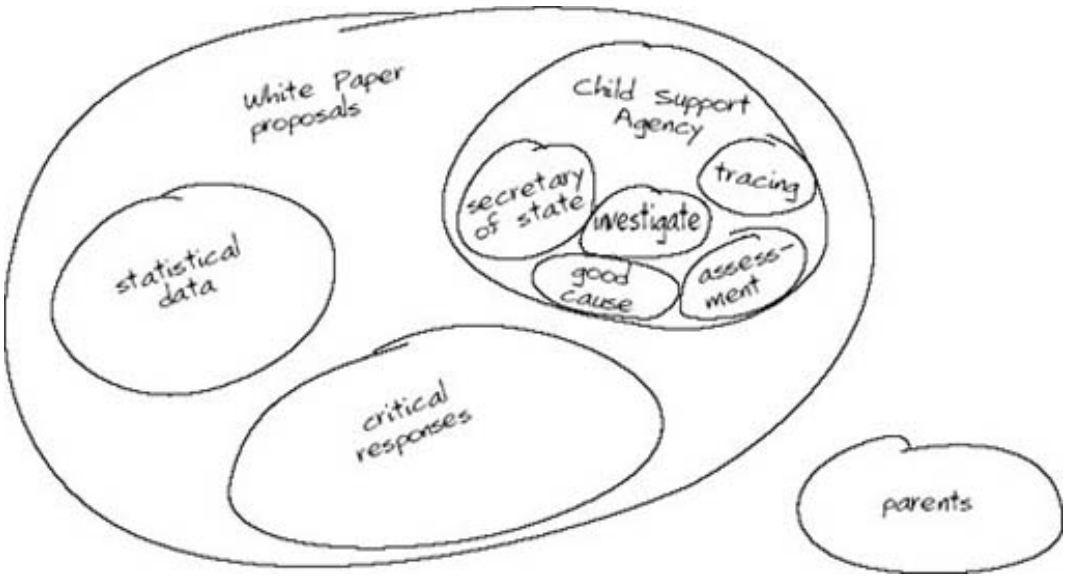

Figure 10(a) Defective systems map of White Paper proposals

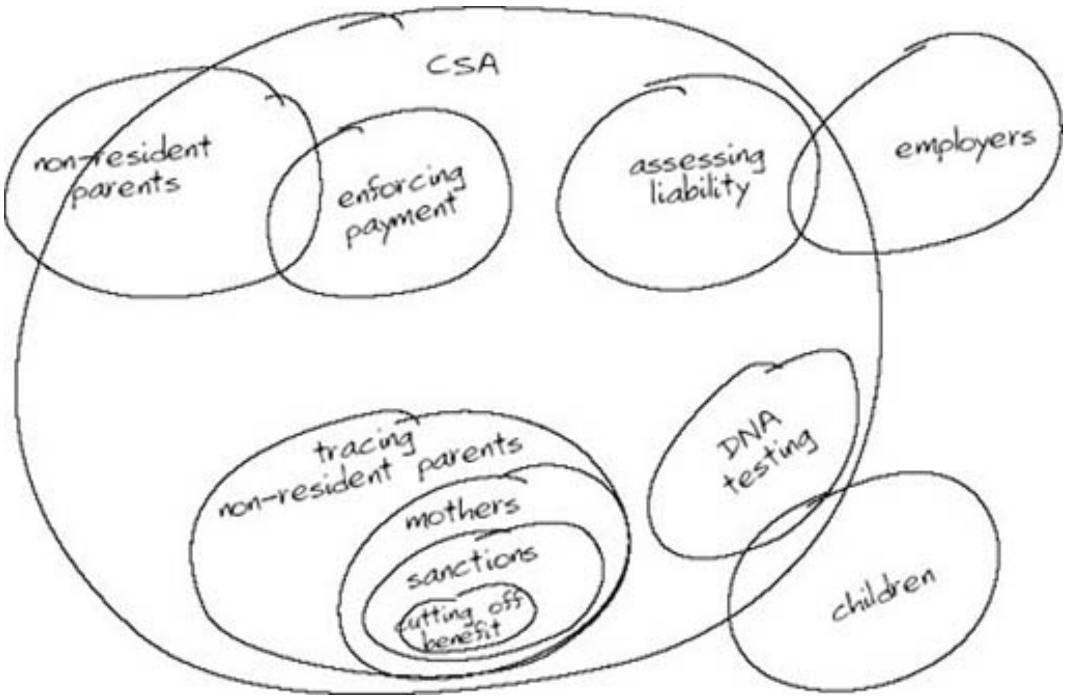

Figure 10(b) Defective systems map of the CSA

Answer

There are several problems in Figure 10(a). The first one that I spotted was the secretary of state is not part of the Child Support Agency. There is some confusion about systems and subsystem here, at the very least. I didn't think the secretary of state was really a system as such. I was also concerned about whether the White Paper proposals could be regarded as a system-with-purpose; I wasn't sure they could. In this case, the diagram seems to simply illustrate the structure of the White Paper. It is more like a structure or organisation map.

I suspect the diagram would be clearer, and make more sense if the system of interest were relabelled. This idea is confirmed for me by the inclusion of 'statistical data', which doesn't seem to be a proposal, although it was part of the White Paper. The critical responses were certainly not part of the White Paper proposals or the White Paper. It may be they might have a better role in an influence diagram on the outcomes of the White Paper proposals. I then checked back to see what the White Paper proposals were. The establishment of the CSA was the only one mentioned. I wondered why 'parents' had been included as a system in the environment, which, by implication, influences the system of interest. If it was really an influence on the White Paper proposals, what about the other influences?

Figure 10(b) seems to have a clearer structure although some subsystems seem to be out of place, missing or inappropriate. I was also concerned about the subsystems that overlap both the main system and its component subsystem. This is very occasionally allowable but almost always is best avoided. While non-resident parents are not part of the enforcement subsystem of the CSA, they may feel its effects.

DNA testing is clearly one of a number of components of the tracing subsystem, mothers are not. You can tell they are not by saying 'mothers are a system to…' and then seeing if there is any completion that will contribute to a purpose such that mothers are part of a tracing-non-resident-parents system. There were many other components that belong in the tracing-non-resident-parents subsystem and the 'mothers' system seemed to contain many subsystems and sub-subsystems than any other subsystem in the diagram. It has not got a title.

Expect to take about **an hour** for the next activity. Allow about **twice as long** if your experience of systems maps is limited or non-existent. If you find yourself taking very much less time, it is possible your map is not really representing the situation. Creating structure in complexity takes considerable effort.

Activity 19

Choose one of the systems you identified in the activities above.

The basis for your choice isn't important at this stage but it might be useful to choose a system that seems to be central to the situation. This is your system of interest. Make a note of why you chose it – even if it's no more than a vague preference.

Draw a systems map of your chosen system. Use OpenLearn unit T552_1 *Systems diagramming* as a support and guide.

1. Make notes of the insights and understandings you gain as you draw your map.
2. Give your map a title. Does the map you have actually drawn match the title? It is common, and not unexpected, to find you have drawn a systems map different to the one you intended to draw. Iterate until your title and map match.

3. Be wary of drawing a systems map that simply reproduces an organisational chart. It should be *purpose* that defines the system and its boundary, not organisational structure.
4. Be wary of drawing a map of what would be needed for your system to achieve its purpose. The diagram you are drawing is a snapshot of the current situation.
5. Take particular notice when the temptation to break the conventions seems strong. This *experience* nearly always signals an important trap. Resist the temptation and look for ways around the problem other than breaking the rules – almost always the reward is an important new way of understanding the complexity.
6. Use your rich picture as a source, checking you have included all the items relevant to your system.
7. When you have completed the first draft of your map, check it rigorously against the rules and guidelines for drawing systems maps given in T552_1. You should think of this process as being much more than a check for compliance with the rules. It is one of the mechanisms by which you begin a dialogue with your diagram.

There are dozens of different systems maps you could devise, don't think of mine as a best map in any way. I am simply showing you what I learned from drawing my map.

I started by identifying the CSA as being something that could be interpreted as an attempt to address an issue. There were all sorts of issues it might have been attempting to address. You can see my notes in Figure 11. I quickly identified some potential systems.

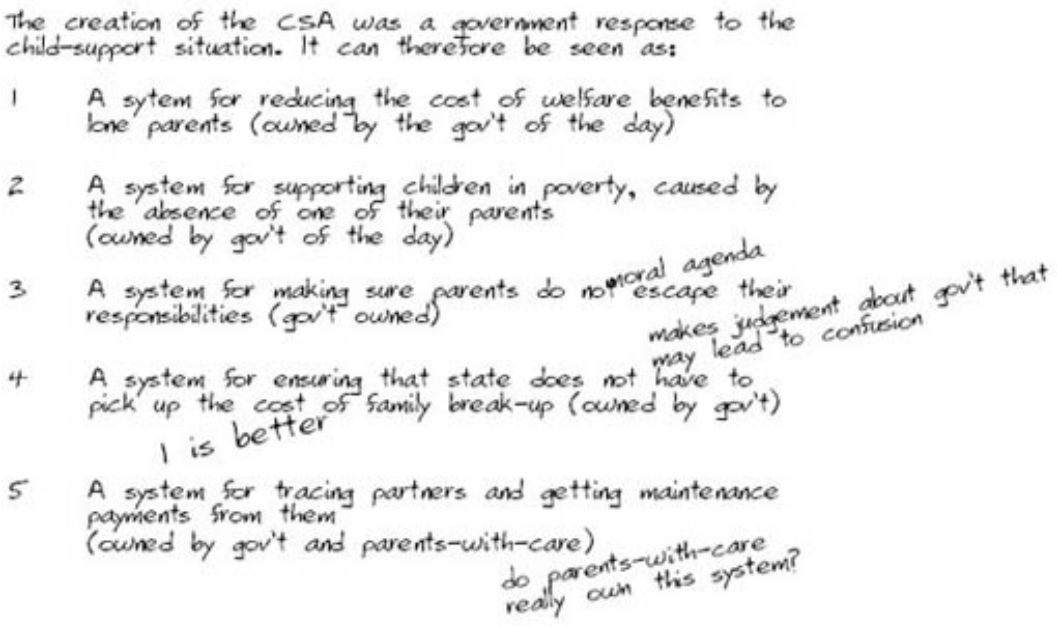

Figure 11 Some ideas for thinking of the CSA as a system with purpose

I chose to explore the second of my two systems, mainly because it looked the most straightforward. In Figure 12, you can see the notes I made as I explored this system. You will see I changed my mind several times as I went along. The first attempt at a systems map is shown in Figure 13.

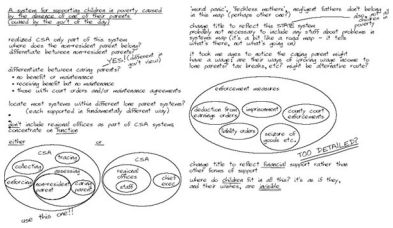

Figure 12 Some preliminary notes

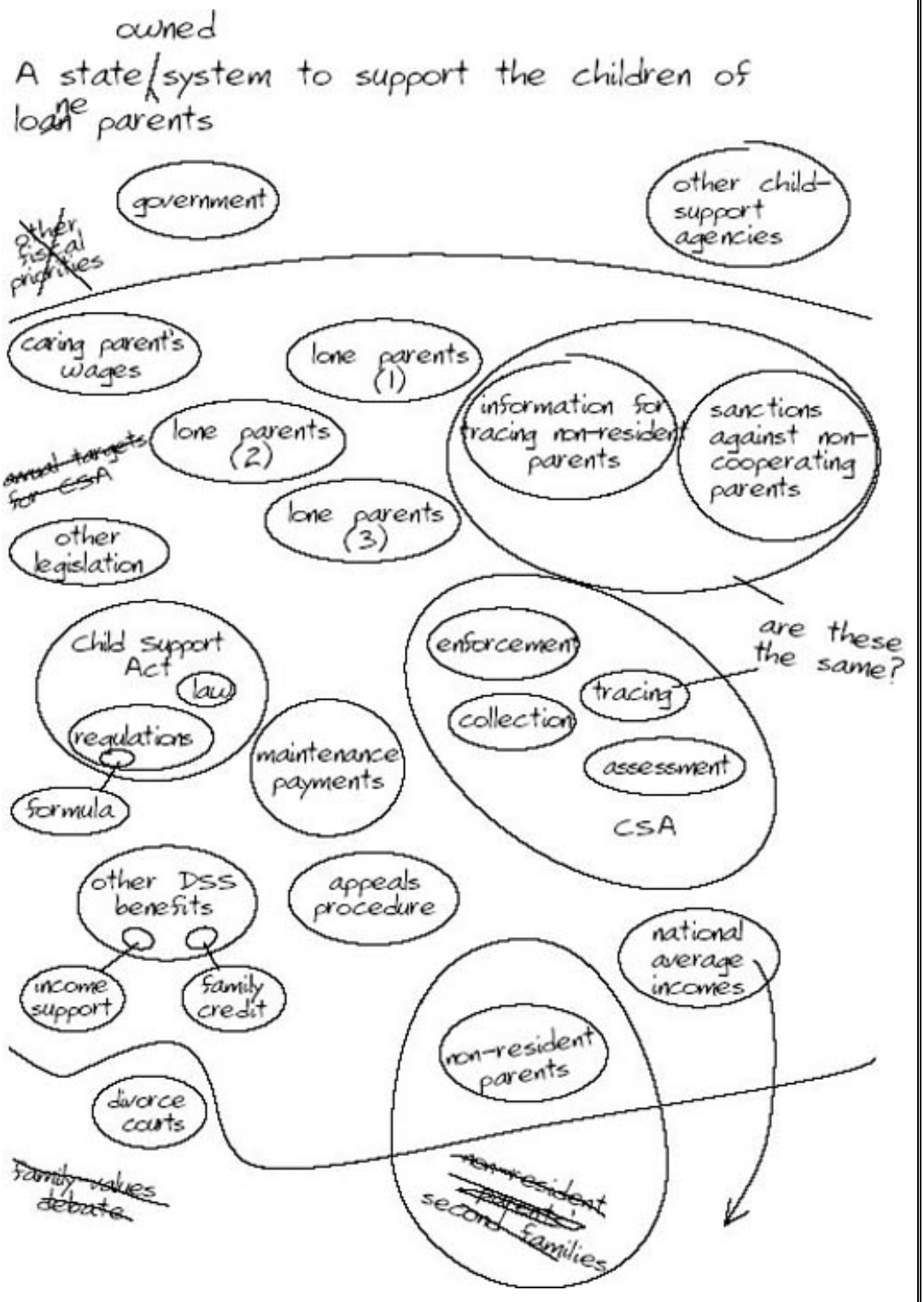

Figure 13 An early attempt at a systems map of part of the complex situation

Figure 13 is incomplete: it's full of crossings out and the system boundary is tentative but it seemed to lead to some breakthroughs. I was aware I was going against some of the decisions I had made earlier but it was easy after the Figure 13 version to see my way to a much clearer system. I'd changed the title several times before I began to see a system emerging. Figure 14 is my almost-final version. It contains quite a lot of components and rather more levels of subsystems than I would normally expect to use. But despite all the detail, I decided not to simplify it – it worked for me as a way of locating lots of the elements. The map may need modifying as my understanding of the system improves.

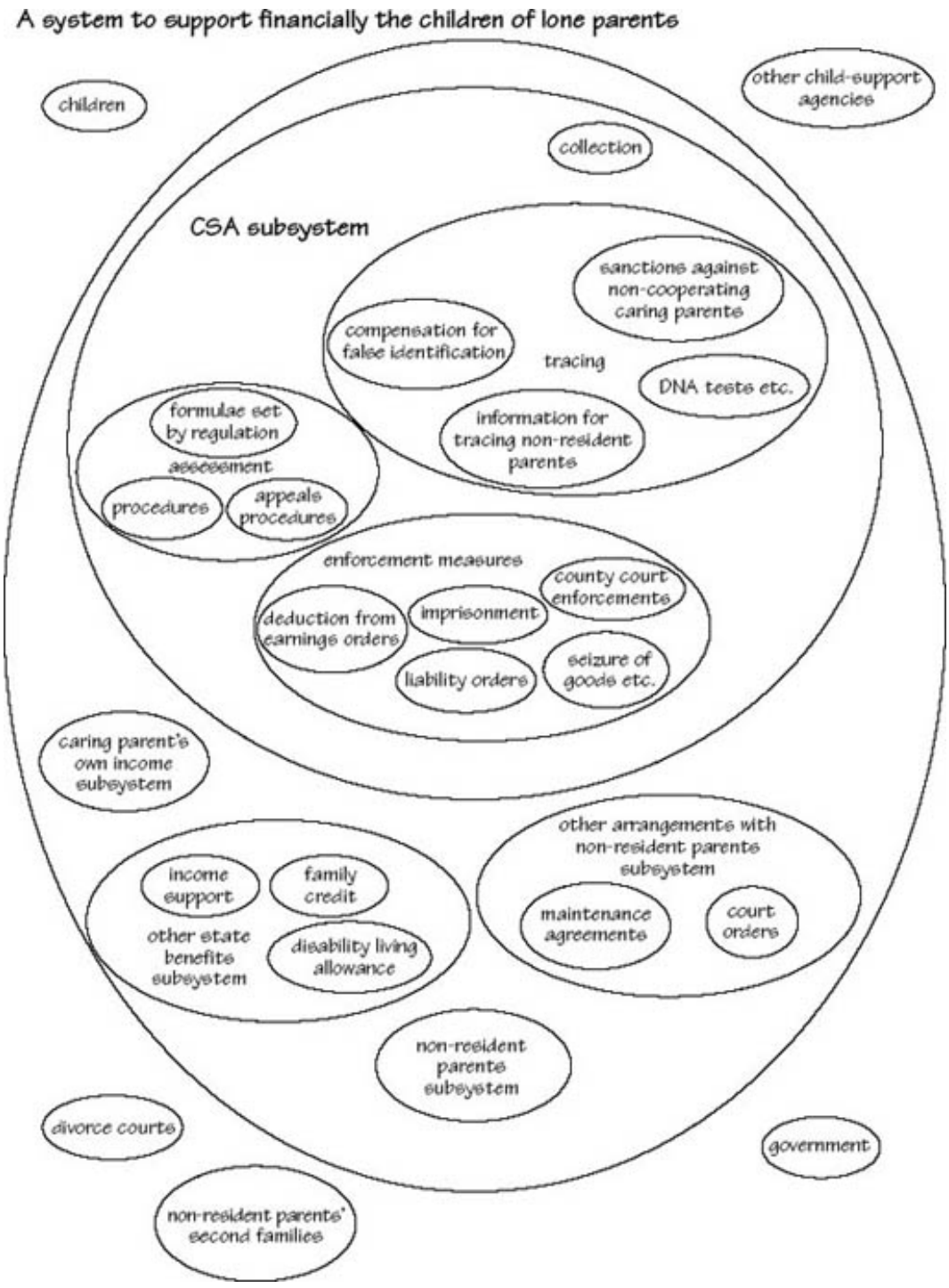

Figure 14 An improved version of my earlier systems map

Spend **15 minutes** on the next two activities, perhaps longer if it prompts some reworking of your map.

Activity 20

Review your systems map.

Check it is drawn from a perspective. Is it possible to deduce from it who the owner might be?

Is the purpose of the system evident? Are the intended beneficiaries (or victims) present in the map in some form? Is there anything in the environment that affects the functioning of the system?

If you are not sure these challenges can be answered, have another look at your map.

Compare your map with your rich picture. Does your rich picture prompt you to include any other elements in your map?

The test of a good map is whether it clarifies the complex situation. Does your map do this?

Activity 21

Review your system boundary.

Look at the system *boundary* you have drawn. Does it represent a boundary between the system and its environment? Is it clear the subsystems within the system are part of the system's working. Are your sub-subsystems part of the subsystem's working? Is it clear the elements outside the system boundary influence, or are influenced by, the system?

What happens if you move the system boundary? If you include other systems as subsystems, does that change the title and purpose of the system. Does this change the systems that must be included in the environment? Is the new system more, or less, useful in aiding your understanding? Record any new insights in your Learning Journal.

If you feel you need practice in drawing systems maps, you may wish to take another of the systems-with-purpose you listed earlier and develop a new map. Although this task may take some time, it will be time well spent if you need the practice. If not, use my map to compare with your own in the next activity.

Expect to take about **10 minutes**.

Activity 22

Compare your map with mine or with a second map you have drawn.

Resist any temptation to use my map as the basis for evaluating yours. Notice the ways the different system purposes – as expressed in the title – lead to different structures and different elements.

Notice any differences between the beneficiaries identified, the actors or activities, the perspective, the owners and the elements in the environment.

Does the comparison prompt any questions?

9.4 Influence diagrams

I want to return to the definition of a system I used earlier: an assembly of components interconnected as if they had a purpose. In the last section, I used purpose as a way of structuring the complexity of the case study. In this section, and the sections that follow, I want to turn to the idea of *interconnectedness* as another way of structuring the complexity. In the case of *influence diagrams*, I search for interconnection in the form of influence to hold together a structure that resolves some of the complexity.

There are at least two ways of looking for influence connections from the myriad of possibilities a complex situation presents. The first is to start from a systems map, modifying it and adapting to identify the principal interconnections. The second is to start by identifying a component in the complexity that seems to be influential and building the influence diagram from there. There are advantages and disadvantages to both.

Allow yourself about **30 minutes** to do the following activity. If this is your first attempt at an influence diagram, expect to take at least **twice as long**.

Activity 23

Draw an influence diagram that structures a system of influences within the case study.

Either use your systems map as a starting point or identify an alternative starting point within the complex situation.

Remember to give your diagram a title that matches the diagram. Use the guidelines given in T552_1 *Systems diagramming*.

As you do your diagram, make notes about any advantages or disadvantages you notice about your chosen approach. A good starting point for this is to notice why you are choosing your particular approach.

Make notes about any insights you gain about the situation as you draw your diagram.

When you think you have finished your diagram, check the guidelines rigorously. If you are uncertain you have complied with the rules, be strict with yourself about getting it right. Experience shows these points are the most effective at unlocking your understanding of the complexity.

Two of the hardest things to know when you are diagramming is whether you've got it right and when it's complete. These concerns come up in all diagramming but seem to me to be particularly tricky when it comes to influence diagrams.

The first concern is the issue of rightness. I use diagrams mostly for exploring complex situations. This usually happens when I'm baffled by something and cannot see a way of getting to grips with it. The bafflement I experience often arises from false assumptions I am making; mis-attributions of connection and so on. So, in endeavouring to understand the complex situation, I am dealing with misunderstandings as well as lack of understanding. Following the rules, tedious though that often seems is, for me, a powerful way of unearthing misunderstandings. The challenge of forcing the representation into technically correct, diagrammatic form meets the misunderstandings head-on. Since other people seem to experience this too, I am encouraging you, in the activities, not to let yourself get away with bending the rules until you're absolutely sure it's justified. Use the rules rigourously as a form of challenge to your understanding.

Concerning completeness, I often find once I am no longer baffled the rest is relatively easy to understand. So in diagramming, I am often looking for an understanding that makes me feel more prepared to explore. So, in some senses, completeness is when I feel I have enough understanding to start being more directed in my exploration. This may involve further, more detailed, diagrams. This intuitive sense that it's complete when I feel it's complete enough, works well enough for me when I'm working by myself. A more appropriate idea of completeness for diagrams to be used with other people might include additional features. In this, a guideline that works well for me is to ask if there is a good match between the diagram and its title, and to ask if the diagram shows all the relevant pieces to meet the aims implied by the title. But a diagram for showing to other people also has to show something. It must actually be capable of being read. This may involve pruning so that I don't simply reproduce the complexity in diagrammatic form.

Drawing an influence diagram about this situation illustrates the point about completeness. I discovered an important insight. I was trying to trace some of the influences that lead to the unpopularity and the perceived failure of the CSA. I had two diagrams that didn't fit. One of them seemed to be turning into a multiple-cause diagram, so I shelved that for later. The other seemed to concern the motivations that led to the setting up of the CSA.

I discovered there seemed to be little coherence between the motivations that led to its setting up and what it actually set about doing. The motivations seemed to be mostly driven by the moral panic about so-called runaway fathers and feckless mothers, and a desire to reduce the welfare bill for supporting single-parent families. What the CSA was actually doing was more concerned with re-working maintenance agreements and court orders.

This insight seemed important enough to preserve the diagram so I drew it in a form that would be presentable to you. It is shown as Figure 15. I feel it is complete because it seems to represent all the reported motivations the government had in setting up the CSA. Again, you should not interpret my diagram as a model answer.

I decided to stick with the wording used in the case study, although I wondered if it was a trap in itself. The close identification of the parent-with-care with the mother, and the identification of absent parent with the father, might be a trap in my thinking and possibly in the thinking of the people in the situation.

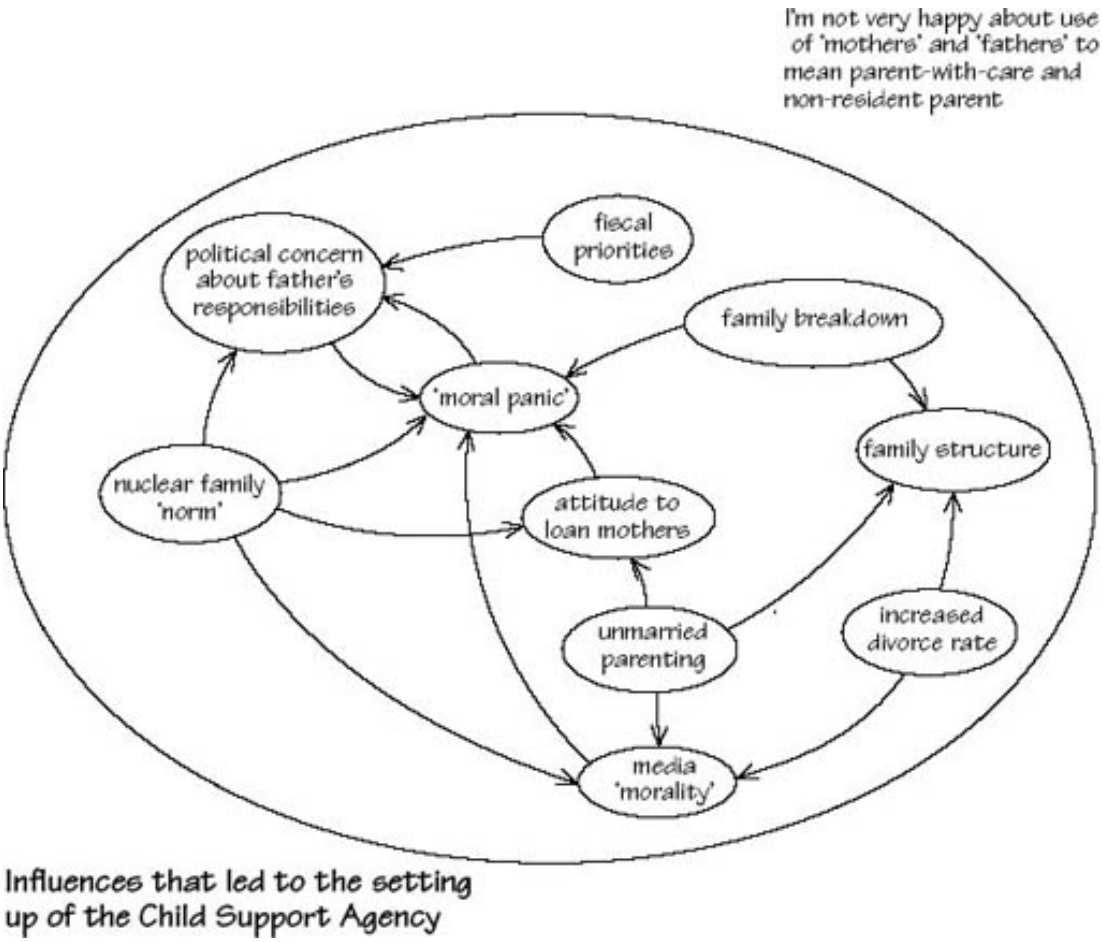

Figure 15 My attempt at an influence diagram of part of the complex situation

9.5 Multiple-cause diagrams

Multiple-cause diagrams are another way of using interconnectedness to structure a complex situation. In this case, the interconnectedness is that of *causation*. Multiple-cause diagrams represent both sufficient and contributory cause, without making a distinction between them. Drawing *multiple-cause diagrams* allows for the identification of systems of causation. Such a system can be pictured as an interconnected group of events or effects; the effect is of a system that behaves as if its purpose were to cause other events and effects. Sometimes, if one of the input causes is removed, the output effects continue to happen, either because feedback loops are present or because there are other causes to drive the effects.

The power of multiple-cause diagrams as ways of structuring complexity goes to the heart of the idea of complexity. This will be explored later, but I mention it here because complexity is typified by causal links. Multiple-cause diagrams allow me to see past the simple idea of single chains of causation and allow me to represent the webs of causation that lie at the heart of many complex situations.

In drawing multiple-cause diagrams, even more than other diagrams, I find using a pencil and rubber is essential. It is a process of untangling the causal links so that they lie flat on the page with the minimum number of lines crossing. This takes a lot of iterations. The fewer lines that cross, the more your diagram will reveal.

Expect to take about **an hour** for the following activity; more if this is your first attempt at a multiple-cause diagram.

Activity 24

Draw a multiple-cause diagram of the events or effects that seem to be central to the complex situation described in the case study.

You may like to draw several drafts. (You can find some further guidance on this type of diagram at this link.

Make notes about what your diagram reveals, questions it raises and things you would like to know more about.

It may be you can, at this stage, begin to see ways the situation might be improved. Make notes about this.

SAQ 4

Examine the multiple-cause diagram in Figure 16. Identify the strengths and weaknesses in the diagram, as it relates to the case study. What do you like about it? What are the things you find hard to understand? Are there any technical difficulties with it?

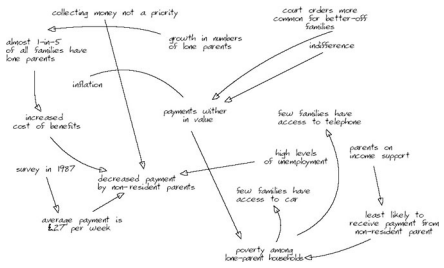

Figure 16 Multiple-cause diagram based on case study

Answer

There are quite a few good points in this diagram. There are also some problems. The diagram is about the right size; which is to say it contains about the right number of elements for the space, so it's easy to read. It has a title – although there are problems with it – and it is easy to follow the train of thought that led to the diagram's development.

Creating a good diagram takes skill developed through practice. This one has the makings of a good diagram but the following issues need attention.

The title needs to say what type of diagram this is, otherwise it is not possible to attribute any meaning to the arrows. This is intended to be a multiple-cause diagram so the arrows should mean 'contributes to', 'causes', or 'leads to'. I can check whether this is what they do mean. I notice, for example, that some logical errors become evident when I apply this test. The survey in 1987 did not lead to an average payment of £27 per week. It was just one of the things it identified. The title also needs to suggest some of the events or effects whose causes the diagram is trying to explore: '… in the 1980s' is rather vague.

Other logical errors include the connection from 'parents on income support' to 'least likely to receive payment from non-resident parent'. I can't find a meaningful way to connect these using 'contributes to', 'causes', or 'leads to' – and certainly not in the context of the case study. The same is true of 'court orders more common for better-off families' and 'payments wither in value'. In this instance, it looks as if a time sequence has crept in. There is no arrowhead at all between 'inflation' and 'payments wither in value' and it may be pointing in the wrong direction between 'increased cost of benefits' and 'decreased payments by non-resident parent'.

There are several places in the diagram where the arrows cross each other and this effectively disguises the fact there are two quite separate chains of causation in the diagram. (Imagine 'inflation' moving to the right and 'high levels of unemployment moving to the left.) This is an important insight that is likely to be overlooked because the drawer allowed herself to get away with avoidable crossings over.

It's not altogether clear what is meant by 'indifference' without a detailed reading of the text.

Sorting out the crossovers and re-thinking the title would prompt the drawer to think more clearly about what she was trying to explore and perhaps to rearrange the diagram so that there was a more obvious direction of flow. That would make it easier to read.

The next activity asks you to evaluate your learning needs. Notice it does not ask you to evaluate your diagram against a standard. (This is why I have not given you a version of my multiple-cause diagram.) If you really want to compare your multiple-cause diagram with someone else's you should refer to Figure 44, which shows a causal-loop diagram. Rather, you are asked to reflect on how pleased *you* are with your diagram.

Expect to take about **20 minutes** on this activity.

Activity 25

Make some evaluations of your diagramming skills, using your multiple-cause diagram as the focus of your attention.

Identify the things in your diagram you are pleased with. This may be something quite technical, like a developing skill in reducing the number of crossed lines. Or it may be something like an increased ability to get insights from the diagram; the enjoyment of drawing the diagram; or the sense of achievement when you find yourself better able to understand the complexity of the situation.

Identify technical improvements you would like to see in your diagram. Improved neatness? More elements in the diagram? Less elements in the diagram? An ability to prune out elements that obscure the main points?

What changes will be needed to bring this improvement about?

Identify things you feel you should be getting from diagramming you are not getting yet? Are there things that still puzzle you? How are you going to resolve that puzzle? What sources of help and support do you have access to?

9.6 Sign graphs

Next, in the exercising of your diagramming skills, I want to look at *sign graphs*. Unlike the three diagram types you have already drawn, a sign graph is not usually used to structure the understanding of complexity. This means it is likely to be relatively less useful in the task of searching for system within the complex situation described in the case study. Sign graphs can, however, be useful once some elements of system have been identified. They can support the exploration of *how* a system works. Although drawing a sign graph will not necessarily contribute to the main task of structuring the complex situation, this is a good opportunity for brushing up your skill in drawing them.

Sign graphs can help sort out how and why variables in the system change. A good way into such a diagram is to identify some variable, either from the text or from your rich picture. You can then explore other variables that drive that variable. Within the case study, I noticed ‘contributions collected from absent parents’ as a possible variable worth exploring. It caught my attention because it seemed to represent an implicit measure of the CSA's success, or lack of it. A sign-graph would help to discover the influences that would increase the amount of contribution collected and those that decrease the contributions. You could either use ‘contributions collected from absent parents’ as a starting point or identify a variable of your own choosing.

Expect to take about **20 minutes** on this activity. Allow longer if this is your first sign graph.

Activity 26

Use a sign graph to explore the relationships between variables within the case study.

Chose a variable to use as a starting point. Identify the variables that influence that variable and whether they have a plus-sign *effect* or whether they have a minus-sign effect. Be careful to use the signs correctly.

As well as the variables that affect your starting-point variable, include the variables the starting-point variable affects. Are there any feedback loops? What are the overall effects of changes in some of the key variables? Aim to have between 7 and 12 variables in your diagram.

Make a note of any insights your diagram generates, either about the case-study situation, or about the processes of diagramming.

Take the necessary steps to evaluate your diagram.

9.7 Control-model diagrams

Perhaps, like me, you are beginning to form the view there were some ambiguities about purpose in the case-study situation. Control models are a useful way of investigating purpose and the means in place to achieve it. They address issues like ‘What is X trying to achieve?’ ‘How are they trying to do it?’ and ‘How will they know when they've done it?’ *Control-model diagrams* provide a structure for exploring these questions. The drawing of the model allows you to decide whether the elements are in place to support the achievement of the purpose – and whether they are the right elements.

To get started on this, you could use one of the purposes you identified earlier. And, by expressing it in terms of a simple transformation, work through the formal elements of the diagram seeing if the elements were there and linked together in appropriate ways. Using the control-model form as a diagnostic tool, as you are here, often means you don't get a diagram that conforms to the rules. This is precisely the point. If the diagram doesn't work, it is because the system is not connected together in a way that would allow it to work, or because some of the elements are mismatched or missing.

The output from your diagnosis can then take the form of a precise description of the reasons for its failure to effect the transformation, or achieve the purpose it was meant to achieve. It can also suggest means of improving the performance of the system in achieving its purpose: by adding missing components; by connecting components of the system together in other ways; by changing components so that they better match the intention; or by, for example, using alternative measures of performance.

Spend about **20 minutes** on the next activity.

Activity 27

Draw a control-model diagram to diagnose a system you have found within the case study that does not seem to be achieving its purpose adequately.

First, identify a system in the case study that you believe is not working as well as it should.

Think of the system as a transformation process in which an input or inputs are converted into an output or outputs. Draw this as a transformation diagram such as I have drawn in Figure 17. You will, of course, have different labels to my general ones.

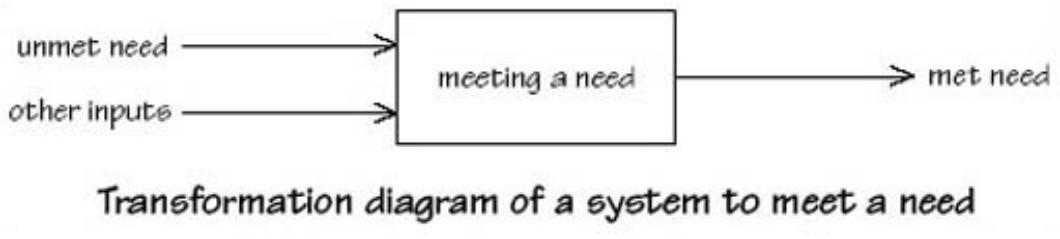

Figure 17 A general form of a transformation diagram

Next, identify a purpose for this system. The idea is, if the transformation process is working properly, this purpose will be met. Express this purpose in the title of your diagram.

Now express the purpose as a goal.

Next, ask yourself how you will know if the transformation process is working properly. Then consider what property or quality in the output you would have to measure to find out if the transformation process is working properly.

Now return to your idea of the goal: can it too be expressed in terms of the same property or quality?

You may have to iterate between your ideas of goal and what you will measure.

When you are satisfied with your goal and measurement, represent them by converting your transformation diagram into a control-model diagram.. Label the actuator, sensor, goal, and comparator appropriately. I have shown a general form in Figure 18.

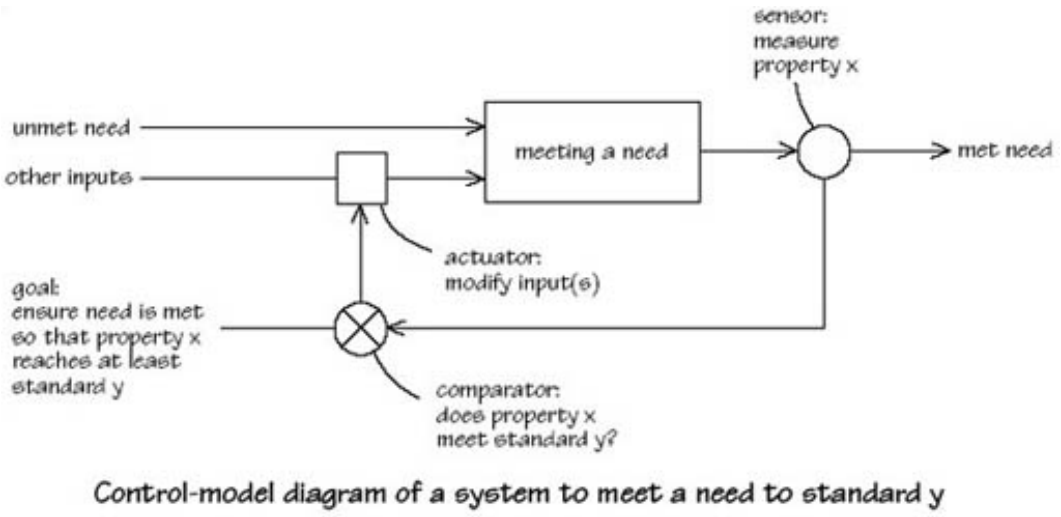

Figure 18 A general form of a control-model diagram

Compare your diagrammatic representation with the system you identified within the case study. Can you now see why the system in the case study does not work as well as it should? You have drawn an idealised system; the ‘real-world’ system may not be working because some important control element is missing.

Use you diagram to specify possible changes that might improve the system's capacity to achieve its intended purpose.

9.8 Diagramming a complex situation

Diagrams are never an end in themselves. They have a purpose. They exist in relation to a situation and can be used to cast light upon aspects of that situation or to explain it to someone.

So, the next step is to look at the diagrams you have drawn and to ask yourself what you have learned about the situation. This answer may be in terms of a deeper appreciation of the situation. It may also be in terms of pointers towards possible interventions and some idea of the likely effects of such an intervention. The advantage of having a good set of

diagrams to hand is it becomes possible to predict the likely beneficial – and detrimental – effects of changes that might be made.

Diagrams play a central role in systems practice. They allow the systems practitioner to impose some structure on a complex, and possibly problematic, situation. As you saw during the activities you did, it is possible to draw several of any type of diagrams and an experienced practitioner will often draw several diagrams of each type. Sometimes the variations will be in terms of perspective, sometimes they will explore different aspects of the situation. The systems maps will illuminate structures and relationships between structural entities in the situation. The influence diagrams and multiple-cause diagrams will illuminate the dynamic relationships between events, effects and structures, and the sign graphs will show something about sensitivities between variables.

Sometimes the insights gained from a few good diagrams are sufficient to give confidence in designing and making an intervention. It may be possible, for example, to predict the knock-on effects of an intervention in a way that allows the risks and benefits to be evaluated.

Your responses to the next activity will probably be tentative (maybe they ought to be tentative) but the process of answering the questions will help you to develop further your evaluation of your diagramming efforts.

Spend about **15 minutes** on this activity.

Activity 28

List any ideas for interventions you would like to investigate further in your Learning Journal.

Simply list ideas that have occurred to you during the drawing and afterwards in the reviewing.

What ideas would you like to explore further? Why do they appeal to you?

Do your diagrams give you any idea about any likely effects, both intended and unintended, that might occur as a result of your suggested intervention?

Don't worry if your answer is *no*. There will be further opportunities to explore situations in this way later in the unit.

SAQ 5

What are the overall objectives of using diagrams in Systems case-study work?

What are the main outcomes you expect from each of the following diagram types?

- Rich pictures
- Multiple-cause diagrams
- Systems maps
- Control-model diagrams

Answer

The essence of using diagrams is captured in the idea of getting to grips with complexity. Producing a diagram enables you to explore your understanding in a dynamic way and enables you to identify patterns of interconnection. Notice I am attaching considerable importance to the idea of drawing the diagram. This is at least as important as, if not more important than, having the final diagram. The process of producing the diagram can be rather like a dialogue between your understanding and your representation. The diagram itself is like a captured piece of the complexity – captured by your understanding and capable of being interrogated about likely effects of intervening. Diagrams can also be used as the basis for exploring your perspective, perhaps by comparing your diagram with someone else's.

Rich pictures allow you to have the whole of the situation spread out in front of you. You can see all the components, as well as the events, facts, values, opinions, and emotions expressed by all the stakeholders. It allows you to check back at each stage of your further analyses to ensure you are not unintentionally neglecting important features of the situation.

Multiple-cause diagrams allow you to explore the origins of particular events or effects. This is especially effective where particular effects seem to recur, even when their most obvious causes have been removed. It may be that the immediate causes are reappearing because their causes have not been removed or because there are other, less obvious, causes in place. It also lets you explore unexpected effects such as when a well-intentioned intervention seems to have exactly the opposite effect to what was intended.

Systems maps allow you to structure features of a situation in a number of different ways. They allow you to find simple ways of thinking about multi-faceted situations by ordering features in hierarchies of systems with subsystems embedded in them. It allows you to say things like ‘If I think of this X as being a system to… then this other feature belongs to it as a subsystem whose purpose is …’.

Control-model diagrams allow you to explore what is needed if a system is to fulfil its purpose. It allows you to explore what transformation takes place in order to fulfil that purpose and what checks and controls are needed to find out whether it is doing that. It allows you to think about the necessary components and about the way they are connected. Control-model diagrams are therefore a way of diagnosing a system that appears not to be working or working well, and they can also be used to design ways of making sure a system you are thinking of using will work as well as you hope it will work.

9.9 Perspectives review

Just as you were completing your rich picture, I asked you to identify and record any stakeholdings, thinking, feelings, and views about what to do. In the next activity, I invite you to do a similar exercise based on where you are now. I then want you to re-examine the notes and compare the earlier perspective against your current perspective.

Expect to spend about **half an hour** on this activity.

Activity 29

Record your current thinking, current feelings, and your views about what should be done about this situation.

Try to do this in as much detail as you did before.

Look again at your previous notes.

Make notes about how your thinking has changed.

10 Part 2: 6 Review

In Part 2 of this unit, you have undertaken a major piece of work. In encountering the case study you were engaging with a set of events, issues, actors, stakeholders and intentions that was, by any standards, complex. In addition, you brought your own complexity to it, your own stakeholdings and understandings, your own reactions and feelings.

You used systems diagrams to structure the complexity you encountered in the case study. That then structured and clarified the situation in ways that helped you to see through the complexity, without, at the same time denying the complexity. You were able, I hope, to find ways of representing the complexity so that you could see how all the elements of it fitted. I hope you were able to glimpse a number of possible alternative ways of representing the complexity. There are potentially huge numbers of possible systems maps one could draw, lots of multiple-cause diagrams, dozens of influence diagrams. None of them is the right one. There is no right diagram, but there are lots of ways of gaining insights into how the complexity can be structured so that you can begin to comprehend it, and explore how the situation might be improved.

Throughout this section, I have been offering you ways of *evaluating* your own diagrams and developing them. It can be genuinely disconcerting not to have a single, best answer to aim for, especially for those of us with a technological or scientific background where right answers are an important indicator of learning.

Systems practice, as opposed to the simple appreciation of systems techniques, involves two levels of self-confidence. You need the confidence to use the techniques and approaches and you need the confidence that comes from knowing you are using them well. How are you to know you are using systems approaches well when each situation you encounter is unique? I now believe that skills in *evaluating* my own use of the approaches are as fundamental as the skills of using the approaches themselves.

Take about **30 minutes** to complete the next activity.

Activity 30

Review what you have learned from Part 2 of this unit.

Look back through all the notes you made on all the activities. Make notes in your Learning Journal about the following:

- The *experience* of engaging with a complex case study.
- Your *experience* of drawing diagrams in order to structure complexity.
- What you have learned about diagrams and diagramming.
- Your evaluation of your own skills in diagramming. (What elements of your skills do you need to develop?)
- What you have learned about evaluating your own diagrams.

11 Part 3 Understanding systems approaches to managing complexity

11.1 Part 3: 1 Introduction

I wonder if you experience complexity in your daily life? Perhaps you experienced the child-support case study as being complex, as I did? For much of the time I struggle to keep my head above water as I try to understand and manage the complexity I experience as part of everyday life. I find social commentator and cartoonist Michael Leunig's depiction of a solitary figure looking through an 'understandascope' (Figure 19) a particularly skilled way of capturing the sense of bewilderment I sometimes feel. For the purposes of Part 3 I am using his cartoon featuring the 'understandascope' because it raises a number of important questions relevant to my aims. Using Figure 19 as a metaphor, these questions are:

- What is it about individual human beings that characterises how they observe the world? i.e. what are the properties of the *observer* looking through the understandascope?
- How do humans engage with the world around them? i.e. what are the properties of the *understandascope*?
- What sense do humans make of the world they experience? i.e. what sense is the observer able to make about the 'messy' sea of human activity that is being engaged with through the understandascope?
- Does the observer stand outside the 'messy' situation being observed or do the properties of the 'understandascope' – the way in which s/he engages with the world – enable the observer to be an effective actor in it?
- What new understandings does the observer have after engaging with the situation through the understandascope?

Figure 19 Understanding complexity? (Leunig, 1985)

It will take about **40 hours** to study this part of the unit.

I use Leunig's cartoon as a means to introduce my **ideal** of a systems practitioner. As you work through this part of the unit I want to invite you to imagine an ideal systems practitioner as a type of understandascope, as a lens through which to develop your own systems practice and to respond to the questions posed above. By ideal, I do not mean highly desirable. I am using the term in a philosophical sense meaning *a set of ideas about*, or *a model of*, a systems practitioner.

At the end of this free course, my aim is that you will have a greater understanding of 'systems approaches to managing complexity'. But what makes it possible to say 'I understand someone or understand something about the world in which I live?' Is there a state of mind or body that can usefully be referred to as understanding? By the end of this free course our hope is to have provided the means to respond to the question: What is it that we would need to have observed, in others or in ourselves, for us to say that understanding systems practice had occurred? In the language of the cartoon I am asking you to envisage

1. yourself as the observer;
2. the ideal systems practitioner as the understandascope; and
3. the complexity you are trying to understand as residing in the relationship between the observer (you), the understandascope (your appreciation of systems practice), and the context (the messy situation depicted in the cartoon).

You might find it helpful to return to this section as the unit goes on. This will enable you to see how the issues raised here are taken up in subsequent parts from different perspectives.

Figure 20 illustrates the general idea of a practitioner, P. I am using the idea of the practitioner as someone who engages with some so-called ‘real world’ situation in practice, using selected approaches.

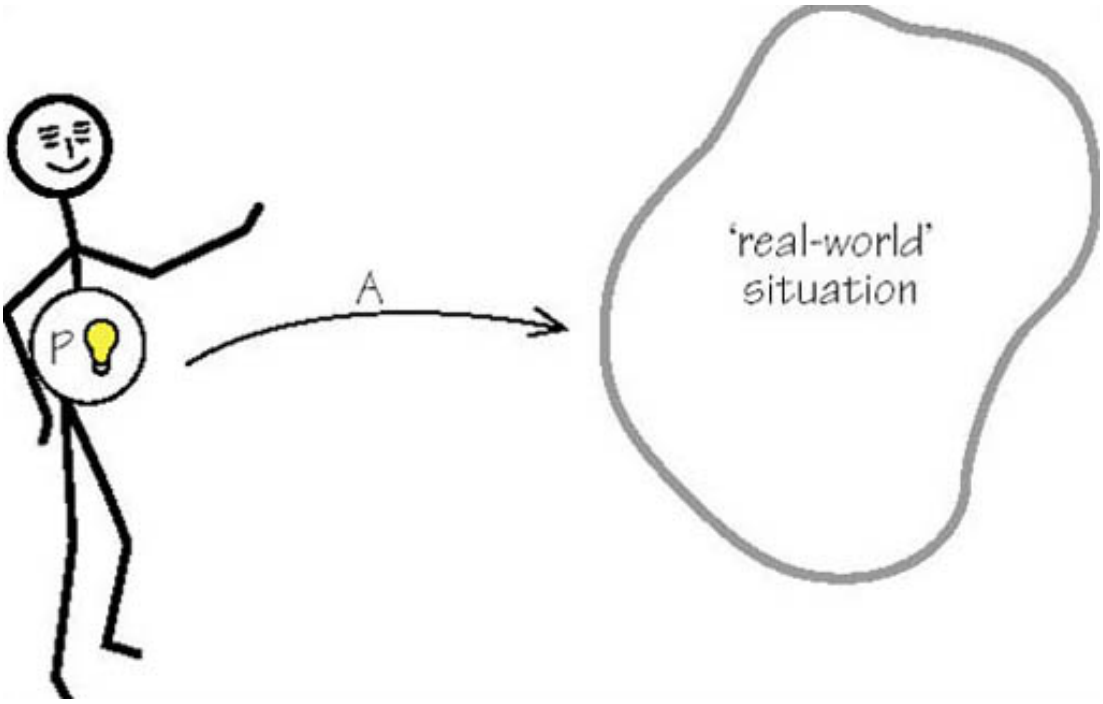

Figure 20 A general model for a practitioner, P, engaging with a ‘real world’ situation using an approach, A

I am using the phrase ‘real world’ to distinguish from the conceptual world, the world of thinking. In many ways this is an artificial distinction because the world I perceive to be the ‘real world’ is, in fact, my own conceptual model. What I perceive is conditioned by my conceptual models. So for me the real ‘real world’, is unknowable. My desire is to change the question from ‘what is the world’ to ‘how do I know the world’. So every time I use the term ‘real world’ you should remember that this is a short-hand for the process of coming to know the world.

Later, I will introduce the idea of the systems practitioner who is a special case of the general practitioner. Figure 19 also depicts a form of practice – a person using an understandascope to do something.

In this unit, the idea of *practice*, or practising, is a general one in that it is something everyone does. The dictionary definition of practise is ‘to carry out or perform habitually or constantly … to carry out an action’. Almost everyone has some role in which they practise. Most people occupy a number of roles, in their work or in their community. In these roles it is usual to encounter a number of issues that need dealing with, improving, resolving, or obviating. For example I am a practising father as well as a practising academic.

Activity 31

In your Learning Journal list some of the practices you engage in personally and professionally. Suggest some measures of performance for these practices, i.e. how do you know if you do them well?

Answer

For the purposes of this exercise I will refer to my practises as a father and as a researcher. I will use the following table to complete my answer.

Practice	Measure of performance	How do I know if I do it well?
Fathering	Nature of communication with my daughter	We talk regularly and usually enjoy our conversations – my daughter gives me feedback and I listen (mostly!)
	Emotional quality of our relationship	I feel loved and understand this is reciprocated
	Extent of mutual respect	Manifest through mutual engagement in each others work/ideas
	Extent of trust	By my daughter never feeling the need to have my permission to do something and by the lack of actions that betray my trust
Researching	Grants obtained	Am fully committed with a number of large grants in last three years
	Papers published	Two per annum is target which I usually meet
	Invitations to talk/ participate	These continue to arrive
	Extent of personal satisfaction	I enjoy myself when researching – but find admin distracts me
	Usefulness to others	More difficult – based on feedback and personal judgement

It was much easier to think of measures of performance in my professional practice than in my personal practice. But on the other hand more is at stake, for me, in my personal practice.

It follows from the dictionary definition that a practitioner is anyone involved in practice – in carrying out an action. If I reflect on my own practice, I am aware that what I do is not as simple as the interaction between practitioner and situation portrayed in Figure 20. I experience myself as something of a juggler trying to keep a number of balls in the air as I practise.

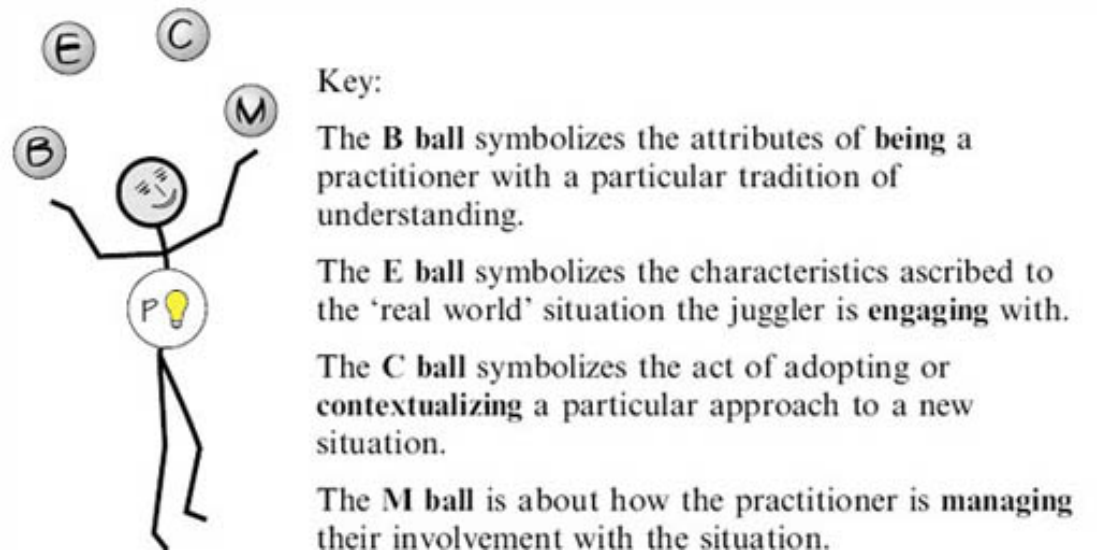

Figure 21 For effective practice, four balls (BECM) are juggled

In this unit we employ the metaphor of the systems practitioner as juggler and now I am going to focus on four particular balls we (the course team) think need to be kept in the air for any form of effective systems practice (Figure 21).

Based on my experience, I claim that effective practice involves being aware that these four balls need to be juggled – it takes active attention, and some skill, to keep them all in the air. Things start to go wrong if I let any one of them slip. To be an effective practitioner, I find I have to continuously think about, and act to maintain, four elements: the processes of **being** a practitioner, my appreciation of the situation I **engage** with, putting the approach taken into **context** and **managing** in the situation. The four verbs, the activities, I am drawing your attention to are **being, engaging, contextualising**, and **managing**. The remainder of the unit is structured around these four balls being juggled by a systems practitioner.

1.1 Making sense of the metaphor

The metaphor of the juggler keeping the four balls in the air is a powerful way for me to think about what I do when I try to be effective in my practice. It matches with my experience: it takes concentration and skill to do it well. But metaphors conceal features of experience, as well as calling them to attention. The juggler metaphor conceals that the four elements of effective practice often seem to be related. I cannot juggle them as if they were independent of each other. I can imagine them interacting through gravitational attraction, or the juggler can juggle them differently, e.g. the E and B balls with the left or right hand as depicted in Figure 22. This allows me to say that in effective practice the movements of the balls are not only interdependent but also dependent on my actions.

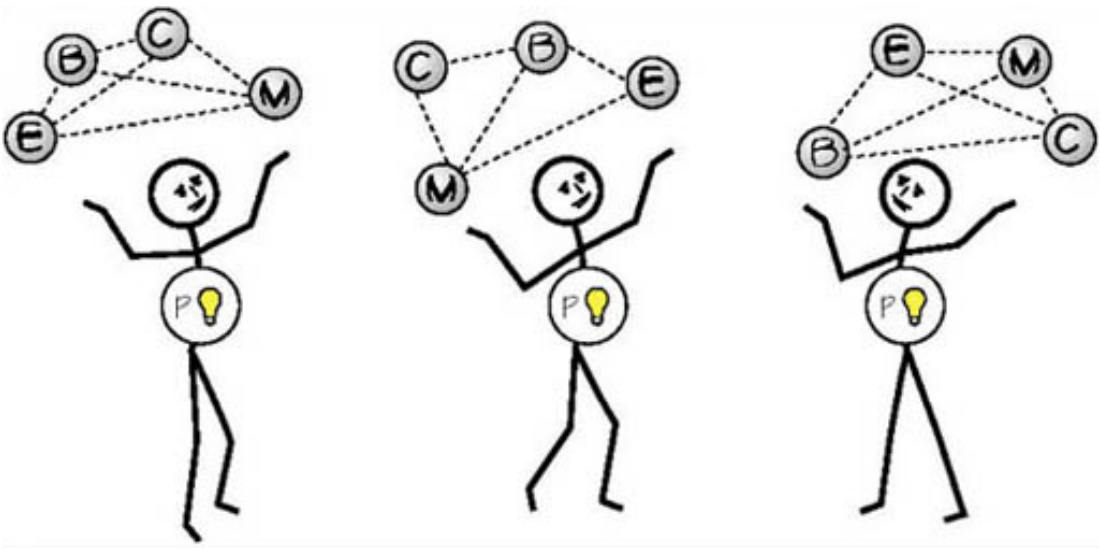

Figure 22 A metaphorical model of effective practice based on juggling four balls that are also interdependent

Activity 32

Write down your own initial impressions to the metaphor of the systems practitioner as juggler.

It might be helpful to explore what the metaphor reveals and conceals for you by relating it to one of the roles you have, or situations you have experienced. A spray diagram could be used.

Part 3: 2 Systems practice – unpacking the juggler metaphor

Systems practice, modelled in Figure 23, is a particular form of the general model of practice in Figure 20. An effective systems practitioner, P_s, is able to use systems approaches in managing complexity. I am not overly concerned with other approaches to practice, and will not be making any extravagant claims that a systems approach is better than other forms of practice. I will, however, develop arguments that enable me to make two claims.

1. Systems practice has particular characteristics that make it qualitatively different to other forms of practice.
2. An effective (or *aware*) systems practitioner (P_s) can call on a greater variety of options for doing something about complex 'real world' situations than other practitioners do.

These are important claims. They will structure most of the argument made in the rest of the unit.

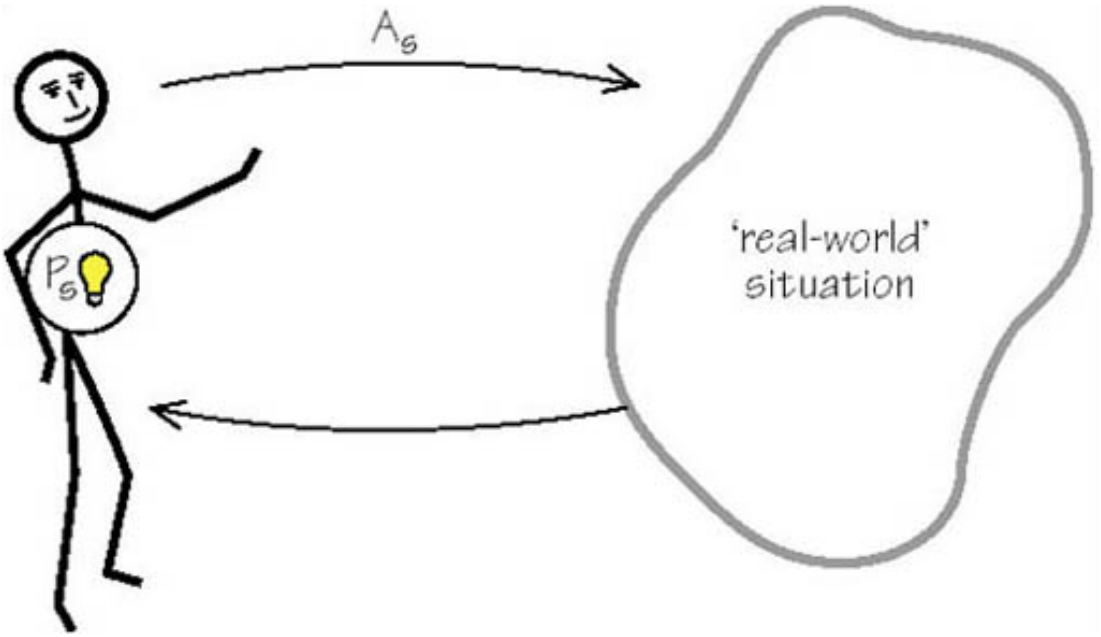

Figure 23 A general model for a systems practitioner, P_s, engaging with a 'real world' situation using a systems approach, A_s, and who reflects on their experiences

I intend to build up a picture of an ideal systems practitioner in stages rather than attempting it in one go. Juggling is a set of relationships. A juggler is a person, or living human being, in a particular context, with their body positioned so as to be supported by the floor and in this case they have four different balls. If any of these things are taken away, the juggler, the connection to the floor or the balls then juggling will not arise as a practice. In some situations an audience might also be important, especially if juggling for money. Taking away the audience would destroy the 'system', the interconnected set of relationships being envisioned. But there's more to this set of relationships then meets the eye. Take the juggler for example, she or he is both a unique person and also part of a

lineage of groups of organisms called living systems. All living systems have an evolutionary past and a developmental past that is unique to each of us – a set of experiences which means that my world is always different to your world. We can never truly ‘share’ common experiences because this is biologically impossible. We can however communicate with each other about our experiences.

Many well-known systems thinkers had particular experiences, which led them to devote their lives to their particular forms of systems practice. So, within Systems thinking and practice, just as in juggling, there are different traditions, which are perpetuated through lineages (see Figure 24).

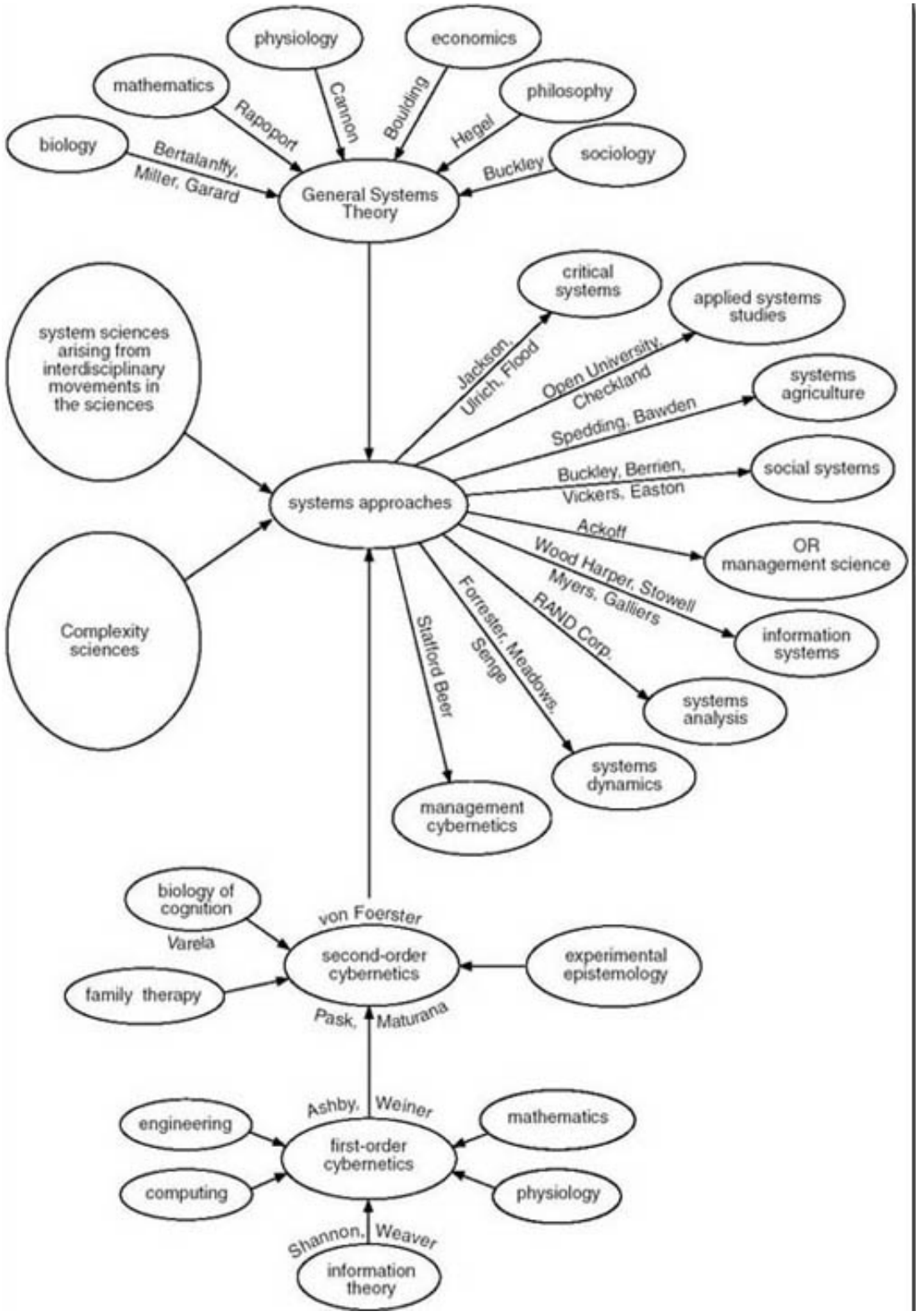

Figure 24 A model of different influences that have shaped contemporary systems approaches

Activity 33

Tick off those blobs in Figure 24 which you have heard of or with which you are familiar.

Do a web search and bookmark some sites which relate to those blobs you have not heard about. Use any search engine to do this perhaps starting with the words or people named in the figure as keywords.

Before finishing this introduction to the systems practitioner, I want to examine in more detail each of the balls being juggled.

The first ball the effective practitioner juggles is that of **being**. Juggling is a particularly apt metaphor in this regard because good practice results from centring your body and connecting to the floor. So juggling arises from a particular 'disposition' or embodiment. Effective juggling is thus an embodied way of knowing. Lakoff and Johnson (1999) argue that in the Western world, the most common sense view of what a person is arises from a false philosophical view, that of disembodied reason, that has influenced almost all of the professions. They contrast this with an embodied person (for example in medicine until quite recently the brain was seen as quite distinct from the body – the mind–body dualism – whereas the brain is part of a much larger network that includes the nervous, endocrine and immune systems (e.g. Pert, 1997)). It is for this reason that I have depicted the juggler with the light in their body rather than above their head. The light symbolises embodied understanding.

Activity 34

List the two contrasting ideas from Table 1 that you find most challenging to, or supportive of, your current worldview. Explain why.

Table 1: Some contrasting features between the traditional Western conception of the disembodied person with that of an embodied person

Traditional Western conception of the disembodied person	The conception of an embodied person
The world has a unique category structure independent of the minds, bodies or brains of human beings (i.e. an objective world).	Our conceptual system is grounded in, neurally makes use of, and is crucially shaped by our perceptual and motor systems.
There is a universal reason that characterises the rational structure of the world. Both concepts and reason are independent of the minds, bodies and brains of human beings.	We can only form concepts through the body. Therefore every understanding that we can have of the world, ourselves, and others can only be framed in terms of concepts shaped by our bodies.
Reasoning may be performed by the human brain but its structure is defined by universal reason, independent of human bodies or brains. Human reason is therefore disembodied reason.	Because our ideas are framed in terms of our unconscious embodied conceptual systems, truth and knowledge depend on embodied understanding.
We can have objective knowledge of the world via the use of universal reason and universal concepts.	Unconscious, basic-level concepts (e.g. primary metaphors) use our perceptual imaging and motor systems to characterise our optimal functioning in everyday life – it is at this level at which we are in touch with our environments.

The essence of human beings, that which separates us from the animals, is the ability to use universal reason.	We have a conceptual system that is linked to our evolutionary past (as a species). Conceptual metaphors structure abstract concepts in multiple ways, understanding is pluralistic, with a great many mutually inconsistent structurings of abstract concepts.
Since human reason is disembodied, it is separate from and independent of all bodily capacities: perception, bodily movements, feeling emotions and so on.	Because concepts and reason both derive from, and make use of, our perceptual and motor systems, the mind is not separate from or independent of the body (and thus classical faculty psychology is incorrect).

(Source: After Lakoff and Johnson, 1999, pp. 552–557)

Answer

I think the last pair is the most challenging for me and others I encounter – not because I do not accept it on the basis of evidence emerging from over 30 years of cognitive science research, but because it is still difficult to talk about. My experience is that the majority of people take the traditional view so much for granted that the alternative is often dismissed before the conversation can begin. Recently my daughter's teacher responded in this manner in response to points she raised in an essay for her 'theory of knowledge subject' as part of her International Baccalaureate studies.

The second I find most challenging concerns 'conceptual metaphors'. The research conducted by Lakoff and Johnson and others suggest that through our evolution we have acquired a predisposition to structure the world in certain ways – and one of the most basic ways we do this is when we form categories. Let me exemplify this by referring to what they call the 'container metaphor'. One needs to think of this in terms of say a child's development from birth. For these researchers metaphors have an embodied basis, e.g. a child putting things in and out of any container is a basic experience; later this is internalised as in-out action patterns ('container' image schema) followed by literal language application of schema, e.g. 'Out of the box'; 'In my pocket'; 'Out of the cup'; 'In the fridge'. Then there is progressive metaphorical extension, e.g.

'Go into the house'
'I'm in bed'
'I'm in her class'
'They won't let me in their group'
'Keep it in the family'
'Within the terms of reference'
'An outsider'
'Exclusive restaurant'
'In time'
'In washing the window, I cracked it'
'There are lots of houses in London'
'In love'
'Let out your bottled up anger'
'Fall into a depression'
'I put a lot of energy into this'

‘Pick out the best theory’

‘I give up – I'm getting out of the race’

‘It finally came out that he had lied to us’

‘My kind of person’

The implication of this explanation is that we do not engage in a process of universal reason which is independent of our biological history.

Being, is concerned with embodiment, with our own awareness and thus our ethics of action, the responsibility we take as citizens. How a practitioner engages with a situation is not just a property of the situation. It is primarily a property of the background, experiences and prejudices of **being** the practitioner. So, in the next Section I will focus on some of the attributes of the practitioner. One of these attributes is **awareness**, awareness of self in relation to the balls being juggled and the context for this juggling. The nature of this awareness and what it means to be an aware practitioner will be explored.

The second ball is the E ball – **engaging** with a ‘real world’ situation. It is an engagement that can be experienced as messy and complex, or experienced as a situation where there has been a failure or some other unintended consequence. Or the ‘real world’ could be experienced as simple, or complicated or as a situation or as a system. Because I am primarily concerned with situations that are experienced as complex, I will call this engaging with complexity; later I will expand upon what I mean by complexity.

The third ball is concerned with how a systems practitioner puts particular systems approaches into context (i.e. **contextualising**) for taking action in the ‘real world’; that's the juggler's C ball. One of the main skills of a systems practitioner is to learn, through experience, to manage the relationship between a particular systems approach and the ‘real world’ situation she or he is using it in. Adopting an approach is more than just choosing one of the methods that already exists. This is why I use the phrase ‘putting into context’, to indicate a process of **contextualisation** involved in the choice of approach.

The final ball the effective practitioner juggles is that of **managing** (the M ball). This is concerned with juggling as an overall performance. The term ‘managing’ is often used to describe the process by which a practitioner engages with a ‘real world’ situation. This is a special form of engagement, so later I will explore some of the features associated with managing. Managing also introduces the idea of change over time, in both the situation and the practitioner.

There are clearly many ways in which being, engaging, and contextualising are carried out, or could be carried out. Thus, when considering managing I shall be concerned with managing the juggling in ‘real world’ situations experienced as complex.

I would urge you to keep Figure 23 and the juggler metaphor in mind when you are answering questions because a competent answer will always refer to the relationship between practitioner (you and your being), the approach you are envisaging given the nature of the situation as you and other stakeholders perceive it (i.e. your mode of engaging with a situation of interest), how you envisage adapting your practice to the circumstances (contextualising) and how you plan to manage the overall activity.

13 Part 3: 3 Being a systems practitioner

3.1 The state of ‘Being’

The structure of Section 3 is set out in Figure 25. Use this as a way of keeping track of the argument I am making.

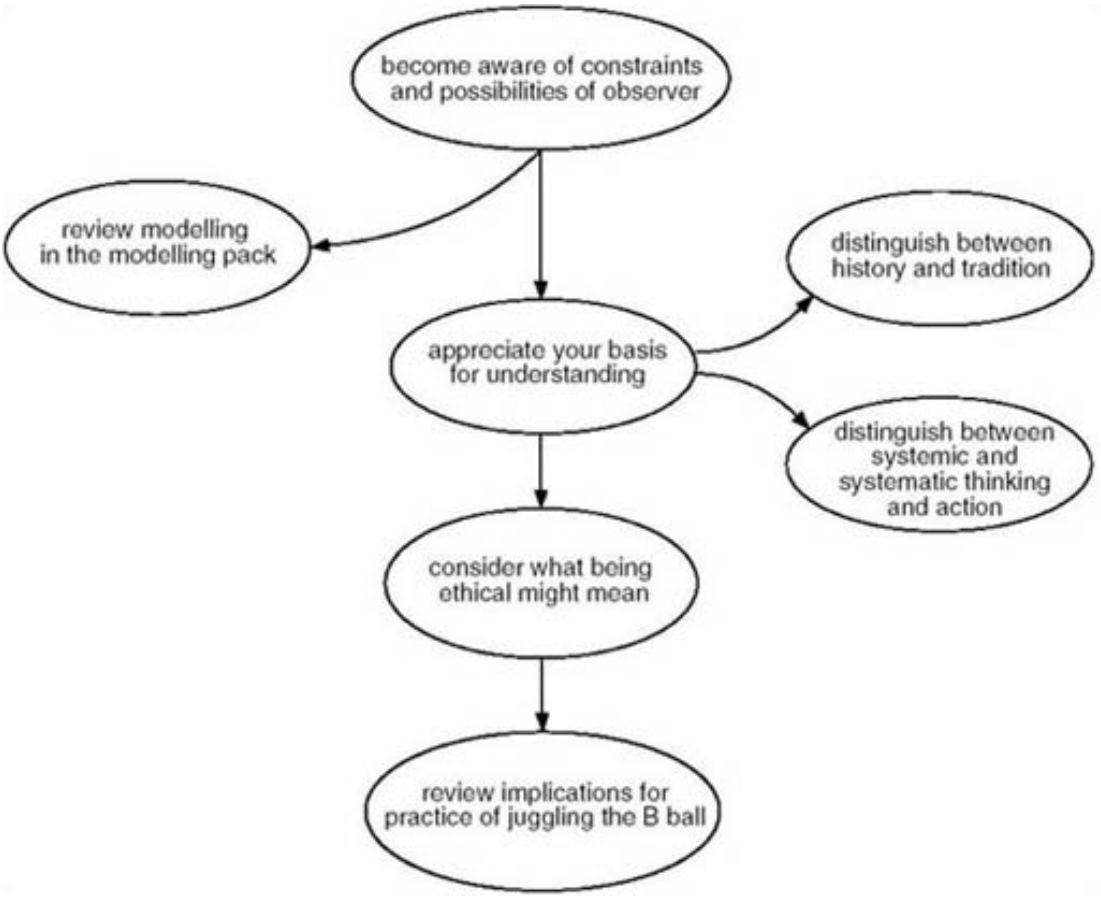

Figure 25 An activity-sequence diagram for this section: being a systems practitioner

Activity 35

Develop a table in your Learning Journal with three columns. Put the verbs from each of the blobs in Figure 25 in one column. Jot down what they mean to you now in the next column and, at the end of your study of this section, jot down how your understanding has changed, if at all, in the third column.

Answer

You will need Figure 25 in front of you to complete this activity. You will also need to return to the activity once you have finished your study of Section 3 of Part 3. The verbs listed in the table come from the blobs in Figure 25.

Table 2

Verb	How I understand these activities now	How my understanding has/has not changed
Become aware of…		
Review…		
Appreciate …		
Distinguish …		
Distinguish …		
Consider….		
Review…		

I am concerned with the juggling of the B ball in this section. As I write, I imagine this ball is shiny and thus acts as a mirror reflecting an image of the juggler. The properties of the juggler as systems practitioner come under the spotlight in this section. In choosing the word ‘being’ I am deliberately playing, metaphorically, with different meanings of being – one of which is, of course, ‘human being’. Some of the special features of being human include consciousness, language, emotions, and the capacity to reason or rationalise. It is also claimed that human beings live with a desire for explanations they find satisfying. You may have had the experience of a child repeatedly asking why?, how?, and then stopping after you have given a particular answer. The child finally finds your explanation satisfying – it makes sense within the child's world – and the child no longer needs to ask.

Perhaps you have experienced explanations that did not satisfy at all. If you are aware of this occurring did you note what it felt like? By this I mean, were you in touch with your emotions when you became aware that a particular explanation was satisfying or dissatisfying? By asking this question, I am saying it is legitimate to acknowledge your emotions – they are part of living and need not be ignored. I would go further and argue that an ideal systems practitioner is able to include an awareness of their emotions as well as their rational ideas. I find my Systems practice is enriched when I am able to access both.

3.2 Being aware of the constraints and possibilities of the observer

It is often claimed that the essence of a systems approach is that of seeing the world in a special way. This immediately prompts the question of what is meant by the phrase ‘seeing the world’. Because we live so intimately with the world of objects, categories and people and phenomena, we tend to think our own way of seeing the world is the only way, or even of thinking, ‘Well that is my view because the world is like that’. Actually, your view is special in several separate ways.

(a) If your vision is not impaired, you see your surroundings using only light of wavelengths between 380 nm and 780 nm (nanometers or 1×10^{-9} m). Bees, for example, see flowers using wavelengths less than 380 nm. You have quite a small visual window on the world.

(b) Research on colour perception in the 1960s showed that colour was not something that is fixed in the world, but is a property of our own unique histories. This led one of the researchers involved to change the question he was concerned with from 'how do I see colour'? to 'what happens in me when I say that I see such a colour?'

(c) With normal hearing you hear frequencies of sound between 20 Hz and 20 000 Hz (Hertz). Bats use sound waves of higher frequency than 20 kHz, which we cannot hear.

(d) Your ability to detect odours is vastly inferior to a dog's. A dog's 'smell world' is vastly richer than its visual world.

(e) The language you have learned steers you into categorising your world in ways you are largely unaware of, just as a fish is unaware of the water it is immersed in throughout its life. Sometimes it is possible to become aware of this when speaking another language – when immersed in the other language the experience is sometimes like being a different person.

(f) Your physiological state and the dynamic relationship of this with your emotional state also affect how you experience the world. This ranges from aspects of the functioning of your nervous system and its role in cognition, to hormonal events such as menstruation, and the release of natural endorphins during exercise.

(g) The culture of the society in which you have developed has determined what you see as well as how you can respond in any flow of relationships. Your culture determines what is implicit in your perceptions and emotions. So the ways you see manners, relationships and behaviours is dependent in turn on how people around you see and act.

(h) A special subset of the last point is the particular explanations we accept for things we experience. The 'theoretical windows' through which we interpret and act are always with us regardless of whether we are aware of them or not. Figure 26 provides a metaphorical account of this phenomenon. The theory or explanation you accept will determine what you see and thus the meaning you will give to an experience. Think here, for example, of the fundamentally different cosmology, the set of explanations for the origin and evolution of the universe, developed by the Mayan civilisation in South America that was entirely coherent but so different to Western cosmology. This is sometimes described as the theory dependency of facts.

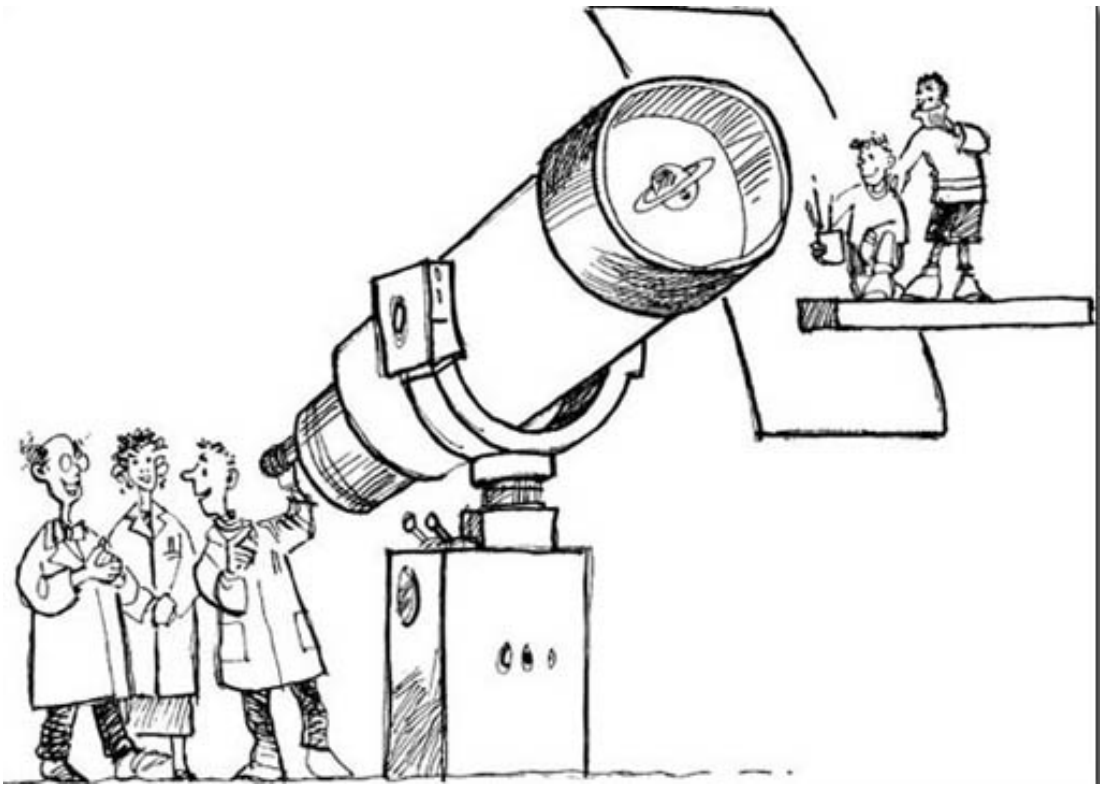

Figure 26 A metaphorical account of the way theories (planet on telescope) determine what we see in the world. The mischief makers in this example are the theory makers – their framing of the situation can determine what is experienced

Activity 36

Checking out your own capacities as an observer.

(This should take no more than 10 minutes.) Even now, your mind set – the way you see things – can be easily influenced. To see how this statement is true follow the instructions carefully.

If your last name begins with a letter between A to M, look carefully at Figure 27. Then look carefully at Figure 29.

If your last name begins with a letter between N to Z, look carefully at Figure 28. Then look carefully at Figure 29.

Figure 27

Figure 28

If you are an A-to-M, you probably saw the young woman, and if you are an N-to-Z, you probably saw the old woman. Tests of these pictures, done with groups of students, show that prior influence is always powerful. This activity raises two important questions.

1. What is experience? In this example some people experienced a young woman whilst others experienced an old woman yet both looked at the same image. This leads me to claim that experience arises by making a distinction – if you are unable to distinguish a young woman then you have no experience of one!

2. Is it possible to decide on which interpretation, the young woman, the old woman or merely the ink on the paper, is correct? In other words do we reject those people who see only an old woman as being ‘wrong’?

Figure 29

On the basis of doing Activity 36 try the next activity. Spend no more than about **10 minutes** on it.

Activity 37

When you talk about *experience* what do you mean?

Describe what was, for you, a new *experience*.

For me the following story was helpful in making sense of what I mean by *experience*. I had the good fortune to do a consultancy in South Africa just after the first multi-racial elections. It was a time of goodwill and enthusiasm and general optimism. An incident happened towards the end of a flight from Johannesburg to East London in the new province of the Eastern Cape.

As the plane taxied up the tarmac towards the terminal, I experienced my South African colleague, in the seat next to me, as becoming agitated and tense. Looking out the window, as he was, I could not distinguish anything that I could see as the cause of his distress. When I enquired, he pointed to some seemingly innocuous cement pillars, which he explained were the remains of gun emplacements left over from the state of emergency in the apartheid era. Because of his history, which was different to mine, he had seen what I could not see – that is, his observation consisted of distinctions that I had not made. Furthermore, the distinctions my colleague made altered his mental, emotional and physiological state – they altered his being. My colleague made distinctions I was unable to make and thus he experienced something I did not.

The act of making a distinction is quite basic to what it is to be human. When we make a distinction we split the world into two parts: this and that. We separate the thing distinguished from its background. We do that when we distinguish a system from its environment. (Remember, using the word system is actually shorthand for specifying a system in relation to an environment.) In process terms, this is the same as drawing a circle on a sheet of paper. When the circle is closed, three different elements are brought forth at the same time: an inside, an outside and a border (in systems terminology, a boundary). In daily life we have developed all sorts of perceptual shortcuts that cause us to forget this is what we do – we live, most of the time, with our focus on one of these three elements: the inside, the outside, or the border. Biologically, we cannot focus on both sides of a distinction at the same time. Heinz von Foerster (1984) observed that the descriptions we make say more about ourselves than about the world we are describing.

While the old woman–young woman example is now well known, the implications that flow from it are not. The activity, and the points listed prior to that demonstrate that in the experience we cannot distinguish between perception and illusion and that ‘we do not see that [which] we do not see’ (Maturana and Varela, 1987). It is ironic that we pay money to go and see illusionists, and marvel at their artistry, yet remain unaware that illusion is also part of daily life. For systems practice this idea is challenging in a number of ways:

(a) It draws my attention to what is involved in the process of *modelling*, of which diagramming is a subset. It raises the question of whether we model some part of the world or model our models of some part of the world.

(b) It challenges the certainty of some practitioners who claim they are objective or they are right, and because of this, affects the way they practise.

(c) It reminds me that my perspective is always partial and a product of my cognitive history (I would include emotions as part of a cognitive history). Thus, when forming a system of interest, the question of ‘perspective, who's perspective?’ is crucial.

(d) It reminds me to be aware of the constraints and possibilities of the observer as I juggle the B ball in my practice.

The properties and role of the observer have been largely ignored in science and everyday culture despite Werner Heisenberg's finding in 1927 that the act of observing a phenomenon is an intervention that alters the phenomenon in ways that cannot be inferred from the results of the observation. This is the essence of Heisenberg's uncertainty principle, which limits the determinability of elementary events (von Foerster, 1994). The story of how the observer came into focus is an interesting one in the history of Systems and its associated field of cybernetics. Lloyd Fell and David Russell (2000) describe it in the box below; its lineage can be seen in Figure 24.

Being aware of the constraints and possibilities of the observer enhances our repertoire of behavioural responses. Because we are able to communicate with one another, and because we live within cultures we can take shortcuts: it makes sense sometimes to act *as if* we are independent of the world around us. Sometimes it also makes sense to act as if systems existed in the world and as if we could be objective. But remember, the two small words *as* and *if* are important in the context of our behaviour when we attempt to manage. From the perspective developed in this section, it is always a shortcut when we leave them out.

Box 1 How the observer has come into focus

Cybernetics, although often applied to the control of machines, has long been one of the foundations of thought about human communication, its central notion being circularity. Cybernetics 'arises when effectors, say a motor, an engine, our muscles, etc., are connected to a sensory organ which, in turn, acts with its signals upon the effectors. It is this circular organization which sets cybernetic systems apart from others that are not so organized' (von Foerster, 1992). In first-order cybernetics it was the idea of feedback control which mainly occupied the practitioners, but in time the question 'what controls the controller' returned to view (Glanville 1995a,b) and the property of circularity became the focus of attention once again.

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 1960s 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. [The understandings which have arisen from second-order cybernetics …] requires a loosening of our grip on the supposedly certain knowledge that is acquired objectively, about a reality existing independently of us, and a willingness to consider the constructivist idea (see Mahoney, 1988) that we each construct our own version of reality in the course of our living together. The virtue of objectivity was that the properties of the observer should be separate from the description of what is being observed. This led to what von Foerster (1992) called the Pontius Pilate attitude of abrogating responsibility because the observer is an innocent bystander who can claim he or she had no choice. The alternative attitude, which seems to be less popular today, is to own a personal preference for one among various alternatives.

(Fell and Russell, 2000)

3.3 Appreciating your basis for understanding

In my experience, the explanation that Fell and Russell suggest (i.e. that we each construct our own version of reality and therefore cannot be an objective observer; which in turn means we have to take responsibility for our observations and explanations) is challenging for many people. When I attend workshops where these ideas are expressed for the first time, people often become angry. You may be able to identify with them. If so, please try to use your discomfort productively for your own learning. It is profoundly disturbing to have the basis for your understanding of the world challenged. It seems important to do it, however, because in my experience, it gives access to new and practical explanations. I have already acknowledged you may find some explanations dissatisfying but, in the end, that is all they are – just explanations. If you don't find them satisfying you need not accept them. Just the same, I invite you to look at them for a while before dismissing them.

Activity 38

Responding to the distinctions about the observer.

Find a way of expressing your emotional and rational responses to the material in 'How the observer has come into focus' about the observer. One way could be to use your Learning Journal to record these.

Relatively recent findings in cognitive science (e.g. colour perception), which are not widely appreciated, challenge some widely held 'common sense' notions. Take information for example. Many people assume that individuals would be better decision makers if they had better information. But how do we gain this information?

Since about 1950, the prevailing view in cognitive science has been that the nervous system picks up information from the environment and processes it to provide a representation of the outside world in our brain. This has been described as the information-processing model of the mind (Figure 30). We now know that the nervous system is closed, without inputs or outputs, and its cognitive operation reflects only its own organisation. Because of this, we are imposing our constructed information – or our meaning – on to the environment, rather than the other way around. This is much like Figure 26, except this time the pattern of the planet is contained in our nervous system rather than the lens of the telescope. It implies our interactions with the 'real world', including other people, can never be deterministic; there are no unambiguous external signals.

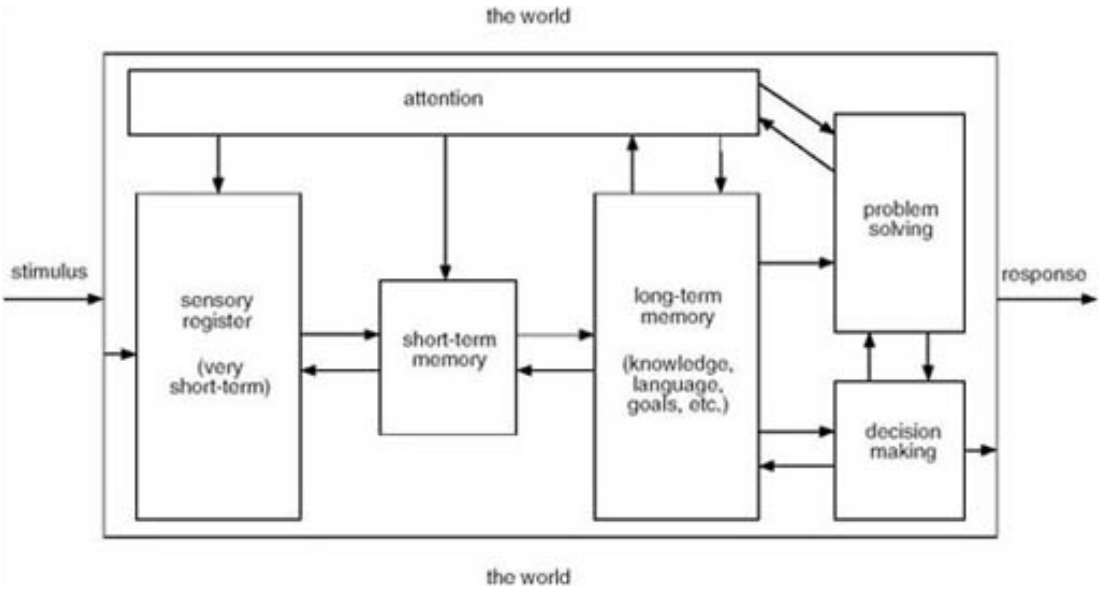

Figure 30 The prevailing but questionable information-processing model of the mind (Rosch, 1992)

Instead, our interactions consist of non-specific triggers, which we each interpret strictly according to our own internal structural dynamics (Fell and Russell, 2000). This has profound implications for how human communication is understood – it is not signal or information transfer but a process of meaning construction much as depicted in Figure 31 (but note, it is never shared as this cartoon depicts). Within this line of reasoning it is argued that we human beings exist, and are realised as such, in conversations. It is not that we use conversations; we **are** a flow of conversations. It is not that language is the home of our **being** but that the human **being** is a dynamic manner of being in language, not a body, not an entity that has an existence independent of language, and which can then use language as an instrument for communication.

For example when the word **nature** is used in modern Western discourse it is often used in such a way that leads us to live as if we human beings are outside nature. The concept 'nature' thus structures who we are and what we do. In some indigenous, non-western languages the term or concept does not exist. Obviously, this view has implications for what we mean by communication within systems practice.

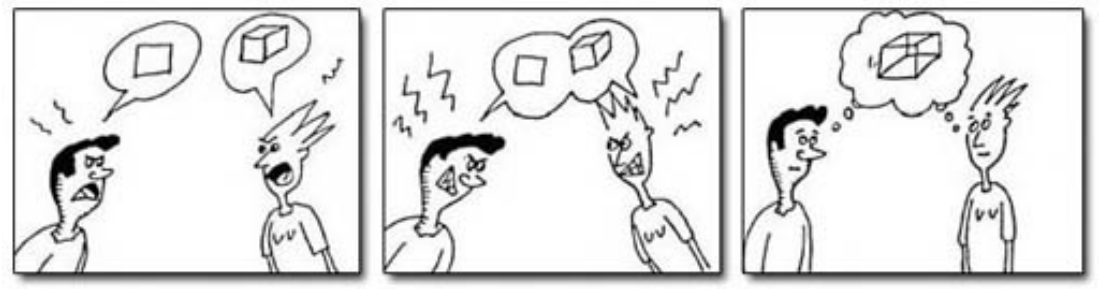

Figure 31 Human communication involves the construction of meaning (O'Brien, 1990)

The notion that we exist in language and co-construct meaning in human communication, much as dancers co-construct the tango or samba on the dance floor, suggests the need to consider on what basis we might accept that understanding has occurred. Asking this question is like opening a Pandora's box. It raises all sorts of questions that we take for

granted, like: What is learning? What is understanding? How do we know what we know? Some of these questions are addressed in the next subsection.

3.4 Experience – making distinctions based on a tradition and constructing a history

Experience, and learning from experience, will be a major theme throughout this unit. The model of experiential learning developed by David Kolb is increasingly well known and used as a conceptual basis for the design of all sorts of processes from curricula to consultancies (Figure 32). In itself, the model is powerful but it does not address what is meant by experience or learning. In what follows, I want to provide a brief account of what these could be taken to be. My explanation is not mainstream, but arises from an appreciation of the constraints and possibilities of the observer described earlier and from the lineage labelled as second-order cybernetics in Figure 24.

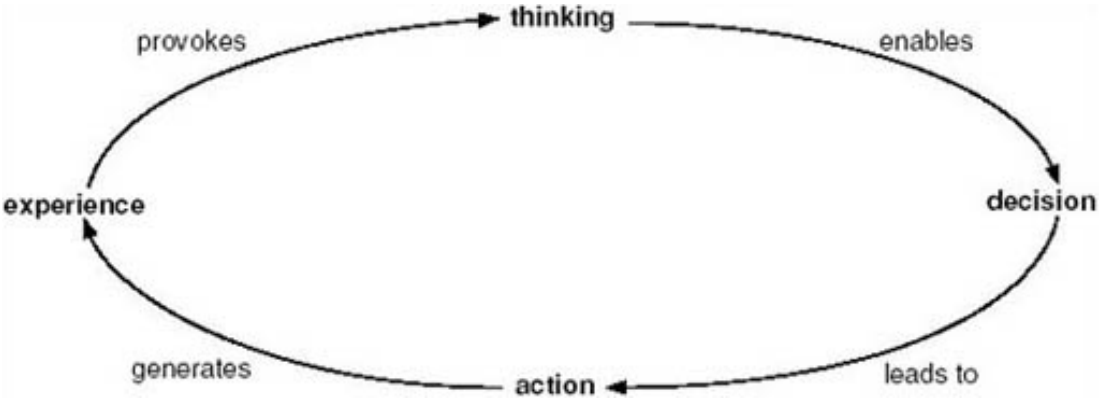

Figure 32 The experiential learning model adapted from Kolb which starts with experience

Figure 33 depicts a person (a living being) over time; as unique human beings we are part of a lineage and our history is a product of both ontogeny, which means biological growth and development, and social development. Together these form what I will call a tradition. A tradition is the history of our being in the world. Traditions are important because our models of understanding grow out of traditions. The various shapes in the clouds above the practitioner's head in Figure 33 are used to depict how our model(s) of understanding change over time. The lightbulbs depict how, over time, we can become more aware of our embodied understandings, which in turn influences systems practice.

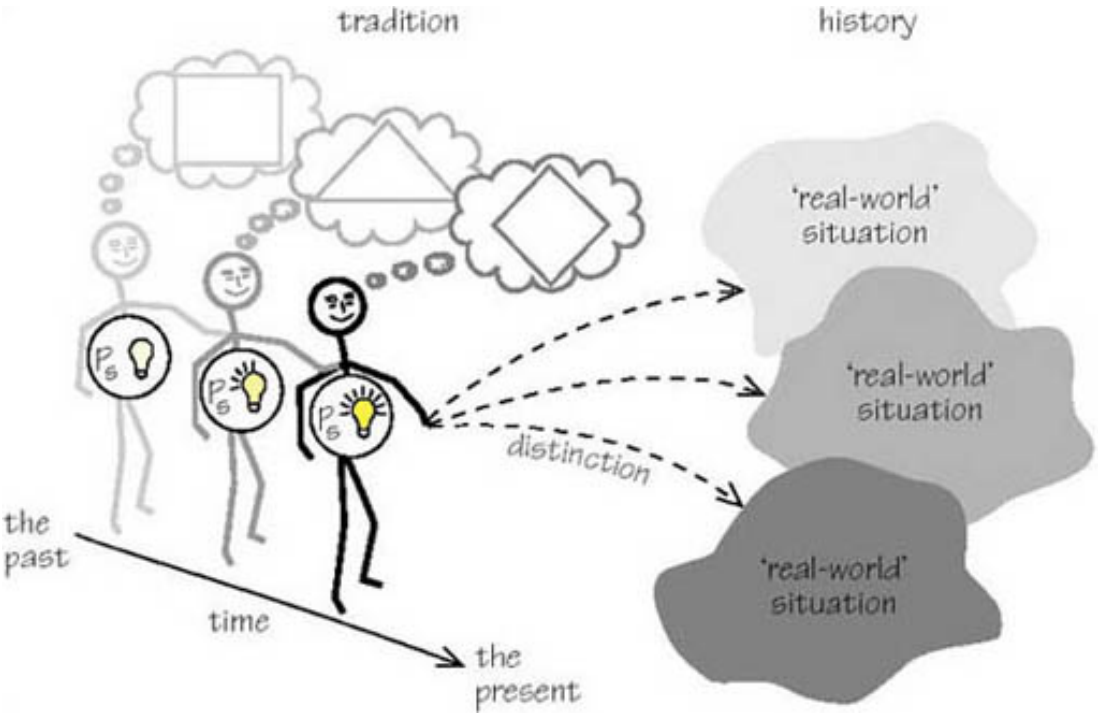

Figure 33 A model of a systems practitioner (P_s) growing in awareness (shown by lightbulbs) with a tradition of understanding (shown by the different shapes) engaging with a 'real world' situation that has a history that can be explored

I have portrayed 'a practitioner' with a prior model of understanding and a current model of understanding in Figure 33. From their current model(s) – it need not be one – the systems practitioner connects with a 'real world' situation and makes a distinction. Based on this distinction, the practitioner can probe, or construct, the history of a situation.

Figure 33 is a refinement of the processes of being and engaging. I have now used the word tradition a number of times, including in Figure 33. I use the word in a specific way. I will call a tradition our history of making distinctions as human beings. Because experiences arise in the act of making a distinction, another way of describing a tradition is as our experiential history. To do this requires language – if we did not 'live in' language we would simply exist in a continuous present not 'having experiences'. Because of language we are able to reflect on what is happening, or in other words we create an object of what is happening and name it 'experience'.

Let me try to explain what I mean in Figure 33 by considering the main fictional character Smilla, in Peter Høeg's novel *Miss Smilla's Feeling for Snow* (1994). Smilla was born and spent her early years in Greenland. Her mother was an Inuit and an expert hunter. Being half Danish, Smilla subsequently pursued a Western education that built on her earlier experiences. She became an expert in the qualities of ice and snow. It was her understanding of the many different qualities of ice and snow that enabled her to solve the murder of an Inuit child around which the story is built. Her understanding also enabled her to survive in the snow and icy water when pursued by the murderers.

As an author, Høeg has grounded the distinctions Smilla is able to make about snow and ice in the history and culture of the Inuit people. Inuit culture is set against the background of continuous snow and ice. Survival depends on being able to 'read' the snow and ice in detail. This detail can reveal, for example, how long ago a wolf left its footprints and whether the ice will support the weight of a dog team. The distinctions the Inuit make assume their importance because of the actions they allow. They arise as embodied ways

of knowing and acting in which knowledge is not separate from action. The distinctions Smilla, or other Inuit make, are not distinctions I could make except that, having read the book, I could claim to know about some of the different categories of ice and snow. But would I, in similar circumstances, be able to escape from the murderers and solve the case based on what I claim I know? The answer is no, because the distinctions Smilla makes are invisible to me; they are not part of my tradition. That would remain the case until such times as I was able to embody the distinctions about snow and ice quality and colour in my actions: for example being competent to run on snow without falling or to find the kind of snow that can be built into a shelter. From this example, the only connection I can make with my tradition is that of 'making categories'. In contrast to Smilla, this is a rather poverty-stricken form of knowing about snow!

SAQ 6

On what does Smilla's ability to distinguish different types of snow and ice depend? What would you have to do to develop a similar skill?

Answer

Smilla's ability to distinguish different types of snow and ice depend on her history of making distinctions, which I have called a tradition; meaning a pervasive network of understanding out of which, as an individual, she thinks and acts. It comes about because she grew up with the Inuit people and was introduced and socialised into their history of making distinctions about ice and snow. To develop a similar skill you would need to immerse yourself in the context of the Inuit and to make connections with their history, which you could embody in your actions. This would not be easy and would take time, just as learning a new language takes time.

Traditions are not only ways to see and act but a way to conceal (Russell and Ison 2000a). Traditions in a culture embed what has, over time, been judged to be useful practice but there is a danger that they may become accepted practice (reified or institutionalised) in ways that no longer seem helpful. The risk for any culture is that a tradition can become a blind spot when it evolves into practice lacking any manner of critical reflection being connected to it. The effects of blind spots can be observed at the level of the individual, the group, the organisation, the nation or culture and in the metaphors and discourses in which we are immersed.

A systems practitioner always engages with the 'real world' situation by making distinctions which are grounded in his or her personal history of distinction-making. Based on the distinctions he or she makes, the practitioner can probe the history of the situation, much like an archaeologist, to reveal those dynamics which relate to the distinctions he or she has made. It is possible to connect with a particular history whenever we make sense of a distinction in relation to its particular historical context. For example, if you look at Figure 34 I suspect that you would have little difficulty making sense of the distinction 'British dinosaur' in relation to a history of symbolising British culture through the image of a bulldog and the union flag.

Because much of my practice is based in academia, and because I often encounter situations in which proposals are considered uncritically, I have found it useful to engage with the history of particular practices that impact on me. Many good insights can be found in Neil Postman's book: *Technopoly. The Surrender of Culture to Technology* (1993). Of the many examples he cites, I was intrigued by the history of the practice of quantifying learning, that is, giving a mark or grade for academic work. Today it seems so much part

of our daily life we do not question it. Yet prior to 1792, when it was first carried out at the University of Cambridge this was an unknown practice. Interestingly it was fostered mainly by military colleges.

Figure 34 A British dinosaur: making a connection with an example of a particular history of symbolic representation

I call practices such as grading and examining, which become unquestioningly incorporated into a culture, social technologies – this is also what I mean by a practice becoming reified. All explanations also have a history, something which has become more apparent in recent years with the emergence of new academic disciplines in the history and sociology of science and technology. Explanations are also open to historical (re) interpretation.

So, after reading Peter Høeg's novel I can claim that I know about the different categories of snow by listing them. Perhaps after visiting Greenland with an Inuit guide I could claim that I know the different kinds of snow if I can distinguish them successfully. To claim I understand them would require me to be able to explain how, when and where different kinds are formed or found, and what implications they have for various activities, my own and other animals. In this latter two cases I need to ground the categories or distinctions within the historical context of the Inuit, much as I have tried to do in my brief description above. However I would need to do much more to embody these distinctions in my practices in the snow, that is to know, or practice in, snow. To know snow I would need to be able to claim that I have embedded my distinctions in a tradition – my own network of pre-understandings out of which I think and act. A test would be that under similar circumstances to Smilla my behaviour had similar results.

Of course, sometimes traditions collide!

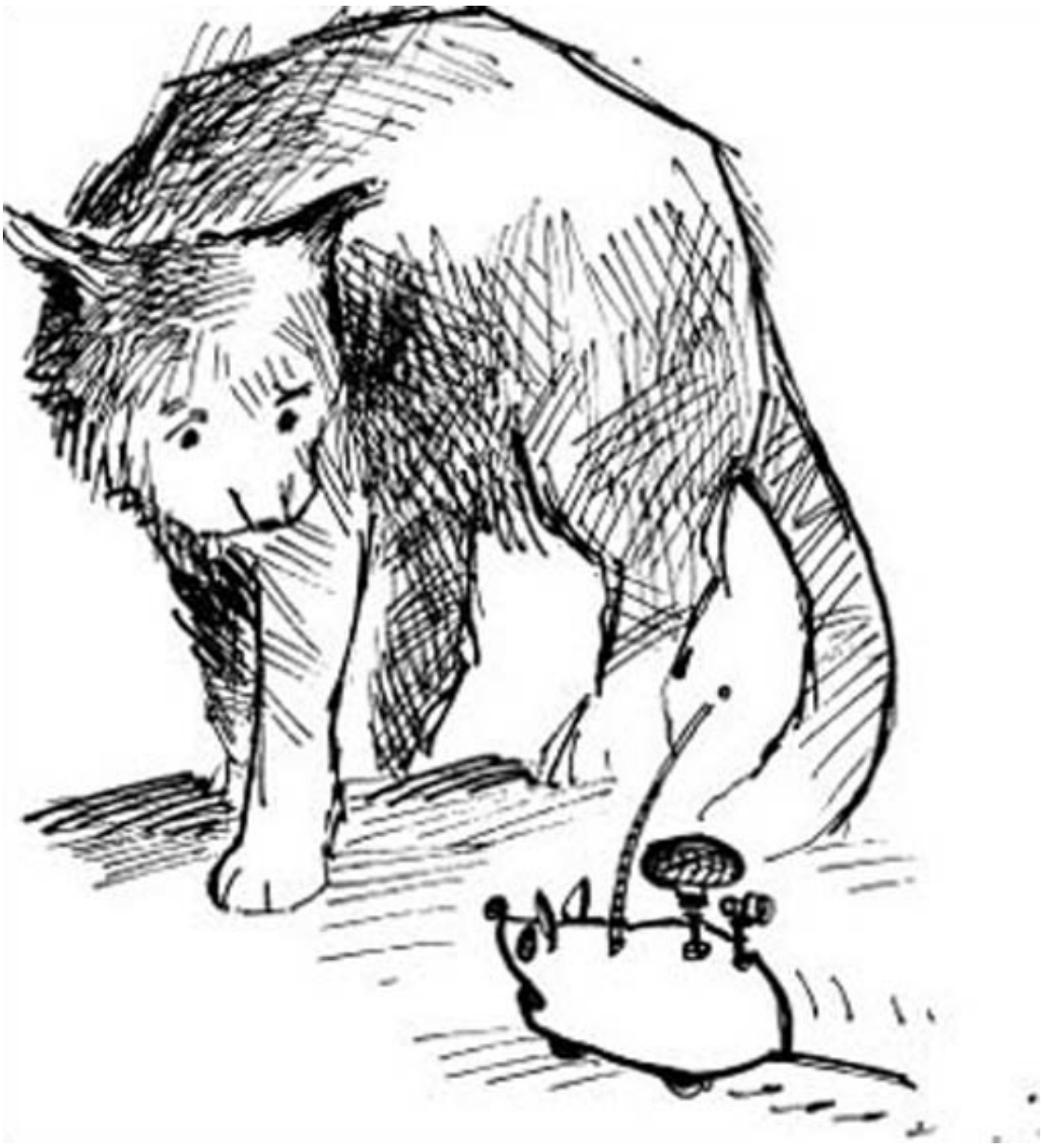

Figure 35 When traditions collide. This is particularly the case when dialogue is not possible or is not sought

Activity 39

Connecting with a history in your own context.

At the beginning of this part of the unit, I invited you to consider one of your own role(s) and situation(s) that could be kept in mind as you worked through Part 3. With this in mind, are you able to think of a practice that is carried out unquestioningly? Are you able to engage in any elementary archaeology to uncover some of the history of this practice? Do try this activity but do not worry if you are unable to identify one.

Answer

Quantifying assessment arose as a practice in the 18th century. An example is the following which has been doing the rounds as an email joke: perhaps you have seen it before but not considered it in the light of my explanation?

Horse's Ass

The US Standard railroad gauge (distance between the rails) is 4 feet, 8.5 inches. That's an exceedingly odd number. Why was that gauge used? Because that's the way they built them in England, and the US railroads were built by English expatriates.

Why did the English people build them like that? Because the first rail lines were built by the same people who built the pre-railroad tramways, and that's the gauge they used.

Why did 'they' use that gauge then? Because the people who built the tramways used the same jigs and tools that they used for building wagons, which used that wheel spacing.

Okay! Why did the wagons use that odd wheel spacing? Well, if they tried to use any other spacing the wagons would break on some of the old, long distance roads, because that's the spacing of the old wheel ruts.

So who built these old rutted roads? The first long distance roads in Europe were built by Imperial Rome for the benefit of their legions. The roads have been used ever since. And the ruts? The initial ruts, which everyone else had to match for fear of destroying their wagons, were first made by Roman war chariots. Since the chariots were made for or by Imperial Rome they were all alike in the matter of wheel spacing.

Thus, we have the answer to the original questions. The United States standard railroad gauge of 4 feet, 8.5 inches derives from the original specification (military specification) for an Imperial Roman army war chariot. Military specifications and bureaucracies live forever. So, the next time you are handed a specification and wonder what horse's ass came up with it, you may be exactly right. Because the Imperial Roman chariots were made to be just wide enough to accommodate the back-ends of two war horses.

3.5 Distinctions about systems practice

A tension has existed throughout the history of Western thought around whether to focus on parts or the whole. The practice that springs from this history carries the same tension. This tension has been particularly visible within science and philosophy for a long time and it gives rise to different approaches. I will be addressing these tensions in Section 4.

Emphasising the parts has been called mechanistic, reductionist or atomistic. An emphasis on the whole has been called holistic, organismic or ecological. As Fritjof Capra (1996) notes: 'In twentieth century science the holistic perspective has become known as "systemic" and the way of thinking it implies as "systems thinking".' Capra also claims systems thinking is 'contextual' thinking; and since explaining things in their context means explaining them in relation to their environment, I can also say all systems thinking is environmental thinking.

Two adjectives arise from the word 'system'. Systemic thinking, thinking in terms of wholes, may be contrasted with systematic thinking, which is linear, step-by-step thinking. Likewise, it is possible to recognise systemic practice and systematic practice. Table 3 summarises some of the characteristics that distinguish between systemic and systematic thinking and action.

Both systematic thinking and systemic thinking have their place. I am not in any way trying to set up an idea that systemic is good, systematic is bad. They are not in opposition in the hands of an aware practitioner. My own perspective, when managing or intervening in messy situations is that it is usually more appropriate to approach the task systemically. In other words, systemic thinking provides the context for systematic thinking and action. Thus my ideal, aware, systems practitioner is one who is able to distinguish between systemic and systematic thinking and is able to embody these distinctions in practice. This has implications for the initial starting conditions for any form of purposeful action – i.e. do I start out systemically or systematically? I take this up in Section 4 in terms of engaging with complexity in a given 'real world' situation.

Of course, I am building an ideal model and day-to-day experience is different from this. No person can expect to become or embody the ideal overnight. It requires active engagement in a process of experiential learning. The other point I wish to make is that I am not equating the systems practitioner role with someone who is a professional consultant. This is a possible role, but in my idealised model the systems practitioner is anyone interested in understanding and taking action in any context.

Table 3: A summary of the characteristics that distinguish systemic thinking and action and systematic thinking and action

Systemic thinking	Systematic thinking
Properties of the whole differ, they are said to *emerge* from their parts; e.g. the wetness of water cannot be understood in terms of hydrogen and oxygen.	The whole can be understood by considering just the parts through linear cause-effect mechanisms.
Boundaries of systems are determined by the perspectives of those who participate in formulating them. The result is a system of interest.	Systems exist as concrete entities; there is a correspondence between the description and the described phenomenon.
Individuals hold partial perspectives of the whole; when combined, these provide multiple partial perspectives.	Perspective is not important.
Systems are characterised by feedback; may be negative, i.e. compensatory or balancing; or positive, i.e. exaggerating or reinforcing.	Analysis is linear.
Systems cannot be understood by analysis of the component parts. The properties of the parts are not intrinsic properties, but can be understood only within the context of the larger whole through studying the interconnections.	A situation can be understood by step-by-step analysis followed by evaluation and repetition of the original analysis.
Concentrates on basic principles of organisation.	Concentrates on basic building blocks.
Systems are nested within other systems – they are multi-layered and interconnect to form networks.	There is a foundation on which the parts can be understood.
Contextual.	Analytical.
Concerned with process.	Concerned with entities and properties.
The properties of the whole system are destroyed when the system is dissected, either physically or theoretically, into isolated elements.	The system can be reconstructed after studying the components.

Systemic action	Systematic action
The espoused role and the action of the decision-maker is very much part of an interacting ecology of systems. How the researcher perceives the situation is critical to the system being studied. The role is that of participant-conceptualiser.	The espoused role of the decision-maker is that of participant-observer. In practice, however, the decision maker claims to be objective and thus remains 'outside' the system being studied.
Ethics are perceived as being multi-levelled as are the levels of systems themselves. What might be good at one level might be bad at another. Responsibility replaces objectivity in whole-systems ethics.	Ethics and values are not addressed as a central theme. They are not integrated into the change process; the researcher takes an objective stance.
It is the interaction of the practitioner and a system of interest with its context (its environment) that is the main focus of exploration and change.	The system being studied is seen as distinct from its environment. It may be spoken of in open-system terms but intervention is performed as though it were a closed system.
Perception and action are based on experience of the world, especially on the experience of patterns that connect entities and the meaning generated by viewing events in their contexts.	Perception and action are based on a belief in a 'real world'; a world of discrete entities that have meaning in and of themselves.
There is an attempt to stand back and explore the traditions of understanding in which the practitioner is immersed.	Traditions of understanding may not be questioned although the method of analysis may be evaluated.

SAQ 7

Being systemic or systematic.

Classify the following statements as reflecting either a systemic or systematic perspective. What are the implications of classifying these statements in this way?

(a) My car is getting old and periodically refuses to start. When it does, I have to check a series of options and do some tests to discover what's causing the latest trouble.

(b) There is no point in having a meeting to discuss this because the antagonisms within the department will dominate the situation and there are too few people interested in changing that.

(c) I am being investigated by the Inland Revenue because my accountant made an error in calculating the dividend I received from the business last year.

(d) The understanding of life is based on an understanding of DNA and how this is incorporated in genes.

(e) As the managing director, I always found out what all participants in a disagreement thought and felt about what went on. Therefore, I could never blame any one person for the conflicts and messes that arose. I did my best to help each participant understand the others were taking a different view and had misunderstood aspects of the situation.

Answer

I think descriptions (a) and (b) exemplify systematic thinking. If I accept (a) for what it is, there is a step-by-step procedure that I know from *experience* will result in a successful analysis. For me, (b) and (c) exemplify simple cause-and-effect thinking, which in both situations could represent a trap. Description (d) is for me an example of systematic thinking that conceptualises life as understandable in terms of basic building blocks, which can be understood by studying the properties of the blocks. Example (e) suggests to me someone who is thinking and possibly acting systemically. I say possibly, because I would like to check out the claims from perspectives other than the managing director's.

3.6 Learning and effective action

I claim that learning is about effective action. It is distinguished when I, or another observer, recognise that I can perform what I was unable to perform before. Following Reyes and Zarama (1998), I am going to claim learning is an assessment made by an observer based on observed capacity for action. From this perspective, learning is not about ideas stored in our mind, but about action. So what makes an action effective? Reyes and Zarama (1998, p. 26) make the following claims:

> Assessments change through history.[…] A major blindness we often observe in people is the almost exclusive attention they pay to learning particular skills as a way to become effective and successful in the future. However, they do not pay much attention to the fact that the standards to assess effectiveness in the future may be very different from the ones used today.[…] Actions by themselves never generate effectiveness. Only actions that comply with existing social standards can produce it.[…] A good example […] is the importance granted today to ecological concerns. Based on historical changes in standards of effectiveness, procedures that were considered extremely effective in the past are now discarded because they do not meet ecological standards.

This historical pattern of changes in what constitutes effectiveness is made in our social communications – it is referred to as discourses in the social sciences. Making judgements about effectiveness is something we do every day when we say, ‘He is a good footballer’, or, ‘She is a good manager’. Implicit in these statements are some measures of performance against which we judged effectiveness. I know from my own experience that my own standards of effectiveness are different to my daughter's when, after listening to a CD, I say, ‘She is a good singer’!

To be highly competent in practice, any practice, requires learning to be embodied – incorporated in the body itself. This is clear if we watch an Olympic hurdler or any other consummate athlete or performer. Every learning involves an alteration of the learner's body to perform the newly learned actions. Thus, practice must happen. If I have an aspiration it is to be able to embody my systems practice. I think I have a long way to go, but I have experienced systems practitioners who meet many of the criteria of my ideal. There is, however one further element of being a systems practitioner that requires juggling.

3.7 Being ethical

As outlined in Table 3, ethics within systemic practice are perceived as operating on multiple levels. Like the systems concept of hierarchy, what we perceive to be good at one level might be bad at another. Because an epistemological position must be chosen, rather than taken as a given, the choice involves taking responsibility. The choices made have ethical implications. Within systematic practice ethics and values are generally not addressed as a central theme unless the practitioner is aware of the choice they are making. If there is no awareness, they are not integrated into the change process because the practitioner or researcher takes an objective stance that excludes ethical considerations. Recourse to objectivity can be a means of avoiding responsibility (see also Maturana, 1988).

My concern is with the ethics of systems practice. Heinz von Foerster (1992), citing philosopher Ludwig Wittgenstein claims that 'ethics cannot be articulated'. Further, 'it is clear that ethics has nothing to do with punishment and reward in the usual sense of the terms. Nevertheless, there must indeed be some kind of ethical reward and punishment, but they must reside in the action. Von Foerster goes on to consider the epistemological choice I outlined in Table 3 in terms of the following questions:

- Am I apart from the universe? Whenever I look, am I looking as through a peephole upon an unfolding universe? Or
- Am I part of the universe? Whenever I act, am I changing myself and the universe as well?

He then goes on to say:

> Whenever I reflect on these two alternatives, I am surprised again and again by the depth of the abyss that separates the two fundamentally different worlds that can be created by such a choice. Either to see myself as a citizen of an independent universe, whose regularities, rules and customs I may eventually discover, or to see myself as the participant in a conspiracy [in the sense of collective action], whose customs, rules and regulations we are now inventing.

The ethical way forward, von Foerster argues, is to always try to act to increase the number of choices available. By this he seeks in his own practices to act in ways that do not limit the activities of other people: 'Because the more freedom one has, the more choices one has, and the better chance that people will take responsibility for their own actions. Freedom and responsibility go hand in hand.' (von Foerster and Perkson, 2002, p. 37).

A practical tool for acting ethically is to be aware of the language used in a conversation. For example, by turning away from statements that begin with 'That is the way it is'! To enter a conversation convinced you are right or that your perspective is the only valid one limits the choices available to those who wish to pursue a conversation. Of course this does not mean you have to agree with the perspective on offer!

SAQ 8

List the ways the available choices could have been increased in the child support case study. State any other ways of being ethical you would like to apply.

Answer

There are many possible answers to this question. I am going to focus my answer on the choices available to the professional staff within the agency. My reading of the case study suggests the initial legislation was tightly drafted and highly prescriptive. This suggests those managing the agency probably felt constrained in allowing staff to make a judgement based on circumstances; a type of case-law approach based on practice.

The prescriptive legislation may have been a product of the ideological position of the party in power together with a perhaps unhelpful perspective on accountability.

At the time of writing this, the decisions I am being asked to make about named-degrees of the Open University seem to be constrained by the capacities of the OU's computer set up and the data-handling arrangements for the various options. The same may have been the case in the Child Support Agency; the CSA information system may not have been readily adapted to its changing context.

From my perspective, the other ethical principle I want to apply is to encourage maximum stakeholder participation as this has the potential to maximise the choices available.

3.8 Reviewing some implications for systems practice

The following anecdote exemplifies one of the main reasons why I think juggling the B ball is important for systems practice. The story relates to two practitioners who were able to connect with the history of organisational complexity ideas. It describes the process they chose to take in response to a highly specific organisational-development tender document couched in traditional ways:

> Our first decision was to challenge the tender document.[…] When asked to present our proposals to the tender panel we ignored the presenter/audience structure in which the room had been arranged by drawing chairs up to the table and conversing with the client group. We began a discussion about the way those present were thinking about organizational and cultural change and emphasized the unknowability of the evolution of a complex organization in a complex environment. Instead of offering workshops or programmes we proposed an emergent, one step at a time contract […] to discover and create opportunities to work with the live issues and tasks that were exercising people formally and informally in the working environment. […] we were subsequently told that the panel's decision to appoint us was unanimous. (Shaw, p. 10, 2002)

When reflecting on this experience Patricia Shaw made the following comments:

> We were told by one of the directors, ‘Everyone else made a presentation based on knowing what to do. You were the only ones who spoke openly about not knowing while still being convincing. It was quite a relief’. Our success in interesting the client group in working with us seemed to be based on:
>
> (a) Making it legitimate in this situation not to be able to specify outcomes and a plan of action in advance, by so doing we made ‘not knowing’ an intelligent response.

(a) Pointing out the contradictions between the messy, emergent nature of our experience of organizational life and the dominant paradigm of how organizations change through the implementation of prior intent.

This approach helped to contain the anxiety of facing the real uncertainties of such a project together. It was an example of contracting for emergent outcomes.

What does this story tell us? It shows that how we think about the world; our theories and models are a result of experience, even if implicit, determine what we do in the world. Our theories predispose us to engage with 'real world' situations in particular ways. Unlike the other consultants, Patricia Shaw and her colleague, did not respond to the tender as if it were a problem for which they had the answer. I have experienced Shaw in action, and think she has embodied her conversational theories in her actions.

This approach is potentially able to encompass all of the complexity in the situation. It is also able to bring forth the multiple perspectives through the engagement of all the actors in the situation. They used conversations, interviews and even drama to achieve this. This allows outcomes to emerge from the process rather than being defined in the form of a plan with outcomes specified in advance. Sometimes highly specific plans that are not renegotiated iteratively as the environment changes are called blueprints, and the process called blueprint planning. Shaw and her colleague approached their task as an unfolding process of 'engaging' in which all parties were learning or co-constructing new meanings in the situation (Shaw, 2002). Systemic approaches to managing complexity, of which this is an example, are designed to achieve emergent outcomes because they orchestrate a process of learning.

You will, of course, recognise that the behaviour of Shaw and her colleague is not appropriate in all contexts, although I think the approach could be used more. In the case of an engineer responding to some specific request that required precise technical specifications another response may have been appropriate.

Being aware or, becoming aware of our being, I argue, increases the repertoire of possible actions available to a systems practitioner. It is the first step on the journey from being to becoming. Being aware, or not, of the issues I have raised in this section creates the initial starting conditions for engaging with complexity, the subject of the next section.

SAQ 9

State the main ways you need to be self-aware as a practitioner. What are the advantages of each awareness, and what are the traps if you do not have each awareness?

Answer

The main ways of being an aware practitioner are:

(a) by attempting to surface your traditions of understanding (these could also be called mental models; theories in use; frameworks of ideas) so that you can be aware of the choices you make in pursuing your practice;

(b) by refining (a), you become epistemologically aware, and able to think and act systemically or systematically;

(c) by appreciating the constraints and possibilities of the observer and how this awareness questions the commonly accepted notion of objectivity and replaces it with that of responsibility;

(d) by seeking to embody your systems thinking in practice;

(e) by adding an ethical dimension to your work, particularly by seeking to increase the choices available to stakeholders.

In Table 4, I suggest some of the advantages of each awareness and some of the traps.

Table 4

Way of being aware	Advantages	Potential traps when missing
surface traditions	you know what theory informs your practice; you can actively choose new theoretical frameworks; allows surfacing and questioning of many hidden assumptions	you remain unaware of your own prejudices; you have theories that are not suited to the context
epistemologically aware	increases the choices you have as a practitioner; alters your approach from one of discovering or describing systems to constructing or designing systems of interest	conflict (including passive aggression) arises when your truth claim (perspective) is asserted over someone else's; collaborative action is more difficult
appreciate observer	avoid mistaken reliance on objectivity; enables a richer appreciation of what is involved in human communication	avoid taking responsibility for actions; avoid being ethical
embody systems thinking	you are more readily able to contextualise your practice, you can adapt it to novel situations; you appreciate the history of the situation in which you are practising	your actions are confined to the theoretical rather than constituting praxis (combining theory and practice)
incorporate ethics	is an act of being responsible; can increase the choice available to stakeholders	you take responsibility for others without their agreement

Remember to return to the table you developed for Activity 35 in your Learning Journal and note down any changes in understanding resulting from your study of this section.

14 Part 3: 4 Engaging with complexity

4.1 Articulating your appreciation of complexity

I have organised the material in this section so that you can follow the activity route shown in Figure 36.

This section is primarily concerned with what can be understood by the term complexity, and how to compare it with the ideas of **difficulty** and **mess** you may have encountered in your previous study of Systems.

To do this, you are first asked to notice your developing understanding of complexity in Section 4.2, and then to enter a deeper engagement with the distinction between difficulties and messes in Section 4.3. The substance of Section 4.4 is an exploration of the conceptual links between complexity and mess. It also alerts you to the many ways the term complexity is used, especially in relation to the new complexity sciences.

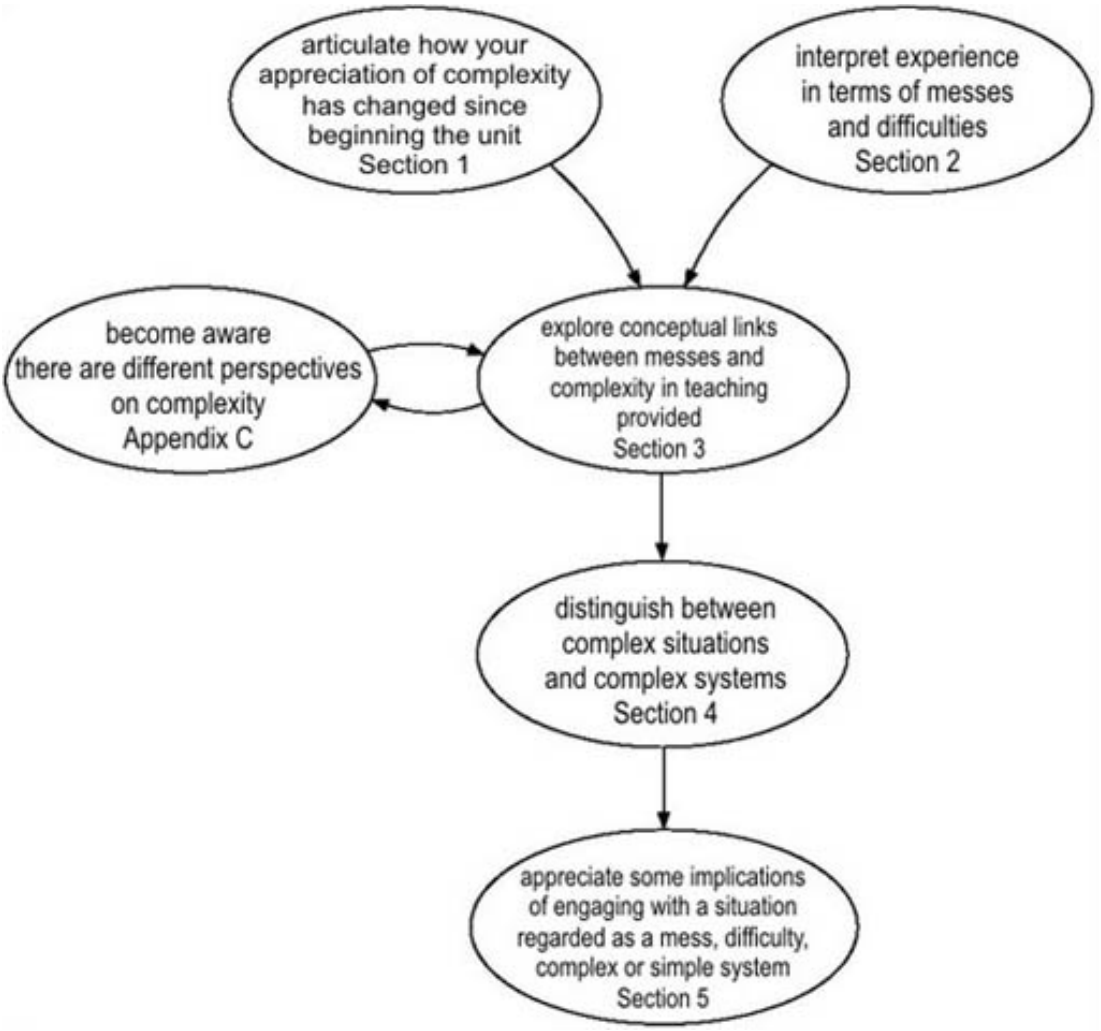

Figure 36 An activity-sequence diagram of the route through this section, which is concerned with engaging with complexity

The terms ‘complexity’ and ‘system’ each carry a rich set of meanings. As with complexity, the everyday senses of ‘system’ can get in the way of acquiring a rigorous understanding of its meanings in systems thinking and practice. Section 4.5 tackles this thorny issue and explores whether, and in what ways, a complex situation can be thought of as a complex system. Finally, the implications of adopting these distinctions are explored in Section 4.6. Your understanding of complexity should have developed quite a bit by the end of this section.

You can return here, and to Figure 36, as you work through Part 3: Section 4. Doing so will help you maintain your sense of direction as you work through the ideas and arguments in this section.

4.2 Articulating your appreciation of complexity

Initially, I would like you to notice whether and how your appreciation of the phrase ‘managing complexity’ has changed since you started the unit. As you work through Section 4 you will encounter a number of ways of thinking about complexity that may be new to you, so it becomes important to record your developing understanding. To help you with this, return to your notes on Activity 2 in Part 1. They should be in your Learning Journal. Now complete Activity 40. You should take no more than **20 minutes** to complete this activity.

Activity 40

Articulate your initial appreciation of complexity.

You chose to do a unit entitled ‘Managing complexity …’. Construct a spray diagram around the phrase ‘managing complexity’ by adding descriptions of the different meanings you gave to the phrase when you started the unit. To do this you may have to refer to this link to ensure you are aware of the best way to construct a spray diagram. You will also need to draw on your answer to Activity 2 and, possibly, other activities in Part 2. There may also be other relevant material in your Learning Journal. If you are unable to articulate more than one or two meanings for managing complexity do not worry. Complete a spray diagram all the same, because I will be asking you to add to it as you go through this section.

Outline the experiences that led you to attribute the range of meanings to managing complexity shown in your spray diagram. For example, some of the meanings might be ‘I read book x’; ‘I work in this field where complexity means y’. Complete this by writing a paragraph or two.

Articulate changes in your appreciation of complexity.

Add to your spray diagram any new meanings for managing complexity that have become apparent to you as you study the course. If you gain new insights into your earlier answers, add another set of branches to existing branches on your diagram. You can use the original diagram and add the additional information in a new colour.

Keep building up your spray diagram using different colours – or a scheme that suits you – as you work through this section of the course. As new meanings and insights become apparent, add them to your spray diagram. You may find at some time that you want to reorganise the diagram because new insights enable you to see ‘managing complexity’ in a different way. Add your diagram to your Learning Journal.

4.3 Experiencing complexity as mess or difficulty

In this section, I want to take the ideas of mess and difficulty and explore them in the context of complexity. I want to determine how these ideas are connected, how significant the connections are and what the differences illuminate. I shall draw on the ideas of three writers: Schön, whose central theme is practice (e.g. Schön, 1983; 1987); Ackoff, who explores the characteristics of mess; and Rosenhead, who shows how different approaches to practice may be contrasted in terms that illuminate the distinction between difficulty and mess.

When reflecting on his own professional experience of engaging with complex situations, Donald Schön, author of *Educating the Reflective Practitioner* (1987) had this to say:

> In the swampy lowland, messy, confusing problems defy technical solution. The irony of this situation is that the problems of the high ground tend to be relatively unimportant to individuals or society at large, however great their technical interest may be, while in the swamp lie the problems of greatest human concern. The practitioner must choose. Shall he [sic] remain on the high ground where he can solve relatively unimportant problems according to prevailing standards of rigour, or shall he descend into the swamp of important problems? (p. 28)

The metaphor of the swamp provides some useful images for this section, which is concerned with the problems and opportunities of the swamp. Schön argues that:

> all professional practitioners experience a version of the dilemma of rigour and relevance and they respond to it in one of several ways. Some of them choose the swampy lowland, deliberately immersing themselves in confusing but critically important situations. When they are asked to describe their methods of inquiry they speak of experience, trial and error, intuition or muddling through. When teachers, social workers, or planners operate in this vein, they tend to be afflicted with a nagging sense of inferiority in relation to those who present themselves as models of technical rigor. When physicists or engineers do so, they tend to be troubled by the discrepancy between the technical rigor of the 'hard' zones of their practice and apparent sloppiness of the 'soft' ones. People tend to feel the dilemma of rigor or relevance with particular intensity when they reach the age of about 45. At this point they ask themselves: Am I going to continue to do the thing I was trained for, on which I base my claims to technical rigor and academic respectability? Or am I going to work on the problems – ill formed, vague, and messy – that I have discovered to be real around here? And depending on how people make this choice, their lives unfold differently (1995, p. 28).

In my view the argument Schön presents is simple: there are many domains of human activity where professionals fail to take action in situations of uncertainty, complexity, uniqueness and conflict or where past actions have had unintended, sometimes surprising and catastrophic, consequences. It seems to be a common human experience, for example, that a well-meaning attempt to improve a complex and problematic situation has the effect of making the situation worse in quite unexpected ways. Such situations also arise when experience is at odds with intuition about how things should behave or should be. This class of experiences is described as counter-intuitive understanding. The

idea is explored further in the following box, ‘Counter-intuitive understanding – an example’.

Box 2 Counter-intuitive understanding – an example

In many parts of the world since the end of the Second World War planners and individuals have begun to live with the common sense, and simple view (thanks to the so-called laws of supply and demand) that increasing the supply of something will lessen demand for it, i.e. they are inversely related. However, recent *experience* shows that increasing the supply – both in number and capacity – of roads creates its own demand, i.e. that increasing supply increases demand. This phenomenon, known as the Pigou-Knight-Downs Paradox, is one in which positive feedback operates, at least until basic resources are totally used up or skyrocketing costs block the positive feedback. In southeast England it is possible to speculate that the incidence of gridlock, pollution effects and social effects such as road rage, as well as increased fuel costs are beginning to block positive feedback. This provides some explanation for why political parties found it possible in the 1990s to curtail road-building programmes. On the other hand, the car lobby is powerful. They are major employers, contributing to economic growth, as currently measured, and it is in their interests to see the road-building programme continue as this also increases the demand for cars.

In the early 2000s English road building policies have, once more, been adopted as one solution to traffic congestion. Demand for new cars has also increased fuelled by a drop in their relative cost. One possible outcome is that **pollution levels per car decrease**, as newer cars are far more energy efficient, but that **aggregate pollution may stay the same or increase** due to the rising number of cars, increased number and duration of journeys – the latter exacerbated by increasing frequency of gridlock. Other forms of controlling demand such as the central London congestion charging have been introduced.

An intervention in a policy process designed to alleviate some critical need or process, may at first seem logical and intuitively correct, but may exacerbate the situation in the future. It is for this reason that representing systems of interest, particularly through some form of modelling which makes modes of thinking, particularly in terms of patterns of influence, or cause and effect, is at the core of most systems approaches for managing complexity.

Given that in many situations, unexpected and potentially disastrous events may occur, it makes sense to think about doing some things differently. Doing things differently requires changes in thinking and in the actions that result from thinking. Being prepared for, minimising, or even avoiding unintended potentially disastrous consequences means engaging with complexity. The effect of not engaging with Schön's swamp is to run the risk of unintended consequences of unknown seriousness, even if the intervention seems the right thing to do. We risk doing the wrong things with greater and greater efficiency rather than establishing what is the right thing to be doing. Russell Ackoff (1995) claims that it is better to do the right thing imperfectly than to keep doing the wrong thing better and better.

The experiences that have led to claims that different ways of thinking and acting are required for managing complexity have been derived in many domains. Examples include:

> The computer press is littered with examples of […] information technology fiascos or near disasters. An example is the computer-aided despatch system introduced into the London Ambulance Service in 1992. The £1.5 million

> system was brought into full use at 07:00 hours on 26 October and almost immediately began to 'lose' ambulances.[…] The system reverted to […] manual methods on 4 November when the system locked up altogether.
>
> (Fortune and Peters, p. 33, 1995)

> One of the striking things about public policy […] is that so many of the most pressing problems are ones that cut across departments, cut across disciplines; issues like social exclusion, the environment, the family. [So] my fifth point is about thinking systemically. (Geoff Mulgan; ex Demos, Director PIU, UK Cabinet Office)
>
> (Mulgan, 1998)

> One of the more remarkable aspects of British debate is how little analysis is made in […] systemic terms. (Will Hutton, journalist and former editor of *The Observer*, a London Sunday newspaper)
>
> (Hutton, 1995)

> I felt that a concern for and systematic study of the social and environmental aspects of technology was essential. Certainly environmental problems were approachable only by means of systemic and interdisciplinary methods and I felt convinced that any Faculty of Technology that did not concern itself with such problems could not claim to be either modern or responsible, whether socially or academically. (Geoff Holister, founding dean, Faculty of Technology, The Open University)
>
> (Holister, 1974, pp. 149–152)

> Education for sustainability is the continual refinement of the knowledge and skills that lead to informed citizenry that is committed to responsible individuals and collaborative actions that will result in an ecologically sound, economically prosperous, and equitable society for present and future generations. The principles underlying education for sustainability include, but are not limited to, strong core academics, understanding the relationships between disciplines, systems thinking, lifelong learning, hands-on experiential learning, community-based learning, technology, partnerships, family involvement, and personal responsibility. (President's Council on Sustainable Development, USA, under the Clinton administration)
>
> (President's Council on Sustainable Development, 1996)

These quotations are used in relation to at least four different domains. These are situations associated with:

(a) the use of information and communication technology to develop information systems;

(b) organisational arrangements and associated policies and programmes;

(c) approaches to learning in technology education and in education for sustainable development;

(d) practice – whether in conducting an analysis or being professional.

There are a number of responses available to Schön's invitation to descend into the swamp of messy, confusing problems. Russell Ackoff uses the term messes to refer to the

swamp, and difficulties to refer to the high ground. You may already have encountered Ackoff's terms in your earlier study of Systems.

SAQ 10

Try to describe three features a practitioner might use to distinguish a mess from a difficulty. Is any one of these distinguishing features more significant than the others?

Answer

The three main features a practitioner might use to distinguish a difficulty from a mess are:

1. Messes are made up from a network of problems and opportunities that will be described differently by different people engaged in the situation. By contrast a difficulty will be described much the same, even from a diversity of perspectives.
2. The improvement in a mess is not just the sum of the improvements in its component parts. The improvements in a difficulty are easier to identify and describe and it is easier to identify how they came about.
3. Because a mess is a set of external conditions that causes dissatisfaction, a judgement about whether or not it has been improved, and by how much, will depend upon the perspective of the observer. The improvement in a difficulty will be generally agreed upon by observers from any perspective.

To deal with messes requires a holistic or systems approach, therefore it makes little sense to distinguish one feature as more important than another. A core concept at the heart of the idea of mess is, however, that of **emergence**, meaning the whole is greater than the sum of its parts.

Activity 41 should take about **15 minutes**.

Activity 41

Refresh your understanding of messes and difficulties.

Read Ackoff's points about messes and difficulties in Box 3 below. Relate these points, and your previous understanding of messes and difficulties to the child support case study. From your perspective on the case study, are there aspects that appear to be difficulties and others that appear to be messes?

Make notes on these in your Learning Journal.

Box 3 Some features of messes and difficulties

(a) A problem or an opportunity is an ultimate element abstracted from a mess. Ultimate elements are necessarily abstractions that cannot be observed.

(b) Problems, even as abstract mental constructs, do not exist in isolation, although it is possible to isolate them conceptually. The same is true of opportunities. A mess may comprise both problems and opportunities. What is a problem for one person may be an opportunity for another -thus a problem can be an opportunity from another perspective.

(c) The improvement to a mess – whatever it may be – is not the simple sum of the solutions to the problems or opportunities that are or can be extracted from it. No mess can be solved by solving each of its component problems/opportunities independently of the others because no mess can be decomposed into independent components.

(d) Simple situations do exist that can be improved by extracting one problem from them and solving it. These are called difficulties and they are seen as exceptions rather than the norm in terms of decisions that are needed in environmental, organisational and other information-related contexts.

(e) The attempt to deal with a system of problems and opportunities as a system – synthetically, as a whole – is an essential skill of a systems practitioner.

(Following Ackoff, 1974a and 1974b)

Russell Ackoff first coined the term 'mess' in 1974. He did so in response to the insights of two eminent American philosophers, William James and John Dewey. These philosophers recognised that problems are taken up by, not given to, decision-makers and that problems are extracted from unstructured states of confusion. Ackoff (1974a; b) argued, in proposing his notion of mess that:

> What decision-makers deal with, I maintain, are messes not problems. This is hardly illuminating, however, unless I make more explicit what I mean by a mess. A mess is a set of external conditions that produces dissatisfaction. It can be conceptualized as a system of problems in the same sense in which a physical body can be conceptualized as a system of atoms.

From this definition of mess, Ackoff recognised a number of features of messes and difficulties (Box 3 above) that, if one is aware of them, affect the way a practitioner engages with a 'real world' situation (see Figure 20 again).

When you have refreshed your understanding of messes and difficulties and re-read Box 3, spend about **15 minutes** on the next activity.

Activity 42

Explain some implications of treating a situation as a difficulty.

You have been asked by the relevant government minister to prepare five quick-fix actions he can take to improve the child support situation. As a systems practitioner you are reluctant to take this approach. Write a few paragraphs briefing the minister about the possible implications of treating the situation as if it were a difficulty rather than a mess.

I find it interesting that Schön and Ackoff both have a professional background in planning. It is not surprising therefore that they have made similar distinctions when describing, or accounting for, their experiences in the messy business of planning. For me, they exemplify the aware practitioner juggling all the balls I described in Figure 21. What these planners have in common is they recognise that if the situation is engaged with as a difficulty there will be an outcome that will be different than if the situation is engaged with as a mess. They also agree that the traditional problem solving methods, which are often associated with fields such as operations (or in the UK, operational)

research (OR), or 'scientific management,' become useable only after the most important decisions have already been made. In other words, a difficulty is first abstracted from the mess and then the difficulty is treated using a traditional problem-solving approach.

I have summarised some of the characteristics associated with traditional OR in Table 5. Characteristics of an alternative, ideal, approach to OR, envisaged by Rosenhead (1989b, pp. 1–20) in the early 1980s, are included in the table. Surveys had shown a low level of satisfaction on the part of managers with OR and management science projects at the time Rosenhead suggested his alternatives.

Table 5: Caracteristics of doing traditional operations research in comparison to alternatives that were suggested in the early 1980s

Characteristics of traditional OR	Alternative characteristics for OR
1 Problems and opportunities are formulated in terms of a single objective that can be optimised. Trade-offs are made by reducing variables to a common scale.	1 Does not seek to optimise. Done by seeking alternative solutions that are acceptable on different dimensions without trade-offs.
2 Has overwhelming data demands, which leads to problems of distortion, data availability and data credibility.	2 Has reduced data demands because of integrating qualitative and quantitative data with social judgements.
3 Subjected to demands of science (scientisation), assumed to be depoliticised and that consensus exists.	3 Strives for transparency and simplicity so as to clarify terms of conflict.
4 People are treated as passive objects.	4 People are regarded as active subjects.
5 Assumes a single decision maker with abstract objectives from which concrete actions can be deduced for implementation through a hierarchical chain of command.	5 Facilitates planning from the bottom up.
6 Attempts to abolish future uncertainty and pre-take future decisions.	6 Accepts uncertainty, and aims to keep options open for later resolution.

(Adapted from Rosenhead, 1989b)

One way of interpreting Table 5, is that Rosenhead regarded the traditional OR approach of staying on the high ground, of treating the 'real world' situations with which many practitioners engage, as made up of difficulties to be solved rather than messes to be improved. I find many similarities with the ideas in Rosenhead's table with the following observation attributed to Richard Dawkins (Plsek, 2001):

> If I hold a rock, but want it to change, to be over there, I can simply throw it. Knowing the weight of the rock, the speed at which it leaves my hand, and a few other variables, I can reliably predict both the path and the landing place of a rock. But what happens if I substitute a [live] bird? Knowing the weight of a bird and the speed of launch tells me nothing really about where the bird will land. No matter how much analysis I do in developing the launch plan … the bird will follow the path it chooses and land where it wants.

Which of these metaphors (the rock or the bird) do you think best describes the process of launching change in the Child Support Agency case study?

There are differences as well as similarities in the explanations the two planners (Schön and Ackoff) provide when they reflect on their experiences. Schön in particular, chose to focus on the characteristics of the practitioner. I referred to some of these characteristics

in the section above on being a systems practitioner. Schön's ideas, among others, have already informed the approach taken in Parts 1 and 2 of this block.

Plsek, a change consultant based in the USA, used the 'rock-bird' story in an address to a UK National Health Service (NHS) Conference entitled: 'Why Won't the NHS Do As It Is Told?' The UK NHS is the world's third biggest employer after the Chinese Red Army and Indian Railways. Understandably many people involved in the NHS experience it as complex. In his presentation Plsek evokes different metaphors as means for the audience to make new distinctions. He contrasts the machine metaphor (as characterised by traditional OR in Table 5 and scientific management) with an alternative metaphor of **complex adaptive systems** (CAS) as exemplified by the bird in the rock-bird story (CAS is explained in Section 4.5).

Ackoff, in his definition of a mess as a system of problems and opportunities chose systems thinking as his strategy to make sense of the mess of the swamp. His strategy was to look for system within a mess as a means to do something about it. Please note I am not referring here to 'discovering' **the** system or **a** system but the **process** of distinguishing one or many systems of interest in a context. The end product of the process of finding system within a mess is called **formulating a system of interest**. This is the task you were engaged in when you were drawing diagrams, and finding ways of drawing diagrams, in Part 2.

Let me consider now what I think Ackoff was doing in terms of a practitioner juggling the E ball. In my terms, Ackoff was a systems practitioner (P_s) engaging with a 'real world' situation that he could choose to recognise as either a mess or a difficulty using a systems approach (A_s). This leads me to ask a fundamental question: **are the characteristics of a mess part of the situation or a function of the choice the practitioner makes**? I will answer this question by grounding it in my responses to the case study.

If I use everyday speech to describe my initial experience of the child-support issue I say 'it is a mess', or 'it is really complex', or 'I find it hard to understand it all'. You will notice I have used the word 'it' each time, which suggests the existence of something, an entity, a 'real world' situation with which I have engaged. The structures of the language I use tie me into a linguistic trap – the naming of an 'it' that is independent of my act of distinction. Getting out of this trap means finding a language that avoids the implication there is a pre-existing 'it' waiting to be noticed by me. As someone once said every noun obscures a verb!

The same could be said of thinking that there **is** a NHS which **is** a machine or **a** complex adaptive system. I can get out of this trap by claiming a mess or a difficulty arises in the distinctions that a practitioner makes in a particular situation. If this is the case, a mess or a difficulty is not a property of the situation but arises as a distinction made by a systems practitioner – someone aware of the conceptual distinctions between seeing a mess and experiencing a difficulty – engaging with a particular 'real world' situation (see Figure 33).

If, on the other hand, my experience of the child-support issue had led me to say, 'Oh, I know what the problem is – we just have to do X and that will fix things', then I would be implicitly seeing the issue as comprising a difficulty. This was the approach asked for by the government minister in Activity 42.

If I were charitable, I could imagine the minister was unaware of the distinctions between mess and difficulty (as many decision-makers seem to be in my experience). If I were cynical, I could suggest that the system of interest the minister was forming in his head, which led to the search for quick-fixes, had nothing to do with improving child support but was related instead to political expediency.

Of the two positions, the first seems to make more sense in terms of my experience of the case study. It works better because it suggests ways of avoiding some of the pitfalls of distinguishing individual problems to be solved.

SAQ 11

Which of the following statements conform to the idea of formulating a system of interest?

(a) I am fascinated by the solar system.

(b) When I read the child support case study I was struck by the deficiencies in the system for caring for lone parents.

(c) When I engaged with the child support case study I thought it might be helpful to consider it as a system from a number of perspectives. For example

(i) As a system to reduce the social security budget;

(ii) As a system to secure the best future for children in lone-parent families;

(iii) As a system to ensure the non-resident parent contributes equitably to the raising of their children.

(d) I am interested in making computer systems function more effectively.

Answer

Statement (c) best conforms to the idea of formulating a system of interest because it considers systems not as things out there in the 'real world' – as in answers (a), (b) and (d) but as a useful way of thinking about – engaging with – complexity from different perspectives. A rephrasing of statement (b) in the form, 'it might be useful to think about the child support agency case study in terms of a system for caring for lone parents', would better conform to formulating a system of interest. Statements (a) and (b) have little to say about context therefore it is more difficult to consider how these might be reformulated as systems of interest.

Activity 43

Consider your own practices.

Consider your own practices in some recent situation(s) in the light of Figure 33 and the question I posed above:

> Are the characteristics of a mess [or a difficulty] part of the situation or a function of the choice the practitioner makes?

You might benefit from writing your answer in your Learning Journal and returning to it as your own systems practice develops.

4.4 Where is the complexity and what is it?

When I first described some of my experiences of the child-support case study above, I attributed the properties of mess, complex, or hard-to-understand to the situation. So, are mess, complex, and hard-to-understand the same thing? If they are, why is the unit called

Managing Complexity, rather than, say, Managing Messes? A glib answer is you might not have been attracted to it because of the everyday meaning of mess. Yet another answer is that complexity is a rich term whose everyday meanings have been further enriched by the so-called new sciences of chaos and complexity (see Appendix C which is attached below for your convenience).

Click on the link below to read Appendix C.

File attachments are not available in this format.

View document: Appendix C

Let me try to explore some of this rich set of meanings by examining a cause célèbre in the computer world. The story is described by John Naughton's (1998) article from *The Observer* (Box 4). Read this article now and complete the activity that follows it.

Activity 44 should take a little less than **10 minutes**.

Box 4 Open versus closed systems of innovation – an example of self-organisation?

There is a saying in the computer business that ‘only the paranoid survive’. The man who has taken it most to heart is Microsoft's Boss of Bosses, Bill Gates. Although he is the richest man alive and his company has a stranglehold on the world's computer screens, Gates is forever looking over his shoulder, trying to spot the newcomer who will wipe him out.

One can understand his anxiety. The pace of change in the computing industry is such that if you blink you might not spot the threat. Gates himself blinked spectacularly in 1994, when Netscape was founded. He failed to appreciate the looming significance of the Internet, and Netscape had captured a huge slice of the web-browser market before he woke up.

From that moment onwards, Microsoft's corporate ingenuity was devoted to finding ways of crushing Netscape. Its crass attempts to do so eventually stung the US Department of Justice into launching the anti-trust suit which is currently being decided in an American court. But while the eyes of the media are on the trial, those of the Net community have been focused elsewhere – on a leaked Microsoft internal memorandum which is far more revealing than anything released in court. For it shows that Gates & Co have finally realized where the Next Big Threat is coming from. And it's nothing to do with Netscape – or browsers. They're yesterday's battlegrounds

The leaked memo is now all over the Net. It was written by a Microsoft engineer called Vinod Valloppillil last August [1998], but is universally known as the ‘Halloween Memo’ because it was leaked last weekend [November 1998]. Its purpose is to explain to Microsoft bosses the nature and extent of the threat posed by a free operating system called Linux and the ‘Open Source’ software development community that built it.

To appreciate the memo's significance, you need to remember that Microsoft dominates the world market in operating systems – the complex programs which transform computers from paperweights into machines which can do useful work. The Windows operating system is the jewel in Gates's crown, and anything that threatens it threatens his company's

dominance. Microsoft's long-term strategy is to move us all on to a version of it called Windows NT (for ‘new technology’). But NT is in trouble. The release date for the next version has been postponed so often that it has had to be renamed ‘Windows 2000’. And as NT flounders, the world's attention has increasingly focused on a rival operating system called Linux which offers many of the same facilities as NT, is incredibly stable and reliable – and is free. Anyone can download it, free gratis, from the Net.

Linux is free because it was developed collectively across the Net by skilled programmers working in the Open Source tradition which created the Internet and which holds that software should be freely accessible to the community. The name comes from the fact that ‘source code’ is computer-speak for the original version of a program – as distinct from the version you buy and install on your computer. If you have the source code you can do what you like with it – alter it, damage it, improve it, whatever. Linux is powerful and stable because it was created by clever people working collaboratively on the source code and because it's been tested to destruction by more programmers than Microsoft could ever muster. The Halloween Memo warns Gates that Linux and its ilk pose a serious threat to Microsoft. It argues that Open Source software is now as good as – if not better than – commercial alternatives, concedes that ‘the ability of the OSS process to collect and harness the collective IQ of thousands of individuals across the Internet is simply amazing’, and concludes that Linux is too diffuse a target to be destroyed by the tactics which have hitherto vaporized Microsoft's commercial rivals. The people who built Linux cannot be driven out of business, because they're not ‘in’ business. Henceforth, Microsoft will be fighting not another company, but an idea.

The Halloween Memo provides a chilling glimpse into the Darth Vader mindset of Microsoft. The reason Linux is so powerful, reasons Valloppillil, is that its basic building blocks – its technical protocols – are free, openly distributed and not owned by anyone. The only way to kill it therefore is for Microsoft to capture the protocols by pretending to adopt them and then ‘extending’ them in ways that effectively make them proprietary. The new (Microsoft) revisions will – surprise, surprise! – be incompatible with the ‘free’ versions. Gates calls this process ‘embrace and extend’. In reality it's ‘copy and corrupt’.

The coming battle, then, will be between two philosophies – closed shop versus Open Source, commercial paranoia versus altruism and trust. The outcome is already predictable. Microsoft's difficulties with Windows NT show that some software is now too complex for even the richest, smartest company. Instead of trying to suborn Linux, what Gates should do is release the NT code and let the collective IQ of the Net fix it for him. He won't do it, of course, which is why his company has just peaked. If you have Microsoft shares, prepare to sell them now.

(John Naughton; writing in the *Observer*, a British Sunday newspaper, November 1998)

Activity 44

What form does the complexity take in the situation described in Box 4?

You may have experienced Naughton's article as complex in itself because of the range of concepts it uses and some of the specialist language, e.g. Internet, web-browser, open-source software, anti-trust suit. Try to put this aside for the moment and focus on how Naughton uses the term complex.

Is Naughton, in your terms, describing a complex situation? Outline your reasons. In what ways was the term ‘complex’ used by Naughton in his article in Box 4?

> Please note that you do not require definitions of complexity from other sources to answer this question.

Naughton specifically describes ‘complex programmes’ and software that is ‘too complex’ (e.g. Microsoft's Windows 2000). It is possible in both instances that Naughton ascribes complexity to the programmes and the software. But he does suggest in the latter use that the ‘closed’ approach Microsoft and its staff pursued led them to experience the task of developing Windows 2000 as highly complex and that this is qualitatively different from the ‘open’ process being followed in the development of Linux. It seems to me he could be attributing several meanings to the word complex.

I do not regard myself as computer literate and I'm not particularly enthusiastic about computers, so when I encounter a story like that told by Naughton I experience the situation it describes as complex. I do so because there are many actors in the situation. The issue has a global span. There is apparent or potential conflict, suggesting a range of perspectives on the situation just as in the Child Support Agency case study. And the outcomes of these different technological trajectories are likely to have profound economic and social implications. When I use complex in this way – and it has been used in this way most of the time in the unit so far – I am speaking about **perceived complexity**.

John Casti (1994) said ‘when we speak of something being complex, what we are doing is making use of everyday language to express a feeling or impression that we dignify with the label complex.’ He also argues that the meaning we give to the word complex is dependent on the context. For Casti, the complexity of a situation or a system is not an intrinsic aspect of the situation or ‘system’ taken in isolation but ‘a property of the interaction between two ‘systems’ where one of these is more often than not an observer and/or controller’ (i.e. a person). So, in this explanation, complexity arises in the relationship between the observer and the observed. This is my response to the question in Figure 19. It is also another way to understand what is happening in Figure 20.

Although the language is different, the process I have just described is the same as the one I described earlier for messes. Perceived complexity arises because of our cognitive limitations **as well as** characteristics of the situation. Our embodied ways of knowing – individuals and the explanations they accept have different traditions and histories – lead to only seeing aspects of a situation never the whole as discussed in Part 3, Section 3.

There is no viewpoint or perspective that can appreciate the full variety of a situation. It is from the recognition of these limitations that a range of systems approaches have been developed (see Part 3, Section 5). The notion of perceived complexity addresses one of the ways I experience Naughton using the word complex in Box 4. But are there other ways complexity is currently used? The short answer to this is: Yes, lots.

There are in fact many explanations provided for what complexity is or is not. Someone who went to the trouble of counting in the early 1990s claimed to have found 31 different definitions. Five pages, many more than for any other concept, are devoted to aspects of complexity in the *International Encyclopaedia of Systems and Cybernetics*. This situation has arisen partly because in the 1990s the field of complexity science has emerged, made popular by the activities of the Santa Fe Institute in the USA; partly because of a series of popular books; and the association of complexity with chaos research (Gleick, 1987). Horgan (1996), a sceptic and critic, describes the academic field as ‘chaoplexity’.

A selected range of perspectives on complexity are provided in Appendix C. This appendix is background material if you want to explore the subject matter in more detail. It

is not essential reading and can be extended by a search of the World Wide Web. I outline the context in which complexity science is evolving below.

Click on the link below to read Appendix C.

File attachments are not available in this format.

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I suggest you browse Appendix C now before moving on. As you read you may like to add to the spray diagramme you began to develop as part of Activity 40.

One of the main driving forces behind the current interest in complexity is the advent of computers and sophisticated non-linear mathematical techniques. Horgan claims these 'will help modern scientists understand chaotic, complex, emergent phenomena that have resisted analysis by reductionist methods of the past' (Horgan, 1996, p.192). He uses the following quote to exemplify some of the claims being made:

> Through its capacity to process what is too complex for the unaided mind, the computer enables us for the first time to simulate reality, to create models of complex systems like large molecules, chaotic systems, neural nets, the human body and brain, and patterns of evolution and population. (p. 193)

In an essay entitled 'The Lure of Complexity', Steve Talbott (2002) asks whether claims that the study of complex systems, or complexity is a new scientific revolution are, instead, a 'retrenchment and strengthening of the most serious limitations of traditional science'. He asks if in the drive toward generality and abstraction complexity theorists have lost the features of a qualitative science that refuses to sacrifice the phenomena to abstraction in the first place? For me, as a member of an Open University group that has been teaching and researching systems approaches to managing complexity for the best part of 30 years, many claims made by complexity theorists appear extravagant. (This is taken up in Appendix C.) While I do not wish to deny the potential unleashed by increased computing power and non-linear mathematical techniques, and thus the new questions that are being asked, my preference would be to situate these ideas in a historical context. If this were to happen, and those making these claims were to look into the traditions that give rise to these claims, there would be much to be learned – particularly about the difficulties caused by a multiplicity of meanings embedded in one word as well as a lack of attention to the theory-practice relationship.

Given the wealth of ideas within the notion of complexity, is it possible to be clear what is meant by the terms complex situation and a complex system? Does a historical context illuminate this question? The next section, represented by the second blob on the main spine of Figure 36, explores these issues.

4.5 Choosing to distinguish between complex situations and complex systems

Within some of the lineages of systems thinking and practice (Figure 24), the idea that system complexity is a property of what is observed about some 'real world' system, is known as classical or type 1 complexity. Exploring type 1 complexity, Russell Ackoff (1981, pp. 26–33) claimed for a set of elements to be usefully viewed as a system, it was necessary that:

(a) the behaviour of each element of the set should have an effect on the behaviour of the whole set;

(b) the behaviour of the elements, and their effects on the whole set, should be interdependent;

(c) however subgroups of the elements are formed, each subgroup should have the same effect on the behaviour of the whole and none should be completely independent.

Following in the footsteps of Ackoff, and with others, Schoderbeck et al. (1985) described the complexity of what they regarded as a real or physical system as arising from the interaction of:

(a) the number of elements comprising the system, for example, the number of chips on a circuit board;

(b) the attributes of the specified elements of the system, for example, the degree of proficiency of musicians in an orchestra;

(c) the number of interactions among the specified elements of the system, for example, the number of neuronal connections in the brain;

(d) the degree of organisation inherent in the system, for example, the social arrangements in a beehive or an ants' nest.

They regarded systems as ranging from living organisms to individual families and governments.

Type 1 classification was subsequently regarded as insufficient by other practitioners because it excluded any complexity arising from culture and from human behaviour. Nor did it encompass the complexity arising from the properties of the observer, as discussed in Part 3, Section 3 (as exemplified by the language used in the list above, these authors saw 'systems' as real entities existing in the world. Some contemporary authors make the same claims about CAS – this idea is explored in more detail later in this section.)

Systems theorists have in the past had to confront some of the same issues as complexity theorists began to confront during the 1990s. The issues they confronted can be put rather bluntly as a series of questions:

(a) Do systems exist 'out there' in the so-called 'real world'?

(b) Do systems have certain properties, some of which can be described or classified as complex and some as simple?

(c) Are systems distinguished by an observer in a context? Is systemicity, the quality of being a system, a choice made by an observer when they perceive complexity in a 'real world' situation?

(d) What can I learn about a situation I experience as complex by engaging with the situation using a process of inquiry that formulates systems of interest?

These are not questions that have definitive answers. The view I choose to adopt will, however, have implications for my systems thinking and my systems practice. Exploring the implications will assist in deciding what course of action will work best for any particular practitioner.

I have constructed Table 6 from the characteristics Casti (1994) claims are exhibited by simple and complex systems as well as those claimed by Plsek (2001) to characterise complex adaptive systems. The examples are also theirs.

Spend a few minutes reading through the table and then do the activity that follows.

The activity should take no more than about 15 minutes.

Table 6 Characteristics ascribed to simple and complex systems and complex adaptive systems

Simple systems	Complex systems	Complex adaptive systems
Have predictable behaviour; e.g. a fixed interest bank account.	Generate counterintuitive, seemingly acausal behaviour that is full of surprises; e.g. lower taxes and interest rates leading to higher unemployment.	The elements of a system can change themselves.
Few interactions and feedback or feed forward loops; e.g. a simple barter economy with few goods and services.	A large array of variables with many interactions, lags, feedback loops and feed forward loops, which create the possibility that new, self-organising behaviours will emerge: e.g. most large organisations, life itself.	Complex outcomes can emerge from a few simple rules (this relates to initial starting conditions and the idea that complicated targets and plans may stifle creative and adaptive ability).
Centralised decision making; e.g. power is concentrated among a few decision makers.	Decentralised decision making – because power is more diffuse, the numerous components generate the actual system behaviour.	Small changes can have big effects and large changes may have no effect – i.e. non-linearity operates (e.g. in the UK a small band of lorry drivers interconnected by mobile phones almost brought the country to a standstill by blocking petrol deliveries to service stations).
Are decomposable because of weak interactions; i.e. it is possible to look at components without losing properties of the whole.	Are irreducible – neglecting any part of the process or severing any of the connections linking its parts usually destroys essential aspects of the system behaviour or structure. There are dynamic changes in the system and the environment.	Thrive on tension and paradox. (It is argued that healthy organisations exist on the edge of chaos – a region of moderate certainty and agreement).
		Are embedded within larger complex systems, and are

	made up of smaller complex systems.

(After Casti, 1994, pp. 271–273 and Plsek 2001)

Activity 45

What properties are ascribed to an observed system?

In Table 6 above, Casti has ascribed the terms simple and complex to the word systems. Likewise Plsek has ascribed the words 'complex, adaptive' to the word system. In what ways do you *experience* the terms 'systems' and 'complex' being used by Casti and Plsek?

What implications might these categories have for systems practice?

Are you able to use any of Casti's or Plsek's categories to make sense of the Microsoft-Linux story described in Box 4?

How does your attempt at doing this activity alter in any way, if at all, your understandings of the terms 'complexity' and 'systems'?

Answer

My purpose in writing this activity was to invite you to reflect on what it is that we do when we categorise anything. One way of reading this table is as a set of three categories each containing different category members. The mechanism employed in this categorisation is to add an adjective in front of the noun 'system'. So they are different categories of system. This is another example of the 'container metaphor' discussed in my answer to Activity 34 and it is the same process as developing a typology (see Appendix C). Of course this is something we do all the time but I do not think we reflect very often on the implications of this doing! I discuss the implications for systems practice in the text.

The questions I posed in Activity 45 are, for me, extremely interesting but at the same time potentially confusing. The word complex is being used by Casti in some cases to mean the same as system, and some of the characteristics of complexity seem to be applied to system. The phrase complex system is common, as you can see in Appendix C, although the meaning attributed to it is often unclear in my experience. For example, it is unclear to me whether Casti is using system in its everyday sense or in the specific way it is used within the study of Systems to mean a system of interest to someone.

When I consider the examples used in Table 6 there is something qualitatively different about a simple barter economy and the phenomenon of lower taxes and interest rates leading to higher unemployment other than whether they can be described as simple or complex. Indeed, I would question whether it would be helpful to consider a barter economy as simple. Considering the quality of relationships and trust that might be necessary to sustain a barter economy it could be perceived as complex. This notion of quality of relationship seems to me an important additional distinction that could be attributed to complexity over that provided in the earlier list of Schoderbeck et al. (1985) which tends to focus only on the quantity of variables or interactions.

In some circles it is now recognised that what some people call complex adaptive systems offer insights into human action by way of analogy or metaphor (e.g. Stacey, Griffin and Shaw, 2000). Stephen Rose (1997, p. 33–4) argues that analogy 'implies a superficial resemblance between two phenomena, perhaps in terms of the function of a particular

structure'. An example is blood circulation in animals and sap flow in plants. Analogies can provide insight but also mislead – Rose (1997) asks 'Is it a help or a hindrance to regard the access memory (RAM) in my computer as analogous to memory in chicks or humans or is it merely a metaphor?' He also distinguishes analogies from homologies which imply a deeper identity that arises from an assumed common evolutionary origin (e.g. the bones in the front feet of a horse may be assumed to be homologous with the bones in the human hand). Each of these distinctions can be drawn into your systems practice if they help in making new distinctions. Each is a choice that can be made. From this perspective one way to engage with the idea of 'complex adaptive systems' (CAS) is as a metaphor to trigger new ways of thinking and acting, e.g. lets consider the NHS *as if* it were a CAS.

It is also possible in practice to attribute systemicity to some of the examples in Table 6. It might make sense as part of my systems practice to look at the activity of paying taxes (in a particular context) as if it were a system, or a living organism as if it were a system, or even a complex adaptive system, or a fixed interest bank account as if it were a system. In doing this though, it is important to ask *who* is looking at these situations as if they were systems. In the 1970s and 1980s, this confusion began to be addressed in Systems practice. Unfortunately, some confusion remains even now. So, what is the best way to sort out some of this confusion?

4.6 Appreciating some implications for practice

I think for most people, the CSA case study would be experienced as a complex situation. If so this would be a good example of perceived complexity. Remember though, if you engaged with it as if it were a difficulty, just as the government minister did in Activity 42, you would not describe the situation as one of perceived complexity. I could not call it a complex system unless I had tried to make sense of it using systems thinking and found, or formulated, a system of interest within it. This means I would have to have a stake in the issue – an interest. In systems terminology, I would need a purpose for engaging with the 'real world' situation. When I do not have such a purpose in mind, I am using the word system in its everyday sense rather than in its technical, systems practice, sense.

The fundamental choice that faces both systems theorists and complexity theorists is choosing to see system or complexity either:

> (a) as something that exists as a property of some thing or situation; and that, therefore, can be discovered, measured and possibly modelled, manipulated, maintained or predicted; or
>
> (b) as something we construct, design, or experience in relationship to some thing, event, situation, or issue because of the distinctions – or theories – we embody.

There are profound differences between these two options, as I have tried to depict in Figure 37.

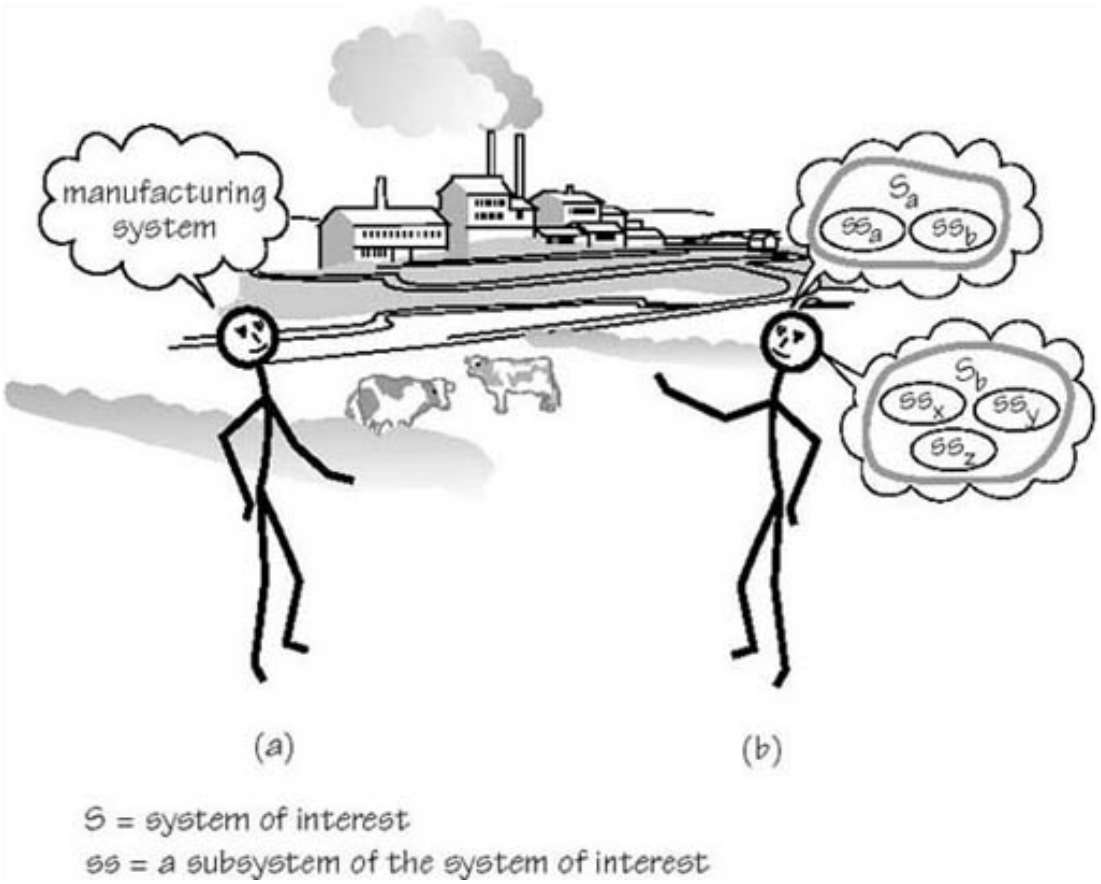


Figure 37 An iconic diagram of a systems practitioner who (a) sees systems in the world i.e. jumps to the conclusion that this is clearly a 'manufacturing system', and (b) one who is open to the complexity of the situation (factory, river, dairying) and sees systems as mental constructs formulated as part of a systemic inquiry

These epistemological choices depicted in Figure 37 determine the nature of the engagement – the E ball – of a systems practitioner with a 'real world' situation. The first choice says a lot about the nature of the thing or situation but says little about the practitioner concerned with the thing or situation. This is the situation where technical rigour, of the type described by Schön in his quote in Section 4.3, informs practice. Schön describes this as technical rationality in which there is a radical separation of research – and what is regarded within this epistemology as legitimate knowledge – and practice.

The latter position however, has a lot to say about the practitioner and about what they know and are able to do, as well as about their relationship to the thing or event they experience. In this situation the systems practitioner is engaged with the complex situation. He or she must construct or design alone, or with other stakeholders, the system of interest and choose to see the situation as complex or simple, mess or difficulty.

Taking responsibility for the choice you make about these two distinctions is an act of being epistemologically aware. The aware systems practitioner recognises that a system of interest is an epistemological device, a way of creating new ways of knowing. (I return to this in Part 3, Section 5.) The unit is designed to help you develop your skills in being aware as part of your systems practice. At this stage, all you need to do is to note your reaction to my claim about being epistemologically aware. Do you recognise something of what I mean or does it seem quite meaningless and unnecessary? I anticipate both responses, so don't worry if you fall into the latter category. I have already introduced the basis for my position in this section and I intend to clarify it further in Section 5.

Let me emphasise here, making a choice of one epistemological position or another in a given context is not an act of discarding or deciding against the other position – it is an act of being aware of the choice you made. Both positions offer rich explanations of phenomena in different contexts.

In Part 2 you were moving towards formulating systems of interest by drawing a rich picture; by drawing systems maps and making the necessary boundary judgements; by drawing influence diagrams, and multiple-cause diagrams to look at the dynamics of influence and causation; and by drawing control diagrams to look at the idea of inputs and outputs and transformation processes. You have in fact begun to juggle the E ball yourself. It will require a further judgement on your part, against some criteria, as to whether you recognised your system of interest as a complex system or as a simple system. In doing this you could choose criteria from any of the perspectives on complexity described in Appendix C. In this unit we are not greatly concerned with ascribing the adjectives simple and complex to a system, except to the extent that your choice of adjective reflects your capacity to manage complexity. Reflecting on some of the problematic practices in the field of biological science, Stephen Rose (1997) suggests it is due to the 'cultural difficulty we have in perceiving a world of fields and processes rather than objects and properties'. The same phenomenon seems common in other forms of practice.

The next activity should take you about **10 minutes.**

Activity 46

Complete and review the additions to the diagram you started in Activity 40.

Add any new understandings, or development of old understandings about the meaning of complexity.

Write a few paragraphs of notes about what has changed and how and, if possible, what triggered the new understandings.

Part 3, Section 4 may have presented you with more questions than answers. If this is true for you, don't worry, that was the intention. As I outlined in Appendix C, there is no agreed meaning for complexity. For the main part, in this unit we shall be referring to perceived complexity unless the author suggests otherwise. The ambiguities implicit in facing questions where the only honest answer is, 'I don't know', need not be troubling, once you get used to them. Living with these ambiguities is actually a powerful way of learning to manage complexity and being a systems practitioner. It might be argued that a lack of certainty can be an advantage in that it provides a space to think about, or reflect on, how your practice might be contextualised to the situation. Contextualisation, the C ball, is the subject of the next section.

SAQ 12

For each of the following situations, decide whether it is best considered as a mess or a difficulty.

(a) The group that runs a local orchestra continually argues about whether they should stick with popular classics or venture into more difficult and less popular pieces.

(b) Joan wants to send a computer file to Ray, but they use incompatible types of computer software.

(c) Although the company started as a software business, it now received most of its revenue from consultancy work. At a board meeting the issue about whether to continue developing and selling software was raised. This is partly due to the increasing cost of programmers, but also because software sales were declining. However, the software is used in all the consultancy work, and some of the projects involve extending the software to new areas.

(d) Jack is buying a new car and his most important criterion for choice is fuel economy.

(e) An environment agency has legislative responsibility for controlling pollution but the fines imposed on polluters are minimal.

Now decide what might be gained by considering each situation as if it were a simple or complex system or as a complex adaptive system.

Answer

My answer to this SAQ comes from my own **experience**, which may lead me to choose different answers to yours, which are based on your **experience**. Having experienced how much effort is required to work effectively in groups, I regard (a) as a mess. I do so because hidden behind what appears to be a simple choice of musical direction may lie conflict, emotion and a clash of values, which I could recognise as a system of problems. I view (b) as a difficulty based on my belief that a technical and unambiguous solution exists for the problem. If I were to move my boundary around this situation to encompass the generic issue of software platform compatibility, it might better be regarded as a mess. The issue of whether to maintain both PCs and Macs is a complex and emotive issue in the OU for example. I regard (c) as a mess because there are likely to be different perspectives on what constitutes a problem or opportunity. As given, I would regard (d) as a difficulty and (e) as a mess.

In some circumstances it might be helpful to consider (e) as if it were a complex system. I say this because I imagine it involves a large organisation – the agency – and large social institutions – Parliament and the law. On the criterion of centralised decision making (see Table 3) I would choose to regard all the other situations as simple systems, but in doing so I feel I have gained nothing helpful for my systems practice.

15 Part 3: 5 Contextualising systems approaches

5.1 Introduction

In this section, I shall explore the features of the contextualising (systems-methods) ball – the C ball. I will make a distinction between systemic and systematic thinking and action and I will argue that the aware systems practitioner has more choices than the practitioner who is not aware.

An aware practitioner is able to contextualise a diverse array of methods at their disposal creating an opportunity for a greater range of advantageous changes in the 'real world' situation. This section explores how this comes about.

Systems is a subject that provides a language for talking about other subjects. This will be exemplified as you encounter complexity in the domains of 'information systems', organisations, learning for sustainable development, and in your own practice. This adaptability has led some to describe Systems as a meta-discipline or trans-discipline. The challenge for the systems practitioner is to be able to engage in double learning – learning about the domain and learning about the approach to the domain as well as juggling the other balls in Figure 21. This is a lot to manage. It's like trying to learn a language at the same time as trying to learn what is said in the language. Fortunately, there is a rich tradition of systems scholarship to support you in meeting this challenge (Figure 24). You can draw on this as a basis for developing your capacities as a systems practitioner. The more aware you are of this history and the more it becomes part of your own tradition – just as in my example of Smilla and the history of the Inuit people – the greater will be your ability to embody particular Systems distinctions in your practice.

Our focus in this unit is on the thinking that enables you to use relevant tools, techniques and methods in the right context for effecting action. In this section, I am first going to describe what I mean by a systems approach and how this relates to purposeful behaviour on the part of the practitioner. Then I will distinguish between tools, techniques, method and methodology. With these distinctions in mind, I am going to provide a brief synopsis of some of the systems approaches you will encounter in this unit. I will also refer to some that will not be featured. The process I will use is to ask, 'What experiences did individuals or groups have that led them to develop particular systems approaches for managing complexity?'

Finally, I want to consider what is involved in contextualising any approach in a given 'real world' situation and to invite you to do the same. To do this I will ask you to keep in mind a number of questions as you work through the section:

- Is it the method or how it is used that is important?
- How are learning and action built in?
- Who is, or could be, involved in the approach?
- What could be said about the politics of intervention in a 'real world' situation?

5.2 What are systems approaches?

An approach is a way of going about taking action in a 'real world' situation, as depicted in Figure 20. As I have outlined earlier, an observer has choices that can be made for coping with complexity. Here I am assuming that because this unit is about systems approaches, a choice has already been made to approach the world systemically using systems thinking.

Other choices of approach could be made. Think of the everyday ways we use adjectives to describe the word approach. Some that come to mind are a scientific approach; a reductionist approach; an empirical approach; a philosophical approach; an experimental approach; a spiritual approach; a practical approach; a critical approach. You can probably think of more.

Some of these approaches to taking action seem to operate at different levels – both Systems and science could be seen as meta-disciplines and different approaches could be taken in both by an aware practitioner.

There are certainly scientists who see themselves as systems biologists, for example, just as there are many scientists who take a reductionist approach and some, such as Teilhard de Chardin who took a more spiritual approach. I have already claimed both a systemic and a systematic approach can be encompassed within a systems approach, by an aware practitioner. Please bear in mind here that I am saying these are choices to be made; I am not commenting on the appropriateness, quality or efficacy of the options nor am I saying they are exclusive options.

The question of choice is a bit like that hackneyed phrase 'horses for courses', although in practice it is more subtle than this. The image of juggling seems to say much more than this alternative image. It is not just a question of matching a 'horse' – an approach – with a 'course' – a 'real-world' situation. This is because taking a systems approach involves addressing the question of purpose. Let me explain what I mean by this.

Earlier you attempted to interpret some possible purposes a government minister might have had in engaging with the child support case study as if it were a difficulty (Activity 42). I then ascribed a purpose to the imaginary minister's behaviour. This is something we tend to do all the time. For example, one of my pet hates is people saying 'you should' to me – because I experience them as imposing their purpose on to me whenever they use 'should'. The question of purpose is central to systems practice and the process of contextualising an approach.

Activity 47

Attributing a purpose to the Child Support Agency.

Can you identify situations in the child support case study where particular actors appear to have ascribed purpose to particular behaviours? Are you able to identify any particular outcomes that may be attributed to this process?

Did you recognise yourself as having a stake in the child-support issue in Activity 13? If you do not recognise yourself as having a stake in this issue choose one for the purposes of this activity. Having done this, describe from your perspective, and in no more than one or two sentences, the purpose you would attribute to the Child Support Agency. Start your sentence with: 'The CSA is a system to …'

When you have completed this sentence you will have formulated a description of a 'system of interest'.

Churchman has listed nine conditions that he considers necessary for assessing the adequacy of a design for a system of interest. The first of these addresses the question of purpose (Box 5). Read through Box 5 now and make notes about any points you are uncertain about.

Box 5 Conditions for assessing the adequacy of design of any system of interest

Churchman (1971) has identified nine conditions for assessing the adequacy of design of any system of interest. He argues that these conditions must be fulfilled for a system (S) to demonstrate purposefulness. The conditions are reproduced in summary below (adapted from Churchman, 1971, p.43)

1. S is teleological (or 'purposeful')
2. S has a measure of performance
3. There is a client whose interests are served by S
4. S has teleological components which co-produce the measure of performance of S
5. S has an environment (both social and ecological)
6. S has a decision maker who can produce changes in the measure of performance of S's components and hence changes in the measure of performance of S
7. S has a designer who influences the decision maker
8. The designer aims to maximise S's value to the client
9. There is a built in guarantee that the purpose of S defined by the designer's notion of the measure of performance can be achieved and secured

Churchman (1979, p. 79) later reordered these nine conditions into three groups of three categories; each group corresponding with a particular **social role** – client, decision maker, and planner. Each category is associated with two allied categories which Werner Ulrich (1983) later termed **role specific concerns** and **key problems**. Ulrich also identified each category group with a term reflecting the primary source of influence – **motivation**, **control**, and **expertise**– for client, decision maker, and planner (or 'designer') respectively (Ulrich, 1983, p. 250). In Table 7 I have reordered the nine conditions to match the three categories Churchman later defined. The numbers refer to the same item in the list above and in the table.

Before moving on examine the system of interest you formulated in Activity 47 and try to identify the three groups of three conditions associated with **motivation**, **control** and **expertise** specified as necessary conditions for the design of any system of interest (Box 5, Table 7). Suggest some possible implications if the system you have described has not satisfied all the conditions for the design of a system of interest that Churchman specified (Box 5).

Table 7: Categories of 'involved' in a purposeful system's design

Churchman's 1971 nine conditions for a purposeful system (S)	Churchman's 1979 three groups of three categories for a purposeful system	Ulrich's 1983 sources of influence informing a purposeful system
Group 1		
3 Are the clients, the stakeholders of S identified people whose interests and values will be served by the system?	*social role*: client	sources of **motivation**: whose purposes are served?
1 Is S teleological? Does it exist to serve a purpose? (teleology means to have a purpose)	*role specific concerns*: purpose	
2 Does S have a measure of performance? Are expected performances identified and are relevant measurements available, and are they carried out?	*key problems*: measure of performance	
Group 2		
6 Does S have identified designers who serve the interest and values of the stakeholders? How are these interests and values known to the designers? Who is involved in validating the design?	*social role*: decision maker	sources of **control**: who has the power to decide?
4 Does S have teleological components that co-produce the expected performance of the system? Do these components have measures of performance that are related to the performance of S?	*role specific concerns*: components	
5 Is the system's environment clearly defined? Is the relationship, the mutual interaction patterns between the system and its environment, defined?	*key problems*: environment	
Group 3		
7 Does S have a decision-maker? (The client stakeholders, the designers, and the decision-makers can be the same.)	*social role*: planner/designer	sources of **expertise**: who has the know-how?
8 Do the designers intend to change S so as to maximise its value to the client/stakeholder? Do they maintain fidelity between the preferred/ideal design and the operationalised design?	*role specific concerns*: implementation	
9 Is there a guarantee that the designers' intentions are realisable?	*key problems*: guarantor	

(adapted from Ulrich, 1983, pp. 245–250 and Banathy, 1996)

I will refer back to Box 5 and Table 7 but first I want to distinguish between two different forms of purpose.

5.3 Purposeful and purposive behaviour

It is possible, as observers, to ascribe a purpose to what we or others do, the actions we take. How particular actions, or activities are construed will differ from observer to observer because of their different perspectives, which arise from their traditions of understanding. For example, in Figure 38 the person cutting the stone may ascribe their purpose as cutting stone or building a cathedral. It is for this reason that I will ask you to adopt several different stakeholder perspectives in answering Activity 48.

Figure 38 An iconic model of ascribing purpose to an action (Espejo et al., 1996)

Even if we do not ascribe purposes to our own actions, another observer may infer our purposes by observing our actions and their outcomes, so that in their eyes we implicitly have a purpose to our actions. Ascribing purpose is an important process in taking a systems approach to managing complexity. It also raises the question as to whether there is any relationship between what an observer can distinguish when he or she wishes to claim an overarching goal, a common purpose, a set of shared values, or a common ethic? When I think about these I see little difference, but each term means different things to different people, and each has a particular history of use in different intellectual traditions.

Within systems thinking, purpose is a contested notion. However purpose is always attributed to a system by someone. Within systems practice the attribution of purpose can be a creative, learning process. I am reminded of Peter Checkland's story of working to improve prison management and seeing purpose – and thus system – in terms of ‘rehabilitating criminals’; ‘training criminals’; ‘protecting society’; etc. Stafford Beer said:

'the purpose of a system is what it does'. But for me this is too constraining as it runs the risk of objectifying 'the system'. I would rather employ the notion of purpose in a process sense, within the process of inquiry. This would lead me to ask: What might we learn about the situation if we were to think of a prison as if it were a system to train criminals?

For me there is also a risk in reducing the notion of purpose to mean an objective or goal that can be achieved, and in some cases optimised. I make this distinction because the important aspect of systemic practice, compared with systematic practice, is exploring or inquiring of a situation: 'What would I learn from attributing purpose to this situation?' Alternatively the question might be posed as 'In reflection what purpose do I attribute to my own actions in this situation?'

Two forms of behaviour in relation to purpose have also been distinguished. One is **purposeful** behaviour, which Checkland (1993) describes 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. Thus, in the example of the government minister, if I described his purpose as meeting some political imperative, I would be attributing purpose to him and describing purposive behaviour. I might possibly say his intention was to deflect the issue for political reasons. Of course, if I were to talk with him I might find out this was not the case at all. He might have been acting in a purposeful manner which was not evident to me.

SAQ 13

Decide which of the following scenarios best exemplify purposefulness or purposiveness.

(a) A group of friends who drink together regularly at the local pub are enthusiastic about football and decide rather than just watching and talking about it they will form their own team. This they do.

(b) Sophie noticed a group of youths running down the street and immediately thought they were responsible for the vandalised telephone kiosk nearby.

(c) My company has adopted the internationally recognised set of environmental management standards, but after a year of working with them we find they are not helpful in our particular circumstances. However, we feel we have to stick with the international standards to maintain credibility.

(d) We learned our customers were dissatisfied with our after-sales support. As a result, we changed our ways of operating; this has had positive effects right through the business.

Answer

Both (a) and (d) exemplify purposefulness because each demonstrate examples of willed action and/or changing behaviour in response to learning. Scenario (b) exemplifies purposiveness – the attribution of purpose by someone outside the context. For me, scenario (c) has elements of both purposefulness and purposiveness. The former is indicated by the phrase, 'my company has adopted'. Whereas purposiveness is indicated by the way standards are often imposed from the outside in ways that are unhelpful because they are not sensitive to the local situation.

Activity 48

Ascribing purpose and system to your engagement with complexity. Re-examine your answer to Activity 43. What purpose did you attribute to it?

Can you imagine other purposes that might be attributed to it? Take a number of different stakeholder perspectives and list a possible purpose for the CSA from what you think is their perspective.

Following the logic of the purposeful and purposive distinctions, systems that can be seen to have an imposed purpose that they seek to achieve are called purposive systems and those that can be seen to articulate their own purpose(s) as well as seek them purposeful systems. This reminds me of the story of the rock and the bird used before in relation to the label 'complex adaptive systems'.

One of the key features attributed to purposeful systems is that the people in them can pursue the same purpose, sometimes called a **what**, in different environments by pursuing different behaviours, sometimes called a **how**. Note that I have deliberately not used the term goals, because of the current propensity to see goals as quite narrowly defined objectives. Certainly this was the way they were interpreted in the systems engineering tradition of the 1950s and 1960s and in the traditional OR paradigm (see Tables 5 and 8). Checkland and his co-workers beginning in the late 1960s reacted against the thinking in systems engineering and OR at that time and coined the terms 'hard' and 'soft' systems. I will discuss this in more detail later.

Table 8: The 'hard' and 'soft' traditions of systems thinking compared

The hard systems thinking tradition	The soft systems thinking tradition
oriented to goal seeking	oriented to learning
assumes the world contains systems that can be engineered	assumes the world is problematical but can be explored by using system models
assumes system models to be models of world (ontologies)	assumes system models to be intellectual constructs (epistemologies)
talks the language of 'problem' and 'solutions'	talks the language of 'issues' and 'accommodations'
Advantages	**Advantages**
allows the use of powerful techniques	is available to all stakeholders including professional practitioners; keeps in touch with the human content of problem situations
Disadvantages	**Disadvantages**

may lose touch with aspects beyond the logic of the problem situation	does not produce the final answers
	accepts that inquiry is never-ending

(Adapted from Checkland, 1985)

Some systems practitioners have found the thinking associated with goal-oriented behaviour to be unhelpful when dealing with messes. This has resulted in a move away from goal-oriented thinking towards thinking in terms of learning. Some of these trends are depicted in Table 8.

Peter Senge suggests the key to finding a strategy that energises and focuses an entire enterprise without constraining imagination lies in a deep sense of purposefulness (Senge, 1998). This, I suggest, arises out of a cycle of activity that is described in Figure 39. This is another manifestation of the experiential learning cycle described in Figure 32. If this cycle is completed, the purposeful action can be aimed at intended improvements; improvements that are judged by those who take the action. Those involved in this process learn their way to new understandings of the situation from which decisions about change can be made. Many systems approaches are designed to facilitate this cycle of learning.

If a system is conceptualised as a result of the purposeful behaviour of a group of interested observers, it can be said to emerge out of the conversations and actions of those involved. It is these conversations that produce the purpose, and hence the conceptualisation of the system. What it is and what its measures of performance are will be determined by the stakeholders involved. This process has many of the characteristics attributed to self-organising systems (I shall describe these in the next section).

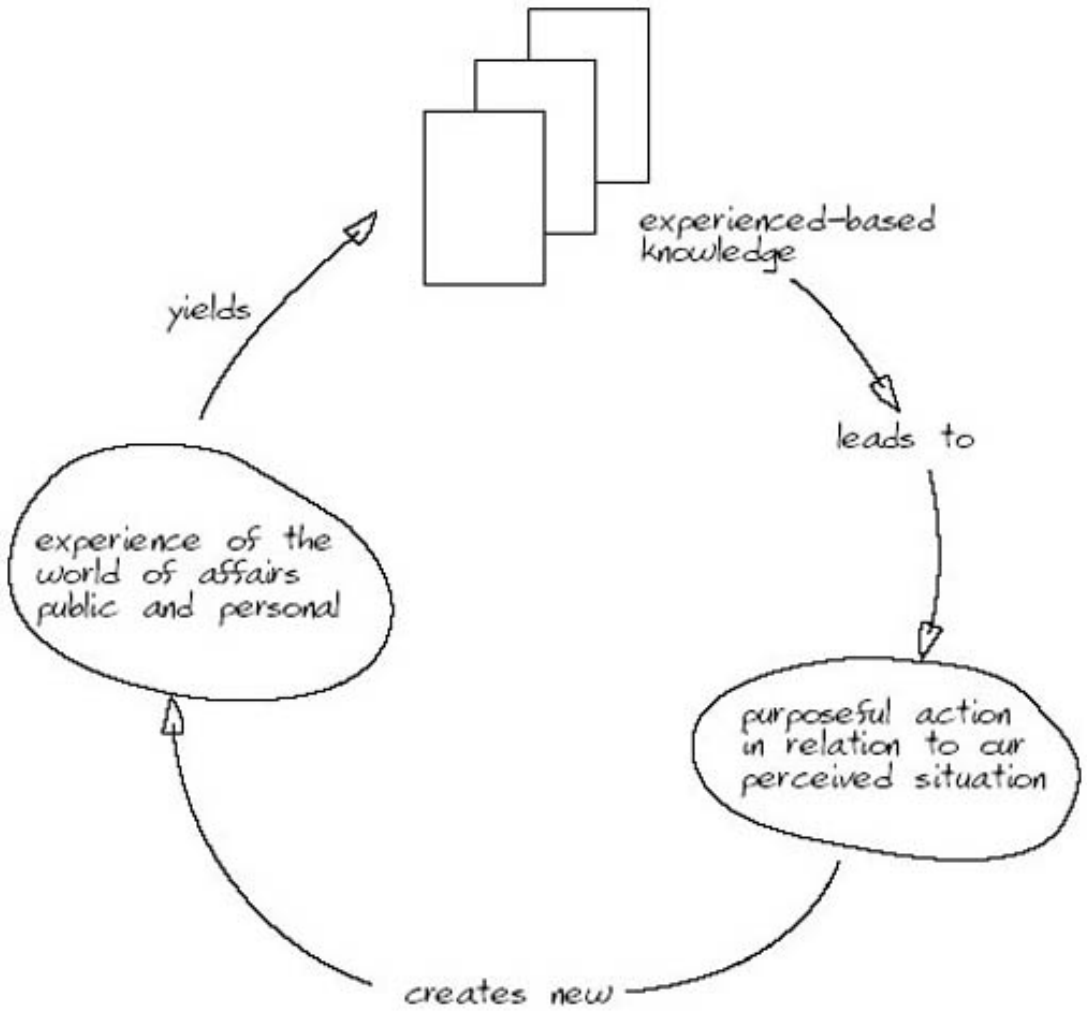


Figure 39 An activity-sequence diagram of the experience-action cycle involving purposeful action (Checkland and Scholes, 1990)

Sometimes there is no agreement on what the system of interest is or what purpose it is seen to have. This seems to me to be a common occurrence. For example, there is no shortage of experts, organisations, agencies, governments, and so on engaged in the definition and derivation of targets, principles, indicators and standards against which the achievement of the measures of performance of a supposed system might be evaluated, monitored and audited – but little agreement, or even discussion, about purpose. In the UK this can be related to the failures and unintended consequences of policy built around the achievement of imposed targets. In other words many people have a propensity to pursue purposive behaviour that assumes both purpose and measures of performance rather than engaging stakeholders in a dialogue in which purpose is jointly negotiated. This can have unfortunate consequences.

If you have engaged with this unit's activities, I think you have already taken systems approaches. Therefore, you have developed the potential to manage complexity. I say potential, because in this unit you have been participating in a simulation by engaging with the activities. This is a common way to develop practice skills. You have been invited to:

(a) Reflect on your purpose in doing this unit (to begin the process of becoming aware of your being);

(b) Engage with a ‘real world’ situation, the case study, which you could choose to perceive as complex, as a mess;

(c) Use different modelling conventions (diagramming) to explore some aspects of the complexity;

(d) Gain insights into: patterns of structure, interconnection, dynamics, systems and subsystems of interest; the implications of boundary choice; situations where taking control action might be possible by modelling a complex situation;

(e) Identify yourself as a stakeholder in the situation;

(f) Attribute a purpose to some of the interactions in the case-study situation – to regard it as a system to do X – from the perspective of your stake in the child-support issue;

(g) Formulate a description of a system of interest using the phrase: 'The CSA is a system to …'.

This was a lot to achieve, and if you made some progress on all of these you are off to a good start. You have taken a systems approach. This approach is one that the course team has found from experience works well in the teaching of Systems to undergraduate OU students. It is also the way the Open University's residential course, called TXR248 *Experiencing Systems*, starts. There are many ways to refine, develop and add to your skills, and you will have the opportunity to do this as the unit progresses.

5.4 Methodology, method, technique, and tools

As you engage with systems thinking and practice you will become aware how different authors refer to systems methodologies, methods, techniques, and tools, as well as systems approaches. Having just spent some time explaining what I mean by a systems approach, I now want to distinguish between methodology, method, technique and tool.

Several authors and practitioners have emphasised the significance of the term methodologies rather than methods in relation to Systems. A **method** is used as a given, much like following a recipe in a recipe book whereas a **methodology** can be adapted by a particular user in a participatory situation. There is a danger in treating methodologies as reified entities – things in the world – rather than as a practice that arises from what is done in a given situation. A methodology in these terms is both the result of, and the process of, inquiry where neither theory nor practice take precedence (Checkland, 1985).

For me, a methodology involves the conscious braiding of theory and practice in a given context (Ison and Russell, 2000). An aware systems practitioner, aware of a range of systems distinctions (concepts) and having a toolbox of techniques at their disposal (e.g. drawing a systems map) as well as systems methods designed by others, is able to judge what is appropriate for a given context in terms of managing a process. This depends, of course, to a large extent on the nature of the role the systems practitioner is invited to play, or chooses to play. When braiding theory with practice, there are always judgements being made: 'Is my action coherent with my theory?' as well as, 'Is my experience in this situation adequately dealt with by the theory?' and, 'Do I have the skills as a practitioner to contribute in this situation?' There are also emotional feelings – 'Does it feel right?'

Within systems practice, a tool is usually something abstract, such as a diagram, used in carrying out a pursuit, effecting a purpose, or facilitating an activity. Technique is concerned with both the skill and ability of doing or achieving something and the manner of its execution, such as drawing a diagram in a prescribed manner. An example of technique in this sense might be drawing a systems map to a specified set of conventions.

There is nothing wrong with learning a method and putting it into practice. How it is put into practice will, however, determine whether an observer could describe it as methodology or method. If a practitioner engages with a method and follows it, recipe-like, regardless of the situation then it remains method. If the method is not regarded as a formula but as 'guidelines to process', and the practitioner takes responsibility for learning from the process, it can become methodology.

In this course you will encounter in some detail the hard systems method (HS-method), the viable systems model (VS-method) and soft systems methodology (SS-method). I will use these abbreviations except when I quote other authors who may refer, for example, to SSM (soft systems methodology) or VSM (viable systems model).

When speaking of SSM, Peter Checkland claims:

> One feature never in doubt was the fact that SSM is methodology (the logos of method, the principles of method) rather than technique or method. This means that it will never be independent of the user of it, as is technique.
>
> (Checkland and Scholes, 1990)

From the perspective of this course SS-methodology arises from a particular form of practice using SS-method. The transformation of method into methodology is something to strive for in the process of becoming an aware systems practitioner.

SAQ 14

Describe a circumstance in which each of the following could be classified as either a tool, a technique, a method, or a methodology.

(a) Idea generating (sometimes called 'brainstorming')

(b) A systems map of the CSA case study

(c) Learning by reflecting on experience

(d) Adapting the HS-method for a new IT development

(e) Checking personal reactions and investments in situations

Answer

(a) Idea generating. I do not envisage many situations where I would call idea generating a method, or where I would recognise its use as methodology, though I recognise it could be a component of both. I regard it as either a tool or technique depending on how I experienced it being used by myself or someone else.

(b) A systems map of the CSA case study. I regard this as a tool. With practice it becomes a technique.

(c) Learning by reflecting on **experience**. My classification depends on how experienced I was at doing this, including the sophistication of my practice.

By sophistication, I mean the extent to which I was theoretically and emotionally informed and aware. Depending on my understanding of these factors, it could be technique, method, or methodology.

(d) Adapting the HS-method for a new IT development. If, in the adaptation, I was able to contribute new insights into the theories of HS-method and also improve my use of HS-method and enhance the IT development, I would regard it as methodology.

(e) Checking personal reactions and investments in situations. I only have enough information to class it as a technique. In use, it could be a method or it could become incorporated into a methodology.

SAQ 15

Which of the examples that follow best exemplifies for you the process of contextualising. Give your reasons. Note, I am asking here about the generic process of contextualising, not the more specific case of contextualising a systems approach.

(a) I am preparing a dinner for guests on Saturday. My guests are business associates from the Middle East whom I have not met before. I am renowned for my skills in cooking pork-based dishes so I think I will build my menu around this experience.

(b) I am adept at getting people to contribute creative ideas during a brainstorming session. For this reason, I always start my workshops with a brainstorming session.

(c) I have just finished a Systems course at the OU. Most of my colleagues at work are not really interested in these ideas and don't really understand them but I found a lot of the tools useful in thinking about my own situation. Because of this, I have sometimes suggested using a particular systems diagramming tool when I thought my colleagues would be receptive to the idea.

Answer

The final example (c) best exemplifies the process of contextualising. It does so principally because the protagonist understands their own situation – diagramming can be useful for them – but does not seek to impose their latest fad on colleagues. This person is sensitive to their context. In contrast, the protagonists in examples (a) and (b) both impose their **experience** onto the context. In example (a), this may have disastrous consequences for the dinner party because no allowances appear to have been made for the range of possible diets of the guests.

5.5 Experiences that motivated the development of systems methods

I have already introduced various systems methods. Behind all of these methods, there has generally been a champion, a promoter aided by countless co-workers, students, etc. To paraphrase the French sociologist of technology, Bruno Latour: we are never confronted with a systems method, but with a gamut of weaker and stronger associations; thus understanding what a method is, is the same task as understanding who the people are.

A method, like any social technology, depends on many people working with it, developing and refining it, using it, taking it up, recommending it, and above all finding it useful. But not all technologies that succeed are the best – it depends on who builds the better networks, particularly of practitioners. As you experience the use of a particular systems method and strive to make it a methodology, reflect on it critically – judge it against criteria

meaningful to you but above all judge it in relation to your practice of it. It will be your experience of using an approach in a situation to which it fits that matters.

5.6 Developing the Open University hard systems method

When the writers of the course T301 *Complexity Management and Change*, the predecessor to T306 (the course from which this unit is taken), started in 1982 they had to decide what to include and what to leave out (just as we have). They started with the systems analysis approach of the engineers De Neufville and Stafford (1971), which had been developed in a civil engineering group at the Massachusetts Institute of Technology (MIT). De Neufville and Stafford defined systems analysis as 'a coordinated set of procedures that addresses the fundamental issue of design and management: that of specifying how men, money, and materials should be combined to achieve a larger purpose' (p. 1). Unlike this course, De Neufville and Stafford had a definition of system much closer to its everyday meaning: any complex, large combination of facilities. They also conceived of a systems analyst, who would use the power of computing to be explicit 'perhaps as never before, about what is involved in the creation of a design and what goes on while this takes place' (p. 3). They believed a systems analyst would:

- be more aware of their objectives because of being forced to make explicit statements about what they were and how they were to be measured;
- have mechanisms at their disposal for predicting future demands on a system, which often are not observable in advance but must be determined from an interaction of social and economic factors;
- have a procedure for generating a large number of possible solutions and for determining efficient methods to search through them;
- use optimisation techniques that can pick out favourable alternatives;
- be aware of strategies of decision-making that could be used to select among possible alternatives.

De Neufville and Stafford (1971) regarded systems analysis as being consistent with a scientific approach, which they thought followed the process described in Figures 40 and 41. The T301 course team was not fully satisfied with the original method developed by De Neufville and Stafford. They developed a new starting sequence for the application of the hard systems approach (HSA) because from experience they knew it was the initial starting conditions that often shaped how the analysis proceeded (something that chaos theory has subsequently made more generally known – see Appendix C).

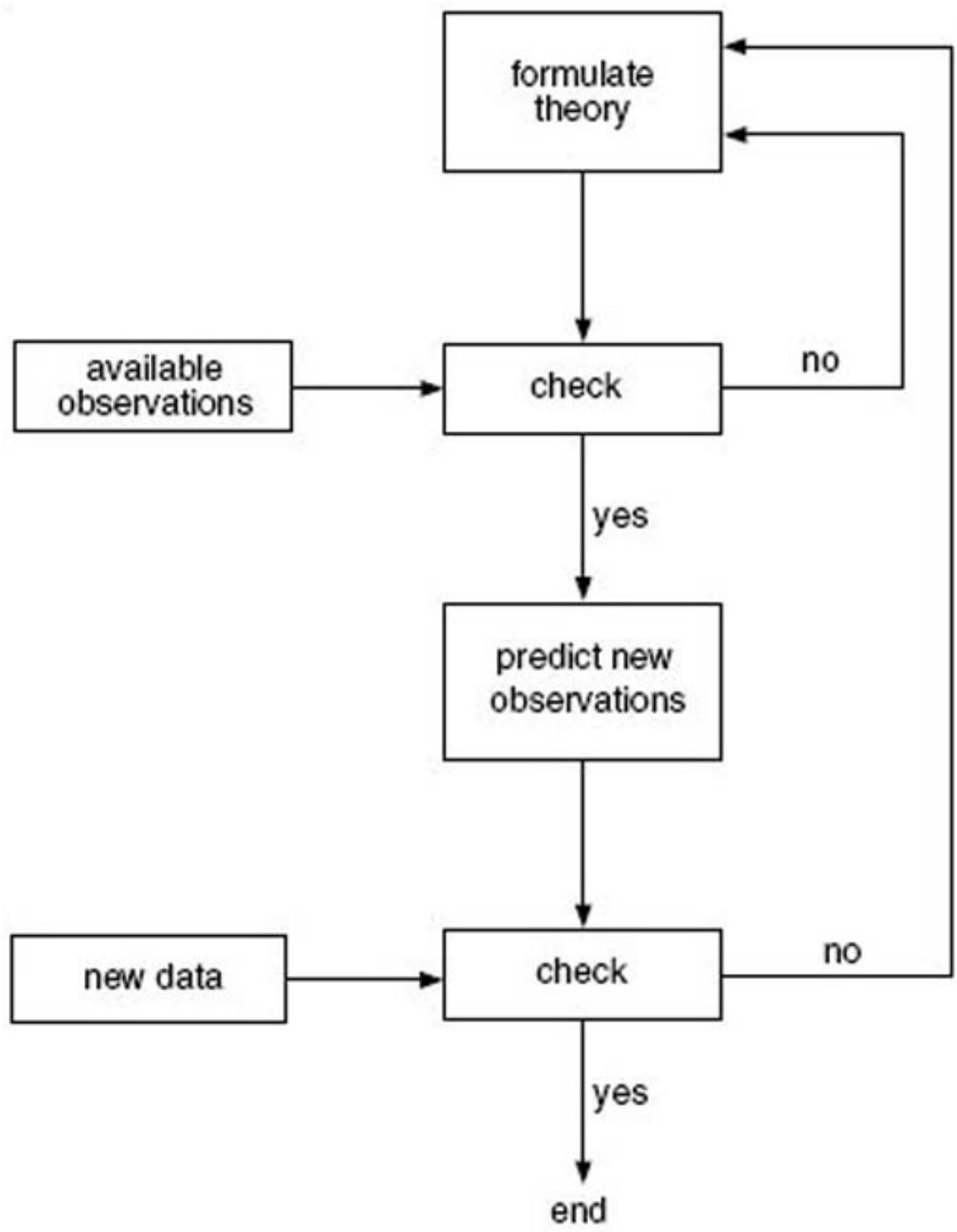


Figure 40 A schematic representation of the scientific method (De Neufville and Stafford, 1971) (Reproduced with the permission of the McGraw-Hill Companies)

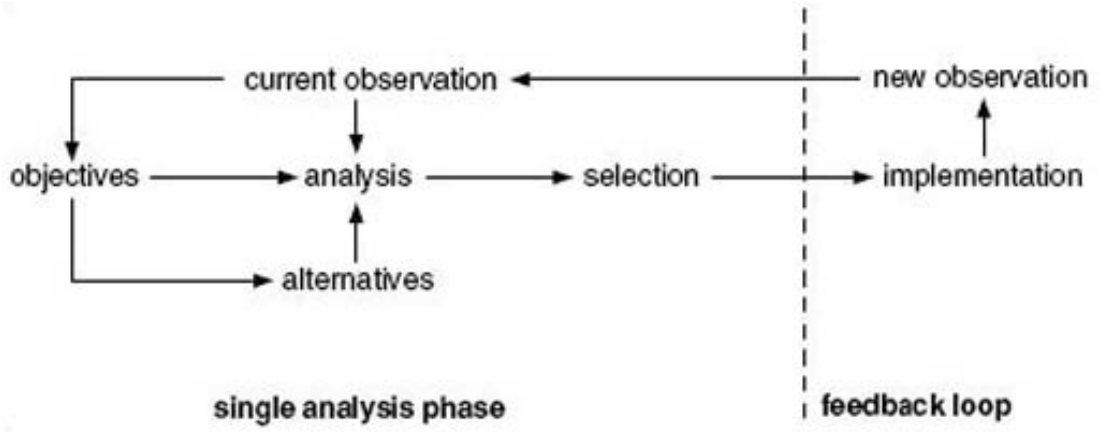
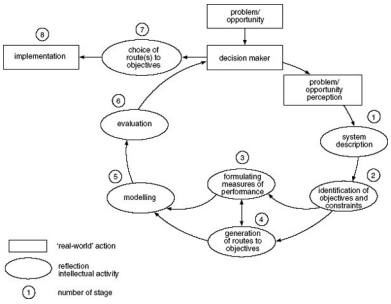


Figure 41 The dynamic systems analysis approach devised by De Neufville and Stafford (1971) (Reproduced with the permission of the McGraw-Hill Companies)



A model of the OU hard systems method (T301, Block 3, Unit 8)

The T301 team saw the starting point as a decision, problem, or opportunity; it got away from the previous focus of starting on just a problem. They did that so that the **HS-method** could be taught as dealing with aspects of decision making that are designed to prevent problems and messes from occurring and also recognising opportunities and seizing them in an optimal way (Tait, 1982). With this change in emphasis at the start the academics recognised it was no longer essential to have a client-consultant relationship – the approach was available to everyday decision making. The revised OU HS-method began with describing the system using what was known as the system-description method. The process is described in Figure 42. Joyce Tait, one of the contributors to the development of the OU hard systems method says in reflection:

> I think what was innovative at the time was the fairly strong warning about inappropriate application of the HS-method and the inclusion of a soft stage 1, under 'system description'. The existing 'method for system description' was incorporated into this first stage for reasons of consistency in our courses, but I think it was a mistake – not a robust enough method. Thinking back, it would have been a good idea to use the early stages of the soft systems approach (Checkland's SS-method) as a preliminary to HS-method decisions on 'what are the objectives' but we would never have got away with it. Peter Checkland was external assessor and he was against any softening of the HS-method. I think this aspect is still innovative. There is not much sign, given the huge amount of misapplication of HS-method, particularly in the public sector, e.g. the whole measures of performance industry, that the points we were making in T301 have got through to anybody.

In other words, Joyce Tait believes that generally the systematic HS-method would be better contextualised within a systemic approach. My colleague, Simon Bell,, gives the following example:

> In 1996, I worked with an Indian researcher from an Indian agricultural research centre on a project concerned with monitoring the uptake of recommendations about fertilizer use by small farmers in remote regions of southern India. He was in a complete fix about how to do this and had problems scoping the problem.
>
> We started off with SS-method and got a picture of why current monitoring did not work. This boiled down to farmers being busy when monitoring people turned up during the working day and the fear experienced by officers of the local research centre about being spied on by staff from the research centre. When he finished his SS-method and produced an activity plan it indicated the need for some quantitative modelling of the current situation as a base-line survey. He then used the HS-method to identify how such a survey could be conducted and what it should measure.

As with any modelling activity (see OpenLearn unit T553 Systems Modelling) the cost of measurement and data collection must be taken into account. The HS-method does not take this explicitly into account; nor do most methods whether these are systems approaches or not.

So called hard systems methods attained the dominant position Peter Checkland refers to in Appendix D (see Activity 49 below, where this appendix is attached for your convenience), because of some powerful organisational pressures. It is argued that they were desperately needed because of the increasing complexity of decision making in organisations. It was considered no longer safe to leave decisions that could affect the whole organisation to the hunches and best-guesses of one person, however experienced they might be. As organisations increased in size after World War II and the number of variables to be controlled increased, the levels of risk and uncertainty associated with decisions rose. The environment of organisations also changed rapidly so that the organisations had to become more adaptive, more ready to change, and more aware of the political and social implications of their decisions. In addition to all these other factors, there was a rapid expansion in the domain of knowledge, so that the amount of data that could bear on a particular decision or problem exceeded the scope of one person. An additional factor favouring the development of hard systems methods was their strong emphasis on the supposed logical and scientific nature of the decision-making process (see Figure 40). Stafford Beer (1966), in the preface to *Decision and Control: the Meaning of Operational Research and Management Cybernetics*, states: ‘This book is about management and the way in which it may invoke the use of science to help solve problems of decision and control’. Given the dominance of the scientific method in our culture, this heavy emphasis on the scientific nature of hard systems thinking helped to give it academic weight and respectability. It is interesting to note the same cycle repeating itself with regard to ‘the sciences of complexity’ as evidenced in Horgan (1996) (see also Appendix C).

Many of the early hard systems methods were developed by observing good managers, decision-makers or designers in action and codifying what they did. As defects in these early methods became apparent the methods were modified and changed. The OU hard systems method evolved as a result of teaching the approach to students at summer

school and in response to certain criticisms of hard systems methods in general (see Tables 3 and 8).

The OU experience with the predecessor course to T306 was that students, who had to choose a project based on a hard systems, soft systems or systems failures approach, were often unable to appreciate the relationships between approach and context. Often, those students who were predisposed to technological or quantitative approaches finished the course still seeing the world only in hard systems terms. They were unable to make the epistemological distinctions I have outlined as being desirable in my ideal of a systems practitioner. In the process they metaphorically dropped the C ball!

Unfortunately, the terms hard and soft are now part of the systems tradition. The reasons for this are outlined in more detail in Appendix D. In this unit, we do not wish to perpetuate the hard and soft distinctions but prefer the distinctions systemic and systematic (Table 3) used in an holistic way, i.e. not either/or but both/and.

5.7 Developing a VS method through the viable systems model and Viplan

Anyone familiar with the controversy in the UK about the detention of the former Chilean dictator General Pinochet can make a link with the history of the viable systems model (VS-method) developed by Stafford Beer and with Viplan developed by Raul Espejo. Espejo describes the connection in these terms:

> [my] work has focused on improving organisations of all kinds […] In this work […] above all I have been influenced by Stafford Beer.
>
> It all started in the early 1970s when, as a young graduate, I was working at the national Development Corporation of Chile. Those were difficult days for the country. The people's will was for change and to make it happen they had elected Salvadore Allende to the presidency. Stafford Beer was invited to Chile and for two years he supported a very important transformation process [as foreign advisor on the organisation of the public sector of the economy]. Though many of us will know the sad end of Allende's government, naturally [the experience] left many seeds for personal transformation.[…]
>
> When Stafford arrived in Chile he had with him the manuscript of *Brain of the Firm*, his latest book (Beer, 1972). This was the first of three books in which he developed the viable system model (Beer, 1979; 1985). This is the model underpinning recursive organizations […] I was captivated by this model […] and it has held my interest ever since.[…] It is becoming a most powerful paradigm to support the development of fair and effective organizations.
>
> (Espejo, 1997, p. 1–2)

Stafford Beer is regarded as the founder of management cybernetics. With his books *Cybernetics and Management* (1959) and *Decision and Control* (1966) he laid the foundation for management cybernetics, thereby building on earlier works of Ross Ashby, Warren McCulloch, Norbert Wiener, and Heinz von Foerster.

Spend a few moments referring back to Figure 24 and see how I have located management cybernetics in the various Systems traditions. Beer's contribution can be gauged from his obituary (Box 6).

Box 6 An obituary for Stafford Beer

World leader in the development of operational research, who combined management systems with cybernetics

by Dick Martin and Jonathan Rosenhead

Professor Stafford Beer, who has died aged 75, was a remarkable figure of British operational research (OR) – the study of systems that emerged from deploying newly invented radar in the late 1930s, and has since found extensive management applications.

A charismatic, even flamboyant, character, Beer founded two major pioneering OR groups; wrote some of the best books about it; and was a world leader in the development of systems ideas. He is widely acknowledged as the founder of management cybernetics, which he defined as 'the science of effective organisation'.

His thinking on how decisions about complex social systems could best be made went through several phases. As an operational researcher he pioneered the idea of interdisciplinary teams to tackle problems in business, government and society. As a systems guru, he was concerned with designing appropriate feedback loops within social systems. More recently, he worked on participative methods to enable large groups to solve their own problems. What united these aspects of his work was his early and consistent commitment to a holistic approach.

He began a degree in philosophy and psychology at University College London, but in 1944 left it incomplete to join the army. He saw service as a company commander and in intelligence in India, and stayed there until 1947, leaving the army with the rank of captain in 1949.

He realised that OR, so successful during wartime, also had immense possibilities in peacetime. Appointed to a management position in a steel company, he soon persuaded it to set up an OR group, which he headed. The group grew to over 70 professionals, carrying out studies across United Steel.

In 1961 he left to launch SIGMA (Science in General Management Ltd), which he ran in partnership with Roger Eddison. This was the first substantial operational research consultancy in the UK. Its staff numbered some 50 before Beer left in 1966 to join the International Publishing Corporation (IPC), which had been a SIGMA client. IPC was then the largest publishing company in the world, and Beer was appointed development director. In this role, he pushed IPC into new technologies, many IT-based. He coined the term 'data highway', 30 years before 'information highway' came into vogue.

From 1970 he operated as an independent consultant. For over two years, until Chile's President Allende was overthrown in 1973, Beer worked on a new cybernetics-based control system to be applied to the entire social economy of Chile. This was to be a real-time computerised system, an extremely ambitious project given the technology then available.

Although the Pinochet coup prevented the full realisation of the system, Beer later undertook commissions for the presidential offices of Mexico, Uruguay and Venezuela, answering directly to the president in the latter two. His recognition was always greater abroad than at home, where the British establishment was uncomfortable with his big vision and radical orientation.

From the publication of his first book, *Cybernetics and Management* (1959), a systems approach to the management of organisations was his central concern. In this he built on the foundations of cybernetics laid down by Norbert Wiener, Ross Ashby, and his mentor

Warren McCulloch. A series of four books based on his Viable System Model were published during the 1970s, of which *The Brain Of The Firm* is the most celebrated.

In the 1990s he turned his attention to a complementary approach, introduced in his 1994 book *Beyond Dispute: The Invention Of Team Syntegrity*. Team Syntegrity is a participatory method for enlisting the creativity of substantial groups to develop solutions to shared issues. Non-hierarchical and democratic, it has been widely adopted, with a growing international network.

His impact on the way we think about management and systems was the result both of his magnetic personality, and the power of his writing. His prizewinning 1966 book *Decision and Control* charms the reader with its style as well as content. In this, as in his other writing, he takes an expansive view of his subject. His approach was always challenging, even subversive to conventional decision-making. Radically then, and unfashionably now, he believed in the benefits of a scientific approach, though he railed against reductionism. Unlike other management writers, he saw science as freeing thought and action, not trapping it in narrow procedures and techniques. It was his constant theme that the greatest possible autonomy of action should be maintained at all levels of the organisation, not just at the top.

Beer was a larger than life character. He was tall, broad, brimful of energy, and, in later years, bearded like an Old Testament prophet. His enthusiasm for life could be over-powering and quite non-Anglo-Saxon. Those who encountered him polarised between the group that was distrustful of what it saw as his showmanship, and those who were converted into permanent admirers. He was deeply loyal and affectionate to his friends.

The Guardian, Wednesday September 4, 2002 and http://www.guardian.co.uk/obituaries/story/0,3604,785671,00.html [accessed 07/11/2007]

Beer was a member of the group of researchers who generated the fields of systems science, as it was then called, and cybernetics. Many of these researchers were interested in what is now often called the theory of information, but more particularly the notion of control (see Box 7).

Of his experience in Chile, Beer had this to say:

> We embarked […] upon a programme so ambitious as to have had at least a chance of revolutionizing the form of government on a cybernetic basis that would match the revolutionary political intentions of that democracy. […] I emerged from the experience very much changed. I changed in my awareness of myself, of my fellow men, and of political realities. […] I changed also as a technologist, in terms of confidence. For I now know that it is possible to do what I have advocated for so many years – things which many used to say, and some still do say, are impossible.
>
> (Beer, 1981b).

Beer's full account of his experiences in Chile (1971–73) can be found in the second edition of Brain of the Firm *(1981a)*.

Box 7 An underlying unity between control mechanisms in different disciplines

Biological scientists […] logicians, engineers, psychiatrists – all these and others, too, were finding roads which led to the same basic topic: the notion of control itself. Gradually some of those concerned began to realize, through the terrible barrier constituted by their different professional languages, that they were talking about the same thing.

This group of scientists originally centred around the dynamic figure of the American mathematician, Norbert Weiner. By 1947, they had decided that their work had indeed uncovered a new field of scientific endeavour, and they named the science cybernetics. A story attributed to Weiner describes how this underlying unity existed in various different sciences.

Two members of the group had been designing a machine to enable the blind to read. It was not a new idea that a photo-cell could be used to scan a line of print, and to produce variable audible tones which would in some way represent the letters and words concerned. If a means could be found of combining the sounds produced in this way into patterns, patterns that would be as easily recognized as the visual shapes on the page, blind people who were not deaf could be taught to read 'with their ears'. The main difficulty in this idea is that the pattern of sound must be substantially the same for a given pattern of letters, whatever the size of the print. The apparatus proposed by these two men involved selective reading by an automatic scanning process. A schematic diagram of the lay-out of the machine, with its banks of photo-cells and oscillators, was prepared. The diagram, quite unexplained, came, according to Weiner, to the attention of an eminent anatomist who belonged to his group. He asked: 'Is this a diagram of the fourth layer of the visual cortex of the brain?'

That is an early example of the way in which a theory of control began to arise from the merging of established sciences. Who could fail to be excited by the fact that these two men, who knew little of each other's professional fields, had the same formal insight into so deep a question? Nor was this synthesis of ideas to prove a futile coincidence. The scientists, stimulated by the incident, produced a theory about the anatomy of the part of the brain dealing with vision, and its physiology, in terms of a mathematical description of a scanning process.

(Beer, 1959, pp. 2–3)

What Beer proved to himself in his Chilean experience was that it was possible to create designs for self-organising systems. This is something of a paradox because a self-organising system is one upon which, by definition, no organisation is imposed. Beer's detractors, he says, believe his model facilitates the secret manipulation of everything by shadowy figures in high places. He argues this is definitely not the case, and we are too often constrained by our everyday notions of control, which, in cybernetic systems, are very different. Unfortunately, I do not have the space to expand on these ideas here, however see also Ashby's definitions of hierarchical complexity in Appendix C.

Raul Espejo, as outlined above, built on the work of Beer. This includes the development of a software package called Viplan, which is a process for enacting the **viable system model** in organisational contexts. Espejo describes his concerns as being with a paradigm shift from the goal seeking, black box, functionalist approach of early cybernetics (first-order cybernetics in Figure 24), to the 'meaning creation' of soft system methodologies, to methodologies based on self-construction and autonomy (1997, p. 25).

He also argues that it is crucial to clarify the way we see purpose in social systems, particularly the capacity for participation and self-construction of purposeful systems. His concern is that most purposes in our social systems are defined from the outside, denying the autonomy of the participants or stakeholders.

5.8 Developing a soft systems method

One of the more widely used systems methods is known by its originators as '*soft systems methodology*' or SSM. The driving force behind its development and increasing application in the domain of information systems development has been Peter Checkland at the University of Lancaster in the UK (e.g. see Checkland and Holwell, 1997). SSM, or adaptations of it, has been used in many other domains as well. The experiences that have given rise to the development of what in this course I will refer to as **SS-method** are described in an easy-to-read article in Appendix D.

You should now complete Activity 49, which involves you reading through the article in Appendix D on the development of SS-method (described as SSM in the article). This should take about **1 hour** at most.

Activity 49

Appreciating the experiences that gave rise to the development of SS-method.

Spend up to an hour working through the article on SSM and completing this activity. As you read, try to make a note of the systems concepts Checkland refers to in his address. Jot down any points you find yourself disagreeing with or that accord with your own **experience**. Record these in your Learning Journal.

Click on the link below to read Appendix D.

File attachments are not available in this format.

View document: Appendix D

I want you to read carefully Checkland's description of SSM as an action research process. Based on your reading of Checkland and your own **experience** write a paragraph or two in your Learning Journal about what action research means to you.

A publication by CCTA (1993), the UK government centre for information systems states 'SSM provides an approach to solving management problems which requires skill and judgement'. They recommend readers of the book attain a level of competence in SSM before attempting to apply it. They suggest three levels of competence may be expected to be gained through appropriate training and practice:

- Appreciative beginner
- Initial practitioner
- Practitioner

If you choose to study course T306, you will have the opportunity to develop all three competencies in the SS-method if you so choose. The course team's aspiration is that all students are at least initial practitioners by the time they successfully complete this course. If you do a successful project based on SS-method, you will have attained the competence to be a practitioner. Remember, however, methodology arises in the doing, so it is only through doing SS-method in a particular way that you can transform your practice of it into methodology.

In the doing, it will be important for you to appreciate and develop your understanding of action research, because an aware systems practitioner is also a systemic action researcher.

5.9 Developing other systems methods

There are many more methods that are regarded as systems approaches for managing complexity (e.g. Rosenhead, 1989a; Flood and Carson, 1988; Flood and Jackson, 1991; Mingers and Gill, 1997; Francois, 1997; Flood, 1999; Jackson, 2000). The systems practitioners responsible for developing these come from a varied background, but in the main their experiences are similar to those described for Checkland, Beer, Espejo and the T301 team. All wanted to be able either to take action that stakeholders could agree would be an improvement or to pre-empt breakdown or failure. Both aspirations are responses to managing complexity.

A contention we have as a course team, is that an aware systems practitioner is able to braid their theoretical understandings and practical abilities so as to take purposeful action in any domain of perceived complexity. While this does not preclude you from learning or attempting to learn many of the methods and techniques commonly used by systems practitioners, it does mean you do not have to know them all to become a competent and aware practitioner. Our concern is to equip you with a combination of the theoretical and practical skills needed to make sense of, and use, systems methods as you become aware of them. What is more, many methods use similar tools or techniques. This is the case in the methods used in this unit, and we will be drawing this to your attention as you proceed.

Figure 24 provided an overview of the systems traditions from which different systems approaches have been developed. Three other systems methods you should be aware of are described briefly in the rest of this section.

Open University systems failures method

In their most recent book, *Learning from Failure*, Joyce Fortune and Geoff Peters describe the 20 years of experience, which has produced the systems failures method (SF-method). Their motivation was to discover the ways failures in organisations can best be understood. They observe that one of the best ways people learn is from their mistakes, yet few organisations foster attempts to learn from people's mistakes. They believe this absence of learning can be attributed to a blame culture and the absence of robust methods for the study of failure. Their aspiration is to enable personnel managers, software engineers, teachers and the like to bring complexity and connectivity to the surface through the application of the SF-method (Figure 43).

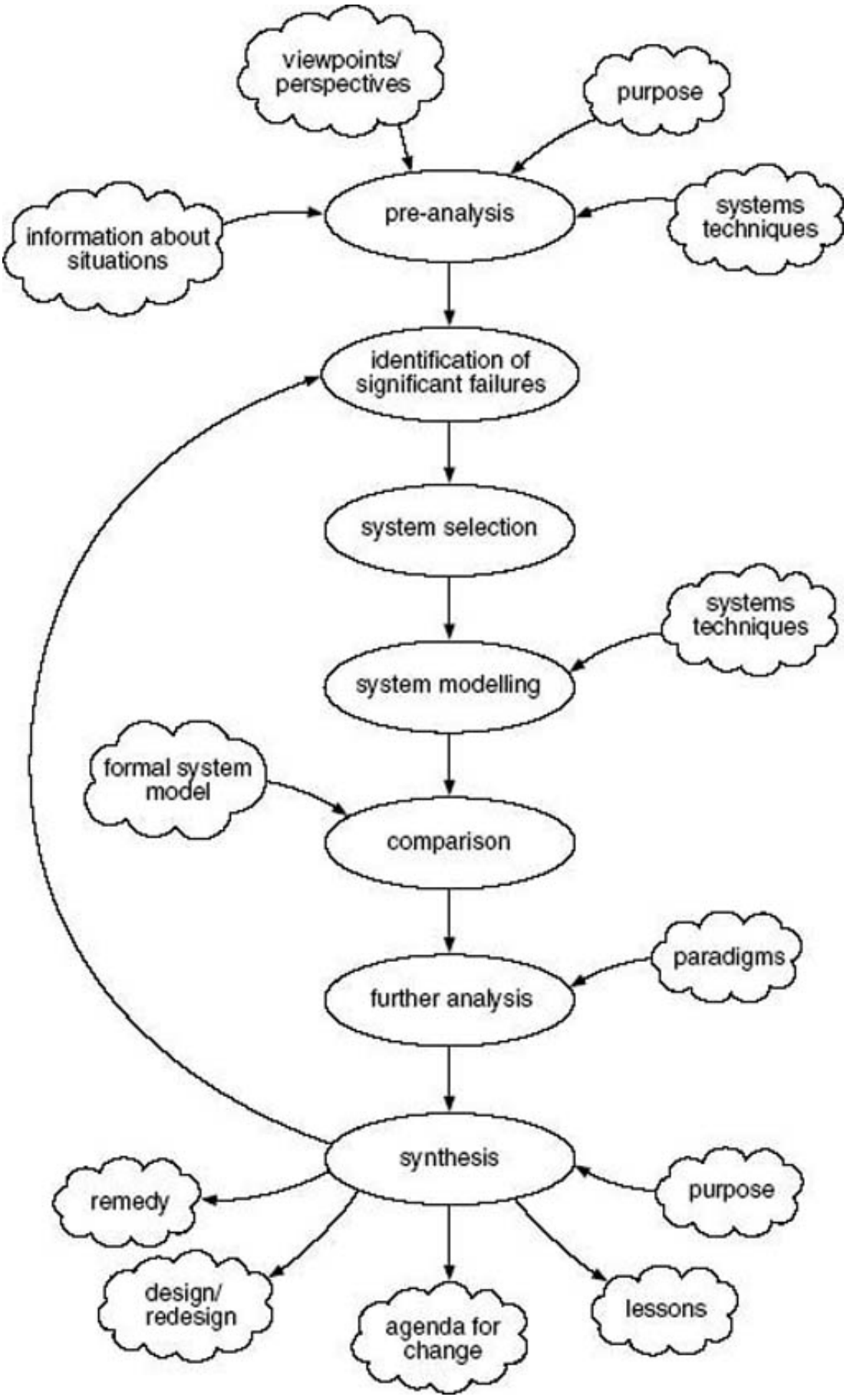


Figure 43 The systems failure method (Fortune and Peters, 1995)

SF-method involves a systemic interpretation of a failure and its context (e.g. the CSA in the child support case study), which could lead to learning and action. The process involves engaging with a situation using a variety of diagramming techniques to depict it in a way that improves the initial understanding and enables a system or systems that can be said to lie at the core of the failure to be conceptualised.

This system is then modelled in systems terms and this model of the 'real world' situation is compared with an idealised model of a robust system capable of purposeful activity without failure. Insights and strategies to avoid future failure arise through the process of comparing models of the 'real world' situation and the idealised model. The method allows for iteration as shown in Figure 43. Examples of how the method has been used to study failure can be found in Fortune and Peters (1995).

Systems dynamics

In the 1950s, Jay Forrester, a systems engineer at MIT, was commissioned by the US company Sprague Electric to study the extreme oscillations of their sales and establish a means to correct them. From previous experience, Forrester knew the essence of the problem stemmed from the oscillations present in situations that contain inertia effects, or delays and reverse effects, or feedback loops as basic structural characteristics.

Subsequently, in 1961, Forrester published his report on industrial dynamics that marked the beginning of the systems dynamics (SD) technique based on the study and simulation of the behaviour of social systems (Martinez, 1993). The experiences of Forrester that gave rise to the development of SD have been investigated in considerable detail by Brian Bloomfield (1986) as part of his PhD research with the Systems Group at the OU. He describes the SD approach as:

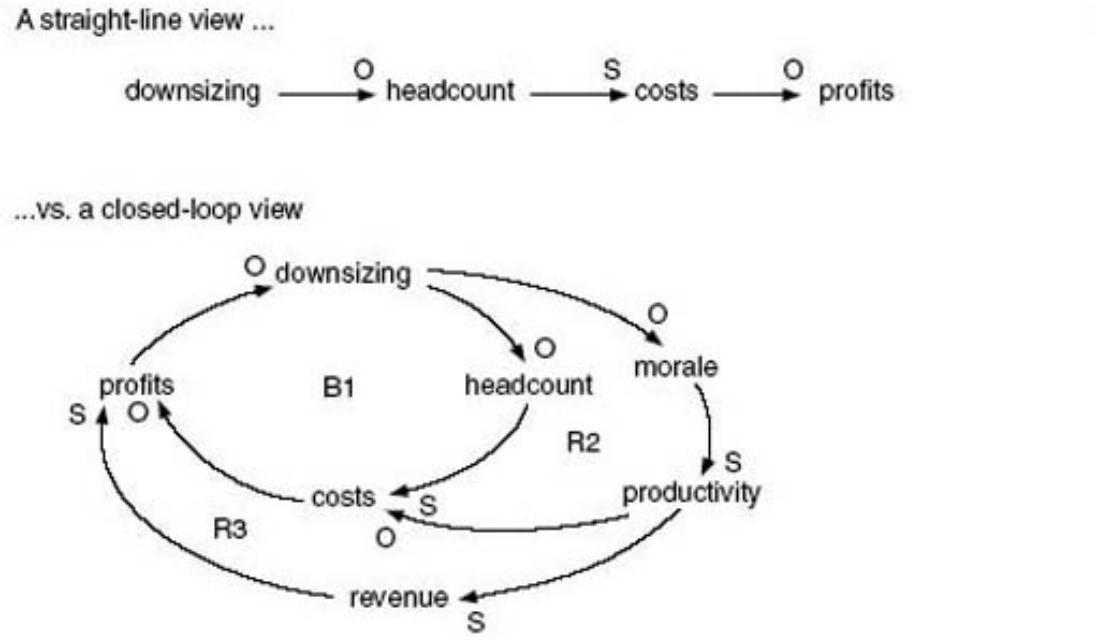
> […] building a computer simulation model to describe the behaviour of any particular system under study, followed by experimentation with the model in order to derive suitable policy options for modifying the behaviour of the real system. (p. viii)

Bloomfield does not regard SD as mere technique, but as a systems philosophy because it embodies a theory about the nature of complex feedback systems. This theory holds that people live in a network of feedback structures, incorporating economic, political and ecological subsystems. The feedback structures determine many of the problems – from famine to overcrowding, from inflation and unemployment to ecological collapse – which have caused considerable public concern in recent times (e.g. Figure 44 models unemployment and profit).

Forrester has been and remains (he was born in 1918) a powerful figure in the SD community, which is regarded by many as somewhat closed.

Forrester, an electrical engineer by initial training, spent the years of World War II at MIT where feedback theory was being developed for the control of military equipment. In 1947, Forrester took charge of the MIT digital computer laboratory, which developed one of the first high-speed digital computers. The second phase of Forrester's career began in 1956 when he moved into the field of management science at MIT's Sloan School of Management. At the time, the mathematical approach of operations research was restricted to linear relationships between variables. This was because non-linear relationships could not be solved analytically. In contrast, Forrester advocated a closed-loop approach in which a feedback loop is established between policy output and information input (Bloomfield, 1986, p. 4).

Forrester published *World Dynamics* in 1968 and this served as a basis for the Meadows and Meadows (1972) report to the Club of Rome entitled *Limits to Growth*. Francois (1997) suggests the report and the extensive controversy it provoked were actually responsible for popularising systems dynamics. The cultural background as well as some of the methodological assumptions of SD have been heavily criticised (e.g. Flood and Jackson, 1991). Flood (2000), for example, suggests SD-practice is open to criticisms of being imprecise because it relies on extant data and the outputs are potentially very sensitive to initial starting conditions, including assumptions. Many however find it useful.



Key: There are three loops: B1 (a profits loop), R2 (a productivity loop) and R3 (a revenue loop). A 'B' loop is balancing feedback that seeks equilibrium. An 'R' loop is reinforcing feedback that amplifies change. An 'S' signifies a causal link where a change in variable X causes a change in variable Y in the same direction, where X adds to Y. An 'O' signifies a causal link where a change in variable X causes a change in variable Y in the opposite direction, where X subtracts from Y. (Richmond, 1998)

Figure 44 The contribution of systems dynamics is exemplified by showing that the inadequate diagram of one-way, straight-line thinking is only part of the story. The closed-loop diagram used in SD modelling raises awareness of unintended consequences. In this case, it suggests the laying off of workers causes demoralisation of remaining workers and reduces productivity. (Downsizing is a management term for cutting staff to reduce company costs and raise profits.)

The initial stages in making an SD model involve the description of 'the system', identification of elements and relationships followed by the construction of a causal loop diagram (see Figure 44). SD has also developed its own modelling language and symbols, which are shown in Figure 44. It is argued by some that when engaging with complex situations many SD practitioners can enable participants to learn just as much from the process of developing causal loop diagrams (combinations of influence, multiple-

cause and sign graphs – see OpenLearn unit T552 Systems Diagramming) as from the subsequent computer simulations.

Critical systems thinking

Critical systems thinking (CST) is regarded as a systems approach to research and intervention in complex situations. The approach developed from the concerns held initially by C. Wes Churchman and his student Werner Ulrich. Later, Mike Jackson and Bob Flood, who were then professors at the University of Hull in the UK (e.g. Jackson, 1991, 2000; Flood and Jackson, 1991) developed their interpretations of the earlier work. Jackson and Flood were concerned that existing systems methods, including Checkland's SSM and other 'soft' approaches, reinforced rather than challenged relations of power.

CST continues to be developed in a distinct strand by Werner Ulrich, a Swiss administrator and systems researcher concerned with the provision of public health and social services (Ulrich, 1983). His motivation was to make transparent what was involved in plans developed by experts without consideration of local people and their needs. CST, it is argued, is a debate within the Systems research community around three themes.

1. Critical awareness is a process that involves boundary critique by considering in formalised ways the question of where and by whom boundary judgements around a system of interest are made. This involves examining and re-examining taken-for-granted assumptions, along with the conditions that give rise to them (Midgely, 1996; Midgely, Munlo and Brown, 1998). The motivation is to address issues of marginalisation.
2. Improvement – or emancipation, development or desired change – is defined temporarily and locally, taking issues of power into account. It is argued that critical awareness is required to surface different viewpoints in any attempts at purposeful action.
3. Methodological pluralism – uses a variety of systems methods that are flexible, dynamic and locally decidable. The role of the systems practitioner is to work with local stakeholders and to facilitate their capacity to select and use relevant methods, taking issues of power into account.

Midgely (1996), in an article entitled *What is this thing called CST*?, argues there are no consensually accepted definitions of what it is. He regards CST as an evolving debate around a set of themes that are regarded as important by a significant number of systems practitioners.

5.10 Contextualising any particular systems approach

The capacity to put any systems approach into context is based on the ability of a practitioner to appreciate their own traditions of understanding and to make connections with the history of particular systems methods or methodologies, or to formulate their own. Above all, there is a need to learn from using them and to achieve outcomes that are agreed by those involved as worthwhile. This is a level of systems practice to which you can aspire.

At the beginning of Part 3, Section 5 I posed four questions that I asked you to consider as you worked through it:

- Is it the method or how it is used that is important?
- How are learning and action built in?
- Who is, or could be involved in the approach?
- What could be said about the politics of intervention in a ‘real world’ situation?

Like so much in systems practice, there are no definitive answers to these questions other than ‘it will depend on the context and your own abilities in that context’. What I hope is clear is that an aware systems practitioner does not force a method on to a context, a ‘real world’ situation, to which it is not suited.

Your ability to contextualise a systems approach, of juggling the C ball, will be aided if you don't shoot first and ask questions later! Because most systems practice is carried out in some institutional setting your ability to contextualise an approach will also be helped if you appreciate it is not only people who have epistemologies but institutions as well. All institutions hold conceptions of what counts as legitimate knowledge, which determines how individuals are able to claim what they know. These epistemologies are built into institutional structures and practices. Don Schön (1995) cites the example of the typical elementary school that is organised around school knowledge – knowledge contained in the curriculum, the lesson, the module, in the promotion procedures for teachers, the practices of teachers, the organisation of rooms and so on. All of these things enter into the idea of ‘school knowledge’.

16 Part 3: 6 Managing complexity

6.1 Perspectives on managing

My focus in this section is on the M ball being juggled by a systems practitioner. My purpose is to enable you to appreciate the diversity of activities that might constitute **managing**. More specifically, I am concerned with the type of managing a systems practitioner might undertake. When you began Part 3, Section 4, I asked you to complete an activity (Activity 40) in which you used a spray diagram to record the different meanings you associated with the phrase managing complexity. I wonder: did your answer focus on the **managing** or the **complexity** or both?

Before going on, I want you to engage in a short ideas generating session to develop a list of all the verbs you associate with the word managing. Use Activity 30 as a starting point to trigger your thinking. Spend about five minutes on generating the ideas for the list and another five minutes on the sorting.

> **Activity 50**
>
> Generate a list of the verbs you associate with managing.
>
> Generate and list all the verbs you associate with the word managing.
>
> Sort through them and develop some categories that help you to group and make sense of your list.

Some of the verbs we (I did this with a colleague) thought of were understanding, surviving, seeing, visioning, allocating, optimising, communicating, commanding, controlling, helping, defending, leading, supporting, backing, enabling, coping, informing, modelling, facilitating, empowering, encouraging, delegating. I identified three categories that helped me make sense of the list. These were (a) getting by; (b) getting on top of; and (c) creating space for. I make no claim that this list is definitive; my categories are ones that I found useful at the time. Undoubtedly your list and categories will be different. For example, the functions – the verbs – in the Act that led to the establishment of the Child Support Agency were process, trace, investigate, assess, collect and enforce. So these were the activities, presumably that had to be managed.

My concern in this section is with managing in all its manifestations and how these are embodied in a particular manager. I am not concerned with management. When I think of a manager, I think of anyone in any context who is engaged in taking purposeful action. That includes you and me. Winter (2002) asks the question ‘Why not think of “managing” in more generic terms?’ and illustrates this in the form of Figure 45a. Later he casts the act of managing in terms of a process of relationship maintaining (Figure 45b)