Chapter 1 Introduction

"To everyone who has a hammer, everything looks like a nail," *Russell Ackoff.*

Chapter 1 Introduction

It is believed that human activity problems are unique in that they are socially created reflections of our consciousness. The way in which we construct them creates the world we interpret around us on a regular basis. The world we see 'out there' is the result of a complex interaction of intersubjectively created meanings, conceptions, framework of ideas or mental models that we use to make sense of the complex web of events that bombard the senses (Kling 1999; Liebl 2002; Senge 1990; Stacey 2003a; Stamper 1997). These mental models or conceptions, some known, some subconscious, reside in our minds and are stored for interpretive/appreciative (Vickers (1983)) purposes and so allow us to act purposefully in the world. However, these conceptual frames need comparison or contrast to define themselves. The topical issue of terrorism provides a contemporary example.

Terrorism is not a new phenomenon; it has been documented for many thousands of years as a way for so-called 'radical' groups to express their conceptual frame against complex societal problems. As a response to their conceptual frame, the problem has been diagnosed, and the solution prescribed in military terms. However, the conflict is between ideas, conceptions of how each sees the world, and attempts to stop the progression or spread of the terrorist's conceptual frame may need more than a military response. The action, terrorism, eventuates from the conceptual understandings held by the radical groups. The action is seen to be a symptom or logical consequence of their conceptual frame. However, their conceptual frame does not exist in a vacuum. It is defined through tension (dialectic) with another conceptual frame that might be called secularism. This tension between the two conceptual frames encourages differing retaliation acts by both parties. Both see their own reactions as rational, given that their conceptual frame is in tension with another conceptual frame. Each sees particular problems because of their conflicting conceptual frames, which could be creative, but taken to extremes is destructive. Cognitive engagement sees problems in this way. The perceived problem is the symptom of a tension between conceptual frames. Problems are therefore addressed by thinking about each participant's cognitive frame and how they are in tension with

each other. What is needed is to find a solution that turns this tension into something creative rather than something destructive (Poole & Van de ven 1989).

In a smaller way, we all use this tension between conceptual frames to identify and solve problems, be they personal or organisational. It is, of course, an interpretive view of the personal problem which recognises that something that is perceived to be problematic by people finding themselves in a particular situation may not be problematic to others. Social problems, rather than personal ones, are also seen to be the result of a group or community's interpretation of an observed phenomenon that the group deem to be problematic.

Because we have layers of conceptual frames, we can also see problems as containing a series of complex layers. Some of these complexities may only be revealed over time or after acting to solve some particular problem, which in turn acts to reveal further understanding of new problems (Rittel & Webber 1973). Even in making decisions about how to act in our everyday life, we are forced to choose between layers of interacting interpretations. Everything around us – our jobs, the way we conduct them, the nature of buildings, music – is filtered through and built from a web of conceptual frames. To problem solve when other humans are involved is to understand both our own frames and those of the other participants and to figure out a new frame that will turn any destructive tension between these conceptual frames into a creative tension.

1.1 Research Overview and Questions

The overall objective of this thesis, therefore, is to explore the argument that cognitive engagement is a useful concept for tackling complex problems. This is divided into a number of sub arguments:

1. What are complex problems?
2. What are the limitations of traditional problem solving methods for dealing with complex problems?
3. How can complex problem solving be theorised in terms of changing conceptual frames?
4. What is meant by the term 'cognitive engagement'?

5. Does cognitive engagement assist in solving ill-structured problems?

This thesis hopes to demonstrate that cognitive engagement is useful, in so much that it should warrant further examination as a method for thinking about ill-structured problems. This thesis is structured as follows: a review of the literature on problem solving and cognitive engagement, and two studies (one a preliminary exploration and the other a case) in which engagement is used in interpretation.

1.2 Key terms and definitions

The following section presents definitions of the key concepts used in this thesis.

1.2.1 The social construction of reality

Berger and Luckmann (1966) first drew attention to the social construction of reality in mainstream thinking through their work with the same name. Their idea was that individuals and groups construct their own perceived reality through participation, relationships and discourse. In a later work, Berger and Kellner (1981) argued that we construct the world around us through an interpretation of our own life world and that which is going on around us. They argued that there is a conflict of meaning in our life world (p.24), between the internal realisations of reality and those constructed outside of us in our collective lived experiences. The cornerstone of the constructivist argument is that all knowledge is produced and reproduced by social interactions and relationships through the dynamic of lived experiences. Social reality is taken to be a collection of commonly held assumptions that are tied together through 'collective perceptions'. As people interact with each other, forming perceptions, building institutions and things like 'supply chains', for example, then reality begins to take shape. As Scott (2001) noted in his study on power, the most impressive form of power in social systems is that of collective mobilisation. Collective mobilisation is when individuals form group cohesion around an issue, like unionisation in the industrial revolution, and change the fabric of society. This is how 'reality' comes to be formed.

1.2.2 Framing social problems

Social problems are different from problems that deal with the physical world, because the latter will only bring to the situation the alternative conceptual frames that the problem solver perceives to be inherent in the physical artefact. Therefore, the physical problem is defined by natural properties that are consistent with the nature of such a situation. The shortage of water is considered a natural problem. However, it's a social problem in that people will present conceptual frames for its solution. The dependent party is people. The earth is presenting this problem which leads us to interpret the cause naturally and so on. If people stop existing, the natural problem, the water shortage, will continue but because there won't be anyone to interpret it ceases to be of concern. Natural problems like water crises, which are subject to our accumulated scientific knowledge, differ because there are few diverse ways of framing and constructing such problems due to them having been presented to us through natural circumstances. In a social problem there are stakeholders interacting, with differing conceptual frames, stemming from people with various needs and political agendas.

This distinction was highlighted in the thirty-year research project started by Peter Checkland (see his retrospective for a concise summary – Checkland [1999]), whose assessment of social problems was based on the idea that they were highly complex, contained in the minds of people and "the idea of a situation which some people regard as problematical" (Checkland 1999:8). This thesis, therefore, carries on this work, studying what Checkland (1981) originally called 'ill-defined problem solving'. His work is in line with the Pragmatists, such as Churchman and Rittel and Webber (1973), who called it 'wicked' problem solving, and Ackoff (1974), who called it 'messy' problem solving. In order to keep things simple, the term 'complex' problems will be used in this thesis.

Complex problems are unique in that they are usually poorly defined, casually efficacious and messy in nature. Checkland and Scholes (1990) argued that our world is shaped by the way we 'engage' with it (p.43) through our perceptions and our understandings. An example given to us frequently in the Australian media is that of petrol prices. From an economic conceptual frame, it is the cost per barrel

driving up the price of petrol. What of the political ramifications, the social systems at work or the technical factors? How do these variables combine to create the problem we interpret at the fuel bowsers? How is the whole of the reality of higher fuel prices constructed? The current affairs programs assist us in framing a problem from something like this fuel example because they use generalisations and assumptions which force dichotomised interpretations of complex problems. We listen to what they say, their conjecture (guesswork), and we find ourselves forced into an uncomfortable dichotomy that produces a perception for us resulting in our cognitive 'engagement'. The problem of rising fuel prices is thus limited to the scope of one or two areas of the problem whilst the other competing areas are largely ignored. To explore the problem of rising fuel prices requires that we understand the perceptions in the complex interconnected web of meanings that leads to the observable phenomena we engage with. The dichotomy gives us only a limited view of social reality and hence forces cheap answers to problems that are inherently more complex.

In a recent guitar festival, Carlos Santana was quoted as saying that most young guitarists, and even the older ones, have to go through Eric Clapton to find themselves. This means guitarists will take on the 'engagement' Eric Clapton has and, based on his style will eventually find their own unique engagement with the guitar. Clapton's interpretation of music, in Santana's opinion, is so important that most people coming to that kind of music have to engage firstly with him, and his style, interpretation and perception of the 'blues' in order to find themselves. In interpreting their own voice on the guitar, most people, according to this reasoning, build their engagement *through* influences of others. Influence comes through listening to other people play, borrowing elements of style (which have themselves been borrowed from others and reinterpreted) and assimilating them into their own unique recreation.

As we recreate our realities we are deconstructing the old ones, taking the elements we liked of the old ones and making a new socially constructed reality. Problems are not isolated from this process because they cannot be isolated from the person that makes something seem problematical in the first place. Just as people do their jobs in a certain way, engaging with their job in a certain manner, so it is with problems. The

literature provides very little insight into this situation almost to the point where it seems to be not really a problem (Weber 2003). Problems as a part of the social construction of reality is an argument divided along paradigmatic lines (Jackson 2003; Mingers 2001) in problem solving literatures. Where are the insights into how problems form and become 'something of concern'? How are these 'engagements' made?

Gandhi created a process for conflict resolution through a dialectical synthesis called *satyagraha* (Juergensmeyer 2005) that created a platform for conflict resolution based on getting opposing sides to agree on the same side. Gandhi did this by taking the two opposing engagements with the world and dissolving conflicts to find agreements to find a better or more agreeable arrangement which removed the conditions for the conflict to exist. In a similar fashion to the Hegelian synthesis, Gandhi creates a new understanding from two seemingly opposed, contradictory points of view. As Juergensmeyer argues (pp.20-25), this is not to create 'accommodation', as Checkland and Holwell argue for on the sixth step of contemporary Soft Systems Methodology (see Checkland and Holwell [1998a] for a more in-depth treatise), but to create a new platform that all stakeholders can agree to. In Gandhi's approach, we see the essence of real world problem solving, moving towards the new or better solution based on a new synthesis of perceptions. In *satyagraha*, people are not in a lose-lose situation where both sides make sacrifices and accommodations for each other. Somehow keeping the balance, they are brought together to a new understanding where the oppositions are removed and the strengths of the agreements form a new engagement that can bring the situation to an altogether different resolution.

In essence, what Gandhi was trying to achieve was the meaningful construction of a new 'reality'. His approach to conflict resolution was an attempt to synthesise or construct a new 'reality' that was better than the old (as perceived by those in the situation). In the terms used by Checkland and Scholes (1990) mentioned earlier, the point of this work is to move forward in problems at the level of 'engagement' and build a new 'reality' from there. When problematic realities form they form in the mind of those who have interpreted them as problematic (after Checkland [1981]). To improve something considered problematic, the issue then becomes how we can construct new realities that improve social problems deemed to be of concern. The

question should not only be how can we can improve real world problems, but how we can build new and better understandings so they can be improved and the resulting action is more desirable.

A social problem, therefore, in this thesis is used in the broad sense to define 'something deemed to be of concern'. In his original treatise on Soft Systems Methodology (Checkland 1981), Checkland argued that social problems (so called "Soft" problems) are those that contain people and deal with matters of everyday life; this is as opposed to those that are of what he calls "hard" problems which are more "scientific" in nature. According to Checkland, in the most basic sense, a social problem is one where there is a situation desired and a situation perceived. Further, a problem is not just a gap between what is idealised and what is realised, but a perceived reality that stems from something deemed to be not desirable. That is, this thesis takes an interpretive (Avison & Myers 2002; Klien & Myers 1999) approach to the idea and concept of problems and therefore presents them as social constructs. Others who share this view include Ackoff (1974), Checkland (1999), Churchman (1971), Dooley (1999) and Rittel and Weber (1973).

1.2.3 Area of concern

A problem situation is taken to be 'socially constructed', which means that someone has to consider it a problem. Problems are defined by persons who observe phenomena they deem to be problematic. Although this sounds over simplistic, the paradigmatic perspective of a problem being a social construct means that it may better be termed as "an area of concern". Use of the term 'concern' is perhaps preferable over 'problem' because it subjectifies or personalises it. For example, according to this paradigm the values and so-called facts from a situation are observer dependent. This means that the person who identifies the problem (diagnoses it) is presenting a value laden approach which will ultimately suggest certain possible solutions. However, to use the term 'concern solving' or even 'area of concern', as used by Checkland, was thought to be distracting if a contribution were to be made to the problem solving literature. For the benefit of simplicity, the term 'problem' is

used; however the researcher has strong sympathies for the term 'concern' as more carefully reflecting the conceptual frame being taken in this thesis.

1.2.4 Problem solving

The term 'problem solving' was selected instead of 'decision making' for several reasons. Firstly, the phrase 'decision-making', much like 'system', has connotations that imply a certain style of decision situation within the broader context of a problem. Given this broader context (i.e. a situation deemed to be problematic as in Checkland's [2005] perspective), the language of decision making refers to a single event that takes place within a bigger context of a problem solving environment. When assessing a problem situation, several decision making themes may emerge (Dooley 1999) that indicate broader systemic problem areas. By reducing the study down to the decision, the researcher runs the risk of analysing individual decisions that are a part of the broader perspective base.

Secondly, decision making literature is considered to have been deconstructed to the extent where meaningful representation is no longer possible. Chia (1996) makes the point that the term decision making has been over analysed and to a point deconstructed, and this makes it contain less meaning. He continues to argue that, by doing this, it means that making a decision is often taken out of the context of the interchangeable social reality. The individual value of the decision is often relegated to a situation where the understanding of what is meant or even understood by decision making is often hard to represent. Problem solving as a phrase, on the other hand, refers to the cooperative activity of decision making and sense making in a real world environment, and is thought to be much easier to understand.

Thirdly, Chia (1996) also argues that the approach taken by management theorists towards decision making is highly positivistic. That is, even the latter work of March, for example, still focuses on determining causal factors in decision making processes. The positivist aspects of popular decision making theory neglect the broader role perspectives play in understanding the concept of problem (Landry 1995). When decisions are reduced to factors, the role perspectives play is automatically excluded.

In Chapter 2 the role perspectives play in problem solving and planning literatures is explored and this literature alone highlights the reasons behind not using the language of decision making in this work.

Finally, the decision making terminology is abandoned here because the local focus of decision making literatures implies control and a rationality that is not in line with current trends. Hoijer, Lidskog and Ugglia (2006), for example, in their study on decision making, argue that modernity has seen a shift to a reality where certainty has given way to dilemma. The authors also suggest that decision making processes lead to actors making knowledge claims based on highly uncertain viewpoints. Taking a view or forming a conceptual frame to make decisions through is a multidimensional process that requires understanding perspectives. Therefore, a complex problem is thought to contain decision making processes within a problem solving framework. The term decision making does not appropriately capture this complexity.

It is thought that the literature fails to present a conceptual frame that adequately helps in understanding (at least from an interpretive sociology perspective) how problems are perceived in social reality. Put simply, problems are the result of a mental model that interprets phenomena as being problematic because it does not match that model. In essence, to begin a debate about changing a problem situation requires a case to be made, evidence to be presented and a new arrangement to be made. Engagement as a concept argues that problems are formed and solved when new discourse is structured in organisations. If reality could be changed with methodological interference, then it would be really easy to solve social problems; something perceived can only be changed when the person perceiving it decides to change the way they think about it.

Structure is arguably the result of discourse, sense-making and action-taking as opposed to simply existing externally to the people in the situation. It may be arguably real in the effects noticed, as noted in Mingers (2000), but still what changes as a result are perceptions or the way we engage with the world. Therefore the argument made is that problems form as a result of our engagement with the world and are solved as a result of attempting to change our engagement with the world as opposed to trying to intervene in reality or a social structure to bring change. A social

structure exists as a concept to make sense of how we decide to engage with the world, despite its causal efficacy. As Peter Checkland (2001) noted in an interview with the BBC:

> The fundamental stance [of soft systems thinking] is that the world is mysterious and complex but that the way of enquiring into it, engaging with it can itself be organised as a learning system. So that the "systemicity" is in the process of enquiry, not taken to exist in the world. And the "soft" systems stance is the one that has shifted "systemicity" from the world to that process of enquiry into the world, and that is a hard step for people to take. Particularly because every day, in everyday language we use the word system as if it were a description of some part of complexity in the world.

The way we make sense of the world and engage with it is done through our own perceptions of what we think is likely to be helpful in our purposeful activity within the constraints and the rules of the environment we are engaging with. Problems begin to form when the way we 'engage' with the world no longer matches the desires we have for something we deem to be of concern, hence this part of the 'structure' of our lives now needs to be renegotiated. We can organise learning systems to enquire into problem situations through combining or engaging ideas into areas of concern and learning from the process. Taking this a step further, every person interprets reality in a different way, and a problem is an example of how the interflowing perceptions are mismatched, causing a reality to be perceived as problematic. People have different ideas of what a problem is, what it is likely to be and how to organise problem solving activity. In this sense, reality is an organised form of action designed to make sense of how 'to do' something purposeful. It stems from a framework of ideas embedded in the activity itself (after Checkland and Holwell 1998a), which drives the action forward. For example, the language of the police officer is a set of ideas (legal ones) that the police officer has to usually abide by. These ideas are so serious, in fact, that when action is taken, for example an arrest, these words become part of the arresting action.

1.2.5 Engagement

Put simply, 'engagement' is the way we relate to the world around us and how we make sense of it. When a person 'engages' with the world they are trying to extract

meaning from it by building mental models they can interact with that will create meaning. Engagement is used throughout the thesis to refer to the manner in which we 'engage' with the world and how, on the basis of these perceptions, we act. Because the argument of this thesis is constructivist and pragmatic, the term engagement refers to the nature of discourse that produces the perceived reality and the actions that flow on from this. The term has been previously used by the researcher and his colleagues in a conference paper (Ledington & Ledington 2001) and a Masters thesis (Houghton 2003) to describe the process of 'engaging ideas and situations' to make sense of problem situations. Checkland's understanding of the comparison phase in SSM lends itself to this kind of thinking. The idea of constructing systems models is to use them as epistemological devices in 'comparing' the different worldviews about the situation in order to structure debate about change. The models are used both to 'engage' the participants epistemologically speaking (that is, to cause them to systemically reflect on the situation) and to accommodate conflicting worldviews (Checkland & Holwell 1998a). Checkland's idea was based socially constructed realities (Checkland 1999:32-4) designed to be 'engaged' with the world in different ways (Checkland & Scholes 1990:43).

Here, engagement is used to explain how we cognitively relate to the world and the way in which we participate in it. For example, when considering what a university is (or is not), thinking along Checkland's lines may say it is a system for delivering education. Groups who are not fond of universities may respond to that by saying, "it's a sausage factory" or other groups may say, "a place of enlightenment". There are many different ways of thinking about a university and each point of view about it may be equally valid. Social reality is much more ambiguous, mysterious and complex to understand due to the inherent messiness and political nature of human affairs. An engagement is the way in which we choose to create a meaning-based relationship (as a springboard for action) with the world outside our own reach and the world at hand (Berger & Kellner 1981). These could be: the actions taken as a manager, our perception of what an 'injustice' is, how we think the poor should be treated and so on. An engagement is the way in which people perceive, build mental models and take action in the world. This could be, for example, a job. The way a hairdresser cuts hair is an 'engagement' – why do they cut hair that way? –because that is how they engage with that particular area of their job. When we engage

'problematically' with the world, we have perceived a mismatch to what we originally desired. The problem stems from the way in which we engage with the world as we perceive it to be problematic. When the way we are engaging with the world is problematic, our desires and expectations (Ledington & Ledington 1998) inform us that something is wrong. The term engagement, then, is used as way of saying how we build mental constructs in our meaningful human activity and how these are reflected in both the perceptions we have and the physical actions we take.

Engagement also describes how we are involved with the world, for example, the way in which actions are taken and the involvement a person might have in the world. In the civic engagement literatures, the term is used to mean the involvement of people together for some social benefit. Those engaged in social problem solving are exchanging ideas, trying new things and taking collective action towards a more desirable situation. Ackoff's (2000) problem dissolving discussed later is a way of making a new way of seeing or engaging with the world of action. He argues that messy problems require a reorganisation of 'subsystems' to build a way around the mess.

1.2.6 Conceptual frames

The term 'conceptual frame' refers to understanding something through a set of ideas or a viewpoint. Haynes (2001) uses the term 'perspective', while other systems scholars such as Checkland (1981) use the term 'conceptual model'. For the sake of clarity, the term 'conceptual frame' is used to mean worldview, viewpoint, perspective and the like throughout this thesis.

This concept originated from the work of Checkland and Scholes (1990), who suggests that all intellectual work uses a framework of ideas, inside or embodied in a methodology to explore an area of concern (further explained in Checkland and Holwell 1998b). A framework of ideas is a useful way of explaining the way in which we think about something that concerns us because it reflects the perceptions we have as being a mental model (Senge 1990). The term is used frequently through the action research field studies to 'make sense' of the ideas or conceptual material used as the building blocks for purposeful action. This is a constructivist position (Landry 1995) that argues all action stems from the interchange of meanings in social

reality or through the reinforcement of ideas in social settings through discourse. Popular culture is an example of how 'ideas' are for sale and those that find them so go about adopting them.

1.2.7 Discourse

Phillips and Hardy (2002) refer to the term 'discourse' in the simpler sense of the word being defined as the practice of talking and writing. More to the point, they quote Foucault (1965), who argued consistently that 'texts' of various kinds bring into the mainstream thinking ideas and unconsciousness into the sphere of consciousness. In the central part of the engagement model is the idea of 'discourse'. This idea of 'discourse' suggests that talking and writing are the building blocks of social reality. Further, social interactions cannot be understood without reference to the discourses that give them meaning. The term discourse is used simply to describe the communication and relationships between people and their conversation that helps to build their engagement. Texts and conversations in organisations are ways in which individuals meaningfully construct social reality and discourse is the bridge between a mental model and the observable output of putting that mental model to use at work or other setting.

When considering the modern media and the presentation of terrorists, the idea of 'discourse' and its relationship to reality becomes a lot clearer. Discourse on one side of the world might use the word 'heroes' to define the acts carried out by terrorists, where others might use the word 'cowardly' to help in making sense of the actions taken. The media uses this kind of discourse to help in the construction of reality. They achieve this by using suggestive dichotomies, divisive language, and creating acceptance based on emotion rather than well thought out perceptions. In this thesis, the discourse is seen as it is commonly or generally understood to be, and this is as the building blocks of reality. These so-called building blocks are not limited to language but the ideas that form the basis for discourse in the first place. Hence, the term is used to describe the process of perception, action and communication and not just the use of language. When we engage our ideas into problem situations we are actively putting concepts to work, and in social reality this is achieved through conversations and meaningful action (Checkland 1981; Davies & Ledington 1991; Ledington 1992).

1.2.8 Human activity systems

The human activity systems concept is used (in Ackoff [1974], Checkland [1981] and Churchman [1968, 1971]) to describe the purposeful structuring of human activity in a systemic manner. For example, the sales system is a way of thinking about how sales departments are structured. A human activity system is a meaningful way of saying, 'structured action in a systemic way' because it helps to see the overall process and purpose of a group of individuals working together. Modelling these human activity systems is a required practice in soft systems methodology because it forms the basis for meaningful debate about change (Checkland 1999). In this thesis the term is used as a meaningful way to describe the meaningful construction of purposeful human activity.

1.3 Importance of Research: the problem with problem solving

This section argues that human activity problem solving is messy and cannot be solved with simple calculative methods as may be possible with well-defined maths problems.

There is a reasonable body of evidence in the problem solving literature to assert that dealing with human problem solving is a complex, messy affair and therefore calculative approaches are not adequate, as exemplified in the work in Soft Systems Methodology (Checkland 1999), Ackoff's interactive planning (Ackoff 1978), McFadzean's creative problem solving processes for groups (McFadzean 2002a). As early as Churchman (1968), the argument was made that technical or linear and mathematical approaches such as Polya (1962, 1965) are inappropriate for social systems 'complex' problem solving.

There is a substantial body of literature that has consistently argued that complex problems are not linear in their nature (Ackoff [1974], Checkland [1981], Churchman [1971] and Koestler [1968], for example) and therefore mathematical programming techniques are no longer useful when it comes to social problems. Gao (2005:9) takes

the argument a step further by arguing that every problem solving approach differs, because: "these [problem solving] methods are developed for different problems (e.g. mathematical problems, human problems) and targeted at different types of users". The literature in general has continually presented the idea that social problem solving is a complex, messy affair and is a lot more intricate than simply applying a method to provoke a certain kind of response from the area of concern. Consider these authors for example:

Churchman (1968) argued that planners will often build their own assumptions into 'systems' so much so that they will build systems that meet the needs of some kind of abstract customer, that represents in essence what the planner thinks meets the solutions best. He argued, "the scientist does not look for a real customer, but an abstract customer concocted out of a multitude of conflicting interests. Even so, how does he justify this construct of the mind?" Churchman argued in several of his works that problems cannot be solved with 'technical' approaches (Churchman 1971, 1979).

In a similar manner to Churchman Checkland (1981) argued that problems of a social, ill-defined nature are those that rely explicitly on human actors to create them. He used examples like, should I marry this girl (pp.65-6) or what is a prison (Checkland 1999) to illustrate the point that social reality is constructed and very problematic. Further, Checkland (1999) lists as his first 'constitutive rule' for the use of soft systems methodology as being that a user must accept social reality as being socially constructed (p.34). Other papers by Checkland refer to the social world as an ever-changing flux of messy situations (Checkland & Casar 1986; Winter & Checkland [2003]). Unlike Churchman, Checkland takes a constructivist position insisting that social reality can never be objective.

Dooley (1999) presented the argument that problems of a social nature are generally messy. Dooley argued (p.3): "A problem is a lot like an mushroom: there is usually a great deal more to it than you can see, and the part that gives it its true scope and strength to persist is often out of sight. Moreover, many of the problems we face cannot be 'solved' once and for all, but are indistinct messes which we can only hope to 'manage over time'". Dooley incorporates the 'perspectivialism' of Churchman

and the Constructivism of Checkland but presents the idea that messes cannot be 'solved' as such. This differentiates Dooley from Churchman and Ackoff who maintain that it is possible to dissolve messy problem situations.

Stacey (1996) argued that methods designed for controlling difficult situations typically underestimate the complexity and messiness of social arrangements. In a later article, Stacey (2003) argued that learning takes place in the context of the interconnectedness of individuals in social environments, and further, any hope to reduce this complexity may result in problems in other parts of the organisation. Stacey rejects the idea that problems can be controlled via any process or methodology because of his stance of the social order of things as being chaotic and control is an illusion created by deterministic management thinking. Interestingly, Stacy's work remains as a critique of systems thinking which he calls a half-way house. This distinguishes his complexity perspective because it relies on the doctrines of chaos, complex interactive processes and so on instead of systems ideas as Ackoff, Churchman and Checkland do. Others like Liebl (2002) have similar ideas. Stacey also rejects the idea that messes can be solved or dissolved (see chapter 2).

Liebl (2002) extends the idea of the complex problem by arguing that most communities (group-based problems) behave like moving targets that once defined can be re-defined, and such social situations often escape easy definition. Liebl also presents the notion of 'moving target' as a metaphor for describing how problems regularly change shape in social situations. Liebl argues that typical problem solving approaches completely fail when facing the reality of complex social systems, an idea also found in Stacey's body of work. Liebl states: "It is because of this political dimension that societal problems can be regarded as issues that represent moving targets both in terms of content and mobilization."

A key argument made by O'Loughlin and McFadzean (1999) is that calculative or so called technical problem solving approaches typically reduce the complexity down to a known set of variables, therefore limiting the scope of problem solving activity. In some cases, problem solving activity is only solving small sub-strata of the overall complexity involved in the problem, therefore playing havoc with unseen organisational complexity. The authors argue that such complex problems are not

easily quantified with mathematical modelling or even reductionist logic; instead they should be understood from the process of how people approach and solve problems.

Further to this, several authors argue that problem solving practice is poorly done. Tucker, Edmonson and Spear (2002) studied workers in a hospital for 197 hours to discover a recurring pattern of workers solving problems that immediately affected their area of concern. The researchers were surprised to note that the problem solving efforts of staff actually hindered later organisational development, because the issues that people dealt with on a daily basis were connected to bigger issues. Therefore, the bigger 'organisational' level of learning was hindered. Gopal and Prasad (2000) argue that typical approaches to problem solving are overly 'reductionist' and rely on technical analysis such as mathematical problem solving and statistical decision making. Mingers and Rosenhead (2004) argue that problem solving activity for 'unstructured' problems needs to encompass key uncertainties as well as incommensurable or conflicting interests. These authors, as well as others like Checkland and Churchman quoted earlier hint at the systemic nature of messy problems and how solving them requires systems level action. Activities like: frame shifting and determining new social arrangements can also be found here as it can be in Dooley (1999) and Stacey (2003).

Following on from these authors, McFadzean and Money (1994) argue that a problem needs to be handled uniquely in context because of the changing flux of situations in which problem solving activity takes place. Moreover, problems are of varying types, and the approach should therefore vary as the situation and context demands. According to these researchers and others like Checkland (1999), Liebl (2002), Stacey (2003), Ulrich (2003a) and Wheatley (2001), there is a need to explore complex problem solving and come up with better approaches. Case studies listed above (Tucker et al. [2001], for example) also point to the need for better understanding of both organisational problem solving and modes of practice. Therefore, considering that complex problems of a social nature are extremely difficult to solve, even if they can be solved (Rittel & Webber 1973), more research into the area of complex human problem solving would be beneficial.

Initial research on technical problem solving (Newell & Simon 1972) and decision making (March & Simon 1958) focused on rationalisation to a mathematical or reductionist view of reality (as in Polya [1962, 1965] and Simon [1997]). A problem here is seen as a 'thing to be solved' or fixed (Checkland 1999). Every problem comes down to a set of rational choices with clear alternatives. At the heart of this debate is the idea that problems are solved and decisions are made through the analysis of clear choices, as in the diagram below:

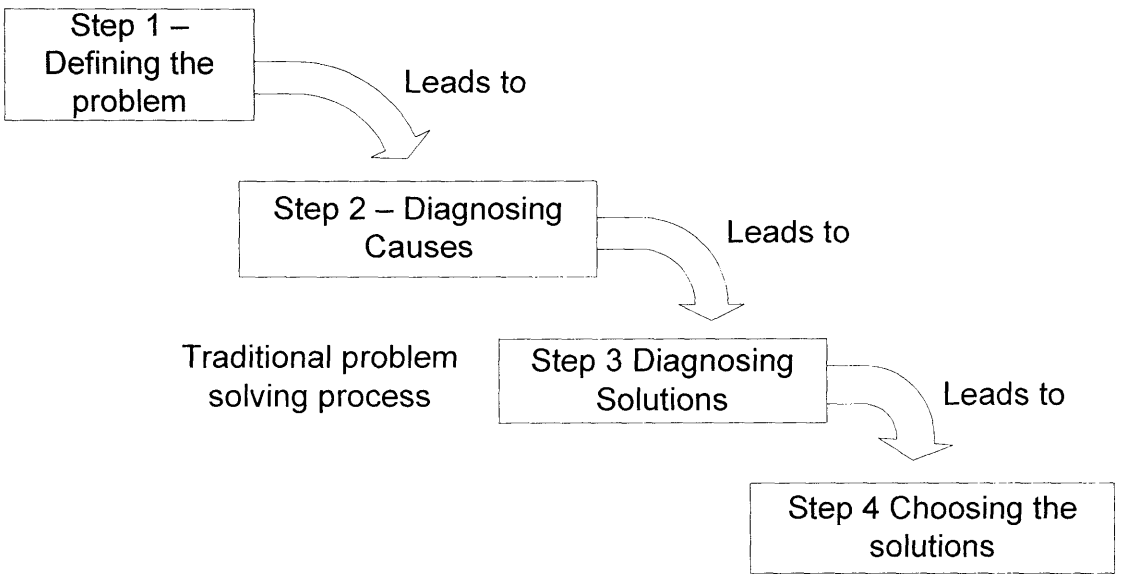

Figure 1 - Traditional Problem Solving Model (Newell & Simon 1972)

The traditional approach places great emphasis on problem definition as the initial step. Once the problem is defined, causes can be found, which leads to solutions being implemented. The following section argues that such a logical and rational approach does not engage the problem but only presents one particular picture of what the problem is likely to be. Modern literatures on problem solving argue for using multiple concepts (Churchman [1979] for an early example) in a process of 'engagement' to appreciate problems. An argument for the use of the term 'engagement' to describe problem solving and decision making activity is made because it better describes the process people actually go through while solving problems.

1.4 Towards engagement in problem solving

March (1978) argues that the search for intelligence in decision making is an effort to rationalise apparent anomalies in behaviour under conditions of ambiguity (see also March [1988]). He goes on to argue that actions follow either from working out consequences explicitly in the form of objectives or from rules of behaviour we determine from our environment. Simon (1997) takes the argument further:

> To the best of our current knowledge, the underlying processes used to solve ill-defined problems are not different from those used to solve well defined problems. Sometimes it is argued, to the contrary, that solving ill-defined problems involve processes that are 'intuitive', 'judgmental', or even 'creative' and that such processes are fundamentally different from the run-of-the-mill, routine, logical, or analytical processes employed in well-structured problem-solving. (Simon 1997:128)

The rationality underpinning Simon's and also March's work is one based firmly on the idea that all problems can be solved through a logical, reasoning process (March 1988) and are the result of "satisficing" and a "bounded rationality". Bounded rationality meaning that a manager is said to have only partial information on which to make decisions and as such will make choices that are bounded by the limited amount of information they have. In summary, four main arguments are consistent through the March and Simon literatures:

1. Problem solving of all kinds is a process of gathering information for reasoning (Simon 2000), and therefore problems should be solved in this manner instead of through 'intuitive' or 'creative' means.
2. Problems can be explained through conceptual frameworks that are applied to problems (Churchman 1968:14).
3. There is a consistent argument (and in later texts a presupposition) that the problem is to be identified ahead of time. Newell and Simon's (1972) classic (see earlier diagram) assumes throughout that problems require definition prior to their solving.
4. A lack of information is what stops an optimal solution from being reached (bounded rationality – March [1978]).

The wicked problem solving literature agrees (see Rittell & Webber [1973] for one example) that reasoning and information are important factors in real world problem solving practices. Simon (1960) argued that problems are gaps between what is desired and the present reality. Therefore, problem solving is a process using tools to reduce the gap between desired and present reality.

However, the researcher argues that complex problems cannot be reduced to a known set of variables, they escape definition most of the time and there are more factors than 'information' causing these problems not to be solved (i.e. they are systemic, political, messy affairs). While March and Simon's work presented us with the ideas of reasoning and information (as well as process – see for example Cohen, March and Olsen [1972] and later March [1988]), there is a need to extend their definition to concerns raised from current problem solving literatures. Chia (1996), in recognising the seminal work of March, argues that, while genuine insights were gained, March's work did not go far enough in exploring the deeper issues related to problem solving. Such problems like the epistemology of problem solving under certain conditions and the role of what problem solvers consider knowledge to be was a chief part of Chia's argument.

The following section will present some arguments from the complex problem solving literatures that argue that there is more to problem solving than only reasoning and information, as argued by Simon and March.

1.5 Complex problem solving is different

Rittel and Webber (1973) argue for a distinction between how tame or simple problems and wicked or complex (complicated) problems are solved. Their definition of a wicked problem is explored in more detail in chapter 2. Mingers and Rosenhead (2004) argue that wicked problems (or what they call unstructured problems) have unique characteristics: multiple stakeholders, multiple perspectives, conflicts of interest, key uncertainties and important intangibles (unseen tendencies). They argue that problems of this complex kind are more strategic in nature than those that give

themselves to easy and simplistic interpretation. Rather they need a different solution to that offered by Simon and March.

Jonassen et al. (2006) concluded that often in classrooms students are given problems to solve that are well structured, but when the transition is made to work they find a shortfall between their education and what they experience. In particular, they argue that a student in class solves problems that already have a number of easily available solutions. They use the language 'workplace problems' and refer to them as being ill-defined, vague in their goal definitions, they have unstated constraints, multiple criteria for decision making, escape definition, multiple possible answers with no clear solution path and no consensus on what the appropriate solution is.

There are many others who argue that social oriented wicked problems are not given to traditional methods. Gopal and Prasad (2000) argue that the traditional approaches are reductionist in problem solving, which Senge (1990) and Flood (1999) also contend is an issue in real world problem solving. For real world problems, Churchman (1968) contends that no one approach can claim to solve the world's problems and that this is 'nonsense.' He argues that technical analysis reduces the complexity of problems and removes the true multidimensional nature of problem situations. Ackoff (2000) argues that problems are systemic, and by moving to new social arrangements problems can be dissolved. By changing the 'system' around the problem and shifting perspectives off the problem, it is therefore dissolved. De Bono's (1967) lateral thinking hints at this process.

Simon's work, though important, did not take on the suggestions made by these authors and others, which is really oriented towards 'conceptual frame shifting' as a form of problem solving. Churchman (1971) argued that, for true problem appreciation to occur there needs to be multiple concepts used for each problem from many different theoretical constructs. Others have picked up what Churchman was suggesting by arguing that he was arguing for a form of 'boundary critique' (Ulrich 2003a) that encouraged seeing a problem from many different frames in order to structure it properly. Haynes (2001) argued that, while Churchman didn't use the term 'conceptual frame shifting', he encouraged the action of seeking multiple boundaries and hence perspectives in problem solving. Churchman accepted the

information and reasoning arguments, but added the idea of synthesising different conceptual frames on a problem, thus gaining a richer understanding of the situation. He used this to great effect in Churchman (1968), where he argued by presenting different arguments against his own systems approach, thus highlighting its strength and weakness.

Checkland has consistently argued that problem solving activity is a renegotiation of social reality (Checkland 1982a) towards a more acceptable answer. Checkland (1981) argued that social reality is socially constructed with various conflicting conceptual frames on what things are and how they should be understood. Checkland's work in general stems from the Kantian idea of subjective reality, where the actor can only learn from applying mental constructs from the flux of events and actions we call the 'lifeworld' (Checkland 2005).

The review thus far suggests that problem solving activity is not just a process of reasoning and gathering more information, as suggested in the traditional sense of problem solving activity. The traditional view of problem solving and decision making has made a few adjustments to these criticisms, although some ground has been given (March 1988). In particular, March (1988) hints at being an apostate by challenging the structuredness of decision theory. Others like Isenberg (1986), for example, argue that there is more to problem solving and decision making because of 'opportunistic thinking'. In his case study, Isenberg presents evidence to suggest that managers will quite often 'think aloud' to solve problems and hence come up with solutions first then try them out. This suggests that problem solving often occurs through an intuitive creative process more so than the logical behaviourist approach put forth by traditional management scientists. Isenberg (1986) is essentially arguing that information processing (such as March and Simon's [1958] idea that information search is crucial to how people make decisions) is important, but often people gravitate towards a solution before they conduct an information search. Often, Isenberg argued, managers create a meaningful solution to the problems prior to information search. Isenberg's study highlights an important development for problem solving which is that often 'solutions' are sought ahead of problem definition. A manager might 'engage' the situation as a way of structuring the

problem by conjecturing first (talking aloud in Isenberg's case), because they find this process more in line with how they think.

More recent studies argue that problem solving activities for real world situations fall short of how people actually think. Metcalfe (2005) presents the argument that coming up with a 'conjecture' as a conceptual frame requires thinking about a problem in a way that is akin to the realities of practice. The traditional approach is brought into question by Metcalfe (2005) because it fails to address how people actually think. Metcalfe (2005) uses Gilbert's (1991) analysis of the psychology literature to point out that people will generally gravitate to belief in something (like a problem) rather than disbelief due to embedded norms and values in the sub-conscious.

Other empirical studies conducted in problem solving by Jonassen et al. (2006) suggest that students solving problems will often defend a constructed conceptual frame that is used to solve problems and defend it on the basis of belief. Polya (1962, 1965), the classical mathematical problem solver, actually argues that conceptual frames need to be applied in advance of problem solving activity by suggesting that the problem needs to be 'understood first'. That is, a conceptual frame needs to be built in advance before an appropriate action and to establish so-called root causes. Mingers (2001) argued with his multimethodology approach that each methodology is built on a set of assumptions (frames) that will provoke some kind of response from the world. The key to the argument for Mingers (2001) is that ideas can be applied to a problem from many different conceptual frames to gain a richer understanding of problem situations.

McFadzean and Money (1994) argue for the same approach to problem solving activity, saying that each situation has 'unique characteristics' and therefore requires different approaches to get it to work properly. Different conceptual frames provide differing approaches. Others have argued that problem solving is a creative process (Flood 1999; McFadzean 2002) that makes use of 'ideas' to better understand and develop the problem solving process as opposed to explicitly defining it. These ideas can be thought of either as conceptual frames or as the result of using a particular conceptual frame. They facilitate deciding what necessary action to begin taking to

improving the problem situations. By placing the solution first, problem solvers are coming up with a conceptual framework that can either be refuted or accepted. Other authors argue for this kind of approach:

> Churchman (1968) argues that the assumptions of the majority of management science methodologies and others contain certain kinds of ideas that constrain problems to certain answers. He included his own 'systems approach' in this category. Later Haynes (2001) called this 'perspectival thinking', which encourages multiple perspectives of a problem situation. Here Churchman is using the more generic approach of thinking through alternative conceptual frames.
>
> Ackoff (1999) argued for shifting conceptual frames as a means of 'dissolving' problems. Recognising adjacent, sub or supra systems that the problem exists within usefully shifts the conceptual frame being used to see the problems. By changing the system used to see the problem as part of that system, the problem becomes redefined.
>
> Liebl (2002) suggests that defining a problem first is dangerous, because problems are like moving targets, once defined will change again only to be redefined. Complex problems by their nature require an explicit conceptual frame agreed to begin with in order to assist in the process of helping to understand them.
>
> Neiderman and Desanctis (1995) argued for the creation of a structured argument as a way of facilitating group problem solving in organisations before the definition process begins. In their words, it was more important to generate ideas privately prior to the problem solving activity before generating them in public. The process of forming ideas from explicit conceptual frames ahead of time for group problem solving can actually facilitate getting agreement on what is the problem by the wider group.
>
> Basadur et al. (2000) argued that, by changing the conceptions of a problem through collaborative behaviour, a problem situation (or his case dispute) can

be resolved more effectively. He argues that, by allowing parties to define the problem rather than trying to solve it, a situation is created where new conceptual frames on what the problem actually is can emerge. New conceptual frames, he argues, allow people to create a meaningful interpretation and direction for the problem to be solved. Basadur et al. actually use the term 'conceptualising' to mean problem definition and idea finding. By working closely together to find the definition of the problem, people are often searching for a higher level arrangement that better meets the needs of the group in a 'win-win' situation. Therefore, by creating meaningful conjectures and searching for new ideas, problems are solved as they are defined.

Checkland's (1999) conceptual modelling process is an attempt to create a model used to structure a debate about change. The modelling process itself presents meaningful epistemologies about the problem situation by attempting to use systems modelling to present a certain 'framework of ideas' as a way of attempting to solve the problem. As Bergvall-Kareborn (2002) argues, the conceptual modelling phase has the potential to create a new way of seeing the problem that actors may have not been exposed to before. In her paper, the author outlines some radical adjustments to the SSM to include descriptions of functions as a means to create a more radical discourse.

The complexity movement (Stacey 2000 et al; Wheatley 2001) argues for the use of complexity theory in understanding organisational life. Of their key ideas used in Stacey (2003) is the idea that we cannot know how to solve some problems but rather through meaningful analysis use concepts like autopoiesis as a form of explanation. Concepts are used in this movement to explain the unexplainable to help learning within the unknowable (Flood 1999).

A growing number of literatures call for problem solving interventions that 'engage' ideas into problem situations in order to help define problems rather than defining the problem first. For the purposes of argument, approaches that rely on the 'ideas' first problem structuring are called 'engagement' approaches. Therefore the term

engagement is used as a better way to think about problem solving and decision making than the traditional approach because:

1. Problem solving should reflect how people actually think (Metcalfe 2005) and be geared towards the realities of the management world (Nutt 1999).
2. Problem solving should encourage perspectival thinking (Haynes 2001).
3. Problem solving often takes place as problems are defined through the engagement of ideas into that situation (for example Basadur et al. [2000] and Jonassen et al. 2006]), not by completely defining the problem up front.
4. There are other factors outside of reasoning and information that can affect problem solving activity. For example, Jackson (1999) argues that, in coercive contexts, resources and managerialism may limit problem solving activity.

In this thesis, two case studies were used to evaluate an 'engagement' approach where a conjectured model is used to explain different problem contexts in the manner mentioned above. The following section will show how this research will be conducted and provide an overview of the thesis presentation.

1.6 Thesis content

A summary of the thesis structure is laid out in the table below:

Chapter 1	**Introduction** Research questions, choice of terms, motivation for the research.
Chapter 2	**Problem Dissolving** This chapter examines the literature on problem solving to argue that wicked problems can be thought of as perspectives.
Chapter 3	**Cognitive Engagement** This chapter argues that the engagement model as presented by Ledington and Ledington is a useful conceptual frame for thinking about problem solving activity.
Chapter 4	**Research Methodology and Design** This chapter explains why a case study approach was considered the most justifiable.
Chapter 5	**Findings** The two contextual case studies are used in this section as empirical evidence for the main argument of this thesis. The two cases are: developing organisational strategy at a decentralised aid agency and understanding adoption of a supply chain enterprise system.
Chapter 6	**Conclusion** The final chapter takes a reflective look at the outcomes and makes some suggestions for future research. There is also a commentary on the use of engagement and the future of the approach.

Table 1 Thesis Chapter Summary

The settings chosen for the empirical evidence that makes up part of this thesis are two companies experiencing a significant problem. Each has been deliberately chosen to explore the constructs of what is a typical organisational problem solving environment. In different organisations, problems are solved according to the real world pressures and social constructs in that particular setting. For example, issues like funding and compliance are involved. It will be shown how conceptual frame shifting, engagement, provides a 'solution'. The demographics of each case differ significantly, so the structure, needs, problems and issues involved are completely different. The major point of selecting these different companies for the case work (as described in chapter 3) was to emphasise how using the conceptual frame of engagement provides a useful interpretation of the problem faced by these two companies.

1.7 Summary

This chapter presented the thesis argument and overview of the research terrain. The chapter reviewed the literature on problem solving to argue that there is a need for more research in this area because key concepts such as perspective shifting and

conceptual framing receive a fairly sparse treatment in the literature. In particular the chapter argued that problem solving activity should take an 'engagement' approach which encourages perspectivialism, how people actually frame problems (or how they think) and move beyond traditional rationalism that argues for 'more information.' This final point was argued in the chapter to point towards problem solving activity that is not just about reasoning and information gathering but the type that encourages the use of ideas first (called engagement) thinking. The chapter also used the critical systems literature to argue that messy problems often suffer because of political concerns such as: managerialism, coercion, party politics and so on.

The chapter also presented a brief suggestion that is proposed to be a less technical approach to problem solving which is called the engagement model. The model aims to facilitate a less methodological and therefore technical approach by appreciating the participants' conceptual frames and managing the tension between them. What follows in the latter half of this thesis is an exploration of that concept through case study research. Before that however, the following two chapters review the literature on problem solving to argue that there is now significant support for seeing problem solving as being about shifting conceptual frames.

Chapter 2 Problem Dissolving

This chapter argues that ill-structured problems can be thought of as actors using conceptual framing to create the problem and subsequent solutions. The actor concerned creates the problem through their interpretation of events and conjectures solutions through appreciation of the situation. This means that "solving" problems is about changing the conceptual frame, to a "solution" that creates new interpretations, of whoever has identified the problem. Ackoff (2000), in his classic example of the London bus strike, calls this 'dissolving' problems. In the bus strike, which was a considerable disruption to public transport at the time, the bus drivers wanted to get around their route quickly to earn a bonus, while those who rode in the bus collecting fares and issuing tickets, the conductors, wanted the opposite. The conductor was penalised if he or she missed collecting a ticket, which was at risk of happening during busy commuter times. Ackoff reports that the problem was dissolved when the negotiators shifted their conceptual frame away from just what was happening in the bus, to one which considered the bus route in term of the number of buses on a route, the number of stops and the distance between the stops. Extra ticket collectors were placed at the bus stops to assist the workload of those on the buses.

To put it in more generic terms than the bus strike example, Berger and Luckmann's (1966) seminal work on the social construction of reality argued that reality was not a concrete thing to be manipulated but an intersubjective web of meanings that interacts and evolves through group meaning, action and perception. The social construction of reality for Berger and Luckmann is the idea that reality is built upon the discourse processes of individuals interacting with each other in the meaningful world of human affairs. Grint (2003) argues that, 'what counts as "true", as "objective" and as "fact" are the result of contending accounts of "reality"'. These contending views of reality are differing conceptual frames that are created through our language and discourses. Therefore, reality is often a temporary fluid process that is collectively interpreted as being meaningful by groups of people. At the heart of this argument is that society is an ongoing human production that is consistently changing through the variability of human action, language and discourse. Whatever reality there is, according to Berger and Luckmann (1966), is the result of the human being creating institutions in social

systems according to certain kinds of constitutive rules. These institutions are sustained through meaningful human activity that shapes and guides the consistency of these institutions.

Increasingly, parts of the problem solving literature align with this conception of problem solving. For example, Landry (1995) directly argues for constructionist accounts of the concept of problems as being the result of group interpretations and interactions, discourse and multiple expressions of the problem situation. Problems are constructed realities by those who deem observed phenomena to be of some concern. As Landry points out, the constructivist position requires the problem constructors to be the ones who solve the problem, because they have interpreted the existence of the problem in the first place. What this means is that problem situations are the result of a social construction process, which required concerned human activity to construct it in the first place. Landry also notes that the constructivist view of problems asserts that the problem is not an independent reality (available to the entirety of humanity), but is only problematic to the groups that construct it as such. This agrees with the later work of sociologist John Searle (1995), for example, who asserts that certain social realities require established practices to make them work. Searle's work highlighted that there are intentions built into the construction of social reality. These intentions form the way in which certain actions are to be interpreted. Things like ownership of property, the financial systems of the world and other arrangements rely on inbuilt assumptions and intentionality to constitute their existence.

A social problem from the constructivist point of view is the output of individuals coming together in some kind of cooperative enterprise in real world purposeful activity. At the centre of this relationship is the human being, not a group of causal laws determining the existence of 'reality'. Reality is a fluid, ever-changing process of interchanging discourses and rhetoric which is not dependent on causal laws but on the '...vicissitudes of social processes (e.g, communication, negotiation, conflict, rhetoric)' (Gergen & Gergen 2003). Such variability in human life is evident when reflecting on past history. Decisions made to conquer continents and execute 'savages' were seen to be quite acceptable to cultural imperialists of the time but are now socially condemned.

Part of the evidence in support of the argument for this constructionist view of problems is the complexity of real-life, messy, wicked, ill-structured or social problems. For example, Grint (2003) argues that:

> A wicked problem is complex, rather than just complicated, it is often intractable, there is no (uni)linear solution, moreover, there is no 'stopping' point, it is novel, any apparent 'solution' often generates other 'problems', and there is no 'right' or 'wrong' answer, but there are better or worse alternatives.

Incidentally, Connell (2001) argues that Checkland and Howell's (1998a) suggestion not to use the terms 'problems' and 'solutions' but rather focus on 'learning' moves the language away from management practice to something reminiscent of their schooling. Therefore this thesis will use the more 'Saxon' term of 'problem solving'.

Dryzek (1987) points out that traditional forms of rationality prevalent in social and political science do not adequately represent the complex problem. This is because even the most refined form of instrumental logic, when applied to simplistic problems, is overly rational and cannot comprehend the overt complexity contained in socially constructed problems. Complex human systems for Dryzek (1987) are those that have systematic variations with their environment because of the multitude of actions they take and interpretative solutions they generate. Dryzek (1987), (like Ulrich [2003a] and Churchman [1968]), advocate using a variety of interpretations in a single conceptual frame to shape problem situations. Underpinning this is the idea that complex problems are interconnected perceptions of a situation competing for attention. Each interpretative solution we generate is only another possible solution to a socially constructed reality.

McFadzean (2002ab) argues that social problems are complex and difficult to define. As well as this they require special teams to be assembled each time, and every complex problem situation is different from the last. The language of McFadzean is that each problem has new dynamics that need to be understood carefully in order for real change to be forthcoming. The process for generating solutions must also

continue to use new and fresh ideas and therefore different conceptual frames. Framing for this author relates to forming unique socially constructed solutions to new problems as they occur.

Jonassen (2000), in like manner to McFadzean, argues for the complexity of ill-defined problems, referring instead to the way in which they are structured. In particular, the domain specificity (area of concern) will need a new development of ideals, structure and practices that are likely to work. In this case, the argument hints at Ackoff's process of problem dissolution (Ackoff [1978]), which is defined as changing the conditions that cause certain problems to exist by modifying organisational sub-systems. The author is arguing for a new social reconstruction where the various elements of the problem are reframed and carefully studied from many different angles. The more relationships between the parts of the problem the more complex and impossible to solve it will be. Therefore, a new conceptual structure for the problem is required.

From a scientific point of view, some have argued that certain types of neural patterns support the ideals of conceptual frame shifting. Jausovec (2000), for example, argues ill-structured problems are seen as open (open solution and situation) with no clear solution and a multiplicity of possible outcomes. Using empirical data analysing brainwaves, the author found that different personality types can account for ill-structured problem solving. The different "frame" produced by personality type in essence is more successful in solving the problem because it offers another more "creative" starting point.

Another author, Fabian (1990), argues that problem solving of a less technical nature is a socially creative process where ideas are exchanged and possibilities explored as a means of offering conjectures or conceptual frames in advance. Fabian also argues that creative problem solving, stemming from intuitive "right" brain thinking, has to make use of spontaneous 'irrational' creative processes in order to be effective. This means, that problem solving relies on certain kinds of conceptual frames, used in conjunction with a intuitive thinking (e.g. brainstorming see Evans (1996)) to be effective.

Others argue that while problems are socially constructed, they are also socially reconstructed through the use of various frames and this process needs careful scrutiny in practice. Dietz, Barker and Giberson (2005) argue that, with each attempt to solve a complex problem, there are results in a changed understanding (conceptual frame) of the problem and hence a socially constructed redefinition of the problem. Each new conceptual frame redefines the problem to a new understanding. That is, the problem definition evolves as it is defined. This argument is similar to Mingers and Rosenhead's (2004) argument that a problem is defined (framed) as it is solved. The authors also agree with Rittel and Webber's (1973) definition of a wicked problem, that each problem has many possible solutions with no clear immediate answer.

A central argument for the constructivist position is that these complex problems, at least, can only be approached by not 'picking them apart' into variables, but rather the whole needs to be maintained and 'x-rayed' by applying different conceptual frames. Mitroff (2004) attributes this idea to the Pragmatic philosophers like William James, explaining how conceptual frame represents different types of knowledge structures, which in turn define the problem differently. Mitroff argues that the creative thinking of James reveals the nature of complex problems because it welcomes different types of knowledge representations (epistemologies/cognitive structures) to give different 'conceptual frames' to the problem. This moves the constructionist view of problem solving to what might be called the conceptual frame shifting conception of problem solving. Mitroff (2004) supports the idea that messy problem solving not only involves multiple perspectives, but the use of variety of conceptual frames will lead to effective problem (dis)solving.

Mitroff (2004) does not address the use of problem structuring, except to argue that it is necessary to use contrary ideas at the same time, to gain better insights into messy problems. Daellenbach (1983) argues that approaches that foster the use of multiple conceptual frames encourage the use of problem structuring rather than solving, because it is more about appreciating the problem rather than 'solving it'. In this view, the author is arguing that problem solving processes are a part of the social construction and renegotiation of reality in which group perceptions (conceptual

frames) are seen to be very important. Frame shifting for Daellenbach creates the opportunity to renegotiate the meaning and understanding of problem situations.

Checkland's (1981) SSM employs a similar type of "frame shifting". The term *Weltanschauung* (worldview) is used to describe the way in which an actor describes the problem. It is assumed by the user of SSM that an actor will have a conceptual frame different from those around them. Each frame will have a conjecture of how the problem should be solved. At the heart of the multiple conceptual frames argument for problems in the soft systems literatures is the idea that social reality is socially constructed (see for example Checkland 1999:32–4). Checkland argues for the accommodation of worldviews and his SSM process structures systems models which are used to renegotiate social reality (see Checkland (1982)). This renegotiation process is conceptual frame shifting because it asks actors to make a new arrangement so that the problem situation can be improved.

The systems approach (revisited again later) insists on the use of many conceptual frames when structuring problems. In this vein, the systems approach of Churchman argues that problems are social constructs containing many conceptual "perspectives":

> When we see things from the point-of-view of taking a perspective we are being perspectival (as distinct from, perhaps, taking things literally). Secondly, there needs to be some conceptual assistance in coming to terms with a perspective itself of conceptual frames. In taking this elevated sense, we are, again, being perspectival. When we are being perspectival in terms of our thinking, we are thinking conceptually, that is, if we consider ourselves, it is the concept of ourselves that is being considered, not ourselves for any personal benefit (Haynes [2001]).

To be more specific, Churchman argued that to be ethical we should use different conceptual frames of problems. In essence, he can be aligned with what Landry (1995) calls the constructivist view of the problem needing to be represented by the group of participants' conceptual frames and what Checkland calls their individual *Weltanschauung*. Churchman therefore thought it necessary to explore a problem through a variety of conceptual frames.

Jackson and Keys (1984) argue, clearly influenced by the work of Checkland, Churchman and Ackoff (see Jackson (1982)) that a problem is going to contain more than just the unitary interests of typical positivist science, and therefore a pluralist orientation (many conceptual frames) is required to uncover the multiple views of the problem situations. Because of this pluralism, the context of problems is likely to contain various interacting sub-systems that will be in conflict, and hence the epistemologies represented (on the nature of the problem) are going to be in conflict. Jackson and Keys advocate the use of multiple conceptual frames, in methodological form, to uncover the many dimensions of the problem.

In more general management literature researchers like Poole and Van de Ven (1989) argued that multiple conceptual frames in the use of creating theories to understand real world problems is important because it can help see the inherent paradoxes and contradictions in real world affairs. In this article, the authors argue that the concept of paradox could be useful in understanding organisational problems because it reveals them in their true state. The use of paradox is promoted as a way of understanding conflicting conceptual frames, which leads a problem to be created as paradoxical.

The consistent theme of many conceptual frames, multiple expressions of the problem and the systemic nature of messy problems in the management literatures constantly recurs throughout the literature. Ackoff (1978), for example, has long argued that problem solving is systemic and understanding multiple views of the problem (through what Haynes [2001] calls perspectival thinking) is extremely important. In earlier works, Ackoff more clearly articulates his view of objectivity and subjectivity in organisations as being inseparable (see Ackoff [1974], for example). In particular Ackoff argued that society is an open system (one that is entirely open to influences and interactions with its environment) that contains a collection of subjectivities that result in collective observable objectivities. The search for the subjective views of those in the system where the problem is perceived is considered to be part of a bigger objective social construction process. Ackoff is probably somewhere in between the transformative view of society (see Bhaskar [1998]) and Giddens' (1979) structuration theory in his explanation of the multiple conceptual frames of problem situations. In the search for subjectivities in the problem that are a part of the bigger

social system there is a seeking of multiple conceptual frames which structures and makes sense of the problem situation.

Others like Vickers (1983) argued, from a more clearly defined constructivist position, that societies have one thing in common when it comes to solving real world 'complex' problems, and that is the role of human beings to shape, define and 'appreciate' the problem from their own mental constructions of the world. Vickers' work was later commented on by Checkland (2005) as understanding the world as mysterious and unable to be understood through anything except the way in which we structure our interpretations of it. For actors to perceive a situation to be of concern, the mental constructs they use to evaluate it must inform them of this particular view. As the multiple conceptual frames engage and intertwine resulting in multiple cognitive facilities at work in assessing the problem, different views begin to surface that might also be seen as relevant to the problem situation.

This refers to the idea of 'sense-making', that is, we often construct different conceptual frames to understand our problems. Vickers, Checkland, Haynes, Churchman and Ackoff to name a few of the authors, highlight the desire of actors to make sense of their problems, through the application of certain conceptual frames.

2.2 Making sense of the mess

In the problem structuring literature (see Franco [2006], Mingers and Rosenhead [2004] for two examples), there is an inbuilt assumption that sense-making is an integral part of problem solving. Rosenhead (1996) highlights the problem structuring approach as attempting to get problem solvers to engage with the problem by structuring it. This kind of sense-making relies on multiple conceptual frames to shape the problem situation.

Sense-making the mess refers to overlaying beliefs as causal structures (belief systems) to explain or make sense of observed phenomena. Weick (1995) refers to sense-making in organisations as applying cause maps which are imposed on the world in order to make sense of what we interpret. For problems, this means that a

situation that is undesirable to people is being interpreted or made sense of as problematic. A problem situation, as argued above, contains many meaningful constructs interpreting the situation from different conceptual frames. Each frame is a sense-making device used to help understand the problem; several authors in problem solving circles have highlighted these issues.

Weick (2001) argues that, in situations that are ill-defined when stress is at a high level, a great deal of sense-making occurs. Such people will act to create values, problem solving strategies and to find justifications that they can adequately use and defend as a way of understanding what the problem is. In defence of their knowledge about the situation, they go about constructing actions to help enforce and understand the justifications that led them to the creation of knowledge. Weick (2001) argues that such justifications are derived from actions taken first to solve the problem in order to make sense of it, with a limited epistemological understanding of what the issue was in the first place. The dialectic is between the ideas (cognitive strategies at work in the situation) and the actors making sense of those ideas to structure action. A different justification for the problem is merely another part of sense-making until an agreed solution can be reached. Unlike the traditional approaches, Weick argues that actors justify their actions by what seems relevant through sense-making to the point where they create value systems to defend.

In relationship to problem situations, Ackoff (2000) is one of many writers who see conceptual frames as making sense of the confusion in situations. He discusses how each frame on a problem highlights a more complete 'systems' picture. Economical conceptual frames, mathematical conceptual frames, social conceptual frames and the like are ways of making sense of problem situations. Ackoff also provides in evidence a case study where different academics were involved in the construction of an inner-city slum improvement program and how each disciplinary conceptual frame (when compared and contrasted) acted to make sense of their problem situation. In essence, Ackoff argues that sense making is a very important part of problem solving because it's through this process that problems can be reframed (see also De Bono [1971]).

Sense making is therefore an essential part of messy problem solving activity. Authors like Rosa (2001), who presented a study of marketing professionals who use concepts to make sense of ill-structured/ill-defined problems, rely heavily on the concept of sense making in problem solving efforts. More specifically, he decided to study marketing managers to see how they engage with ill-structured problems, how managers use concepts to create meaning in relationship to their environment and how a manager's knowledge can be dispositional to certain kinds of conceptual frames. Rosa states, 'Embodied concepts are simple mental outlines that capture aspects of our bodily relationship to the environment, and that are metaphorically transferable to nonembodied experiences'. He goes on to argue that use of sense-making is widespread amongst marketing managers in ill-defined/ill-structured problem solving efforts, and quite often environmental cognitive factors are responsible for determined solutions.

Sense making is therefore a part of the broader conceptual framing process that determines both possible solutions, and possible problems. Returning to Weick for a moment, the causal structures in our beliefs entirely limit the way in which action is conceptualised in sense making. These maps are therefore used to define what problems are likely to exist and how they can best be 'solved'. Authors Hutchinson, English and Mugal (2002) presented two cases of using a general theory of complex problem solving to incorporate different elements that are suggested in Rittel and Webber's (1973) model to make sense (apply casual belief structures to) of a particular problem. Two empirical cases in the article describe the use of a 'conceptual attack' on the problem that resulted in working towards a complete solution for the problem.

The authors' model (derived in essence from both Senge [1990] and Rittel and Webber [1973]) suggests that problem solving activity often requires a conceptual frame for sense-making ahead of time to aid the solutions generation process. In both empirical cases, the authors presented a conceptual frame that was modified through a cyclical iterative process over a three-year process. By using clearly constructed sense-making 'conceptual' devices up front, the authors argue that problems have a better chance of being solved. Sense-making for these authors involves deliberately incorporating conceptual frames into a sense-making framework ahead of time. This

kind of explicit sense making shows how causality is created by engagement of ideas into the problem framing process. The conceptual attack was an explicit use of conceptual frames, to structure, order and define the problem from many possible sense making angles.

Sense making literatures focus on the idea that meaning is created through the application of causal belief structures on reality. Gilbert (1991), takes the idea a step further by arguing that human beings create mental representations of their environment which they believe, and later go about constructing doubt. That is, belief structures are mainly positive (believing first) then disconfirmation (creating doubt) creeps in. When faced with problems (i.e. stress), Gilbert argued that a human being is likely to construct a mental representation (idea) to believe and accept this as true. Further, Gilbert argued that children often gravitate towards belief first, then as they grow older begin to 'construct' doubt in the cognitive and mental systems. The point being that when faced with a problem, people build a conceptual frame that they *believe* could work. He goes onto to argue that this kind of sense making process is inherent in human affairs. Gilbert's work is suggesting that sense-making is creating belief in the same way as Weick's work is. To appreciate an idea, according to Gilbert, is to believe in it and then structure actions around it.

Another researcher that supports this view is Jonassen et al. (2006). The authors argue that there is a great deal of sense-making in real world problem solving because often actors have to create a conceptual frame, as sense making device, to justify action so that they can effectively solve ill-defined problems. Sense-making occurs to create a causal framework (or a constructed belief) to be defended rather than applying an established formula, the authors argue. The authors therefore highlight that problem solvers create the perspective of the problem through sense-making in group situations where political considerations are substantially greater. Each frame of the problem is yet another sense-making 'justification' that the problem solver has to engage with. Like Gilbert (1991) and Weick (2001) this author highlights the application of a causal structure over the top of real world activity which in turn creates the platform for finding meaning.

Smith (1989) touches on the same ground as Gilbert arguing that the psychology of problem solving revolves around the fact that actors want to solve problems by being able to adequately represent them. This means that a problem solver is constantly theorising, defining, structuring and therefore making sense of the problem using multiple conceptual frames. As problems are defined and redefined, possible solutions are anticipated which in turn drives the problem solving process forward. Smith argues that this early cognitive activity of problem definition is directly linked with the idea that there will be solutions for the problem at some point. He states:

> This cognitive analysis paves the way for prescriptive theorizing. Preliminary to such, it should be recognized that in defining real world problems, one is often defining complex situations that encompass many lower order problems.

For Smith, the problem definition, selecting the conceptual frame, is directly connected to the solution because a definition is constructed with an anticipated solution. Hence, while the problem is being defined a solution is really being put forth. Sense making for Smith revolves around the notion of problems requiring a solution hence they are framed as such, therefore problems are conceptual frames looking to be replaced by better interpretations. Like Gilbert and Weick, Smith argues that this process is intrinsic in problem solving activity.

Several other authors highlight this process of sense making in their work. The more recent work of Franco (2006) in the domain of problem structuring, hints at a facilitative approach to problem solving through understanding conversations as conceptual frames. These conversations invite the user of the approach to create individual conceptual frames that can help make sense of the problem, even though they are diverse in nature. Such conversations are said to help actors engage in a dialogue as a particular form of conversation and to help them from this platform to produce interpretative solutions. This is a common theme in problem structuring literatures (see also Mingers and Rosenhead (2004) quoted earlier in this chapter.

In earlier problem structuring literatures the kind of thinking emerged which was built on the premise of sense making. Following in the tradition of Churchman and Ackoff, Lendaris (1986) argued from the systems thinking point of view that problem solving work needs to consider the role of teams in solving problems. The practical

concern for Lendaris is that people interact with problems in a systemic way, thus creating different conceptions (ways of making sense) of the problem structuring process. Lendaris argues that it is essential to understand the conceptual frames of those in the problem situation because of the 'systemness' of the problem situation. Lendaris uses the terms 'perceptual filters', which can be likened to Weick's casual belief maps, to explain the phenomenon of sense-making from multiple conceptual frames. Lendaris argues that, by understanding how people create, maintain and develop these perceptual filters, one can reveal the systemicity of the problem situation.

In other areas of the management literature, several key authors have relied on the use of sense making, through the application of certain kinds of conceptual devices, to explain problem solving activity. For example, Morgan's (1997) organisational metaphors are used as sense making devices. The author argues (p.6): '...fresh ways of seeing, understanding and shaping the situations that we want to organise and manage'. Further, Morgan's approach demonstrates how metaphors can provide a complementary point of view (what he calls 'competing insights') that can assist in learning and drawing from different points of view. Morgan argues that, by applying different metaphors to the areas of management under scrutiny, the bigger picture and richness of complexity can be drawn out. This is very similar in process to what Gilbert (1991), Weick (2001) and others quoted above suggest. The metaphors are used as 'ways of seeing' and in that sense create meaning for the person using them. For problem solving, this means each metaphor is a conceptual frame that can be used to make sense of the problem. It is a perspective that helps to understand the conceptual frames that problem owners have structured in the situation.

More recently in management literatures, the concept of sense making in everyday problem solving has gained more attention. A recent example includes: Hoijer, Lidskog and Uggla (2006) who argue that in late modernity, sense-making occurs as a regular way of managing organisations. The authors highlight the growing complexity of problems in the workplace (due to changing industrial relations laws for example) and suggest that sense-making means creating a standpoint and viewing multiple 'dimensions' or conceptual frames of problems. Each frame is related to another, and making sense of the many dimensions of decision making is a regular

task for the modern manager. Like Weick (2001) and others quoted, these authors argue that sense making is taking a perspective as a justification and a way of understanding the world. Although the authors do not mention problem solving as such, they argue that creating a frame (which would include problems, given that they are social constructs) is a way of structuring, understanding and applying causality to our world through our sense-making.

Another recent example of how sense making effects work place problem solving can be found in the work of McLellan (2006). The author advocates applying the story-telling approach to sense-making as a way of 'bootstrapping'. The author argues that in problem situations, there is often a multiplicity of conceptual frames at work due to multidimensional sense-making. A way to tease out the differing conceptual frames is to have different people read other people's stories or description of a situation at work in the organisation. It is argued that the story-telling process helps those in the situations understand how sense-making creates conceptual frames and to begin to see the complexity between different worldviews. McLennan also makes the point that stories emerge out of problematic situations in which people are forced to hold a view and justify their perceptions of such arrangements. This argument agrees with Jonassen et al. (2006) and Weick (2001) who argued that this is part of workplace practice.

Further, Van Bueren, Klijn and Koppejan (2003) argue that collective action in problem solving can be understood better through a social network view of conceptual frames. The social networks view is a way of understanding collective action. The authors argue that participants' frames are interdependent in the sense that the actions of certain people influence the perceptions and sense-making of others, and understanding the actual process of how the participants as a whole frame the problem is incredibly difficult. This is also because participants overlay the problem with issues around engaging in collective action (e.g. workplace barriers), introducing yet more frames. Each frame of the problem is overlayed with a frame of the social situation of the participants and quite often they are incommensurable. The problems of the workplace are therefore 'solved' through group interactions around perceptions which are deemed to be of importance. The role of sense making, is to justify the approach taken and to help actors understand the meanings of the actions they take.

Other authors take a broader view of sense making by including a definite connection between making sense and the social construction of reality. Alderman, Ivory, Mcloughlin and Vaughan (2005) for example argue:

> Sense-making represents a viewpoint that sees organizations not as fixed objective entities, clearly delimited by organizational charts and management hierarchies, but as variable and multiple representations of reality.

Further, the authors concur that through sense-making meanings are constructed, negotiated and created as constructions of social reality. Each sense-making process creates a frame of meaning to believe in and make justifications from. The authors argue from a project management perspective that the sense-making literature describes adequately the many different meanings ascribed to problem situations by various actors. In complex projects, actors have a multiplicity of frames that are exchanged and need to be accommodated because each project participant has a different idea of what the project means. Each frame an actor has is argued to be the sense they have made of that project and their colleagues. The authors also highlight the importance of sense-making by arguing that a great deal of framing of the problem at hand needs to be done in advance of any attempt to solve the problem.

James and Minnis (2004) argue that stories engage (both emotionally and cognitively) the interest of those concerned about a problem because they provide a platform for effective sense-making. Like McLellan (2006), James and Minnis highlight the notion that multiple conceptual frames are automatically invoked to tell any story effectively. The authors argue for teasing out the various conceptual frames in stories as an effective start to the search for new frames. This act of revealing frames is an act that concerned actors might appreciate. The authors argue from a cognitive perspective that this process allows a deeper understanding of the problem to emerge. This practice of seeking frames from stories calls for an understanding of the conceptual frames engaged (see Haynes [2001]).

2.3 The cause and effect frame

The dominant sense-making frame used in problem solving today is believed to be that of 'cause and effect'. In practice, this frame encourages what Dewey (1910) calls

'picking apart' problems, an attempt to identify and measure variables (elements) and then identify and measure how one variable causes the other to act. A common explanation told to demonstrate concerns over the picking apart approach involves a bike and a frog. You can take a simple system like a bike apart and inspect or modify each part and put it back together, but you cannot do this with a complex system like a frog. It has the emergent property of life. Complex problems are thought to have emergent properties and not be suitable for dissection if the emergent properties are to be understood.

This cause and effect frame is used to include a range of problem solving approaches which align with Herbert Simon's (1960) development of artificial intelligence, mainly chess playing, algorithms. These are sometimes referred to as technical, calculative, reductionist, measurement, goal-oriented or hard operational research methods. Although one useful way for thinking about problems, the pluralist approach is viewed as only one of many socially constructed conceptual frames that problem solvers might use. Cause and effect frames of problem solving can be severely limiting if seen as the only viable frame, as this severely reduces our understanding of problems. In practice, people use more than the cause and effect frame to identify problems and solutions, but often their formal technical education strongly suggests that the cause and effect frame is the only viable frame. Numerous writers have critiqued this position, arguing instead for a more pluralistic approach. The Pragmatists have often led this critique, drawing on the classic example of asking the cause of an oak tree. The seed does not cause the oak tree to exist.

Checkland's (1981) treatise on soft systems thinking highlighted the issue of reducing problem solving interventions down to a known set of variables. Checkland has elsewhere argued (see Checkland [1982b] and Checkland [1985]) that the social world is complex and contains interacting layers of shared meanings that are better understood through phenomenology rather than through scientific methods. He argues that traditional stepped approaches to solving problems make clear assumptions as to the nature of the world and cannot be easily understood by the application of naïve positivistic reductionist assumptions. One of the key arguments made by Checkland is that the social world is irreducible because of the overwhelming complexity contained in it. Therefore offering explanations of it

through just a few variables is inadequate because the richness of the social world is not captured. Checkland's argument relates directly to the social construction of reality thesis, as shown earlier, therefore his concern about cause and effect models being reductionist relates to his constructivist assumptions. To Checkland, problems are socially constructed and cannot be adequately solved or explained through what he calls the goal-centred paradigm (e.g.. Simon (1960); see Checkland [1999] for a longer discussion on this).

Prior to Checkland, Churchman, even as far back as 1946, was using non-reductionist arguments for problem solving. In Churchman (1968), it was argued that operational research methods should consider alternative conceptual frames as being as relevant to the problem situation because it is (ethically) right to do so. In later years, Churchman argued that emerging conceptual frames and systematically understanding them is essential to understanding problems (Churchman 1979). Churchman's main argument was laid out in Churchman (1968), in which he argued that each view of a problem is merely a construct that acts as a lens for understanding the problem. By reducing the explanation of variables down to one construct, the greater level of complexity at work will be ignored and other important ethical and professional considerations will be ignored.

Funkhouser and Dennis (1992), in critiquing Mayer (1992), also argue that, when reducing the problem solving process down to a mathematical process, the multiple conceptual frames of stakeholders and the process of debate are completely ignored. The authors note that the political process of debate is short-circuited because the mathematical approach firstly has to define the desired outcome or goal. By doing this, the authors argue that problems are decomposed to known solutions, and the dynamics that go into complex problems is relatively ignored. Practical solutions that are acquired through structuring (i.e. structured debate and dialectical critique) are ignored. A key point made by these authors is that traditional approaches define both the problem situation and the political relationships in the situation before solving the problem.

O'Loughlin and McFadzean (1999) also argue that decomposing problems to known variables amounts to reframing the problem in light of the method used. Each

method is a frame on a problem that needs adequate reflection and consideration but limiting a problem down to a singular cause and effect structure excludes other issues. In particular, the authors argue that a reductionist view of the problem solving process creates in the minds of problem solvers a reduced and impoverished understanding of problems. This has the effect of localising more complex problems to a known set of variables, something which other authors such as Tucker et al. (2001) argue effects root cause organisational learning. O'Loughlin and McFadzean also argued that ill-defined problems are unique in their application and manifestation, so it is crucial to understand the contextual information in each problem. In a similar manner to Rittel and Webber (1973), they see problems as being unique to the context they find themselves in and suggest that, by understanding how actors unravel problems in each situation, the irreducibility of the problem will be clearly seen. Moreover, they argue that technical methods assume that each problem context is the same no matter what the context is, and this greatly impacts the role they can play in problem solving.

Gopal and Prasad (2000) concur, arguing that using approaches based on statistical and mathematical modelling creates a reductionist picture of the problem solving process. By reducing the understanding of a management process down to a known set of mathematically programmable variables, traditional approaches do not adequately represent the dynamic nature of management activity. Management problems cannot be reduced in most cases, the authors argue, to a known set of variables in the analytical method that these kinds of approaches require. Management problems are socially constructed and involve dynamic changing factors that are not easily reduced to statistically styled analyses. Therefore, the authors argue, each cognitive frame has to be carefully understood and not decomposed to one view.

From an empirical point of view, authors like Crockett (1992) and Dooley (1999) suggest that when managers attempt to solve complex problems they are ill-equipped to do so. In Crocket's case, the argument is made that quite often CEOs will not understand the complex processes that underpin such decision making processes and instead favour simplistic cause and effect scenarios. Moreover, things actually become a lot worse when managers assume they know what will work without appropriately understanding the complexity of the organisational environment they

work in. This reductionism is dangerous, Dooley argues, because it excludes other conceptual frames and creates a limited understanding of the problem.

Beer (1994) created the viable systems model for understanding problems on the assumption that any group that wishes to manage complexity must do so in a way that it can match the requisite complexity it creates. Beer's work has, according to Brocklesby and Mingers (2005), a close relationship to the living systems conceptual frames provided by autopoiesis. Beer assumed that organisations were self-referential complexities that organised themselves through sense-making and providing requisite variety (complexity) to manage it. Beer argued that organisations could not be explained by single cause and effect models, but rather through understanding them as living complex systems. The whole system cannot be reduced down to individual parts because it will lose its synergetic value (ability to work cohesively and effectively as a whole). Each complex system manages the outward complexity and organises itself to cope, adapt and change to problematic situations. Therefore, cause and effect models do not adequately represent organisational life because they do not account for the reality of complex living organisations.

Jackson and Keys (1984) argued that problems exist in different contexts from those that are assumed by traditional mathematical models. They use the term 'unitary' and 'pluralist' to make a distinction between the different types of problems faced by managers. It is argued that unitary problems are solved through simple stepped cause and effect models, while pluralist problems occur over multiple dimensions and contain many conflicting conceptual frames. Problems are socially constructed plural realities that contain conflicting conceptual frames and deal with problems that are often complex, confusing and multidimensional. The authors argue that cause and effect methodologies are not adequately designed to manage the complexity put forth through the demonstration of complexity in real-world settings. Instead, a problem solver has to become a methodological pluralist to solve problems of this nature.

Others like Santanen, Briggs and De-Vreede (2004), as well as Fabian (1990), put the creative process at the centre of ill-defined problem solving. Fabian suggests through his text that problem solving processes are as much 'irrational' (i.e. a creative process of brainstorming and arguing) as they are rational in some cases. Fabian also argues

that this creative process is indispensable in problem solving interventions, so the stale use of the same methodological process should be avoided. The other area that has been covered quite extensively in the literature is the field of complexity science. Recent developments have sought to surpass systems thinking efforts to understanding organisational complexity. The term 'complex' is used to mean a connection of interdependent variables making up a complex chaotic whole. Stacey (1996) argues:

> Contrary to some of our most deep-seated beliefs, mess is the material from which life and creativity are built, and it turns out that they are built, not according to some prior design, but through a process of spontaneous self organization that produces emergent outcomes. If there is a design, it is the basic design principles of the system itself. It is the system that produces patterns in behaviour, and that system consists of a network of agents driven by iterative nonlinear feedback to produce unknowable outcomes that have a pattern.

Stacey is a long-standing critic of the systems thinking of Senge (1990) (see Stacey, Griffin & Shaw [2000]), but in more recent works, his acknowledged approaches to solving organisational problems have included both the critical systems and soft systems approaches (Stacey 2003a,b). According to this view, problems are the result of complex adaptive interactions between people. This view is similar to Ackoff's (1978, 2000) concept of 'messes' that argues a mess is a system of problems interacting with each other. Stacey takes this argument a step further by denying organisational objectivity, and views organisational activity as the complex interaction of people with each other that is continuously redefined and reconstructed as those in control use ideas that seem to fit their purpose. Stacey also sees the role of chaos as being extremely important to the development of organisations, and he has argued, using Giddens structuration theory (Stacey 1995) that value systems are programmed into individuals in organisations. A complex problem for Stacey is one that is strategic and created through the complex learning interactions of people with each other in organisations.

The idea most relevant to this work is Stacey's interpretation of disequilibrium. Stacey (1995) argued that organisations will on purpose select the unsettledness of disequilibrium through the agents working in the system. That is, people create the problems they want to solve (see Cohen et al. [1972] for another discussion on this).

The complex interactions between actors create problems that are deemed necessary to solve, and solving them is an ad hoc self-referential communicative process which is the same process that created them. The resultant changes in the state of the organisation are linked to the conversational process that created them in the first place, therefore putting people as the result of all organisational problems. Put simply, we create problems as a way of creating instability so we can solve them to reach another point of instability that we are happy to be at. Stacey (1995) argues: 'The disorderly dynamics of contradiction, conflict, tension and dialog provide the driving force for changeability'.

Stacey (1995) points to a rationality of problems that is 'unbounded' (see also Shakun [2001], for example), which is ultimately a critique of the bounded rationality of Herbert Simon (Simon 1960). The assumption for Simon (1960) is that managers are unable to optimise when making decisions; instead they 'satisfice' by taking the most information they can and base a decision on this. Simon's work ignores the possibility of multiple conceptual frames because it takes as given that problems can be programmatically approached from singular conceptual frames. In Checkland's (1981) critique of Simon's work, he argues that bounded rationality creates a goal seeking paradigm where problems have general types of conditions to be met: meet the conditions and the problems are solved, according to the available information. Simon's view on problems creates the idea that the problem solver is absolutely right, and it appears that he was unable to make the same 'perspectival' assumptions as Haynes (2001) argues that Churchman made. This has the effect of defining problems through one calculative lens without considering other conceptual frames or possibilities.

The work of Argyris and Schon (1978), in the theory of action and double-looped learning, highlights some other key problem for the cause and effect frame. The authors argue that these traditional approaches to problem solving are not able to produce feedback (said to be the second loop of learning). In a later paper, Argyris (1996) argues that practitioners often cling to models of situations that inhibit them from achieving feedback based on what they have causally determined to be the case. He argues:

> It follows that changing the status quo is required if organizational learning is to be facilitated. It also follows that double looped learning is key to achieving such outcomes. Single loop learning and routines, although they dominate organisational life, are the enemy of organisations solving difficult problems that are embarrassing or threatening. It is variables such as these that disempower human beings and limit their commitment.

Argyris highlights that often organisations will stick with the cause and effect frame that does not stimulate organisational learning and thus their progress will be stunted. The cause and effect frame also limits the ability of problems to be structured through diagrammatic techniques such as: influence diagrams (De Campos, Fernandez-Luna & Huete [2004], for example), brainstorming (Fabian 1990), mind mapping (Buzan & Buzan 2000) and many problem picturing techniques. The cause and effect frame, more importantly, is limited because it can hinder an ability to see more than one stakeholder's conceptual frame.

2.4 Stakeholders' conceptual frames

It may be useful to distinguish between conceptual frames that come from generic concepts like efficiency and justice, and systems from conceptual frames that derive from a participant's or stakeholder's role in a particular problem. For example, with the problem over the war in Iraq, some stakeholders will use the frame of democracy, some colonialism, some resources control and others of profiteering. Of course, generic concepts and stakeholder conceptual frames are not mutually exclusive; however, merely considering either one in the absence of the other is not thought to be sufficient to dissolve problems. Each stakeholder will bring a particular concept of a problem which needs to be appreciated for what insight it offers and can be used creatively for. Several authors have highlighted the importance of identifying and working with stakeholder conceptual frames in problem solving. These include the following studies:

Churchman has long considered that it is ethical to assume any one stakeholder's frame of the problem as important as another's. He advocates setting up a creative dialectic betweens frames, (an idea that will be taken up again later). This view was neatly summarised by Haynes (2001), who prefers the term 'perspectival' rather than conceptual frame, and refers to stakeholders as 'we':

> When we see things from the point-of-view of taking a perspective we are being perspectival (as distinct from, perhaps, taking things literally). Secondly, there needs to be some conceptual assistance in coming to terms with a perspective itself of conceptual frames. In taking this elevated sense, we are, again, being perspectival. When we are being perspectival in terms of our thinking, we are thinking conceptually, that is, if we consider ourselves, it is the concept of ourselves that is being considered, not ourselves for any personal benefit.

Grint (2003) uses the example of the Cuban missile crisis and the current Iraq war. He cites the decision of the American government to invade Iraq on the basis that weapons of mass destruction did exist. Grint argues that the various views of the invasion of Iraq were competing stakeholder conceptual frames at the time and the one that became the most powerful became the springboard for action.

Conklin (2005) concurs that stakeholders can have radically different roles and therefore different frames for understanding the problem. Each stakeholder frame has to include the possible 'political' implications as to what the problem is. This means that each frame that stakeholders have needs to be addressed. Conklin advocates the use of 'dialog mapping' to highlight and structure competing stakeholder frames and thus insights.

Checkland's work on both SSM and appreciative systems theory (Checkland 1999; Checkland & Casar 1986) rests on the assumption that different stakeholders will have different conceptual frames which are often in opposition to each other. Checkland therefore advocates the use of a structured debate to reach an accommodation (Checkland & Holwell 1998:161–5) of the conflicting worldviews. Each stakeholder's worldviews are used as a way to structure a debate about action for change, and a type of common ground is sought. Checkland and Scholes (1990) also highlight the political ramifications of this process by arguing that politics are endemic in human affairs and as such any intervention involving multiple stakeholders is going to contain politically charged worldviews. Finding the common ground, an accommodation of worldviews, between stakeholders and participants is the main goal.

Liebl (2002) also agrees that complex problems are difficult to navigate and often contain many 'issues' that need to be surfaced and understood. The author also suggests that several people involved in the problem situation will be defining it according to differing agendas (conceptual frames). Often these agendas will have a high degree of incommensurability between them which will result in various interpretations. Liebl concludes that a problem is like a moving target that, once defined, shifts again in accordance to the definition placed on it. Each new stakeholder perspective is yet another concerned frame that gives the problem a new shape and structure. For Liebl, each new stakeholder frame adds further problems to what is already a deeply interconnected problem situation.

King (1993) uses the example of nuclear power to argue for solving the right kind of problems. In this example, King presents different sides of stakeholder arguments around the topic of nuclear power and then posits the question, 'Out of these wildly different worldviews, who is right?' King continues by arguing that the best way forward for difficult problems is to find 'common ground' between stakeholder conceptual frames by applying common sense. The search for common ground is seen by King as a strategic necessity because it seeks to find an amicable solution through exchanging diverse worldviews. King views wicked problems as being part of stakeholder perceptions, and in answering the question 'who is right', argues that often there are several right 'elements' that are needed to form a cognitive framework used to make sense and guide action in wicked problems. King also highlights how each stakeholder perspective brings different versions of the 'truth' to the situation which, when placed over the top of each other, highlight the multidimensionality of problem contexts.

Fernandez-Berrocal and Santa-Maria (2006) also concur that stakeholders will have different frames on both what the problem is and how it can be best solved. Using empirical data, the authors take the argument a step further by suggesting that, when their subjects do hold different frames (mental models) of the problem, the problem solving process is drastically improved. The data from the article points towards the idea that the reasoning process, when presented from different frames, interacts in a way that can create sustainable change. Moreover, problems are actually solved more effectively when higher degrees of frame interaction occur. This means when

stakeholders form a new frame by interacting with each other, there is a possibility for a higher degree of commensurability between opposing stakeholder frames. Each stakeholder frame can be assimilated into a central frame that meets the needs of both the group and the individuals in problem solving contexts.

It is argued that many authors agree that stakeholder frames are an important aspect of problem solving and that, even if they are undeclared or have not surfaced, then they still exist. This suggests there is something to be gained by making their frames explicit so that their different assumptions can surface. Mitroff and Emshoff (1979) argue that problem solving is about understanding the strategic level assumptions that underlie the different conceptual frames of stakeholders. Each one of these underlying assumptions involves an epistemology. The role of the analyst for Mitroff and Emshoff is to surface these strategic assumptions so that a clearly definable pattern can emerge out of the mess. Once this has been done, the assumptions can be tested through a dialectical process where assumptions and their 'enemies' can be brought to the surface.

Mitroff, Mason and Barabba (1982) highlighted this by arguing that, in policy situations, different actors will perceive ill-structured problems using different frames, and hence their approach to solving such problems is opposed to those of the technicians. The authors argue:

> When these different views are conjoined together a set of inconsistent or contradictory conclusions often follows. Further there is often not only an inconsistency *between* different views but within any single view of an issue as well.

In an earlier work, Mason and Mitroff (1979) highlighted that key decision making often rests on strategic level assumptions. They developed an approach for strategic assumption making and testing which comprised four key elements:

1. generating the assumptions of which a strategy might be based,
2. producing alternative assumptions,
3. assessing and critiquing the assumptions in light of possible implications for strategy and
4. effectively choosing a key assumption set for making strategic choices.

The authors argue that problems that involve policy formulation often rest on untested and unformulated assumptions. In order to make good policy decisions, practitioners have to surface hidden stakeholder assumptions through a dialectical process.

2.5 The 'systems' conceptual frame

One conceptual frame that has been very popular with those interested in constructionist problem solving in management is that of 'the system'. The system has developed into a popular frame for understanding managerial problems through the work of writers such as Churchman (1979), Ackoff (1978), Senge (1990) and Checkland (1999). There are many other scholars who have used the systems conceptual frame to structure and solve problems that are messy (for example, Midgley [2000]). More explicitly, authors like Kramer and Smit (1979) argue that the systems frame is useful for tackling problems because it is aimed at structuring the 'seeing' of the world as well as being a pluralist concept. That is, we can sense-make the mess using the image of a system with inputs, outputs, elements, boundaries and purpose. This relates to how the world can be thought of as 'wholes' interacting with each other in different open environments. But the systems frame is also a pluralist epistemology for designing thinking. Posited in this way, it suggests that thinking needs to be regarded as being a system, one which has multiple interacting elements. These elements can be alternative frames in tension (dialectic) to achieve some overall purpose.

White (1995) argued that the systems frame is relevant to management because it contextualises the wholes in problem contexts rather than analytical methods which take apart a whole to understand it, try to understand the parts independently from each other and try to assemble the reductionist thinking into an analysis of the whole. Problems of the ill-defined nature can be seen as systemic, having many interacting sub-systems, according to White, that make them unique in each case. The systems frame can help structure problems of this sort because it shows how various organisational sub-systems are interrelated to form the problem situation.

Garnsey (1993) argues that the systems conceptual frame can provide valuable insights into human activity problem solving because it can help understand phenomena from different theoretical vantage points. Different theories can be seen to be elements in a pluralistic system for thinking. Garnsey's argument is that the soft systems frame has in-built perspectivalism and is able to accommodate different assumptions as solutions are developed. This point Checkland (1982b) made when arguing that SSM facilitates a 'Singerian' process where the status quo and its contradictions are simultaneously retained. Checkland's argument centred on the idea that the systems concept can be used to tease out different worldviews which can be used to renegotiate the social construction of reality. Systems concepts have also been used by several others in the shaping and structuring of problem interpretations and now form the basis for Problem structuring methods (see Rosenhead & Mingers [2001] and more recently the debate between Checkland [2006] and Eden & Ackerman [2006]).

Bowen (2001) argues that the problem formulation process is helped through the use of the systems frame (quoting Checkland). In particular, Bowen argues that the ideas around the systems sub-concept of interaction are useful in understanding how ill-defined problems form. Bowen highlights how the systemic frame can be used for this problem structuring through the use of systems diagrams. Systems diagrams can adequately represent different levels of conflict, communication and other types of interactions that help to construct the perceived problem situation.

Critical systems thinking (CST), according to Jackson (2001). is the combination of the systems frame with the explicit conceptual frame of social critique, offering a useful way of understanding the complex societal relationships in ill-defined problems. Jackson argues (1982) that the systems frame approaches of Churchman, Ackoff and Checkland contained a conservative bias (towards management regulation and control). Jackson notes:

> We can trace this process by considering how critical systems thinking and practice came to embrace four related elements: specific criticisms aimed at particular systems approaches; the explicit call for a systems approach that recognised 'coercive' contexts; the attempt to reconstruct systems thinking upon

pluralist foundations; and the preliminary operationalising of critical systems ideas in a metamethodology called TSI.

The particular focuses of the critical systems frame (i.e. CST) bring a pluralism to coercive contexts (see Jackson and Keys [1984] and Flood and Jackson [1991] for some examples) and in particular the desire to bring balance to distorted (language) communication in problem solving interventions. Jackson (1982) argued that problem solving interventions are often marred by coercive contexts in which equally powerful stakeholders are hindered from ideal speech situations. Jackson's main argument centres on the idea that ideal speech situations are unable to be created through problem solving approaches that are managerialist. He also took exception to the 'interpretive sociology' of Churchman, Ackoff and Checkland, arguing that it was regulative and could not produce real change in conflict driven political situations. The main reason traditional 'regulative' approaches are limited is because of the philosophical assumptions they bring into the problem solving process. Jackson also argued that these managerialist methodologies did not take into account the coercive context of real world problem solving. That is, in some cases these methodologies would not seek for change to coercive contexts but for regulation. Jackson also made reference to the traditional positivist problem solving approaches as being regulative and unable to provide meaningful change.

Mingers (1980) also critiques the traditional systems frame for problem solving, arguing that it needed a revision in light of the work of Jurgen Habermas. Mingers argued that the ideals presented in Habermas' work on ideal speech situations need to be considered in light of the development of Checkland's SSM and other traditional systems frames. Mingers' main concern was how critical social theory could provide insights into the problem solving process (through the use of the systems frame) and how such a dialogue might be constructed. However, the paper remains with the pragmatic pluralist systems frame of Churchman, Ackoff and Checkland, believing these to be able to deal with coercive contexts, provided the pluralist pragmatism is not forgotten and the systems frame is used in a mono or reductionist epistemology.

Ledington (1992), using the arguments provided by Jackson (1982) above, introduced the Habermasian framework into a case study into the use of SSM. Ledington argued

that traditional approaches do not make an allowance for the concerns of equally powerful stakeholders and in particular the nature of the ideal speech situations arguments in the work of Habermas. Through a case study, Ledington argued that there is a need to develop traditional approaches further to make considerations for internal politics and conversations in the problem solving process (albeit from the point of view of SSM). In this paper, Ledington also argued that SSM needed to become aware of the process of conversations in organisations that leads to complex problems forming. Traditional approaches have no apprehension of this political process and therefore are not deemed useful by the author to complex, real-world problems.

Ulrich (1983) presents the argument that all rational arguments in problem solving efforts are expressed in language. Ulrich was using the Habermasian framework of rational discourse to argue that any discussion about problem solving involved boundary judgements (understanding the limits of a problem). Ulrich's main concern is that any judgements made in organisational and problem solving contexts are subject to constraints. These constraints are subject to time, resources and other factors but are agreed on through dialogue (as per the Habermasian framework). Therefore, any understanding of what the limits are to the problem solving activity needs to be critiqued and agreed on through rational discourse. In later arguments Ulrich, (2003a) states the importance of creating discourse that makes stakeholders aware of the judgements required to create this kind of dialogue. Ulrich argued that boundary critique has the ability to create an ongoing 'critically systemic' discourse that can improve the dialogue between stakeholders. Ulrich (2004)) is clearly influenced by Churchman.

The influence of Churchman in Ulrich's work is reflected in his work on boundary judgements. For Churchman (see Churchman [1971], for example) determining what is a valuable judgement for defining problem solving as a activity becomes the defining factors of intervention. Where is a judgement made? Midgley, Munlo and Brown (1998) argue that Churchman was influenced by Hegel and argued that systems frame interventions revolve around a dialectical process. Churchman argued that by understanding the ideas an actor thinks is relevant to a problem and then finding the oppositions (or enemies) to those ideas when engaged in a process of

rational argumentation, a better understanding of problems and their limitations can arise. This fosters a dialectical process of critique, conversations and debate as to what ideas are deemed relevant for change. Indeed, this is clearly the same political process argued for by Jackson (1982), who argued that Churchman's systems approach was limited by its regulative framework. On the contrary, Churchman is advocating a multiple frame process of discourse where argument drives debate, design and improvement of problem situations. In Churchman's early work in the philosophy, the influence of the dialectic is very obvious (Churchman 1946). Midgley et al. (1998), in quoting Churchman's work, summarises his dialectic point of view: 'Only if we listen to their views and our arguments survive should we pursue the improvement'.

The term 'boundary critique' refers, therefore. to the dialectical process of argumentation in which different expressions are used to construct a framework of ideas that will drive the process forward. Midgley (2006) argues that Churchman was referring to values that define the boundary of problem solving and therefore it is a political process of argumentation. Churchman's argument is therefore an ethical one, according to Midgley. In a debate started with Turban (1967), Churchman emphasised that it was ethically wrong to assume one viewpoint by excluding others, and that practitioners have a responsibility to explore the different value systems that relate to each other. Ulrich's (2003b) arguments clearly reflect the dialectical process brought to systems thinking and problem solving. Ulrich, though, takes Churchman's ideas a step further:

> Churchman's point in *The Systems Approach and its Enemies* is that the systems approach, because it strives for comprehensiveness, needs to face the not-so-holistic conceptual frames of politics, morality, religion, and aesthetics— the 'enemies'—which in practice contest its holistic rationality and threaten its implementation.

and:

> My point is that we should renounce the quest for comprehensiveness on principal grounds (because it leads us to the dilemma of holism), in favour of a sustained methodological effort to secure at least a 'critical solution to the problem of practical reason'. What matters, then, is not so much expanding systems boundaries, but systematically uncovering their implications for all the concerned parties (Ulrich (2003b).

Ulrich's argument highlights the important political concern of understanding the views of actors involved in the situation and uncovering the implications (or underlying assumptions) that are ignored in traditional approaches. In traditional approaches, the desire to understand these implications is generally ignored, as Omerod (1998) argues, with no thought given to the process of political interactions or setting boundaries. Flood (1999) also argues that management activity in general often assumes a systems frame and requires managers to apply multiple conceptual frames in all areas of the organisation. By critically reviewing a wide range of the modern management systems frame literature, Flood argues that the role of boundary critique is important to understanding political realities such as coercion and stakeholder assumptions and therefore calls for a rethinking of Senge's (1990) form of the systems frame.

Another pluralist frame, and one similar to CST, is the multimethodology frame. Authors like Mingers and Gill (1997), and Mingers (2001), for example, argue that methodologies can be routinely used together (not separately as in Flood and Jackson's [1991] approach) to gain contrasting conceptual frames for problem solving. Mingers (2001), using empirical data, argues that this process of putting together different frames in one setting will provide richer interpretations of both the problem and the conceptual frames for managers and researchers alike. Mingers and Gill's (1997) multimethodology frame presents a frame for real-world problems based on strong pluralism. The central assumption of the approach is that problems are different in each case, a presupposition based on the philosophy of critical realism (see a more developed position in Mingers [2004]). Mingers and Gill (1997) assert that, due to the complex nature of social relations, a variety of methods can be applied to different situations. The authors present a variety of cases in which the argument for pluralism in operations research and management science is put forward. The argument of the book is essentially that of this thesis: that different methods are conceptual frames which present different interpretations of a problem. Each method/frame, therefore, is a way of engaging the problem, and it creates an understanding that can be appreciated and put into context. In essence, the frames become the interface for the engagement with the problem. Jackson (2003) criticised this approach on the basis that Mingers and Gill are not consistent with the Burrell and Morgan (1979) understanding of paradigm. Jackson (2003) contends that frames

come after the paradigms they were meant to serve. That is, each frame was designed with a certain paradigm in mind and, by combining them without appreciating their origins, the problem solver will become confused as to how to interpret the results. Jackson's argument is that one should engage with problems through the lens of paradigm first and then its associated frames. In a response, Mingers (2003) quotes the epistemic fallacy (we should not limit our understanding of the world to our constructions of it, derived from Bhaskar's [1998] critical naturalism), and argues that engagement with the world does not need to be done through a paradigmatic lens. However, all these writers seem to agree that solutions need to draw on coherent pluralism to ensure a multi-ideology.

The issue of creativity has not been mentioned. Solutions need to be creative, or novel (Fabian 1991). Similar arguments can be found in how ideas are created and managed in organisations (see Vandenbosch, Saatcioglu & Fay [2006], for example). The constructionist view of problem solving tends to see this as being achieved through a multi-framed approach, especially if the frame is novel or if the solutions from frames are set in contraction with each other. The synthesis has some chance of being creative (Brocklesby 1993; Checkland 1991; Mingers 2001). The authors argue anyway that real-world problems cannot be explained by just one frame of reference. From the creative industries, Bryant and Darwin (2004) suggest a drama frame for problem solving and policy structuring involving role play. Green (2002) has found this to be very creative in forecasting simulations. Mitroff's story-telling frame has been previously mentioned.

Jackson (2001) and Connell (2001) have highlighted what is perceived as 'conservative' bias in some systems frames, which may be resolved by trying to be creative with some of the multi-frames used within the systems for thinking about problems.

Within the frame of systems, some of the element-frames might include shareholder wealth (e.g. Tinker 1985), power (e.g. Scott 2001) and resource allocation or sustainability. Linstone's (1999) argument for the use of multiple realities in understanding technology implementation also highlights the point that conceptual frames can also be thought of as links between problems (Grint 2003). Frames and

problems can be seen as connected elements that are networked (Hirsch 1967). By eliminating any one frame, we run the risk of reducing explanation of the problem situation down to exclude its connection to problems. Churchman (1968) argued that a problem solver could not justify picking just one frame for this reason. At the centre of Churchman's work is the idea that there are contrasting competing problems at work that need careful exposure and interpretation. Churchman (1982), quoted in Ulrich [2002] states: '...in any specific problem one finds the connectedness to all the other problems...'

2.6 Conclusion

Problem solving involves understanding the different conceptual frames that shape how participants interpret a problem. Appreciating and engaging with these frames is problem solving. The frames provide a one-dimensional view of the problem, so many are needed. The systems frame has a recursive nature in that it carries within it the concept of needing multiple frames in tension with each other like elements in a biological system. It encourages an understanding of the dialectical aspect of pluralist constructions to problem solving as found in SSM. Schultz and Hatch's (1996) paper on paradigm interplay refers to the process of holding two competing frames together and exploring problem situations through that creative tension. Seeing the contradictions and agreements between the frames is believed to produce a synthetic frame for interpreting problems. The problem solver is able to engage the conflicts (or tensions) between competing frames and their similarities. Through appreciating the similarities and differences simultaneously, new richer frames can be gained (Chanin & Shapiro 1985; Grint 2003).

In this way, there is a distinct similarity between the argument for frame interplay (holding multiple views of the world in tension) and Churchman's systems for thinking frame. Both of them are clearly relying on a dialectical approach, highlighting the need for this kind of approach by arguing that problem solving ultimately involves a choice from competing insights. Grint (2003) also makes use of the Rittel and Webber (1973) list summarised below.

Rittel and Webber's (1973) definition of a wicked problems provides a convenient guide to summarise this chapter.

1. Problems are socially constructed 'messes'
2. Problems are an interconnection of various justifications (sense-making processes) which produces multiple conceptual frames of the problem situation.
3. Problems are too complex and messy to be explained by non-reflective cause and effect models. There are too many interdependent variables, some known and many unknown, that go into constructing a problem, often resulting in the emergence of other 'variables'. They cannot all be known, partly because many of them are unlikely to be able to be expressed. Therefore this atomistic method of problem solving is not recommended. Instead useful frames need to be sought.
4. Problems are dependent on the conceptual frames of stakeholders involved in the process and various generic concepts used which will shape how the problem is defined and what kinds of solutions are likely to be offered.
5. Wicked problems can be explained through certain explicit conceptual frames and structured accordingly, but one may exclude what another could reveal. There is no helicopter eye view of problems, rather only the tunnel vision offered by each frame.
6. Problem solving may involve understanding the contrasting conceptual frames to make sense of the problem. This is a dialectical process (e.g. Mitroff and Emshoff 1979) that seeks to use the contrasting conceptual frames of a situation to creatively interpret the problem.

In summary, this chapter has argued, using the constructionist and pragmatic pluralist problem solving literatures, that problems are socially constructed messes that are dependent on the conceptual frames of actors who are involved in constructing and making sense of problems.

Chapter 3 The Engagement Model

The previous chapter argued that complex (messy, wicked) problems are 'conceptual frame dependent', and are best solved by setting up alternative conceptual frames. This idea is elaborated upon in this chapter. Specifically, this chapter argues that a slightly enhanced version of the engagement model suggested by Ledington and Ledington (2001) is useful for (dis)solving complex problems. The chapter begins with an explanation of the model of engagement. The management and humanities literature is then critiqued to provide support for the enhanced engagement model. The chapter concludes with a discussion on the use of the dialectic to provide the suggested enhancements to Ledington and Ledington's (2001) original model.

3.1 The Ledingtons' engagement model

According to the Merriam-Webster dictionary, the word 'engagement' means emotional involvement or commitment. In the majority of management literature when the concept is used to evaluate or understand related phenomena, the term is used in this way. Here the term is used mainly in the context of cognitive engagement, which is assumed to include emotional engagement. Engagement is seen as a way of dealing with stakeholders who present conflicting interpretations of a problem and its possible solutions. In this context, Ledington and Ledington (2001) define engagement as part of their research into the comparison phase in SSM. "Creating an engagement involves choosing and formalising a set of ideas which are thought to be relevant to the problem solving activity in a specific context". They are using the term 'ideas' (and 'framework of ideas') where this thesis has used the term 'conceptual frames'. Haynes (2001) calls them 'perspectives'. As discussed in the previous chapter, these 'conceptual frames' are assumed to cause the conflictual stakeholders to interpret (sense-make) problems in a particular way. For example, an accountant's conceptual frame is expected to cause him or her to interpret (sense-make) some problem as being a budgeting one, while a social worker's frame might cause him or her to interpret the same problem as being about interpersonal trust. Engagement is a process of first exposing these conceptual frames and then, through a

process of reasoned debate and discussion, creatively finding a new conceptual frame that dissolves the problem for all stakeholders. The 'ideas' form the basis for sense-making the expressed interpretations of the situation, made by participants, which the authors argue creates a process of debate that can lead to change. So the first part of Ledington and Ledington's engagement model involves collecting expressions of the problem from the conflicting stakeholders to assist in surfacing their individual conceptual frames. The second part of the engagement model is to seek alternative frames which, if using a systems approach, means thinking about the problem in terms of a different system, as Ackoff did with the bus strike example. The third part of the engagement model is to learn from the interactions that created the dissolving conceptual frames within various value systems. This may help the subsequent engagements.

At the heart of the engagement model is a social process of developing interpersonal relationships that helps to consolidate an agreement of how reality is to be constructed. According to the social construction of reality doctrine (Gergen & Gergen 2003), there are many social processes that revolve around the concept of language as constructing reality. In this instance, the Ledington and Ledington model is referring to the role of communication and discourse in the social construction of a dissolving conceptual frame. There is not thought to be a simple discourse social process, but discourse forms one of the many social processes that can work to help guide and shape the construction of a dissolving frame. Problem solving is seen as taking place in the context of value systems that are likely to be political, emotional and highly subjective.

The following diagram demonstrates Ledington and Ledington's (2001) engagement model (in their language):

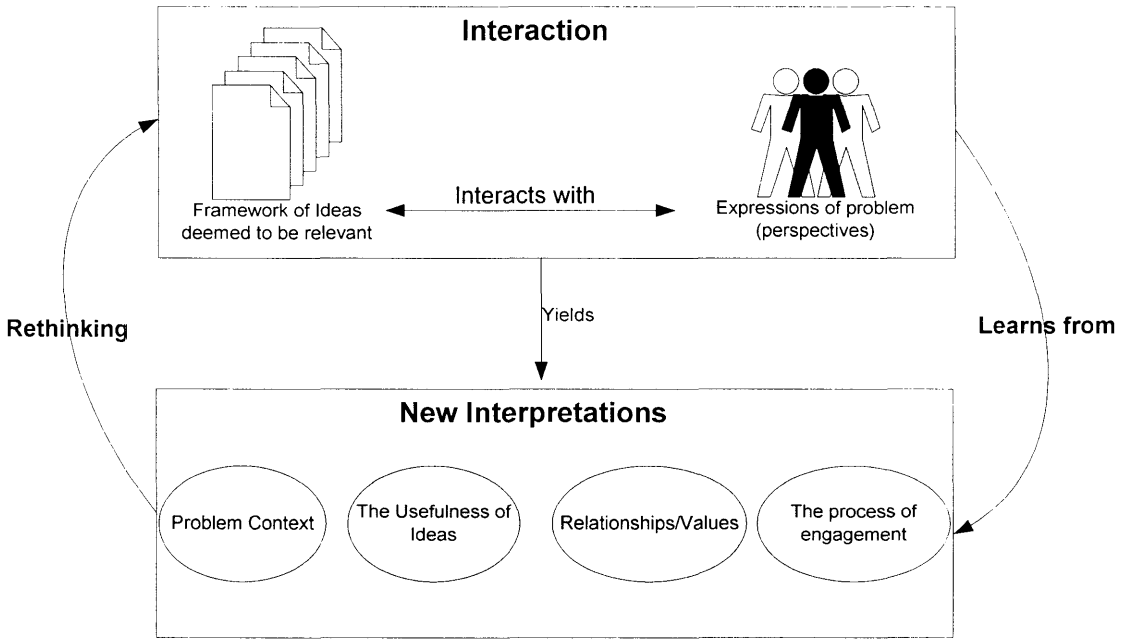

Figure 2 Engagement model of problem solving

The conceptual frames (framework of ideas) used to interpret the problem are not arbitrary but formative. They grow and develop as the interpretations, thus learning, in the situation changes. In the beginning of the process, the stakeholder problem solvers come up with a set of their own interpretations of the situations and what conceptual frame(s) drive their interpretations. This conceptual frame is then tested by trying to understand the consequences of applying the solution to their frame to see if it does produce useful change and learning. This often causes the stakeholders to rethink the conceptual frame. Through appreciating and applying each stakeholder's conceptual frame and its reconfiguration into what it suggests as a solution, they learn from gaining new interpretations of the problem situation. The new interpretations provide learning about: 1) how useful the conceptual frame is, 2) the problem context, 3) the values at work in the situation, 4) meaningful relationships and 5) the overall process of engagement.

The Ledingtons' engagement model was developed to provide a closer understanding of the 'comparison' phase of SSM (Ledington & Ledington 1998). Indeed, the engagement model may have been intended to replace 'comparison' in SSM. Comparison is the phase of SSM that takes different 'abstract' systems models and 'compares' them with the perceived real world problem situation. The intent was to structure a debate about change which Checkland has argued was the 'renegotiation of

reality' (1982b). Checkland (1999) explains the comparison stage of SSM diagrammatically in his LUMAS model.

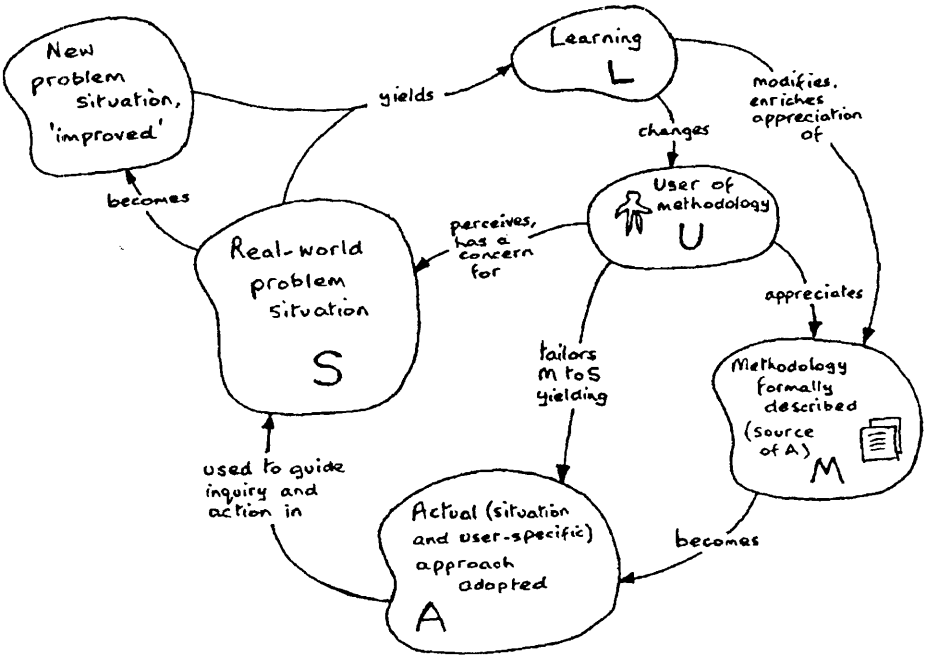

Figure 3 LUMAS model from Checkland (1999)

This LUMAS model is using what Argyris and Schon (1996) call 'double looped' learning. The first level or 'single loop' of learning is when an 'actor' (stakeholder) fixes something deemed to be problematic in the immediate level of their vision. The type of learning refers to the response to a single loop of feedback to an observed effect. An actor notices an effect based on a single loop of learning feedback and takes action to correct it. Argyris and Schon (1996) argue that the second loop of feedback occurs when people start questioning the values that govern the way in which things are learned. The second level of feedback is interested in understanding the observed effect and more importantly the governing values that are at work to make the effects 'observable'. This is a questioning of the values that govern action taken that caused the observable to be generated in the first place.

In engagement, the focus (as in the LUMAS model) is not just on an improved problem situation but on understanding the values that are behind what created something to be perceived as problematic in the first place. In Checkland's LUMAS model above, two levels of learning are displayed: the first about the problem

situation and the second about how the problem situation was improved through the use of the conceptual frame which Checkland labels 'methodology' in the LUMAS diagram.

Checkland and Holwell (1998b) argue that any inquiry should yield insights about the situation under study and the frames used to interpret the problem situation. Therefore, the researcher is not only interested in learning about the problem under study, but is also concerned with the frame used. The engagement model, therefore, clearly shares the values of both Checkland's work and Argyris and Schon's theory of double looped learning, because all are focused not just on fixing the problem but on surfacing the expressions and values that led to the creation of the problem situation in the first place.

To summarise, by definition, engagement for Ledington and Ledington (2001) is the social process of change instigated through the use of ideas applied through discourse and action. The interaction of ideas with expression of the problem yields understanding and sense-making capabilities that lead to new interpretations of the problem situation. These new interpretations shape and guide the cyclical process of interactions and in turn these provide a governing set of values for action.

Put simply, the process of engagement is a cognitive, communication based interaction of ideas and discourse leading to rethinking action. Therefore, engagement has three levels to it: the cognitive, the social interaction process between ideas and expressions and the physical action that results from the first two levels. To engage is to meaningfully use ideas to foster participative involvement and action in changing a problematic context.

3.2 Generic engagement literature

The literature will now be explored to argue that the Ledington model is compatible with the literature and a useful way of thinking about problem solving.

Throughout the management and humanities literature (see below) there is a consistent use of the term 'engagement' to explain how people participate and become

actively involved in the social world. However, the concept is poorly developed around different conceptual notions and does not provide a thorough understanding of the engagement concept as intended in this thesis. The following section will use the literature to argue that the Ledington model is a useful way of defining engagement for problem solving, if not for betrothal.

Generally it was found that the management and humanities literatures present a sporadic and poorly defined use of the engagement concept. Instead of capturing the cognitive, social (communication) and action-based (participation and involvement processes) approach suggested by Ledington and Ledington (2001), this literature typically focuses on differing elements of a broader "engagement" process.

Some examples of this kind of problem are drawn from recent literature examples:

Glick, Ruf, White and Goldschneider (2006) argue that educational engagement (involvement with education systems) in 14 to 22 year olds plays a big part in early teen and adolescent pregnancies. The term 'engagement' in this way is used to explain students' involvement with being 'engaged' in the activity of going to school. The engagement concept is used in the common sense way to explain the involvement of students with education systems. However, the authors use the term 'engagement' to define the participation and involvement in the action of going to school. Engagement is only viewed as being participation, which in itself does not capture the cognitive and social processes that lead to the observed action.

The theme of involvement continues when considering the work of Gorman and Gorman (2006). The authors present the case that managers play a very important role in making sure their employees are engaged (involved practically) in their work. The term engagement is used in this paper to explain how employees become (emotionally) involved in their workplaces and how they develop a relationship with it. The authors argue that the more a manager becomes engaged with their employees the more the employees become engaged with the work they do. In turn, this increases shareholder returns because employees are more motivated, happy and content (emotionally speaking) with their work. These authors argue that engagement is more typically defined by emotional factors, and Gorman and Gorman (2006) fail

to adequately represent how cognitive resources help to shape, define and set the agenda for emotional engagement. Therefore their definition does not represent other considerations for engagement.

Others throughout the literature generally use the term in the same manner as the above quoted authors. Wagner (2006), for example, uses the term engagement interchangeably with the term involvement on an emotional level in the workplace. In this article the author highlights a seven-step plan to achieving an 'engaged' workplace. Unlike the Ledington model, however, Wagner's approach places the emotional engagement as being superior to that of cognitive engagement. In this article the focus is on the principles of being emotionally involved in work rather than cognitively engaged, which is suggested both by Ledington's model and Checkland's LUMAS model.

In management literatures, the term employee engagement has come to describe the way in which employees interact and become 'engaged' emotionally, physically and practically. The previous two authors use the term this way as do some of the following examples:

Thatcher (2005) uses the term in a similar way to describe the ability of employees to become involved, but expands the definition of the term to include the employees' environment as well. For example, the author suggests that employee engagement is more related to the nature of relationships in the world and how people communicate with each other. The author cites previous studies and uses the term engagement to describe the employees' relationships with each other and the subsequent communication contained in the those relationships. Engagement for this author describes involvement, participation and most importantly communication as the means by which an employee connects with the workplace. This understanding highlights an important, yet undeclared, assumption in Ledington and Ledington's (2001) engagement model. The assumption that communication and interpersonal relations govern the problem solving process is assumed by Ledington and Ledington (2001) but not stated as clearly as in Thatcher. In this sense, the model of engagement makes use of a process of communication that is already at work in social networks but does so in a more dialectal manner which Thatcher is not assuming. This issue of

the missing dialectic and the assumptions of the human communicative process will be investigated in more detail further on in the chapter.

Shaw's (2005) study on the workplace uses the term engagement even more loosely than Thatcher (2005). Shaw uses the term to explain how employees become involved and participate in workplace processes, but suggests that how they do it is highly subjective in each workplace. Engagement is used to define how people become emotionally involved at work with each other and their environment. The article lays out a strategic framework for ensuring employee engagement. Shaw, like Thatcher, also assumes that engagement means participation and engagement, but unlike Thatcher reduces the explanation of engagement to purely emotional factors. This argument also takes the environment of the workplace as a given structure not subject to the change of subjective communication and interpersonal processes. Therefore, explanations of engagement are reduced to the emotional engagement of people in the workplace, which excludes other cognitive and physical factors.

Hardaker and Fill (2005) use the term in a similar way, again to describe employee involvement. They also extend the use of the terminology by using the intellect (ideas) and cognitive frameworks in Ledington and Ledington's (2001) model as well as emotions as part of engagement. Like Thatcher (2005), they present the idea that employee involvement in the workplace is primarily related to communication and use the term engagement to loosely define how these relationships take place. More specifically, engagement is used to define the intellectual and emotional involvement of people with each other (through communication/interaction). The concerns of the communication and interaction argument are similar to Ledington and Ledington's (2001) interaction of problem expressions with the conceptual framework dialogue. However, Hardaker and Fill (2005) reduce their conceptual understanding of engagement to 'employee engagement' and use the term to describe involvement and participation more so than interaction and communication. What emerges is a view that employee engagement (involvement and participation) defines the nature of communication and interactions. This excludes the broader group process of problem solving suggested by Ledington and Ledington and also overstates the importance of individual employee participation in the workplace.

3.2.1 Civil engagement

There are many other examples in the present literature that use the term 'engagement' to describe the intellectual and emotional involvement of people in some purposeful, real-world activity. For example, in social science oriented literatures, the term is used more explicitly to describe an emotional commitment to being involved in something. More specifically in the field of civic engagement, the term is used to describe how citizens become involved in 'citizenship'. McBride, Sherraden and Pritziker (2006:152) argue that citizens should be engaged in shaping and building their communities. They state:

> Civic engagement across the various forms is considered a means for developing skills and capacity, increasing tolerance among peoples, building community, supporting collective action on common goals, and girding democratic governance through representation of interests.

Engagement is a pragmatic term, according to these authors, to describe collective action taken on the basis of values. The authors use the term 'civic engagement' to explain the emotional value-based participation of actors in meaningful social activity. These literatures define engagement as meaningful participation based on a set of values but ultimately exclude the process of how such values are determined. This is a problem, because it assumes that values for civic engagement are somehow separate from the process that constructed the values in the first place. That is, certain value systems are implied to exist in cases of civic engagement. This would mean an ideal representation of value systems that overstates the ability of the participants to learn and adapt to new concerns and structures as they are arranged. The process of interaction, creativity and social construction of ideas to 'engage' in discussion about problems is not discussed. All social activity that takes place in the context of 'engagement' is not separated to the values that underpin or determine it, as Ledington and Ledington (2001) note. If a group of people are to become involved in the process of participating in their community, they are doing so on the basis of certain values they find interesting. The question is not why do people participate in meaningful community engagement processes, but what ideas shape and construct the interactions and expressions of problems in the community that invoke value systems into action. In turn, such ideas provoke people to *become engaged*, and hence this is

the platform by which meaningful action ensues. Others share this opinion, and in like manner do not attempt to explain the social communicative process of engagement in any greater depth than that of collective action and participation.

Authors like Beyerlein and Hipp (2006), for example, use religious organisations as a way of explaining civic engagement in American protestant evangelical circles. The argument made is that the more contemporary churches, such as the Protestant evangelical (Pentecostal etc.), have less civic engagement than those in traditional churches (e.g. Catholic). The authors use civic engagement in this article in a way that implies involvement on both a physical, mental and spiritual level. Engagement for these authors is the complete value-based participation in solving social problems through the medium of the local church. The platform for engagement according to these authors is the value systems of the churches that promote them. Like Ledington and Ledington (2001), the authors assume that values form the basis for action in being engaged.

Other authors use the terms civic participation and engagement interchangeably to describe the processes of collective action. The value system is argued to drive the engagement forward, resulting in the changing of social structures. For example, Sampson, McAdam, McIndoe and Weffer-Elizondo (2005) use the term engagement to mean values, ideas and collective action to actively change social conflicts that are deemed to be unsatisfactory by those that perceive them. While the authors define the process of solving the perceived problem through collective action and recognise that certain values drive the process forward, there is no understanding of the creation of value systems that precipitate the action that ensues. Ledington and Ledington (2001) argue that all action is value-laden and in other papers (see Ledington and Ledington [1998], for example) have argued that values shape and dictate action in problem solving interventions. To assume that values are not created through interpretation and appreciation and then meaningful engagement in action is assuming that all action is justified through other means. Ledington and Ledington's (2001) model of engagement uses the word 'sense-making' to describe how ideas are built into the concepts we use to explore the world. This is not an original argument. Weick (1989) argues, for example, that human activity systems will search for justifications for action based on certain values. Such justifications are ideas based on what actors

deem to be relevant to the problem at hand and are more than likely disciplined imaginings. Sampson et al. (2005) explore 'engagement' from a descriptive process without questioning the values that underpin why engagement occurs, which is something Ledington and Ledington (2001) argue is built in to the process of engagement.

In a broader sense in civic engagement literatures, the term engagement can be used to describe political activities, especially those that are sharing ideological standpoints. Norris's (2002) study on the internet and civic engagement argues how people will use the internet to spread their ideas and build civic engagements through ideological groupings. The term 'engagement' is used again to explain how people will foster communication through ideological/political sub-groups and gain civic engagement through these means. Engagement represents political participation for this author as a way of sharing ideas and building networks through digital media. The author highlights something assumed in Ledington and Ledington (2001), which is that actors involved in engaging in purposeful activity, will find and use ideas they deem to be relevant. That is, they will build a conceptual frame through which to assess the problem and use that to come up with certain solutions. This assumes that, even though what ideas will be relevant cannot be known ahead of time, a meaningful cognitive framework can be established to guide action in the problem context.

Others take the political agenda of the word 'engagement' to mean action that improves society in a similar way to Norris. Swain (2001), for example, uses the term 'civic engagement' to describe action taken to improve elements of society deemed problematic by some. Engagement for this author is problematic because the relationships between those engaging in improving social conditions are often formed around ideals that are loosely compatible. Engagement is an ideal that is very difficult to attain because of the individualistic nature of society, in which everyone has ideas to contribute which may or may not be relevant to the practice of implementing social change. Engagement is the process of not only aiming to use value-based change to improve social conditions but the actual process of facilitating and sustaining the problem solving effort. This paper supports Ledington and Ledington's (2001) model that puts the ideals of engagement in a similar light. Improvement to any problem situation is assumed in the engagement model to involve

the surfacing of all ideas deemed relevant to the problem through cycles of engagement, action and reflection. The assumption made by Swain highlights this, but it also shows problems with the descriptions used by Ledington and Ledington (2001) which will be addressed later in this chapter. Namely, the assumptions of the engagement model are based on certain values that are pinned to a sociological framework (interpretive sociology); the implications of this are not clearly stated.

Another example of the political use of the term exists in Rosenthal (1998) who argues that collaborative leadership and gender roles are central to civic engagement. Again, the use of the concept of engagement is used in the pragmatic sense (community involvement/participation), and women are seen as being important to engagement processes in this regard. Engagement again implies both an epistemological commitment with emergent collective action. This author uses the concepts of gender and leadership to critique civic engagement practices, and suggests that values around these concepts are extremely important. Engagement is used in the same way as in Ledington and Ledington (2001) to describe the process of social communicative interaction leading to change. The author uses the term 'collaborative leadership' interchangeably with 'civic engagement' throughout the paper, which then is used to explain what determinants lead to collaborative leadership. This definition of engagement acknowledges the roles played in the process of engaging but fails to adequately capture other dimensions of engagement such as cognition or planning action. In this sense, the author fails to adequately represent the concept in the manner which totally supports the Ledington and Ledington (2001) model. Despite this, the ideas of collaboration and group processes in problem solving are discussed, which also are found in the engagement model.

Other groups of authors take the concept of engagement to mean something that defines a way of thinking about how action is taken. For example, Tolbert, Lyson and Irwin (1998) argue that civic engagement is actually an emancipatory concept, and cites the examples of small community capitalism and self-sustainment. The authors argue that engagement takes place around a local area of concern in small communities, and the resulting collective action builds these concerns into practice. Tolbert et al. (1998) support the argument that ideas deemed relevant to change engaged into action yield better interpretations of problematic contexts as in the

Ledington model. However, they improve on that understanding by suggesting that such a process is highly participative (like Rosenthal) and indeed emancipative by design. There is an emancipative assumption built in to the Ledington and Ledington (2001) model of engagement because the authors argue that the role of the expert/analyst in problem solving should not be idealised or overstated. However, the authors do not, like Tolbert et al. (1998), make the connection to the emancipative concerns that are focused primarily on higher order social change. This is more than likely the bias of Ledington and Ledington's (2001) model towards everyday management activity, which is clearly stated in the paper, rather than a concern on social problems or other emanicipatory projects.

Many other authors like Putnam (1995), for example, use the term civic engagement to mean community involvement around issues of concern in the broad sense and use engagement in the emancipative sense. Lehrer (2004) argues that engagement means participation and involvement in community improvement (emancipative values), and that issues of race are inhibitors to such a process. He argues that often in civic engagement the requirement for collective action fails because there are underpinning racial problems that stop the facilitation of problem solving. The practice of civic engagement in community problem solving efforts is greatly hindered by a lack of collective action (Putnam 1995), and issues like race and other concerns can stop engagement from taking place.

In an empirical study on juvenile homicides in rural versus urban areas, Lee and Bartowski (2004) found that, where a community adheres to a religious value system in rural areas (what they called a critically engaged religious domination), there were fewer juvenile murders. Where church groups were not as prolific (not as engaged in community affairs as in urban centres), the murder rate was higher. While the findings of this study are not relevant to this work, how the authors see engagement in their study is. Lee and Bartowski (2004) are suggesting that a greater level of engagement for people in church groups in rural areas creates or sustains a safer juvenile community. Again, value-systems seems to be a central theme in the use of the concept of engagement in these literatures.

Engagement for these authors is the active employment of a value-system pragmatically at work in the community. Where it was more profound (due to smaller areas), fewer murders occurred; where it was less profound, more murders seem to have occurred. The framework of values at work in such communities may or may not account for why people are getting murdered. The authors also use the term 'critical' engagement to mean active engagement, which in turn is used to describe the process of being actively involved. This extends Ledington and Ledington's (2001) definition of engagement as purely a communication process by presenting it as a social *emancipative* process. This is not addressed in the engagement model, yet is built into the assumptions that govern it. For example, the authors argue that analysts' interpretation of problem situations should not be given status over that of the participants. This perspective suggests that there is something wrong with giving all explanatory power to an analyst (they cite their own work on SSM to highlight the problem). The argument is very similar to Jackson's (1982), which argued that Checkland, Ackoff and Churchman's work did not explore emancipative or coercive contexts (a point all three authors defended). It seems as though the engagement model agrees with the civic engagement literature on this point, but the authors fail to explain or link the concerns of emancipative action to their problem solving model.

3.2.2 The use of the term 'Social Engagement'

Despite this concern at the heart of the engagement process is the idea that reality can be meaningfully constructed and reconstructed through discourse and resultant change action. Other literatures use the term 'social engagement' to explain the process of interaction which Ledington and Ledington suggest. In the previous section, social engagement is assumed because the work of civic engagement is inherently social. However, these literatures were selected on the basis of their use of the phrase 'social engagement' in a more explicit way.

Authors in this category often refer to the same ideas of participation, involvement and values based action but refer more specifically to some kind of 'social process' instead of labelling it as a type of engagement. Some examples of this kind of thinking include:

Walker-Smith (2006) uses the term 'social engagement' to refer to how people act in relationship to each other via the internet to form communities and the nature of these interpersonal relationships. The author argues that the majority of the people in the modern internet business environment despise having a brand name thrust upon them and prefer to be a part of an internet virtual community. Walker-Smith argues that, when companies create these communities, they create a 'social engagement' where people interact and become involved with each other. The engagement concept is used in this article to explain how people in internet communities interact and communicate with each other and how they in turn engage with a company's product. For this author, the term is not merely a description of involvement or participation but a social communicative process where ideas and discussion form the basis for sales in a capitalist organisation. This supports the concept of interaction in the engagement model, but does not address the concern of multiple perspectives. This author, therefore, possibly due to epistemological preferences, has chosen not to explore the multiple perspectives involved in engagement processes.

Others use the conceptual frame of social justice when referring to engagement. Wakefield and Poland (2005), for example, use the term 'transformative social engagement' to describe the process of community transformation based on social justice values. In particular the term engagement is taken to mean participation and involvement, but like Walker-Smith (2006), the term is used to mean the interaction of participants in the social construction of reality. Both Walker-Smith (2006) and Wakefield and Poland (2005) use the term to explain the involvement, participation and interaction of people in the active changing of some problematic situation. The authors also argue that any approach that claims to foster engagement in larger social settings should focus on social justice. This paper supports the interactions between expressions of the problem (conceptual frames) and the idea of forming a solution in the Ledington and Ledington model, but uses the established principles of social justice as the conceptual frame. The problem is that these authors argue that all social engagements can be defined through the conceptual frame of social justice despite the expressions of the problem available. Authors like Haynes (2001), for example, contend that this is problematic because it can limit other perspectives on the problem situation.

Engagement in this paper, means the same kind of participation, involvement and value based interaction as the previous authors. However, others make a distinction, more than likely based of methodological preferences to focus on how individuals and communities interact. Stevens-Ratchford and Lookingbill (2004) conducted a qualitative study on the use of arthritis treatment amongst patients and used the term 'social engagement' to describe the participation of the patients in everyday affairs. These authors used the term to explain how nursing homes in the US that foster social engagement (again used in conjunction with community and the building thereof) have achieved results in improved patient heath. These authors stress the importance of creating a social engagement for patients by building a commitment to continually fostering a community atmosphere in nursing homes. Underpinning this argument are three important correlations with the Ledington model: firstly, that the patients' social reality will continue to change, secondly expressions of problems need to be addressed from all perspectives, and thirdly a commitment to continual learning and development. The final point here relates to the cyclical nature of the engagement model. The conceptual frame changes as new ideas are engaged, acted, and reflected on, as in the Ledington model.

Others, make an argument closer to that of Ledington and Ledington by extending the processes of communication to an engagement process. Despite being about text analysis, the core concept of sharing frames can be found in the work of Hyland and Tse (2004). The authors use the term 'social and communicative engagement' to explain how an author's text becomes a link between the writer's discourse and the reader's interpretations of social experience. The writer and reader relationship and the subsequent discourse interaction they have forms the basis for a social engagement. Although this paper's subject is textual analysis and metadiscourse, it supports the idea of a conceptual frame (the writer's text and ideas) and engages with the reader's perceptions, resulting in a physical connection (engagement). The idea that conceptual frames can engage people in discourse about themselves, and indeed their environment, is a central assumption of the Ledington model. Again, this is not made clear in the Ledington and Ledington (2001) model, though careful scrutiny of the influences present (Checkland, Argyris and Schon, for example) reveal these

epistemological assumptions. It is also something that was explored in the earlier work of one of the primary authors (see Ledington (1992)).

The term engagement is often used to explain how people in the community actively construct and create a reality through their activities in communities. Social engagement for authors is the construction, maintenance and participation in a reality building process which includes discourse, social norms and related conceptual frameworks. Millen and Patterson (2002) use the term social engagement in this manner, to explain participation amongst groups of actors involved in an online community. This in essence is the same as the interaction process suggested by Ledington and Ledington. However, these authors take the argument a step further by suggesting that boundary setting (maintenance and limiting of the development of certain 'realities') occurs in social engagements where norms are enforced through dominant views. The boundary setting (maintenance and judgement) doctrine is missing in the Ledington model but has been meaningfully used by others (see Ulrich [2003a], Jackson [2001], and Midgely [2001], for example). Again, because of the references to SSM, it can be assumed that the authors recognise and assume the value of boundary setting.

Another example of this kind of thinking is found in Wimpory, Hobson, Williams and Nash (2000) who use the term social engagement to make sense of how children with autism differ in how they relate to the world as opposed to those without the condition. The authors' use of the term here is more constructivist than a purely causal interpretation of 'participation' and is used in a way to explain how the autism sufferers create reality and participate in it. In this sense, these authors are using the term to explain the relationships of certain types of actors (those with autism) to the reality they find themselves a part of. Engagement is a process of interaction, involvement, participation and sense-making of the world autism sufferers find themselves a part of. Although the scope of the actors' participation is limited to individuals, the same concepts of expressions and interaction is present in the Wimpory et al. (2000) paper.

Others have taken the social engagement concept to be a process whereby people work together to form a goal (see Cherin [2000], for example). Some authors use the

term more explicitly to define how they relate to the world based on their value systems as argued earlier in this chapter. Other literatures, the education literatures for example, make good use of the engagement concept to represent both the process of interaction as described by Ledington and Ledington (2001) and the learning that ensues from this interaction.

3.3 Engagement in education literatures

Engagement in education literatures has a wide variety of uses, some of which have clearly influenced the work of Ledington and Ledington (2001). In particular, the general concepts of problem based learning and more generally the concepts of participation and involvement in learning. Before exploring the problem based learning literatures, the more general concepts found in education literatures will be explored.

In the Ledington model of engagement, there is first the conceptual frame with is used as a sense-making device to lead to new interpretations of not just the problem situation but the process of solving the problem in the first instance. Leask's (2006) study on cultural diversity in education environments points towards the need for teachers to engage with cultural diversity. In this sense, the author is concerned that plagiarism is often a case of not properly engaging (or choosing not to become involved with) the issue of cultural diversity. The vague use of the term engagement in this sense, differs from that found in the civic engagement literatures, which uses it to describe participation. An engagement with cultural diversity is done through appreciating, understanding and assimilating the ideas that make up this particular doctrine into some form of teacher/student relationship. For a practitioner to engage with cultural diversity they need to understand what it is and then how to structure appropriate action in their teaching practice. As Leask argues, to engage with the actuality of cultural diversity requires firstly a conceptual frame to draw from and secondly a plan to enact and use that conceptual frame which is similar to the Ledington model.

In regards to learning and the ability to creating learning through reflection Lohmann's (2002) study uses the term more explicitly to describe the involvement of teachers in learning practices. In this sense, the term is more explicitly used to describe action taken by teachers to enhance their learning capacities. Again, the principles of double-looped learning, which have influenced the work of Ledington and Ledington through Checkland's work on SSM, are evident. As in the engagement model, teachers are encouraged to reflect on the ideas they engage in practice and the practice of teaching itself. The author argues that the dual feedback process improves the way teachers engage students and the practice of teaching. This is strikingly similar to the Ledington model in which it is argued that the learning will be extracted about the conceptual frame, the problem and the engagement process itself.

More recent articles clearly use the concept of engagement in a similar manner. Jablon and Wilkinson (2006), for example, use the term engagement to refer to the 'involvement and participation' of students in learning. They argue that: 'Psychologically, engaged learners are intrinsically motivated by curiosity, interest, and enjoyment, and are likely to want to achieve their own intellectual or personal goals. In addition, the engaged child demonstrates the behaviours of concentration, investment, enthusiasm, and effort'. In this sense, the authors again are talking about involvement and participation in learning. The term engagement here refers to a cognitively and emotionally participating child. Engagement is evidenced by the active participation of students in learning activities. This adds insight to the Ledington model, because the term is used in a much broader sense to describe the enthusiastic participation in the engagement process. In turn, this suggests that the concepts of motivation, emotional involvement and other psychological considerations are needed to properly explain the engagement process. For example, the Ledington model does not cater for possible psychological interruptions, except for the vague and undeveloped concept of interpretive failure (discussed further on in this chapter).

Similar to Jalbon and Wilkinson, Higgins, Trope and Kwon (1999) use the term engagement to mean involvement in educational activities. The term is derived from the Higgins and Trope (1990) study on what factors motivate students to become 'involved' in education. The use of involvement is the same as the civic and

employee engagement literatures mentioned earlier in these chapters. Engagement for these authors describes how students become active in their learning capabilities. As in the previous literature example, this paper extends the concept of education literature to incorporate psychological and emotional factors in learning. Although the Ledington model focuses on problem solving activity, learning and motivation in team problem solving needs further examination, as it has received in other research (see Basadur et al. [2000], McFadzean [2002a,b]).

Other authors are more interested in how students participate in learning activities and how they 'involve' themselves in class-based learning. Richards (2006) uses the term 'student engagement' to describe the way that teacher and student successfully interact. She cites issues such as: time, space, materials and, more importantly, relationships between the teacher and student as being important factors for engagement. In a similar way to the 'social engagement' literatures, Richards is using the term to explain the nature of how students become involved in their learning interactions more so than just their involvement in school activities. Engagement in this paper refers to both the mental participation of students with each other and the interactions they have with the teacher. While this has already been covered in this chapter, it is worthy to note that in education literatures the process of interaction is seen as essential to the whole process of engagement as it is in Ledington's model. Therefore, while the Ledington model does not adequately address the psychological issues at work, it deals with interaction processes in the same manner as do the education literatures.

Even though the Ledington model is argued to be a social process of interpersonal communication, the role of emotions and mental models of the problem solvers themselves is not explored beyond their conceptions of the problem at hand. Kuh, Kinzie, Schuh, and Whitt (2006), in their study of student engagement in schools, highlighted that a 'caring' attitude, democratic interaction styles, developing students' outcomes based on different models of behaviour and constructive feedback foster student engagement. Their use of engagement is used to explain how students are more involved when the above-mentioned factors are used in the everyday classroom on a consistent basis. Kuh et al. built on the concept of learning by discussing how such teaching practice and environmental factors influence how students socially

interact in the classroom as well. Again, this paper highlights the role emotional issues play in engagement processes. According to Kuh et al. (2006), amongst learners there is as much need for emotional interaction as there is for cognitive interaction. This emotional process and the other factors greatly affect how people learn, so there is a need for the Ledington model to incorporate these concerns, although it is outside of the concern of this PhD thesis.

In the adult learning literatures the concepts of engagement have another type of meaning that presses on deep learning and reflective thinking. The seminal work of Schon (1983) used the term engage to explain the continuous learning cycle that professionals have to undertake to be successful in their careers. Schon argues that engagement takes place when reflection is present in learning because it creates a platform for continuous 'thinking and learning in action'. In an earlier work, Argyris and Schon (1978) distinguished between single-loop and double-loop learning.

Single-loop learning was argued to be about reflecting on individual learning for the sake of performance in a fashion similar to Kolb (1984). This kind of learning does not question motives, assumptions or raise critical awareness; it maintains organisational norms, as the learning never questions the assumptions or motivations of either the organisation or participants. Double-loop is when the learning systems of an organisation are questioned, and the norms, policies and values that underpin how the material learned are questioned. Learning is said to take place by engaging in the activity of learning itself and questioning why that kind of learning is taking place. The term engagement is used as both an explanation of learning activity and the practice of reflecting on organisational learning. In this sense, the influence of Schon's work on the Ledington model is evident. When the conceptual frame has been created and explored against the expressions of the problem, one level of feedback is said to occur in which the immediate usefulness of the ideas will be more obvious. The second level of feedback occurs when those who use the conceptual frame reflect on the way in which they are learning about the conceptual frame, the interaction process and the outcomes of the engagement.

There is a tendency in engagement literatures to slip between the language of Schon shown above and the more typical 'involvement' definitions found in management

literatures. Kadakia (2005) used a computer game called *Morrowind* to enhance student engagement (meaning participation). The class was studying decision making and consequences, and that game was used to great effect and engagement was said to be successfully achieved. The author explains, 'Overall engagement escalated. I include some race/ethnicity identifiers to highlight the fact that engagement was higher amongst all students, not just a certain segment. Each day, many students entered class asking if we were going to use the game again'. This empirical study also highlights how the teacher used a device (computer game) to facilitate engagement and then got students to reflect on decision making and consequences. Again, there is a tendency for the author to use engagement to mean participation which, when reflecting on the Ledington model, seems inadequate. The students are not just participating but creating discussions and learning through the use of the computer game which is really being used as a metaphor. The interactions between the game and problem expressions of the students highlights the needs for authors like Kadakia to think more meaningfully about engagement than on the simple level of participation.

Other literatures like the problem based learning literatures give a much clearer definition of engagement which hints at the double-looped learning process Ledington and Ledington (and their mentor Checkland) assume. Problem-based learning (henceforth PBL) is an action learning discipline that requires students to focus on problem solving first rather than purely gain theoretical concepts. The authors argue that PBL creates 'student-centred engagement' by getting students to participate in real-world problem solving contexts. It was first used in the field of medicine by Burrows and Tamblyn (1980) but has gained more notoriety in education circles to argue for an application to ill-structured problem solving, the idea being that student engagement is enhanced when the problem is put first in educational learning.

Edwards and Hammer (2006) argue:

> Increasingly, graduates are required to demonstrate abilities such as the capacity to critically evaluate and/or consider information, solve problems and interact with others regardless of the nature of their professions. PBL with its emphasis on student centred learning and the application of thinking and problem solving

> abilities to students' learning experiences has been seen as a pedagogical tool aimed at assisting graduates in obtaining the skills now considered necessary for a successful professional post-degree experience.

3.3.1 Problem based education

For the PBL literatures, the concept of engagement refers to something much closer to the Ledington model than the other management and humanities literatures. In particular, it highlights the need to structure the problem situation through the use of ideas.

Chin and Chia (2006) argue:

> Characteristics of PBL include using an ill-structured problem to guide the learning agenda, having the teacher act as a metacognitive coach, and students working in collaborative groups. Ill-structured problems are those where the initial situations do not provide all the necessary information to develop a solution, and there is no one correct way to solve the problem.

Engagement is the sense used by educators in talking about student involvement and participation in learning (see for example Chin and Chia [2006]) in problem solving activities. It also indicates the use of double-looped learning techniques such as in the Ledington model, although the definition of 'engagement' is extended to include how the students 'engage' with the problem at hand. Peterson (2004) argues that the PBL approach encourages students to apply a conceptual frame (or their knowledge in an articulated form – he uses Merriam [2001] to support his argument citing the adult learning literatures) first, and then learn through using such a device to structure interpretations of the problem situation. Peterson (2004) continues to argue that, by putting the problem first – or in other words by not giving students theory upfront but rather forcing them to engage themselves in the problem – student learning is enriched and more in line with industry practices. This kind of thinking is essentially the same process as the Ledington model, as students are encouraged to build a conceptual frame to make sense of the problem and learn about the problem solving process. Some other examples of this kind of thinking from educational literatures are examined below:

Gick (1986), for example, argues that the problem solver extracts information and attempts to understand the problem or connect it to existing knowledge to form an integrated representation (or a conceptual framework of the problem). Xun and Land (2004) in quoting Gick's work suggest:

> If the schema and representation is used during the problem solving process, the solution process is schema driven with little search for solution procedures. If appropriate schema cannot be activated, the problem solver goes back to an earlier stage and redefines the problem or uses another method to solve the problem.

Earlier in this chapter, Jonassen et al. (2006) was used to argue that in real-world settings a student is required to solve problems that are 'wicked', ill-defined and very vague in their representations. It is worth revisiting here because Jonassen et al. (2006) argues that the work of teaching this kind of thinking has practical merit. The authors present a case with empirical evidence to explain how students often create a conceptual framework to apply to the problem situation in order to extract meaning from it to defend politically, in practice. They heavily criticise engineering literatures and education practices that teach students how to solve 'well-structured problems' which in effect have a well defined solution awaiting application. In the real world of engineering practice, the authors argue that problem solvers engage with problems by interacting with them by creating a conceptual framework in order to solve them.

Earlier, than Jonassen et al, Hmelo and Ferrari (1997) argued that PBL approaches engage participants in a cyclical process of problem framing, self-directed learning, hypothesis testing and structuring processes for ill-defined problem solving. Underpinning this process is an Action Learning cycle, in which, Lohmann (2002) states, students select a real-world problem situation (classified as being ill-defined), construct 'frames' to analyse it, generate solutions from this and implement them. This is almost identical to the process that Ledington and Ledington (2001), suggest in their paper. Post-implementation, the lessons from the problem solving activity are collected, and the action learning process starts again. This process of reflection allows the problem solvers to interact with each other and the situation to see what worked and what did not and then to come up with new solutions based on what insights they have gained from this experience.

Other authors, show a similar experience with applying problem based learning. Chin and Chia (2006), for example, argue:

> When learning from ill-structured problems, students engage in a reflective conversation with the elements of the problem situation, which is a dialectic process. They are required to define the problem, recognize the divergent perspectives and multiple representations of the problem, determine what information and skills are needed to solve the problem, and synthesize their understanding of the problem.

In essence, the process above accurately describes the philosophy underpinning the engagement approach suggested by Ledington and Ledington (2001). The only key difference of note is that Ledington and Ledington (2001) are describing 'everyday management activities' and these authors are referring to the education of secondary level biology students. The process of educating the students and the process of real-world problem solving argued for here are philosophically and practically the same.

One of the seminal papers in the area, McPhee (2002), argues that PBL makes use of a collaborative dynamic where students engage with each other and interact with the problem-to-be-solved. Students interact with each other to solve so-called real-world problems in a reflective manner. This collaborative dynamic not only fosters interaction between problem solvers but with the problem situation itself. As the students make use of this collaborative dynamic they construct meaningful answers to help interpret the problem situation. Again, this as a process is extremely similar to what Ledington and Ledington are arguing for.

Other examples of similarity to the Ledington model can be found, at least philosophically, in the Cruickshank and Olander (2002) paper of problem based learning in science education. The authors argued the case for a PBL environment because it is said to increase student participation and engagement in critical (reflective) learning activities in science education. Their empirical study of a classroom indicated (at least qualitatively – in the authors' words) that some of the on-staff instructors found the 'problem first' technique used in their practical session to be educationally advantageous, even though it was more laborious. The resultant

changes noticed in student participation encouraged the authors to continue applying the approach to get greater results.

Another's work who supports these ideals is Udeya et al. (2002). The authors argue that the process of involving PBL in science education requires that the instructor create an ill-defined problem (defined as problems missing key elements) for students to work through. The authors state that in a PBL exercise, students should be given a complex problem to reflect on with no clear-cut solution. This is because:

> ...the problem is unclear and has multiple solutions to it, questions arise regarding the information and understanding needed to solve the problem. Students control the direction of their own learning as they decide what they need and what to know to construct a solution to the problem.

All of these papers point towards something missing in management and humanities literatures, and that is the need to have a conceptual frame to build upon in ill-defined problem solving ventures. For PBL, the student builds the conceptual frame to solve the problem and then cyclically learns by trying to apply these ideas as in the Ledington model. In like manner, the PBL literatures say that a double-looped learning process will be achieved. The common thread amongst educators is that PBL education must be authentic so as to maximise student learning. Barrows (1986), an inventor of the approach, argued this case, suggesting that medical students need to be exposed to real-world problems to enhance their understanding and learning capacity of both the problem and how they solved it. The authentic experience argued for is the same as Checkland's assumptions in the LUMAS model (which has clearly influenced engagement) and the Argyris and Schon (1978) double-looped learning model. There are some critics who argue that this kind of process, where student engagement is centred on structuring conceptual frames to interact with problems, is troublesome.

Moust et al. (2005) criticised PBL, citing the need to produce more empirical evidence to suggest that it is useful. In their study they found that a lot of things are implied in the problem solving process; things like student willingness to participate and teachers who do not encourage self-directed learning. Others like Sanson-Fisher and Lynaugh (2006) argue that in medical science the focus on PBL education is not

proven to be as useful as in other disciplines. The authors point towards the need for more empirical evidence to measure its effectiveness in management situations because of the seriousness of the medical profession. Siu et al. (2005) make a similar argument for social science education but focus on empowerment. In this article, the point is made that students are not always clear on their empowerment and roles as problem solvers, a point also made by Chin and Chia (2006), who suggest that often a teacher will have to intervene enough to make the situation authentic but not too much that they create a better defined problem. Bigelow (2004) too suggests that PBL assists in helping to give students much needed skills in solving unstructured problems, but asks the question will businesses find these skills useful. He cites Nutt (1999), who argued that most managers are under pressure to make decisions in unrealistic timeframes, and these skills may not be accepted by real-world businesses.

Others like Bigelow (2004) argue that students in general in the university environment have had limited exposure to real-world problems and therefore are novices at handling such complex issues. He suggests that great caution needs to be taken to avoid creating problems in this regard. Vat's (2006) empirical studies centred on the case for creating PBL criteria to support organisational learning curricula, citing as a major issue that social factors like change and subjectivity were problematic. Peterson (2004) agrees that PBL is useful, but suggests that in a majority of cases there are assumptions made as to what this requires. He cites three issues: focusing students on the practical issues inherent in PBL instead of traditional education practices, how selecting the problem is a very difficult task, and teamwork.

What emerges from this literature is the idea that solving real-world problems requires an engagement of ideas into a problem situation due to its ill-structured nature rather than a prescriptive, well-built, defined problem solving process (Jonassen 2000). The process suggested by the PBL literatures is very similar to that suggested by the Ledington model. The PBL literatures extend the meaning of engagement to include how a student (or groups of students) will engage with a problem and form conjectures as solutions to make sense of problems and learn about the problem solving process itself.

The PBL literatures provide insights into what educators consider ill-structured problems to be and how they should be solved. Central to this, for Jonassen et al. (2006), is the idea of structuring problems using a conceptual framework to make sense of it and then defend the position taken in structuring the problem. The authors make the point that in education, given problems often have a clear goal and well-defined solutions. Problems in the real world often elude definition and require structuring, conjecturing and ultimately the construction of a set of ideas the problem solver thinks is likely to work. These ideas are reminiscent of Checkland (1999), who insists that all problems are social constructions and anyone wishing to use SSM must maintain this worldview.

In PBL literatures, engagement is a twofold process which could give great insights into what problem situations are and how they could be better understood. Firstly, the student is actively participating with others to solve a real-world problem in the tradition of double-looped learning (Argyris & Schon 1978), therefore students are questioning the assumptions and processes they go through (i.e. the learning required) to solve the problem through the meaningful use of ideas. In the engagement model, the learning process is said to be the same with people learning about the problem and the social process of solving the problem including the nature of the relationships between problem solvers. These are direct correlations with the Ledington model. More specifically, both approaches suggest the following:

1. using a conceptual frame,
2. interaction and participation of this frame against different perceptions and expressions of the problem, and
3. reflecting and learning from the outcome of the process.

Point 3 above highlights an argument made by adult education literatures by authors like Schon (1983) and Mezirow (1991) that reflection is really metacognition, or thinking about thinking. Mezirow, for example, states that, at the point of critical awareness (thinking about what to think about), a student notices that changes need to be made. Instead of reflecting on the material or what is learned, engagement is reflection on both the need to learn certain things a certain way and the way in which it should be *epistemologically* approached. This level of cognition is deeper in the

sense that it sits in the mind of a problem solver guiding the process to a clear conclusion. The PBL literatures are suggesting that students need to engage with the problem by trying to solve it by using their own cognitive structures and then think about how their actions did or did not work. Ledington and Ledington (2001), Checkland (1981) and others have suggested that this reflective process is crucial to real-world problem solving.

Engagement in this literature is both thinking about the problem to be solved by becoming engaged (involved) in solving by applying a cognitive structure to the problem and then thinking about the problem solving action. The second part of the engagement concept in these literatures extends the concept to understanding the metacognitive components of problem solving. The applying of the students' ideas is therefore the first level of engagement, and the second is when the students modify the ideas by reflecting on the problem solving process. A student will engage with the problem by using a cognitive structure to solve it by reflecting on the nature of the problem and coming up with something they think will work. After applying the ideas on a cognitive level, a student is said to be appreciating and structuring the problem according to the available information. However, they are also thinking about how to solve problems on a metacognitive level, which authors like Chin and Chia (2006) argue is the point of PBL. Teachers deliberately provoke metacognitive thinking where students are asked to think about the experience of solving the problem. During the process of using the ideas they think will work (solution), they apply them, but they also are provoked into thinking about what problem solving is really about and, more importantly, thinking about how they learned about the problem (Atkinson, Regan & Williams 2006). It is clear that the PBL literatures share a dialogue with real-world problem solving literatures if only through the similarities in the process. In reference to the engagement model suggested by Ledington and Ledington, the PBL literatures, despite the criticisms of student motivation, empirical data and other concerns, are actively promoting this kind of practice. In the Psychology and Humanities disciplines, similar arguments are made.

3.4 Engagement in Psychology and Humanities literatures

The main concern of the use of the term engagement in these literatures, is the use of the concept, as a means of describing how people become 'psychologically involved' with the social world. For example, McGuire and Gamble (2006) use the term 'psychological engagement' and present an empirical study arguing that, when people become 'psychologically engaged', there is the possibility of improved community conditions. The authors use the term engagement to reflect the idea that participation of teen leaders in a community program was actually based on a mental apprehension of community participation as being a good idea. The actual participation of people mentally leads them to actual engagement in activities that benefit the community, something the civic engagement literatures argue is imperative for community sustainability.

Other researchers make similar arguments about psychological engagement. For example, May, Gibson and Harter (2004) use the term psychological engagement to discuss the nature of employee participation (as mentioned earlier in this chapter), but extend the explanation of engagement to include psychological reasons for employee engagement. They cite Kahn's (1990) work on the way employees express themselves physically (by doing the work), emotionally and, more importantly, cognitively. That is, in organisational work and problem solving, employees will engage *themselves* into activities on all three levels. They will cognitively, emotionally and physically become involved in work activities by participating, being involved and using their knowledge structures, belief systems and other ideals in action. May et al. (2004) argue that disengagement from workplace activities occurs when an employee is said to be alienated. In this sense, cognitive, emotional and physical output will change and the employee will no longer be mentally involved or, if they are, they will grow in resentment towards the workplace. The authors highlight three important concepts for understanding engagement in the workplace: meaningfulness, safety and availability.

Meaningfulness is the employee's relationship to work on a personal level through questions like, '"is my work meaningful?' If an employee's work is not perceived as being meaningful, they run the risk of becoming disengaged. Safety is the ability of

the worker to feel they are free from various kinds of persecution in the workplace environment. Are employees able to speak freely about problems they have and will they be allowed to speak up. Again, the authors stress that engagement takes place over emotional, cognitive and physical spaces, so safety in all these domains is considered important. Availability (called psychological availability) is the employee's belief system that they are able to do the work on a physical, cognitive and emotional level. The authors argue that this manifests as the readiness and confidence of an employee to engage in their work role and make themselves available to do the actual role they were hired for. These terms are largely ignored in the Ledington model, with the exception that problem solving takes place inside the concept of 'value systems' that define the relationship between problem solvers. This is a problem for the Ledington model, because the authors are suggesting problem solving takes place in the conditions of value systems particular to the workplace where the problem was formed.

Others point out the need to understand the different dimensions of engagement. Stone (2002) argues that runners were self-handicapping their performance due to race-based perceptions that other racers ran faster than they did. He used the term psychological engagement in the same manner as May et al. (2004) as being a cognitive, emotional and physical disengagement from participation in running events. Both Stone and May et al. extend engagement as a concept by using it meaningfully to explain social phenomena in terms of ontological variance in more than just participation. Stone goes on to present the argument that the negative stereotype is a belief that runners engage with, and this hinders their ability and willingness to compete. He takes the argument further by saying that athletes use this as a platform for creating a reality to explain poor performance at events.

The term psychological engagement is used in the same manner as those quoted by Khazanovich and Schlenker (2000); who conducted an empirical study on the physical involvement of parents in the Ukraine, to indicate reasons for the willingness of parents to become engaged in shaping their children. In this sense, engagement is used to explain emotional reasons for involvement (outside the scope of this thesis), which the authors reduce to the concept of responsibility. When parents become responsible for looking after their children and take ownership of raising them, they

are said to be more likely to be engaged than disengaged. There are many others who have used the engagement concept in a similar way to these authors to explain participation with life in the broader sense. Koch (1997), for example, uses the term to explain how people engage with electoral systems and in particular examines the use of strategies by electoral candidates to successfully involve women. Banducci and Karp (2003) use the term to explain political and psychological engagement in electoral politics in the same manner as Koch does.

Some authors like Blundell-Jones (1999) uses the term to explain the nature of architecture to be shaped and formed by a psychological engagement to certain kinds of epistemologies. In this case, the author cites a commitment to the ideologies of conservatism. The paper explains how the author attempts to express his ideological position in the use of recyclable material and therefore psychologically engaging his work.

In nursing literatures, Ray (2006) for example, argues that, in traumatic situations for clinicians and the on-going effects that result from experiencing trauma, embodied engagement is used in the same way as in May et al. in explaining the psychological engagement of practitioners and the effect traumatic situations has on patients. She argues (p.108): 'Embodied engagement commands the use of the entire self by the patient and nurse in understanding and making meaning of the world and those experiences'. The author argues that researchers need to become more involved in using phenomenological approaches to make sense of how peacekeeper clinicians experience trauma and how this affects the whole self.

The use of engagement in these literatures speaks of a full engagement of people in the activities they are pursuing. It alludes to emotional, cognitive and physical involvement in activities. The term used in this sense encapsulates the meaning when speaking about employee motivation, theological awareness, architecture, PBL practices and both adult and children education literatures. The quotes above indicate that the Ledington model recognises these concerns but does not provide either a meaningful interpretation or a pragmatic development for handling such concerns.

What becomes evident when considering the broad base of engagement and its use in the literature is that, no matter how the term is used, the frame of participation and involvement is often assumed. There is, though, a sharp distinction between the modes that the authors want to discuss, some of which are not relevant to the work of this thesis. For example, the term 'emotional engagement' differs from the Ledington model, which is primarily interested in the cognitive frame and use of ideas to structure interpretations about problem situations. While the emotional and psychological engagement aspects such as those discussed above and in the employee engagement literatures are relevant to the overall process, they are not primarily rooted in the cognitive model that is being assessed in the form of the Ledington model.

3.5 Adding the dialectic to Ledington's engagement model

There were several key concerns with the engagement model that resulted from the critique. The first was the ill-defined 'interaction' process, which seems to make use of a dialectic. Van de Ven and Poole (1995) describe a dialectic process thus:

> ...dialectical theory begins with the Hegelian assumption that the organisational entity exists in a pluralistic world of colliding events and forces, or contradictory values, that compete with each other for domination and control. These contradictions may be internal to an organisational entity because it may contain several conflicting goals or interest groups competing for priority. Also these contradictions may be external to the directions of the organisation as it pursues directions that collide with other organisations.

The authors continue to argue that a dialectical theory will decentre these conflicts, hopefully by engaging them in a creative process. Creative stability is explained in organisations according to dialectical process theory through the balance maintained between the status quo and the contradictory forces that destabilise organisations. An example is found in Mitroff and Emshoff's (1979) dialectic approach to planning and policy. The authors present a model for uncovering the conflicting assumptions that exist in the ill-defined problem contexts. A dialectic is forged to create a new position that takes into account all oppositions to possible strategy. Mason (1969) suggests that a dialectical approach to strategy could also be helpful in understanding not just the positive elements but also the negative elements. This process of realising

the contradictions and assimilating them into a consistent framework (see also the work of Churchman [1971]) is a dialectical process. In the Ledington model, the dialectic takes place between the various expressions of the problem by the actors as they attempt to make a conceptual frame for moving forward. Sociologist Craib (1997) argued that the dialectic, as framed by Hegel, is indeed a social process where ideas are exchanged for new ones through social construction processes.

Chanin and Shapiro (1985), extend this definition, to use the term 'dialectical inquiry' to mean exploration, structured debate, critique and conflict of values around areas of interest. Again, as in Craib's definition, the authors assume that the dialectic is a social process whereby change stems from new ideas (conceptual frames) replacing previous ones. The authors argue that critique and argumentation are essential to this process because, by teasing out the contradictions, the overall position reached will lead to a better position (new conceptual frame) that is aware of critical problems. In this sense, the interaction process of Ledington and Ledington (2001) would be better described as facilitating a dialectical process. This is because the expressions of a problem are likely going to be different (taking as given the social construction of reality thesis used by the authors) and will be conflicting or contradictory. At the heart of the interaction process is the idea that getting these views to a place where worldviews are living in tension (or balance according to Van de Ven and Poole [1995]) around a central thesis. This thesis is similar to Ledington and Ledington's framework of ideas or the idea of conceptual frames used in this thesis which sense-makes problems.

Ledington and Ledington (2001) argue that the model of engagement is a social process of interpersonal communications where different ideas are used to make sense of problem situations. At the heart of the process is the exploration of a problem situation by dialectic interaction of frames deemed to be relevant with expressions of the problem and structuring a debate about change. The conceptual frames are being used in tension to critique and reflect upon the various expressions of the problem until common ground or a new position is achieved.

3.6 Summary

An engagement is therefore typified by the following:

1. **The conceptual frame:** Others like Checkland (1999) argue that a conceptual frame declared in advance is an epistemology that forms a construct used to 'appreciate the world' (Checkland 2005). This is a set of ideas deemed relevant to 'make sense' of the problem situation. Jonassen et al. (2006) argued in their study on engineering students that often the complexity of the situation requires that a conceptual framework be created in order to tease out meaning from the situation. Ledington and Ledington (2001) used the words 'deemed relevant' when describing a framework that will be considered as being useful. This is 'solution first' thinking that can later be reflected on and changed as necessary.
2. **Expressions of the problem:** This admits that different actors will have different expressions (appreciations, interpretations, sense-making) as to what the problem is. Each one of these expressions needs to be considered as being part of the system of frames that make up the problem (see Ackoff 1978).
3. **Dialectic:** Ledington and Ledington (2001) presupposed a constructivist position for 'engagement' and contend that people interact with the perceptions of others through their own interpretations of the world. Gergen and Gergen (2003) argue that reality is a fluid, ever-changing process of interchanging discourses, rhetoric which is not dependent on causal laws but on the '...vicissitudes of social processes (e.g. communication, negotiation, conflict, rhetoric)'. Perspectival thinking (Haynes 2001) and Ulrich's (2003) boundary critique as ways of exploring multiple perspectives in problem situations are alternative language for the processes being suggested here. The interaction takes place between the frames (different perspectives) of the situation. Mingers and Rosenhead (2004) argue that this process is essential for problem structuring because it allows the different frames to come together to give a richer interpretation of the problem situation. The interaction between the

frames and the situation creates a non-linear dialectic that is used to push the problem situation forward to a new 'synthesis'.

4. **Interpretation and Learning:** In Ledington and Ledington's (2001) model it is assumed that learning will take place about all three elements of the process mentioned above. As learning ensues, the frame can be altered, scrapped or developed accordingly and the 'engagement' can move forward. Ledington and Ledington (2001) expressed this as how a framework of ideas makes sense of expressed interpretations of the problem context.

Engagement can therefore be summarised as: (1) creating meaningful conceptual frames (or a deemed relevant frame) to use to make sense of problem situation before defining the problem, (2) engaging the frame with the situation (remembering this is an interaction between people given the constructivist position taken) to learn and make sense of the problem situation, (3) creating meaningful outcomes that can lead to interpretations of the problem situations that can be used as a strategic 'way forward' and (4) interaction with other problem solvers to reach possible interpretations and conclusions about the problem. The following diagram represents this process.

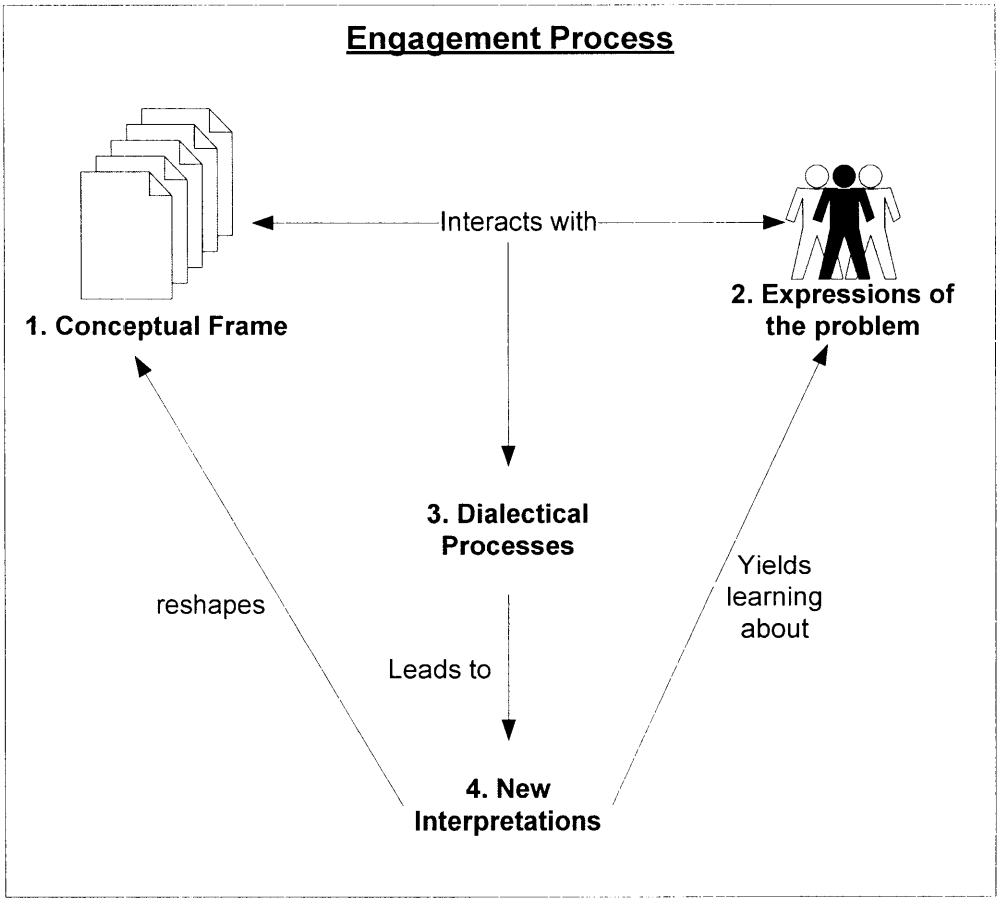

Figure 4 Enhanced engagement model

The enhanced model above still includes a double-looped learning process in which the new interpretations will also yield learning about the process itself. This second loop of learning is show below:

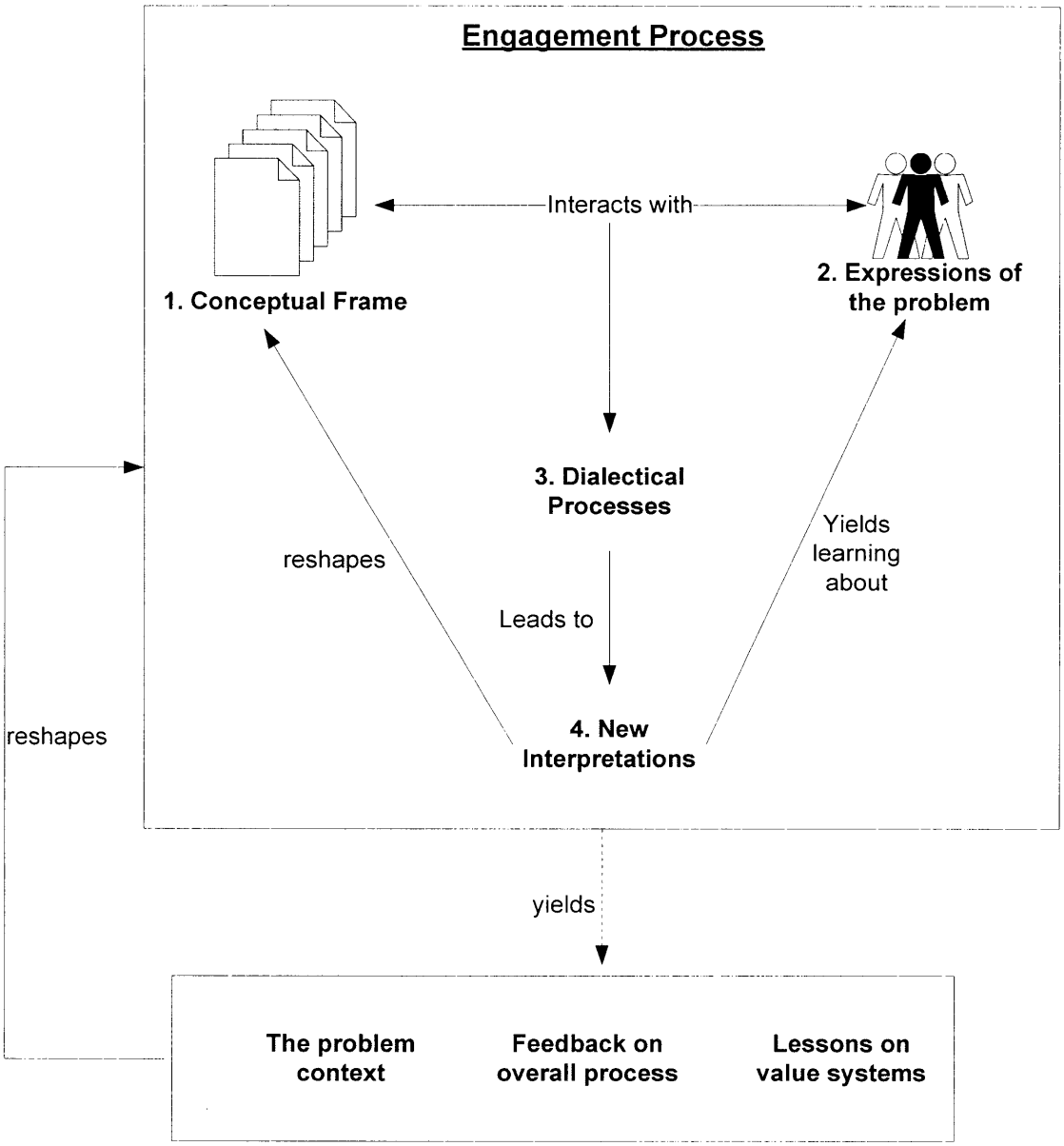

Figure 5 Enhanced model of engagement showing second learning loop

The second loop above shapes the process of engagement, thus making it a continuing cycle. An example of this process can be found in Warfield and Perino's (1999) use of the *problematique*, a graphical device used to represent the structural (rather than causal) relationships of problems, as a way of structuring problem situations in order to create 'action plans'. According to the authors:

> The intent is to provide a graphical display that fulfils two basic requirements: To present a picture of the problem situation in a manner that reduces cognitive overload; second, to facilitate interpretation, e.g. by direct translation of the display or portions thereof into prose when preparing written reports.

These authors argue that by using the diagrams as a way of structuring the problem, written interpretations can ensue. Engagement, for these authors leads to the ability to interpret the situation as it does in other approaches. Warfield and Perino (1999), like Rittel and Webber (1973), argue that the act of defining a problem is part of the same process as solving it; that is diagnosis shapes prescription for action. By engaging with the problem through the use of the diagram, a written interpretation can ensue.

3.6.1 A set of constitutive rules for the use of engagement

Checkland (1999, pp.30-35) outlines a list of rules that constitute the use of Soft Systems Methodology. It is thought useful to create similar guidelines in a non-prescriptive manner as a set of principles for what constitutes the use of the engagement model in this thesis. These are as follows:

1. You must recognise social reality as being consisted of perspectives that change, evolve, conflict and diverge.
2. You must be conscious that action taken in a situation is the result of these perspectives and tensions emerge when actor/stakeholder perspectives conflict
3. You must recognise that tensions have to be dissolved through the use of new interpretations (perspective shifting)
4. You must recognise that new interpretations will reframe and reshape the problem context and yield different courses of action and learning

Rule 1 to 3 point towards reality as a dialectical process and the need to recognise that in the use of this model. It's one of the key assumptions of this work. Rule 4 picks up the argument made in the second chapter that to 'solve' messy problems there needs to be a new interpretation (perspective shift) that reshapes how the problem is defined. To see the basis of these arguments in more detail refer back to chapter three. At the end of chapter 5 the rules will be used to guide the interpretation of the case studies.

Whilst the dialectic provides a meaningful answer to the problem of the interaction process and adds more value, there is still limited discussion on the emotional, psychological and motivational issues with the model. Problems are created and solved by rational creatures, and the simple 'value system' based analysis provided does not adequately describe this process, as some of the literature above demonstrates. Other issues like empowerment, emancipative concepts and considerations like 'boundary judgements' (Ulrich 2003a) could add depth to the model. Despite these problems, the engagement approach (including the added dialectic process) could provide a meaningful theoretical platform and pragmatic device for the ill-defined problem solving activity that managers have to face.

Chapter 4 Research Methodology and Design

4.1 Introduction

This thesis explores the usefulness of the concept of engagement for thinking about problems. This study aims to provide a better understanding of complex problem solving processes by integrating theoretical insights learned from the literature review and lessons learned from two action research case studies. The researcher took on various roles during these studies. In the first cycle of learning (part 1), the researcher used the engagement model to sense make a series of events and in the second, the researcher was part of a team exploring the use of information systems in a large government organisation. The researcher was not paid for any part of these studies except in the later half of the second case (see section titled 'Follow up study'). To ensure a lack of bias in the findings, an independent reviewer analysed and transcribed the transcripts. After this, the researcher returned and began to use the data in the second case.

This chapter will argue that this research methodology produces valid or justified knowledge. Therefore the following sections will argue for the need of empirical data derived from case studies. That is, the research itself is a study of the 'model of engagement' by participating in real-world problem solving activities. It is considered important to fully and explicitly explain the conceptual frame used in the case studies. To help structure this chapter the FMA model from Checkland and Holwell (1998ab) is used in the next section.

4.1.1 FMA model of the research

Checkland and Holwell (1998a,b), use the FMA model to explain the process of all intellectual work as shown below:

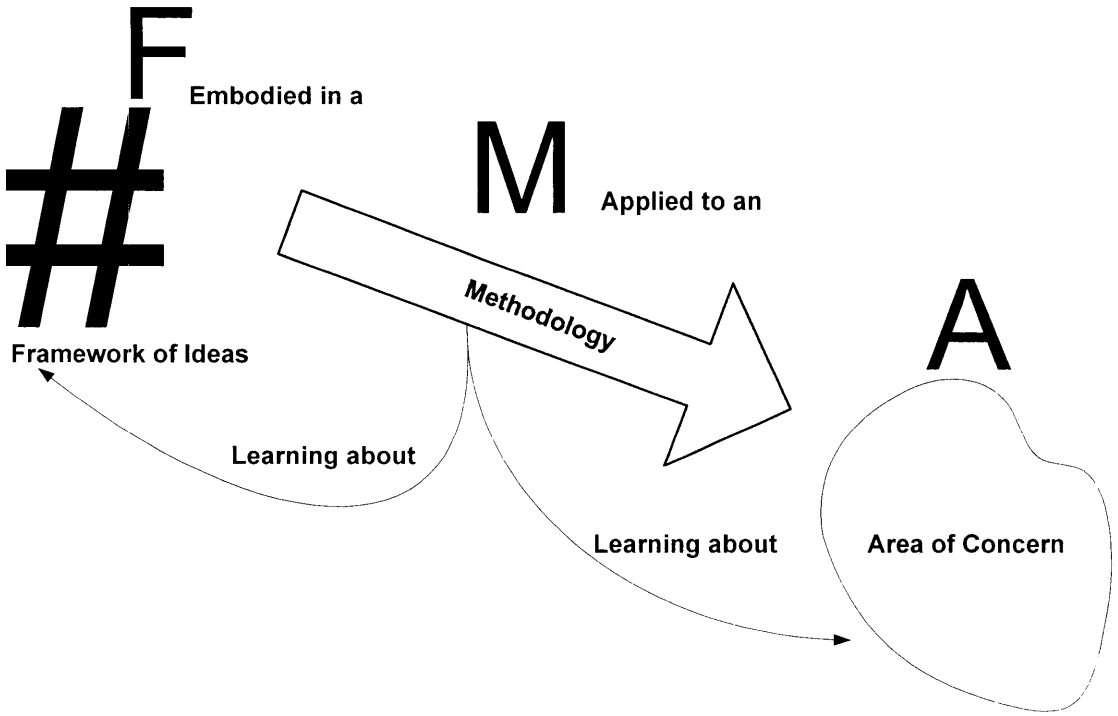

Figure 6 The FMA after Checkland and Holwell (1998a:23—5)

All research, no matter what its underpinning epistemology, is said to be a framework of ideas, embodied in a methodology applied to an area of concern (as mentioned earlier in this chapter). In this thesis, the conceptual frame (F) is the engagement model. The methodology (M) was the action research approach used in the two studies. The area of concern (A) is the ill-structured or complex problem solving. The research will learn about the engagement model (F), the area of concern (A) and the methodology (M) as reported in the conclusion chapter. For this reason field evidence will emerge in relation to the conceptual frame (F), the methodology (M) used and the area (A) under study. In the experimental pilot study the learning will be about the usefulness of the model for sense making purposes as an experimental study. The second study will use the concept with evidence derived from interviews to learn about the usefulness of the concept. While learning about the methodology and the area are interesting to the researcher the insights will only be included that relate directly to the research questions. This research approach is consistent with a pragmatic approach (Omerod (2006)) which is grounded in the social practices of action as argued earlier.

The rest of this chapter outlines the framework for the research, the methodology chosen and the means by which the data resulting from the application of the methodology. As Checkland and Holwell (1998ab) argue any piece of research begins with establishing what kind of 'knowledge' a researcher is searching for. The following section introduces the interpretive pragmatic stream of knowledge the researcher is looking for, followed by an outline of the methodology and the data collection and evaluation processes.

4.2 Knowledge

There are many current theories of knowledge (epistemologies) that are now in use in research communities. Johnson and Duberly (2003), for example, list five, including: logical positivism, conventionalism, postmodernism, critical social theory and critical realism (in which they also include American pragmatism). Johnson and Duberly (2003) list five, as do Guba and Lincoln (1994) and Landry (1995) for example. The mainstream view (see Guba and Lincoln [1994] for one example) is that there are three major epistemologies:

1. *Logical positivism*: Knowledge is construed through understanding a series of causal laws through testing 'cause and effect' in the external world via hypotheses. Reality is seen to exist independent of the observer and contains laws or hypotheses determined through rigorous 'scientific' hypothesis testing.

2A. *Interpretivism:* Knowledge is constructed through group interpretations of observed phenomena and is not causally determined but socially constructed through perceptions of people. Reality is seen to be dependent on the observer. Norms, social institutions and lived experiences all form the basis for understanding interpretivism. At the centre of the interpretive sociological perspective is the idea that reality consists of intersubjectively shared meanings that are value laden.

2B. *Critical social theory:* Shares the same observer-dependent view of reality as interpretivism, but argues that knowledge changes as historical insights change. The modern view takes knowledge as the kind which promotes 'emancipation' through self-reflection. What separates the epistemologies of critical social theorists from interpretivists is the focus on emancipatory knowledge, changing ideological superstructures (a Marxist concept) that are seen as dominating human consciousness.

3. *Postmodernism:* Postmodernism holds that there is no 'group interpretation' of reality and that there is only private knowledge and everything is relative. Authors like Eco (1975) hold that reality can only by held through the experience of individual 'private' interpretation (see also Wittgenstein 1953).

This research is based on interpretivism, which holds that knowledge is socially constructed interpretations of real events. Knowledge is therefore 'observer dependent' and relies on meaningful constructs applied to social phenomena. Therefore this research is not looking for positivist or postmodernist knowledge, but for an understanding of the social construction and reconstruction of problem perspectives. So what is interpretive research? The following section will argue that interpretive research is more appropriate for this study.

4.3 Interpretive research

Interpretive research, according to Avison and Myers (2002), argues that knowledge can only be gathered through the social constructions of reality available to the researcher and various conceptual frames. Therefore, interpretive researchers are not interested in measuring variable dependencies, but in focusing on the process of how humans understand and phenomenologically relate to their environment. Walsham (1995) argues that this underpinning concern stems from researchers who are interested in understanding the 'symbolic action' that relies on the constructivist position that groups and individuals construct their own reality. The reality that researchers come to observe is not separate from the reality of the researcher

interpreting it, as is the case for logical positivism. For interpretive researchers, the reality of the subject is a concern. As Walsham notes: "Interpretive researchers are not saying to the reader they are reporting facts: instead, they are reporting their interpretations of other people's interpretations".

Klein and Myers (1999) argue that, because of the possibility of multiple interpretations, there are many opposing conceptual frames that need to be considered. A researcher should investigate other frames such as economic, political and power where appropriate. This process of collecting different social constructions to represent an area under study highlights the epistemological concern of interpretive research. Authors like Walsham (1995), Avison and Myers (2002) and Baskerville and Wood-Harper (1998), for example, show that in Information Systems research there is a growing body of literature advocating interpretive research. The research process is therefore a collection of these perspectives and not in finding the 'right' answer (see Hirsch's [1967], argument for example, and more recently Myers [1994]), but integrating the different points of view.

This research is not seeking a certain conceptual frame on problem solving as such but is about seeing if the 'engagement' concept is useful for tackling ill-defined problem situations. Given that in chapter 2 the argument was made for problems as frame-derived, this chapter follows the same epistemological ground and argues for the research process of integrating different frames. Klein and Myers (1999) argue that multiple frames are essential to understanding how reality is constructed and it is essential for interpretive research to be differentiated from positivism in this regard. Interpretive epistemology takes as given that social reality is constructed from many viewpoints and hence needs to be understood over many epistemological concerns. Hence the understanding of reality and what knowledge is argued to be is subjective and does not exist independently of the actors who observe events and actions. Therefore interpretive epistemology understands reality through the meanings and understandings people derive from it.

However, some argue that interpretive epistemology is much deeper than understanding multiple frames. Woods (2005), for example, argues that each conceptual frame is a truth in its own right that overlaps and builds tensions with

other truths around it in a dialectical manner. Therefore arguably interpretive research should not just seek to understand the multiple frames involved but it should also create a dialectical understanding of how the many perspectives relate to create the 'general' truth observed. The same can be said of systems research which seeks to understand frames and their inherent contradictions (see Haynes [2001] and Churchman [1982], for example).

Both Walsham (1995) and Stake (1995) agree that interpretive research is steeped in the ethnographic anthropology traditions in which we seek the conceptual frames of a study to make sense of the actions and symbolic interactions observed. In quoting Geertz (1973) Walsham argues that interpretive researchers seek through their own frame to give an account of the frames (social constructions) of those they are observing. As opposed to the unitary concern of positivist approaches, interpretive research looks to uncover the various views and perceptions in the situation, instead of searching for external validation through hypothesis testing. As noted in Checkland (2005), the interpretive perspective takes as given that any model applied to reality is only going to give the interpretation it was designed to and will eventually result in the answer it was designed to give. Bhaskar (1998) also argues that social science differs from natural science and therefore is unsuitable for social research because it fails to adequately comprehend how actions and interpretations cannot be separated from the people who create them. The external reality for Bhaskar is a relatively enduring and changing collection of generative mechanisms which produce 'tendencies'. This stems from the actions and interpretations of the human being who is the primary agent for the continuing construction of reality.

Generalisations are therefore explanations of tendencies observed, as Walsham (1995) argues, not discoveries of observer independent laws. Generalisations for Walsham involve: the development of concepts, generation of theory, drawing of certain implications and the contribution of rich insight (Walsham 1995:79). He argues: "A single concept such as an 'informate' can be part of a broader network or an integrated clustering of concepts, propositions and world views which form theories in social science".

Checkland (1991) argues that interpretive research seeks to create a frame of reference applicable to the real world as a guiding practical epistemology for methodological action. The frame of reference ideally will be employed in a hermeneutical (discussed later) fashion with new insights gained as more and more social constructions and actions are observed and participated in. Therefore interpretive knowledge is that which is seeking to understand the situation under study through the intersubjectively shared meanings and interpretations available to the researcher with the purpose of creating guiding epistemological frameworks for sense-making and action-taking. Guba and Lincoln (1994) note that interpretive research should explore the various epistemological concerns of actors through the multiple perspectives available, especially when they disagree. Moreover, interpretive research should clearly distinguish the social and other such concerns that help people create the meanings they do. The point of interpretive knowledge for Guba and Lincoln is to provide rich 'insight' into social phenomena that can in turn be used to structure meaningful and sometimes provocative descriptions of social reality.

Considering that this is a study about ill-defined problems and the 'perspectives of problems', it is argued that this kind of knowledge is best understood as being interpretive. The researcher is not necessarily interested in deconstructing private knowledge or signs (such as in postmodernism) and is not looking for a reality existing 'out there'. This thesis is not a study on what is the nature of power games, which Avison and Myers (2000) contend represents the critical social agenda. For these reasons, the knowledge derived from this work is argued to be 'interpretive' knowledge that is seeking to build meaningful interpretations and understandings of problematic phenomena in order to provide guiding epistemological insights.

4.4 Pragmatism

The outcome of this research focuses on 'practical consequences' and therefore has a grounding in pragmatism (see earlier research questions). Omerod (2006) states that pragmatic philosophy is one that argues for a guiding epistemology that should provide the platform for 'action' rather than abstract ideas. Therefore knowledge

should be judged not according to whether or not it is theoretically sound, but whether the use of that knowledge produces meaningful and useful outcomes. Vanderstraeten and Biesta (2006) make the link between pragmatic knowledge and the social construction of reality by arguing that Dewey and the American pragmatists held a subjective view of communication processes. For example:

> They developed an understanding of communication in thoroughly practical terms, that is, as a process in which, through the coordination of action, meanings are shared and a common world is brought into existence. The place to begin in understanding this theory is to acknowledge that we basically all have our own, idiosyncratic 'view' of the world. For each of us the world in which we live and work has a unique, individual meaning which is the result of our past experiences and our past learning. As long as we do not interact with other human beings, the fact that we live and work in different worlds is not really a problem. As soon, however, as we begin to act together, i.e., when we engage in a common activity in order to achieve something together, it becomes important for the successful coordination of our activities that we 'see' or 'approach' the world in a sufficiently similar way.

And:

> Communication is the making of something in common. It is important to note that making something 'in common' does not imply that the understandings of person A and person B become identical. The process is one of the construction of a shared understanding, an understanding or outlook or perspective which is the shared 'possession' of the partners in interaction.

The authors further argue that the understanding of communicative practices in pragmatic philosophy moves away from intentionality and towards the social practices of communities that are forged through group communications, actions and interpretations. More importantly, the pragmatic view of communication holds that what is valid knowledge must contain the social world of action and communicative practice. Lawlor (2006:12), in quoting James's foundational work in Psychology notes: "In Psychology, as in his pragmatic theory of truth, all thought is a combination of subjective interpretation and selective sensations of data from the vast chaos that is the total physical world".

For the pragmatist, the actions taken in the world form the basis for the 'subjective' cognitive interpretations of the world. What this means for engagement can best be summarised by what Lidar, Lundqvist and Ostman (2006) call 'practical

epistemology'. In other words, the first question of the thesis can now be extended and put in more philosophical terms: Is engagement useful as a practical epistemology to tackle ill-defined problems? Therefore the aims of this thesis are to evaluate that concept and subsequent ones outlined in the research question list shown in chapter one. In order to do that, a research design was constructed using 'action based' case studies.

4.5 Justification of the case study approach

The case study approach has been an ongoing source of debate amongst different academic circles (see Yin [1994] and Guba & Lincoln [1994] for some examples). The interpretive case study is not concerned with extracting theory from the observed phenomena but synthesising conceptual frames to understand how social reality is constructed within the context of that environment. Therefore, with this aim and the focus on a real-world setting, the case study is ideal for understanding the usefulness of the engagement concept. Several authors make a claim for using this kind of approach in research:

Stake (1995) argues that the case study is not a methodological choice, but choosing to study phenomena in context. This gives the case study an interpretive focus by nature because interest is shown in an individual isolated case. This means that the phenomena under study are being explored in order to gain insights into the case in question and report on that rather than to make big leaps into large-scale generalisation. The author asks the question: "What can be learned from this case?" and focuses his argument on that conceptual frame. The author also argues that different types of case studies, such as instrumental case studies for example, are specifically designed to test a theoretical framework in a particular setting. The author states:

> The case is of secondary interest; it plays a supportive role, facilitating our understanding something else. The case is often looked at in depth, its contexts, scrutinized, its ordinary activities detailed, but because this helps us to pursue the external interest ... The choice of case is made because it is expected to advance our understanding of that other interest.

That other interest represents the general concern or body of knowledge the researcher is interested in. Stake argues for the kinds of cases that seek to extend knowledge through application of ideas in a 'zone' of combined purposes, the purpose being to tease out the systemic understanding that the case study can represent.

Other authors present a slightly different view like Cavaye (1996), for example, who argues that the case study approach can be either positivistic like Yin (1994) or interpretive like Walsham (1995). The author argues that case studies generally systematise observation (quoting Daft and Weick [1984]) by having four discrete tendencies: 1. not interfering or controlling the variables in a case, 2. studying a social phenomenon in its natural setting, 3. studying the phenomenon at different sites, and 4. using qualitative analysis and data collection techniques. The author argues that case study research uses these techniques to relate the finding to a broader general context. As Walsham (1995) argues, interpretive generalisation is more pluralistic in nature and can make use of a creative dialectic to understand the contradictory interpretations that exist in the phenomena under study.

Insights gained from case study research can also guide theoretical assertions as well. Dyer Jr. and Wilkins (1991) argue that case study research provides rich theoretical insights, which other researchers can compare and gain learning from. In citing Dalton (1959), they argue that the role of the case study researcher is to observe the phenomena in question and seek out the interpretations of those involved in everyday work. The authors argue that the goal of case study research should be to provide single stories in one or two cases that can highlight deeper 'structural' theoretical concerns. In this essence, a case study is seen as a picture story that refers back to possible theoretical insights as the researcher makes sense of what they have found. These deeper concerns are argued to reflect theory and to get researchers thinking about the validity of their own research as well as understanding biases in research.

The construction of theory in case studies is a controversial topic and has been covered by a wide array of researchers. Glasser and Strauss's (1967) seminal work on grounded theory suggests that case studies are often chosen to help construct a conceptual frame. That is, a case study may be selected to help see the bigger picture

and construct a theory that can be effectively used as a guiding epistemological framework. Myers (2006) argues that grounded theory allows a researcher to use a theory-creating methodology while simultaneously grounding observations in the empirical data collected. The role of the case study in such a case is to facilitate the building of the theory through the collection of data from real-world case studies. In this case, data can be collected as 'evidence' from a variety of sources in the case study. Each piece of data aids in the theory-building process.

According to the basic outlines above, the case study is not necessarily a philosophical methodology choice but the decision to study some phenomena in context. As Stake (1995) argues, studying a case is a deliberate choice to observe phenomena in context and to report on the observations noticed. Benbasat, Goldstein and Mead (1987), along with Yin (1994), argue that, while no standardised definition for case studies can readily be found, it is generally agreed that case studies are the study of a phenomenon in its natural setting. Therefore, they can be positivistic, interpretivist or based in a critical social theorist analysis. Stake (1995) argues for understanding the employment of case studies from three points of view:

1. **Intrinsic cases**: Where a researcher desires to understand a particular 'case' in a better way. The highlight of intrinsic cases is the specific focus of the researcher.
2. **Instrumental cases:** In this instance the case study researcher is hoping to touch on popular generalisations through the study of the case. Yin (1994) points out that a case cannot give rise to generalisations, but it may pave the way for studies that can bring understanding to a particular theory and lead towards more research being done. This view of case study research is not shared in the soft systems research community (see Checkland and Holwell [1998b]), neither is it shared by the interpretive paradigm (see Walsham [1995] and Klein & Myers [1999] for two examples). The instrumental case study is designed to draw new light onto an existing generalisation and to provide instrumental or theoretical insight on to a particular case.
3. **Collective cases:** Where a researcher investigates a particular area of interest in multiple settings. Eisenhardt (1989) argued that multiple case

studies provide a meaningful way to study phenomena for several reasons. Firstly, the collective case design can provide the possibility of finding continuing patterns in phenomena. Secondly, collective cases can lead to being able to replicate studies, and thirdly, they can provide the possibility of building long-term constructs that can continue to be tested in other cases. Dyer Jr. and Wilkins (1991) argue that, in the case of multiple case studies, the problem of building good 'constructs' overrides the possible depth found in the singular case studies. The authors suggest this happens because the researcher is focused on replicability and construct building instead of understanding the rich background and historical insights in the case. That is, Dyer Jr. and Wilkins are arguing that multiple case studies create a 'construct'-focused research environment, which in turn distracts the researcher away from the depth of the story.

The collective case approach was used, for the purposes of testing a construct (engagement concept) in real world settings. However, Walsham (1995) argues that case studies based in interpretive (and in this case pragmatic) have very different ways (as opposed to other research methodologies) of generalising research findings.

4.5.1 Connecting interpretive research and the case study approach

Walsham (1995) argues that interpretive research means to undertake a study of a conceptual frame. Several other key researchers in the information systems field also present this argument (see Checkland and Holwell [1998b], for example). Klein and Myers (1999) present a paper for evaluating interpretive research, and clearly indicate that interpretive research is the study of multiple frames. Haynes (2001) argues that, by taking a conceptual frame, individuals are abstracting and reflecting on whether that frame helps in the understanding of complex phenomena. Haynes' arguments derive from the systems approach of Churchman, which has it roots in the creative dialectic of Hegel (see also Churchman [1946]). To produce valid interpretive knowledge, according to Klein and Myers, several conceptual frames *must* be appreciated.

From the pragmatic literature, Mitroff (2004) highlights how multiple frames are a part of traditional American Pragmatism. Mitroff shows how James argued consistently for the need to operate in different dimensions of thinking when studying phenomena in context. In various other epistemologies, the use of multiple frames is also considered to be part of the interpretive research process. For example, the term 'phenomenography' is often used (see Chen and Partington [2004]) to describe the study of how people perceive different aspects of reality. Guba and Lincoln (1994) argue that when studying phenomena in this way it is possible for sources to disagree and a creative dialectic to emerge in the research findings. The authors also argue that, by studying different epistemologies linked together in a social setting, even though there are inherent contradictions, a richer insight can be gained into the problem situation. Thus the 'true' nature of the problem can be better understood and the discussion about interpretive 'perspectival' generalisations can ensue.

In the social sciences, Lukes (1974) deals with the conceptualisations of power by arguing that there are latent tensions between those interests and non-interests as they are realised in political circles. More specifically Lukes (1974) holds those exercising power often exclude the interests (or conceptual frames) of those that do not contain power. Certain conceptual frames are available for decision making and problem solving whilst others are excluded. Ackoff (1978) touches on this by saying that issues of power and politics especially need addressing because often they result in unconscious unasked questions. These strategic assumptions need to be tested through surfacing and debate, if possible. Ackoff calls these types of conflicts 'unconscious assumptions' (such as myths, corporate ideology, false beliefs see Clegg (1990) critique on Lukes' work) and concludes that the question not asked about such beliefs will lead to poor problem solving practice.

Tellis (1997) argues that case studies are 'multi-perspectival' analyses because the role of the researcher is to capture the views of those under study and to include the interactions between key actors in the analysis. This does not mean that case studies are naturally interpretive in nature, as Stake (1995) notes, but it does mean they are designed with such ideals in mind. Even Yin (1994), who readily admits to using cases in a so-called scientific positivist manner (see pp.14-20), suggests researchers use 'rival' analyses. In using these rival analyses, a researcher is really creating a

dialectic between the different elements of evidence they have collected. Eisenhardt (1989) also suggests using multiple case studies to see if patterns can emerge from several different applications of research material. Although both Yin (1994) and Eisenhardt (1989) are drawing on positivist assumptions on the nature of knowledge, the suggestion that many perspectives are needed still remains.

In the field of Education, Woods (2005) argues that the postmodern crisis of representation presents the need for researchers in the social sciences to create a meaningful way to interpret multiple conceptual frames. Woods provides an example study where the perceptions of teachers and students were observed and recorded. The author goes on to show the use of multiple conceptual frames through a creative dialectical process allowed for richness of insight. However, underpinning Woods' analysis of the school was an epistemology that allowed for the study of different 'worldviews', not just the view of the researcher or the subject but a complex intertwined 'thick' description. In this case, clearly an interpretive epistemology underpins such research.

Klein and Myers' (1999) argument for an evaluative frame for interpretive case studies take this point further by arguing that multiple frames distinguish interpretive field studies from positivist ones. Their 'fundamental principle of the hermeneutic circle' argues that social phenomena studied this way should seek to understand the meanings of the interrelationships of the field study rather than isolate individual variables for analysis. This is strikingly similar to Haynes' (2001) argument for perspectivalism and Checkland's (2005) rendering of Kant. Bhaskar (1998) makes the argument that the natural sciences cannot be researched the same way as the social sciences because of the fundamental hermeneutical differences between the two. The social sciences rest on the relative endurance of social arrangements that get their meaning from the individuals who continue to help in the transformation of it, whereas the natural sciences' area of interest (e.g. rocks) cannot form relatively enduring perceptions or reasoning. The study of social phenomena should therefore research and look for the generative mechanisms and complex interconnections of reasoning that lead to observed phenomena. That is, the area of interest is not the empirical event (i.e. the observation), but what meanings and reasoning caused the event to generate in the first place.

What this means for interpretive field research in information systems is that it should seek to understand the phenomena not by measuring observed events but by seeking to understand the whole and the parts that underpin events. Klein and Myers (1999), in addressing interpretive case studies argue: "The idea of hermeneutic circle suggests that we come to understand a complex whole from preconceptions about the meanings of its parts and their interrelationships."

In this research, an interpretive case study was chosen to help understand whether engagement is useful for tackling ill-defined problems. Therefore to produce the justified knowledge required an interpretive field study approach. Klein and Myers (1999) argue, by applying the hermeneutic circle approach in interpretive field studies, a complex web of interpretations will ensue. This allows for an analysis and synthesis of alternative conceptual frames. In the case of this research, two very different environments were chosen, and the model of engagement was applied deliberately to see if it would be useful for the participants. How it was applied is the subject of the next chapter on the physical design of the research.

Knowledge is therefore taken in this thesis to be interpretive with a pragmatic focus, and the case study approach will be used to collect data to evaluate the research questions. Yin (1994) argues that data collected in case studies should be linked directly to the propositions and there should be clear indications of how the empirical evidence 'answers' the research questions. Others like Stake (1995) and Walsham (1995) argue similarly. Woods (2005) contends, however, that research in the social sciences should use grounded theory to collect data and then establish questions because of issues with being able to represent data. Woods also argues that social science research should be exploring (exploratory research) the study of practice in the first instance (see also Kemmis and Wilkinson [1998]) by collecting data and then forming research questions. The argument in this case, however, has been derived from the literatures of the engagement concept and problem solving prior to the establishment of an empirical framework to evaluate the research questions. In the case of grounded theory, the literature acts in the reverse manner by being confirmatory to the data collected. In this case, the researcher's questions came from the literature first and then are explored through a first loop of learning (part 1) and

empirical evidence (part 2), which is used to evaluate the argument of this thesis. Empirics are therefore used in this work to provide justifications to support the evaluation of the research questions.

4.6 Reasons for case selection

This section highlights the case study background for the research undertaken. Considering the research is on problems as perspectives, two very different perspectives were sought to highlight the differing roles in problem contexts. The first was a not-for-profit organisation specialising in Christian based humanitarian aid. The second was a large-scale government (henceforth referred to as Firm A) organisation. The two studies include different problem concerns: the medium-sized decentralised aid organisation's goal was to create an organisational development program, and the Firm A's focus was on understanding innovation in supply chains. The primary reason for choosing two different demographics was to try and gain an understanding of the problem solving processes in various contexts.

Another important point in these studies is the idea that each organisation works under different strategic assumptions (Mitroff and Mason (1979)). Each organisation has built-in assumptions that are a part of the organisational culture (according to Senge (p.7) [1990], for example), which shape and guide the actions that are taken. For a not-for-profit organisation, the goal is not necessarily to make profit and please shareholders, but to reach the goal or 'mission' of the organisation through strategically designed fund raising activities. In both situations, the problems needing to be solved have a completely different context and stem from totally unrelated backgrounds. In this regard the cases are presented through the frame of the 'engagement' at each organisation.

Vandenbosch et al. (2006) argue that idea management is based on patterns of behaviour of managers (see also Isenberg [1986], for example). In terms of engagement, this means that the ideas required to manufacture effective frames for sense-making in problem solving are likely to be contextual. Therefore, any solutions suggested or generated are likely be contextual based on known patterns of behaviour within that actual decision making space. For these reasons, two very different

engagement cases were selected. Geographically speaking, there is also a significant difference between the organisations, with one situated in various locations in Queensland (Firm A) and the other based in a global environment (the aid organisation). The range of decisions made span from local, fairly minimal impact decision making, to large-scale 'million dollar' decisions. Each organisation, therefore, represents a different reality with different stakeholders making decisions and solving problems in a variety of contexts.

The background for each study will now be presented and discussed at length. For consistency the terms first and second learning loop are used (please see chapter 3 for an explanation of these terms). The main reason for this is that the first study is used to gain a basic understanding of the engagement model (i.e. first loop of learning) and the case study interview evidence in the second case is used to look at the deeper assumptions (i.e. second loop of learning). For this reason the first study is more like a pilot study whereas the second is a more in-depth case study with interviews used as evidence (discussed later). The discussion will take three parts: firstly, the background context of the organisation will be discussed, followed by a discussion on the nature of the complex problem and concluding with a discussion on the stakeholders involved.

4.7 Case study evidence

Supporting evidence is generally presented in research as qualitative or quantitative. In this case, qualitative evidence has been chosen, because it is generally used in the social sciences to explore cultural phenomena (see for example Myers [2006]). Qualitative evidence also provides the hermeneutical insight (see Maxwell [2004]) required for interpretive field studies as well as helping to understand the real-world processes involved, and can better understand changes and fluctuations in research environments. It is for this reason that the case studies rely on qualitative evidence to evaluate the argument of this research.

Yin (1994), Stake (1995) and Tellis (1997) agree that there are several ways to represent data in case study research. Tellis represents these as:

- Documentary evidence (paperwork, videos, imagery),
- Archival data (files, company records),
- Interviews,
- Direct observation,
- Participant observation and
- Physical artefacts.

The use of experimental field experiences (case 1) and the use of interviews (case 2) is thought to be the most useful in this thesis. Each part of the research process requires a different collection method and these will now be described in order.

4.7.1 First Learning Loop Case Study 1 – Methodological Overview

A term used in systems literatures is the concept of the learning loop (see Argyris and Schon (1996) and Senge (1990)). This concept refers to the application of two levels of learning as mentioned earlier in chapter 3. Action Research is typically associated with the work of education academics (see Greenwood (1999), Atweh et al. (1998) for more prominent examples) and much more recently with Information Systems (Baskerville and Myers (2004), Baskerville and Wood-Harper (1998)). The development of SSM has also given birth to a form of recognised Action Research as noted in Mingers (2000), Checkland and Holwell (1998a:1998b), Ledington (1992), Checkland (1999) and given credence in Information Systems with Baskerville and Wood-Harper (1998).

In its most basic sense the model used is simply applying the Ledington model to problem situations and observing outcomes in reference to the research questions. Checkland (1991) presented the notion that every piece of research begins with the construction of a conceptual frame, embodying the frame into a methodology (designed to help sense-making and shape change) then applying this methodological framework to a problem (see Checkland and Scholes [1990]). Given the interpretive nature of the work the framework of engagement as presented by Ledington and Ledington (2001) is used to sense make the 'lived experience'.

In essence, the researcher is interested in the subjected models used in both cases (see Eisenhardt [1989]). In this case, the lived experience of applied sense making was chosen to gather the subject's reaction to the use of the model and how it helped in structuring a real-world problem. A deliberate attempt was made to use the engagement model to structure the problem through the use of basic discussions and the application of the engagement model. As noted in the next chapter, this involved a process not entirely dissimilar to the action research practices of Checkland and Holwell (1998b) or Kemmis and Wilkinson (1998) in education circles. Another important factor that aligns this study with action research is that it is not only focused on the study of practice but the study of the usefulness of a frame and how that concept shapes and guides the understanding from the researchers point of view. Ultimately the goal of the researcher could be to invoke a research project involving the improvement of practice, but the research is also focused on evaluating the usefulness of the engagement model towards real-world problems. Therefore this is not a case study as such in which the concept is used to make sense of interview data or participant observation. This study is an action-based (Ledington (1992)) first learning loop that takes the concept of engagement and applies it to a lived experience.

From a systems thinking perspective, Midgley (2002) highlights the nature of interventions to be situations where an agent intervenes to create change. He argues that, because real-world 'interventions' are systemic in nature, they need to consider multiple 'pluralistic' frames for synthesising understandings about ill-defined problem contexts. In this regard, Midgley also contends that all scientific observation is carried out where an agent deliberately seeks to change the circumstances in which they are involved, therefore their so-called objectivity in observation is really a deliberate act of intervention. In this sense, scientific observation is only one type of intervention involved in the world of research. Midgley highlights systemic intervention as a process where many epistemologies (conceptual frames) are explored in a real-world setting. A systemic intervention is said, therefore, to make use of a variety of methods, approaches and techniques for capturing evidence about ill-defined problem contexts. Silva (2004) also agrees that observation is an act of intervention, and it changes the social communications and actions as a result. This is

a process of reframing which shifts the conceptual understanding of the problem to new interpretations.

Feyerabend (1975) argued that all research is value laden and what is determined as 'fact' cannot be separated from the biases and interpretations of the researcher. Landry (1995) also points out that any problem requires people to socially construct its existence. For this reason this study is limited but the researcher deemed it appropriate to include because it gives useful insights into the sense making process in relation to messy problems which is the core topic of this work. This is not necessarily an innovative step in the world of IS research as many have applied this kind of approach to the world of problems before. Most notably Checkland's development of the SSM in which he started with a conceptual frame (seen in Checkland (1972)) which moved forward to the classic seven-step model (Checkland (1981) and finally the contemporary thoughts around SSM (Winters and Checkland (2001)).

There is a long history of this kind of research outside of Checkland. In Education circles the idea of action research of this sort is an established practice. The experience of the researcher in their environment is argued to shape and inform the broader environment of practice the researcher is immersed in (Greenwood (1999)). Kemmis and Wilkinson (1998) argue that action research involves moving into practice with a plan that is acted upon and revised. The authors argue that action research is to be thought of as a, 'spiral of self-reflective learning cycles' that involved planning a change, acting and observing a change, reflecting on these processes and replanning. In this first learning loop the engagement framework was used to sense make a series of events and see if the Ledington model was useful. The second learning loop however, was designed to use the evidence of transcripts and interviews to support the main argument.

4.7.2 Second Learning Loop (Case study) – interviews

Interviews are frequently used in research as a way of data collection. Patton (2002) argues that interviews open a window to other conceptual frames because they allow

for another portrait to be painted through the words or testimony of another. Interviews are generally conducted (as in this case) on a one-on-one basis, where a person is given comfortable surroundings to tell their story. The interview can also be thought of as a conversation which is value laden (see Chalmers [1982]), where the interviewee is interrogated in a structured or semi-structured environment. As a form of empirical evidence, interview data has become a regular part of qualitative research literature (see Denzin & Lincoln [2000, 2005] and Miles & Huberman [1994]).

Researchers use interviews as a source of qualitative data (Woods 2005). This data can be used as a way to evaluate an argument or, in the example of grounded theory cases, be coded for pattern matching by qualitative data analysis software. In this research, the purpose of the interviews was to collect as many expressions of the problem situation as possible and then see if a common conceptual framework could be plausible. The interviews provided the expressions of the problem (see chapter 2) and became the building blocks for the common insight.

Interviews can be conducted in a structured or semi-structured manner. In this case, semi-structured interviews were conducted in order to allow for improvisation where necessary. Interviews that are too structured do not allow for the possibility of revealing the underlying assumptions held by interviewees by further probing them for information in a challenging manner (see Klein and Myers [1999]). In interpretive research a source should be treated as suspicious, and in turn the nature of possible systematic distortions must be recognised. To validate knowledge according to the interpretivist epistemology, Klien and Myers (1999) argue that recognition of their frames be appropriately recognised. This of course includes researcher frames. Bias from frames may lead to conclusions from one point of view (i.e. the researcher), so where appropriate, different interviewers were used as well as previously collected interview transcripts from other research projects. The researcher recognises the different frames in the research and has dutifully considered it in the physical design of the work. This process of dialogical reasoning (Klein & Myers 1999) has been built into this research process.

4.7.3 Support from the IS literature

The top-ranking Information Systems journal according to most surveys (see IS World [2006] analysis of journal rankings) is *Management Information Systems Quarterly* (MISQ). Over the past five years there have been several key examples where research has extensively followed the aforementioned methods (case study, interviews and participant observation). Backhouse, Hsu and Silva (2006), for example, use case study methodology to study standardisation in Information Security and one of authors has applied a similar approach to studying IS in developing countries (Silva and Hirshhiem (2007)). Action research also has growing support in MISQ with recent examples like Lindgred, Henfridsson and Schultze (2004) who studied design principles and concepts in competence management systems.

Porra, Hirschhiem and Parks (2005) used historical data to create a retrospective interpretive case study analysis of a failed information systems department. Levina and Vaast (2005) used interviewing techniques and participant observation to understand boundary spanning in organisations. Others, such as Pawlowski and Robey (2005), Martennson and Lee (2004), Lyytinnen and Rose (2003) and Levina and Ross (2003), use a combination of interviewing and the case study approach (or other qualitative methods) in interpretive format.

Some others like Davidson (2002) use a more explicit interpretive framework (see also Walsham [2002]) for analysing interview data in the study of multiple perspectives. In a similar fashion, Malhotra, Majchrzak, Carman and Lott (2001) use case study data (interviews etc.) to analyse Boeing's virtual teams. However, despite strong support for case studies and interviewing in general, there has been limited work on participant observation in MISQ. There are some examples found in the work of Benson (1983), Schultze (2000) and Klein and Myers (1999), and outside of MISQ in books (see Harvey [1997]), as well as Harvey and Myers (1995), Avison and Myers (1995) and Prasad (1997), for example.

4.7.4 Interviews in case study

Interviews in the second case study were used for many different reasons. In applying the model to this case it became necessary to collect the perspectives of those who were part of the problem in order to help structure a better understanding of the process. Interview data in this case was used to structure interpretations of the problem expressions to help understand the engagement processes of those involved in the cases. That is, the interviews provided a strategic device for analysing the dynamic interactions between the engagement model, the problem context and the various multiple perspectives in the area of concern. Subsequently a lot of data and perceptions were gathered during the case from many people. The roles of the people used for interviewing purposes come from different levels of the organisation. Gaining perspectives from various stakeholder groups became very important in order to gauge 'multiple perspectives'. These groups and people are listed below[1]:

Operations Staff – (day to day people):

Name	**Role**
John Roberts	Despatch Manager
Matthew Michaels	Production Manager
Samuel Smith	Project Officer (Supply Chain)
Steve Whittaker	Storeperson (Supply)
Colin Germain	Supervisor
John Lewis	Logistics Officer
Ed Steves	Logistics Officer
Andrew Newbecker	Construction Engineer
Simon O'Donnell	Contracts Administrator
Joe Napoliti	Inventory
Fred Nosamento	Operations Worker
Max Flanigan	Commodities
Harry Callahan	Supply Chain Officer
Mike Suthers	Business Improvement Officer
Matt Benetar	Commodities Facilitator

[1] Names of participants were changed to conform to the wishes of the industry partner.

Tony O'Connor	Operations Worker
David Stower	Technical Worker
Mark Rips	Contract Administrator

Table 2 Day-to-day staff interviewed

Management/Support Services Group

Mike Gore	Sales
Charles Barkway	Account Manager
Steve Goldsworthy	Transport Manager
Ted Orgin	HR Manager
Peter Pitt	Manager Operations Planning
Rodney Mackay	Operations Planning
Tom Flynn	Senior Assets Manager
Errol McTaggart	Manager
Allen Malcolm	Operations Manager
Bill Hunter	General Manager (Supply)
Frank Peretti	Manager (Inventory)
John Connahan	Manager (Commodity Strategy)
Keiran Bennet	Commodity Facilitator
Immanuel Stevens	Network Access
Tony Wilkins	Network Access
Steve Brock	Network Access
Michelle Rotolone	Business Process Manager
Dave Freeman	Project Officer
Martin Bicknell	Business Solutions Manager
Mike Oldfield	Operations Management
Geoff Lawson	Commodity Manager
James Hitchner	Performance and Reporting
Steve Goode	Operations Planning
Max Collins	Commodity Analyst

Table 3 Management staff interviewed

Technical Support

Steve Marks	Senior Officer (Operations Level)
Charles Wooley	General Manager Property
Sam O'loughlin	Human Resources
Nick Carr	Manager Technology and Environment (Partner Organisation)
Peter Le Carr	Technology Management
Graham Pearce	Technical Services
Tony Wilkins	Technical Services

Table 4 Technical staff interviewed

In preparing for the interviews, each interviewee was given the assurance that the data would remain confidential, and approach ethics related documentation was required. The host organisation, due to the controversial nature of the case, requested that names be changed and details altered to protect the identity of the employees. The interviews were tape recorded and then transcribed for storage in a safe secure facility. The choice of staff was an important part in gaining problem expressions because it allowed for the collection of as many perspectives as possible. For example, to verify various pieces of information, the general manager's perspective of the supply chain will differ from that of the project officer, who spends the majority of his time in the centre of the chain.

4.7.3 Retrospective analysis

The researcher used some company documents, minutes of meetings and business plans as tools for making sense of the problem and participants' frames. It should be noted that this retrospective analysis was undertaken after a three-year stint as a participant observer in the company. The point of using a retrospective analysis is not to make sense of the situation, but rather to further analyse how the engagement process model informs the situation.

A retrospective analysis takes place by re-examining collected evidence and by applying new constructs or frames to it (Baker 2005). An example of this kind of study can be found in Swisher's (2002) retrospective study on the changing nature of ethics for physical therapists between 1970 and 2000. By analysing 30 years of data

retrospectively, a pattern emerged that showed the degree of autonomy had exponentially increased over that time span. This is turn led to Swisher's being able to argue that an increase in autonomy led to an increase in poor responses to ethical dilemmas. An example of a similar project can be found in a software engineering study conducted by Karlsson, Regnell and Thelin (2005) who conducted a retrospective analysis on a software development project.

Given that this thesis focused on the collection of evidence to support the evaluation of the engagement model for tackling ill-defined problems, it seemed appropriate to the researcher to collect three years worth of qualitative evidence for analysis. When the study ultimately ended (due to unforseen circumstances), it was decided to see if the three-year study could be salvaged. By applying a retrospective analysis (after spending three years as a participant observer), the researcher was able to create meaningful analysis about how problem structuring exercises can sometimes play a part in the creative destruction of organisations.

4.8 Summary

This chapter argued for the use of interpretive knowledge in the collecting of evidence to support the main argument of this thesis. The interpretive knowledge was also argued to be pragmatic in nature, which means the findings of this thesis are aimed at understanding meaning not just through theoretical constructs but also through social practices. Two studies (learning loops) were introduced. These will be used to demonstrate the usefulness of the engagement model to assist in (dis)solving complex problems.

Chapter 5 Findings and Discussions

5.1 First learning loop – IGC Aid Agency

This first learning loop demonstrates the first two steps of the Engagement Model as discussed at the end of chapter 3, namely that a change in conceptual frame (perspective) causes a shift on how the same problem is then expressed. This is a cornerstone of the concept of the 'wicked problem'. A key assertion is therefore that problem solving is about shifting perspectives (conceptual frames). With wicked problems, the problem and acceptable solution are determined by the conceptual frame of the stakeholders. The background of the organisation and it's current problems will be presented before moving on to the main analysis.

5.1.1. First Learning Loop – International Gospel Centre (IGC)

The International Gospel Centre is a not-for-profit aid organisation run by two managing directors on Queensland's Sunshine Coast. Their mission is described in the corporate literature as 'Breaking poverty and bringing third world countries to Jesus'. The niche for IGC is their focus on providing spiritual as well as physical support for victims of poverty in third-world countries. IGC performs its main area of work through a child sponsorship program. Missionaries are sent to host nations to find children in urgent need of support to be sponsored by patrons from around the world. IGC is also involved in child education centres, emergency relief and other related aid programs.

IGC consists of four groups servicing different parts of the world. They have offices in the Philippines, Zambia, Sweden, India, Singapore, New Zealand, Norway and Australia. The organisation's structure is best thought of as decentralised and almost voluntary. For example, IGC only employs people it can afford at very low rates. For example, the partner organisation in Norway does not make any money from IGC because it is staffed by volunteers. Where field personnel are involved in the development of aid programs, such as in the Philippines for example, some employees are paid. However, counting the managing directors, only about six people are paid. Members of the board do not get paid and neither do most field workers. The

organisation runs its aid programs over four nations: the Philippines, Uganda, Zambia and India. Each nation is run by a group of workers, some paid by IGC and some paid by other organisations. In this respect the organisation is decentralised because decision making processes are made in a fairly autonomous manner by leading members of the partner organisation. However, strategic oversight comes out of the head office in Mooloolaba in Australia. Despite autonomous units having support in the literature (see Senge [1990] or Beer's work on the viable systems model – see Beer [1979]), the partner organisations and the strategic oversight are faced with various problems. One of these problems is strategic level innovation and organisational development, which is the focus of the next section. It should be noted that the office is located in the home of John and Julie Beard and the rest of the organisation is run in exactly the same way, that is, from people's homes or some affiliated church group.

5.1.2 History and current problems

Starting out in the late 1980s through the work of Australian evangelist Cliff Beard, IGC's initial concern was in the nation of Uganda. During a visit to the African nation for a conference with T.L. Osborn (an American evangelist), Cliff was struck by the absolute poverty that surrounded him. The conditions of the poor moved him so much it led him to quit his landscaping business, and he began building IGC to help the people of Uganda.

When the scheme was first conceived in the mid 1980s, the term 'sponsors' was coined to refer to those who offered their money to support the children of Uganda in a once-only payment. In reaction to the support he received, Cliff Beard produced a newsletter called *World Action* to document the work of IGC in the continent of Africa. At this stage the money was being collected from various church and para-church groups in Australia, New Zealand, the United States, Europe and various other westernised cultures.

This early phase of the ministry work of IGC was framed through contemporary interdenominational fundamentalist Christian ideals. The focus was on documenting, according to this view of Christianity, the work of feeding the poor. What

differentiated the organisation in the early phases was its target niche of the diverse areas of the Christian market, hence the title interdenominational. This is important because the organisation used this as a way of marketing itself and creating a unique conceptual frame on providing aid which was not domination specific.

The model for setting up the distribution of funds was left entirely to those helping on the other side of the world. For example, when finance was collected in Western nations, it was sent and not audited, leaving the distribution of the money up to the people in the receiving nations. After spending many years building the organisation to the extent where programs were flowing and Cliff's vision to help the poor was being met, serious problems began to emerge. Although Cliff had raised a great percentage of the money to establish IGC, he had not paid close attention to the way in which the funds were being distributed. For this reason, allegations of corruption within the organisation were levelled at Cliff, who then set about finding out what was happening. After a short investigation it was found that people in some of the nations had taken the money meant for sponsorship and created legal entities to filter the money into their own bank accounts.

At the time Cliff was working long hours to get the programs off the ground, only to find that the vision he had put together was riddled with corruption. Cliff reacted to the pressure of the news by suffering a complete mental breakdown. When news reached the Christian community that had supported his vision, approximately one-third of the sponsors that had supported them left the organisation, resulting in a devastating blow. In the early 1990s IGC almost fell apart until Cliff's son, John Beard, took over the management role of the organisation. Cliff left IGC to go to Broken Hill to recover from his mental breakdown and John took over as a managing director around 1993.

John's first order of business was to establish a good working model for the business by ensuring the money was going to those who needed it. John began this task by informing sponsors of the changes he was to make to the organisation, which at first drove more away, but after a while steady growth was noticed. John, taking the information he had gained from his research to design the next phase of the IGC, surveyed the sponsors. During this time John formed programs and made decisions

based on customer feedback more regularly than before and formed lasting relationships with his customer base. He found that customers identified both with the humanitarian cause of feeding starving children and with the spiritual aim of the organisation, so he created the mission statement, 'Breaking poverty and bringing third world countries to Jesus'. This reflected the statement of charismatic Christianity that the organisation's tradition was steeped in, but it also reflected the desire to do practical things to remove poverty in overseas nations.

The second order of business was organisational restructuring and reorganising around these values. In the various nations in which IGC works an audit process was instigated to see how far the alleged corruption ran. One man in particular, a former general manager at Australia Post, volunteered to audit the Ugandan site. Upon arriving there and going through the partner organisations, he found that in most cases there was no recording of how the money was being spent or where it was going. Further investigations found that in some cases the children who were being supported by people back in the western world had died. John felt an obligation to mention this to his sponsors, so he told them what was happening and even more sponsors left the organisation. An example of the corruption in African nations was recently covered in a BBC news article (Anon. 2004) highlighting some concerns from the people who live there.

John realised that this situation was critical and he needed to bring a systemic order to the business of IGC if it was to continue. He began by appointing officers in each country who were required to keep financial records of where the money was going. The situation became so serious at one stage that the aforementioned general manager at Australia Post had to leave an African nation for fear of his life. Over time, the formerly chaotic organisation implemented changes that saw it develop into an organisation that became completely aware of spending and very intimate with the needs of sponsors. The cultural shift that occurred at this time, though, was only the second part of the plan John had initiated in 1993, and now that things were stable, the organisation was looking for ways to grow and recover the ground lost from the allegations of corruption.

A new problem began to emerge, however, that saw a rising tension between the strategic oversight and the field workers. Typically field workers are not paid so they are focused more on providing the physical side of the aid distribution and do not really pay attention to administration. The previous administration had granted almost complete autonomy to the field workers who in some cases were corrupt and not distributing funds in the direction in which they should go. The new administration realised that this was a problem because research and careful scrutiny of business practices had revealed that financial accountability was essential. Sponsors, as patrons of the organisation, often asked to see how their kids were going, only to be given no answer or an answer that would take a long time. John set about to rectify these problems by attempting to systematically improve business practices.

Before the researcher became involved in the case, the decision was made to professionalise the field offices by sending people who had a background in aid distribution and care. Several people were appointed during a five to ten year period (between 1993–2003) during which time key people were appointed at various sites. After the aforementioned audit, several people were asked to leave the company and people with reputable backgrounds were put into place in foreign offices. Around the time of 2003, it was decided that it would be a good idea to seek avenues of expansion. However, the organisation is a not-for-profit operation that gains most of the funds for its work from the continued support of sponsors and other donors. The main chunk of the money goes into supporting the continued feeding of sponsored children and the administration side of IGC. For the best part, IGC as a corporate entity receives very little continuing donations for administration style problems, despite the fact that almost half of the operational costs should be subsumed by administration. If the idea of expansion is ever mentioned, it seems unlikely to be physically possible because all of the available money is used to maintain operations and keep the poor clothed and fed.

5.1.3 Focus of the First Learning Loop

The question of how to achieve that expansion is the focus of this study. At the heart of the issue for IGC was what kind of tools could be used inexpensively to create a

sustained source of income for IGC. This also had to take place within acceptable sponsorship perceptions, sensitivity to volunteers and alignment to the mission and goals of IGC. The Manager, John Beard, contacted the researcher and asked him to participate in a planned expansion of IGC. IGC wanted to expand their operations and gain a lot more sponsorship for their organisation, but had very few means by which to do it. At the start of the project they had some ideas, but from the point of view of how to go about it, they were not totally sure on the way forward. The researcher was a participant in this case and was asked to help work on building a strategic platform for innovating the organisation, or put another way, to answer the question, 'how can IGC develop?'

The primary task of this thesis is to assess whether or not the engagement concept as cognitive structure is useful for tackling ill-defined problems. For this reason the research task for the first learning loop was to use the engagement model as a cognitive basis for building a conceptual frame suitable for producing a strategy. Therefore this study is more pragmatic in orientation (see next chapter) and aims to alter the action taken from a strategic thinking point of view. How this research is designed is discussed in more detail further on in this chapter.

5.2 First conceptual frame and subsequent expression of the problem

IGC were considering how to develop their aid operations; this meant they needed more funding, more sponsors. So their corporate plan was to secure more sponsorship by informing sponsors about IGC's good works in order to encourage them to provide more aid. However, getting sponsors to provide funding was a long and expensive process, one that IGC had almost exhausted. It involved extensive touring, public visits, organised overseas missions trips and so on. Comments by John Beard and a fieldworker reflected this mindset.

> The way we get church group support is to do presentations using PowerPoints and just visiting churches around here and overseas. *John Beard.*
>
> Presentations are done to connect a visual face to the project because without that people cannot make the link between us and the work we do. The face of

> the people in the presentations create a lasting image for would be sponsors to think about. *Michelle, fieldworker.*

Research was conducted in 1996, when John Beard assumed directorial responsibilities, to fine tune the message that best influenced sponsors.

> When I started at IGC I conducted extensive research to find out what attracted sponsors to IGC. I sent out a questionnaire and the responses we found indicated that our *uniqueness* which is in the essence of our message was the thing that attracted sponsors. *John Beard.*

This uniqueness was the spiritual focus of the organisation, which is missing from other such humanitarian aid organisations. In other words, the niche exploited by IGC was the Christian orientation of their organisation – not the aid they provided as such, but the nature of the way in which they presented it. IGC presented itself this way for a considerable length of time, as the following extracts demonstrate.

> You can also sponsor children in Zambia, Philippines and Uganda. If you decide to sponsor these children you will receive a monthly newsletter entitled Go-Tell. You will also receive two letters a year from your child and updated photographs. The two children above would have died without the assistance of a sponsor, now there are recovering and doing well because someone was moved with Godly compassion and love in their hearts. *Newsletter circa June 2000.*

> Breaking poverty is not easy but with God's Grace, the power of the Holy Spirit, the message of Jesus Christ and the people who are IGC it does happen. Most people will give to the children or give donations that aren't specified why not help those that are unseen...the family that is IGC. *Early website (not in use at present), circa 2001.*

This emphasis reflected how the sponsors already saw IGC. In most cases sponsors had framed IGC in the Christian category and this is what gained their support. One sponsor interviewed commented that they supported IGC because 'they were a Christian organisation'. It is this niche that IGC has captured fairly successfully. The question of developing IGC at this stage focused on gaining more sponsors of this mind set.

IGC had a newsletter that was posted out to potential sponsors. An extract from the newsletter to support IGC's sponsorship marketing at the time is shown below:

Figure 7 IGC marketing pamphlet, May/June 2002

This material in the newsletter also demonstrated a change in emphasis that John Beard had introduced when he first joined IGC. He changed the strategy of IGC to be more oriented to appealing for monies to undertake the projects. Previously there had been a lot of effort put into a Presidential-style approach, which relied on the near-celebrity status of some of those involved.

> Previous to me taking up the position the organisation had focused on the development of sponsors through the ministry of one man. When we took over we turned the focus from him to focus more on the work which we were achieving through IGC. *John Beard*

> We market ourselves by showing the work to sponsors and then letting them decide. *John Beard*

The focus on the projects meant aiming marketing efforts at showing the project and not necessarily designing the work around personalities. This new framework produced the idea that sponsors chose IGC because of their niche Christian focus, and not necessarily because of the personality of people that ran the organisation. Therefore, development efforts focused on gaining sponsors' support by informing them of the projects and allowing them to make up their own mind. How to achieve this became the focus of IGC's planning.

In the researcher's first meeting with John Beard, it became apparent that the question of how exactly to develop IGC's projects was not his main concern, rather it was how to raise monies. All attempts to discuss how to develop IGC's projects quickly headed to the reality that there was no money to develop anything: 'no money meant any development'.

> We have a rough budget for running the organisation which is based on 1/3 of the work IGC does and we have no more than this. We have no money for advertising or marketing or anything like that. *Julie Beard*

The only means of contacting sponsors was through the IGC newsletter, which went out monthly (as shown above).

The shortage of funding was reported in IGC's newsletter:

> IGC has very little room for development mainly because of the limited funds we have at our disposal. When money comes it has to go to the specified purpose it was allocated to. Therefore our unspecified donations are generally sent directly to the programs overseas. To gain more income we need more direct sponsorship, this would give us the opportunity to create a bigger base for admin work and therefore it would give us more options. *John Beard*

John even tried an appeal to sponsors through IGC's newsletter to fund him to go overseas to check on IGC's programs and to do a general audit of present projects.

Each time an issue was raised, the contradiction of having no money seemed to stop the flow of ideas. This developed a conceptual frame that what IGC most needed to do was raise monies, but they reasoned they were in a 'catch 22' situation. How do they generate sponsorship without money? They saw their problem as:

1. IGC projects were not developing, which was caused by
2. lack of money, which was caused by
3. no sponsorship, which was caused by
4. an inability to inform sponsors of IGC's good Christian works.

This conceptual frame could be expressed as a causal map as shown below:

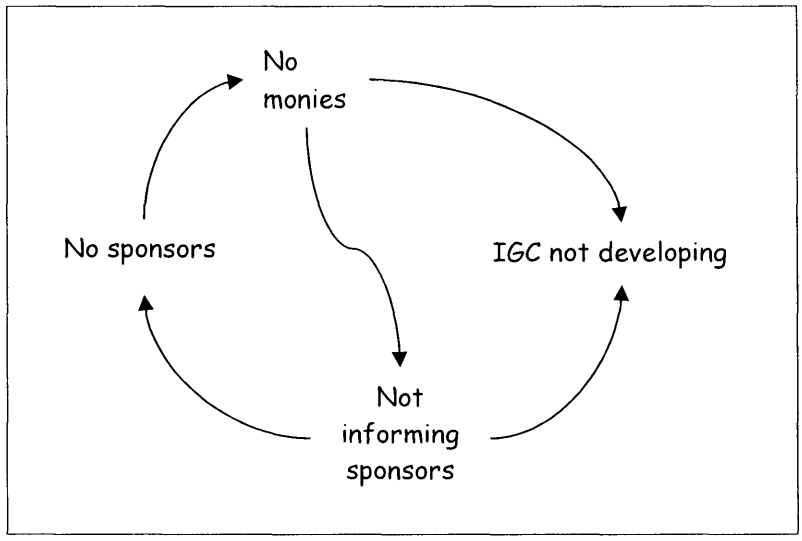

Figure 8 IGC's initial cognitive map

This conceptual frame can also be seen in the following minutes of meetings.

Meeting 1, IGC Development Project
Minutes
October 2003

Present: Luke Houghton (Researcher), Julie Beard (Manager Administration), John Beard (Manager)

Others involved but absent due to overseas work: Louise (Manager Philippines), Matthew[2] (Manager Philippines)

Proceedings

Meeting was called to attention at 1.00pm.

1. A brief history of the organisation was offered by John Beard. This includes the corporate background and how the organisation has developed so far.
2. Corporate problems including the previous attempts to create a platform for change were discussed. This included a discussion on the nature of the corruption in the organisation. Julie Beard discussed how the problems began and how the solutions were formed.
3. Julie Beard discussed the nature of the project since previous developments of a database project initiated and completed during the 2001-2002 financial year. Further discussion was raised about extending the project beyond the database and looking into other avenues of expansion. The decision was made to expand the organisation using similar means.

[2] Participants do not wish to be identified.

4. The expansion of the organisation was raised by Julie Beard (who acts as the accountant for IGC), and she expressed concern about the viability of the project due to lack of funds. 5. John Beard pointed out to the group that the development of the organisation had previously been through church groups and missionary networks. 6. The decision was made to use this social capital to explore expanding the IGC network.
Break at 2:30pm *Development possibilities discussion*
7. Julie Beard raised the point that the database, while fairly poor by industry standards, had improved productivity considerably. 8. The issue of having no money to develop the organisation was discussed with an eye on the on-going expenses of the organisation 9. John Beard mentioned that sponsorship is the primary model of the organisation, so the goal of development is to gain more sponsorship.
10. The process of how sponsors join IGC was discussed including: visiting churches, developing mail out programs, using contacts in church industries and networking amongst social groups. 11. John Beard discussed how a recent mail-out program had attracted new sponsors to the program by suggesting that a missions trip be made available to willing parishioners. 12. Julie Beard mentioned that some of these experiences had brought 20 sponsors at a time in some cases. Many long-term relationships were also established in the program. 13. Luke Houghton adjourned the meeting by suggesting that options and ideas be investigated for using this same strategy using different means. The ideas of virtual mail-outs and other web-based meetings were also discussed.
The meeting adjourned at 4:00pm

Table 5 IGC development meeting 1

The frame is that monies come from informing sponsors of IGC's projects.

In a second meeting, not as many people were present due to other commitments, so the researcher and the managing director, John Beard, were the only ones interacting. The main focus of this session was to come up with possible solutions to the money problem, that is, low cost ideas for attracting sponsors.

Despite long discussions around other possibilities, the only really viable idea that emerged to solve their problems was that of creating a website.

> A website, with an attached church database, would give us a list of contacts that we need to further our cause. *John Beard.*

There was a volunteer who was able to provide the website development.

Meeting 2, IGC Development Project
Minutes
November 2003

Present: Luke Houghton (Researcher), John Beard (Manager)

Others involved but absent due to overseas work: Louise (Manager Philippines), Matthew[3] (Manager Philippines)

Proceedings

Meeting was called to attention at 9.30am

1. Findings of researching ideas to create a strategic platform for budget corporate development were presented. The ideas included: virtual newsletter, e-business platform, email marketing strategy, building a contact list (church database).
2. The question of cost was raised by John Beard.
3. Luke Houghton presented some cost models associated with a service, and it was agreed to test this course of action. More work needed to be done to acquire cost models.
4. John Beard mentioned the development of the project could be facilitated by an initial mail-out to churches to see if they would be interested in joining IGC.
5. John Beard mentioned that church groups were interested but IGC lacked funds to contact them and the website would be a potential way of overcoming this.
6. The model of development from previous ventures was raised again, and John Beard pointed out troubles associated with that. The lack of response from previous campaigns of a similar nature was mentioned, and John Beard explained how sales techniques such as 'hook lines' had been used to great effect.

Break at 10.45

Meeting Resumed at 11.00am

7. John Beard explained how the previous mail-out campaigns were achieved.
8. Other strategic ideas about the organisation were discussed including: corporate

[3] Participants do not wish to be identified.

	data model managing field operations from home managing people in other organisations, intra-organisational relationships.
9.	Luke Houghton mentioned the idea of a corporate intranet to enhance communications.
10.	John Beard mentioned some programs put in place by other aid organisations including World Vision and Compassion.
11.	The problem of unspecified donations was mentioned and how this was a great source of income for IGC. John Beard mentioned how this resource was the greatest but the most troublesome for the organisation.
12.	The meeting closed with some action steps to building a website prototype for IGC.
13.	Luke Houghton mentioned the final approximate cost of the project.
Meeting Concluded at 12.00pm.	

Table 6 IGC development meeting 2

From these minutes, it can be seen that the conceptual frame being used is still leading to suggestions for finding cheap ways to inform sponsors of IGC's projects.

A rough design taken from the discussion in this session is presented below:

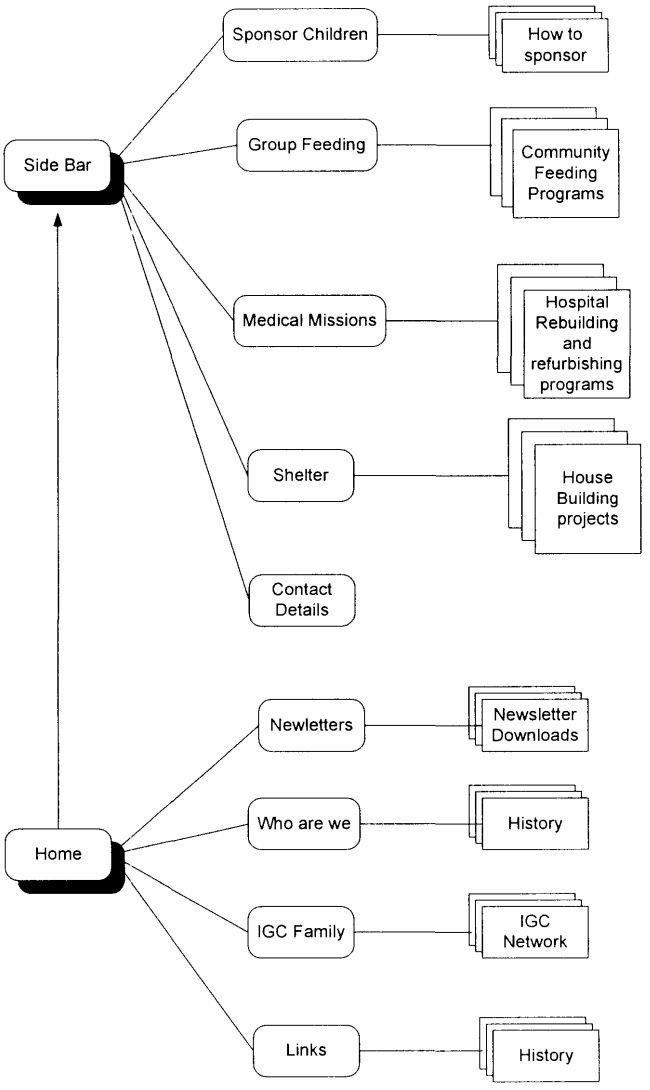

Figure 9 IGC conceptual schema of basic website

The suggestion was that a website could be made (pending copyright issues) by a volunteer using an off-the-shelf program at almost no cost. The program to make the website may already exist in the suite of organisational software licences (i.e. Microsoft Frontpage), and hosting services are provided via the organisation's internet service provider. In this case, the offer was perceived as being a way to enhance the organisation's public perception, increasing marketing potential, reach more possible sponsors and create a greater public awareness. These ideas for development were expressed as a way of meeting the perceived needs of the organisation. The frame used focused on developing a website and using this as leverage to create improved customer focus. This solution was generated from the conceptual frame of no monies to inform sponsors of IGC's good works.

Figure 11 can now be read as 'A good website can create leverage to expand an organisation's customer base'. An example of the website design derived from this initial conceptual frame is shown below:

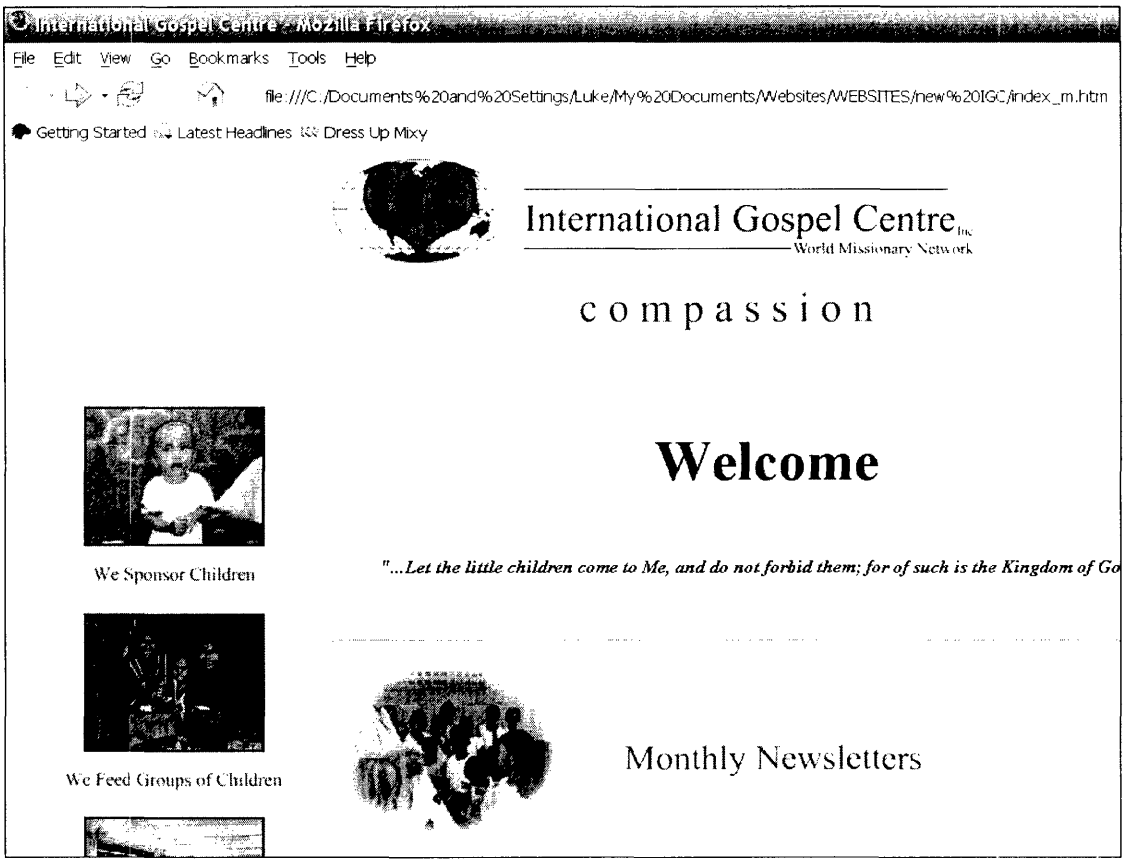

Figure 6 Snippet of IGC web template developed from discussions

To recap, in the first session the beginning process highlighted IGC's main area of concern, developing the organisation with little or no resources. In this second session, the original embryonic apparent solution emerged. Several more 'cheap' solutions came forward in this session, but the concept of using a website to enhance their reputation was the choice that IGC wanted to follow through on.

When exploring this solution, subsequent problems started to be identified, For example, is a website simply a space on the web where people can visit? How do people get there? A third session was planned to further explore solutions to the website problems and how it met (or did not meet) IGC's needs.

5.2.1 The event

Before the planned start of the third session, an intervening event changed the conceptual frame of those at IGC and thus their whole expression of the problem. The event involved a child named 'Salvador'. His case made international headlines and was even included on the evening news in most states in Australia. Salvador was a teenage boy who was asleep in his bed when his mentally unstable mother poured petrol over him and set him on fire. His injuries were so extensive and his condition was such that, when IGC stepped in to help by flying him to Australia for treatment, it drew significant international media attention to both Salvador and IGC.

> Medical personnel have become involved in Western Australia for skin grafts and over there people in the media have run news stories on it and this has created for us a new possibility of seeing things. *John Beard.*

The managing director was exposed to a great deal of media exposure. The result was that numerous sponsors came forward. This changed John Beard's conception of IGC's problems and thus the possible solutions.

> The reason we couldn't go forward with the website and other systems projects we wanted to is because since the development of the initial idea the organisation's donations have increased substantially. This has put us into a different framework than what we are used to. That project in particular showed us that we need to make our projects available to sponsors to visit and carry on in so they can see what's happening. This gives them something real and the results since that time have increased our sponsorship donations by 44%. *John Beard*

The event caused a different conceptual frame, one which saw gaining sponsorship as engaging with sponsors by first informing them through media events and then encouraging them to visit locations where IGC was working to meet with those suffering. This seemed to be very effective in gaining their sponsorship. This new conceptual frame meant that previous solutions to IGC's financial problems were now given different priorities and interpretations. It was certainly not the case that the website was suddenly not welcomed, but the Salvador event changed how the website fitted into the sponsorship strategy. After that event and all the effects from dealing

with the international media attention it created, the old discussions about using the website to create a lasting and changing perception had changed.

This frame removes the website as the main focus of corporate development and focuses instead on meeting the opportunities created by the needs of Salvador, the burned child. This is also reflected in some IGC newsletters (see example newsletters in the Appendix), which still show an increase in sponsorship but also several years after the Salvador event is very much still a part of IGC's core image.

On first glance, the agreed redesign of the website after the Salvador event did not appear to achieve the original expression of IGC's problems. Corporate discussion prior to the event focused on the good works of IGC. The new design and subsequent publications (i.e. newsletters) focused on the crisis of the burn victim. Below is the front page of the website intended for use after the Salvador incident:

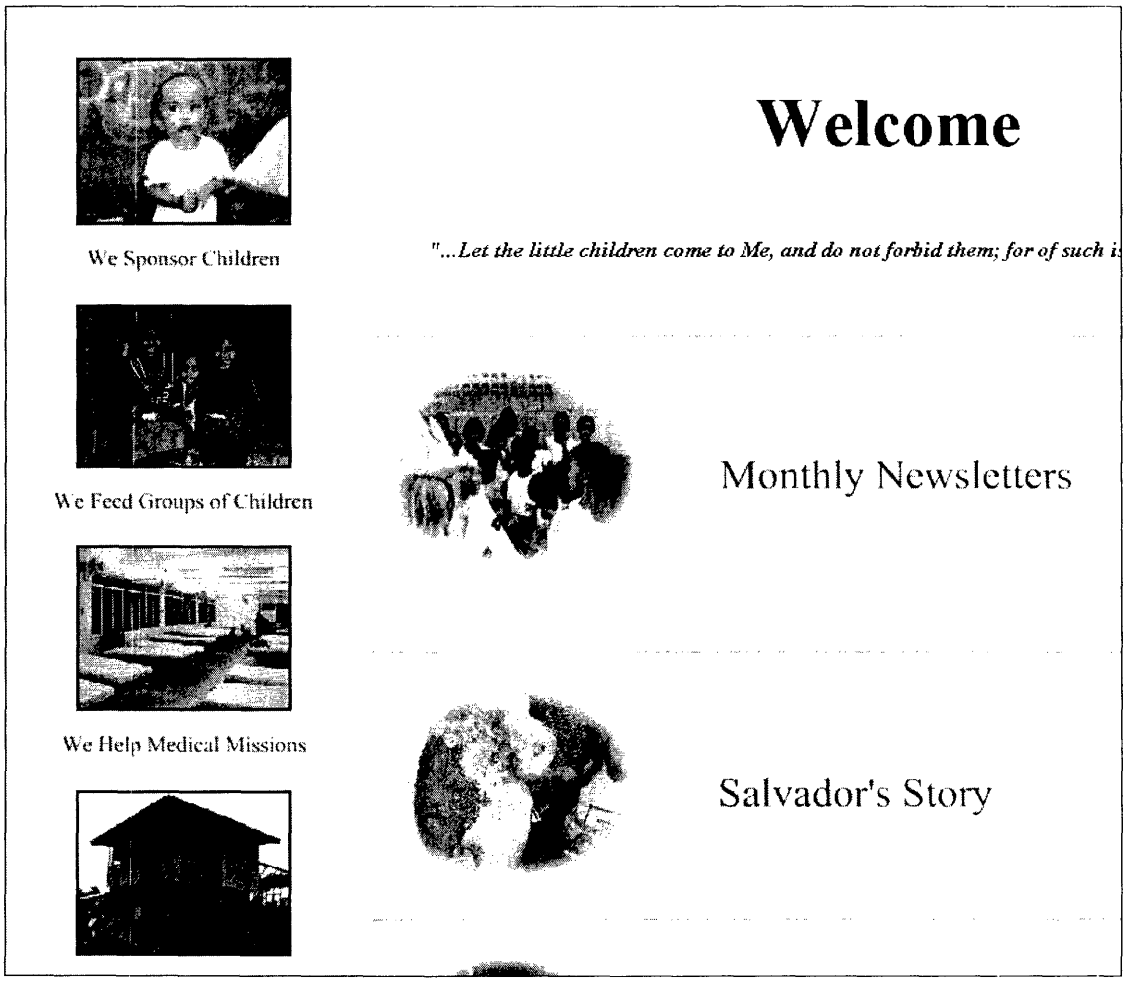

Figure 11 New website prototype

The Salvador incident created a different conceptual frame for how to raise funds. Now the aim was to use hard-luck stories to leverage sponsors to visit and so sympathise with the work of IGC. This kind of thinking is reflected in the comments of IGC staff once the organisation had moved to this new conceptual frame.

> Salvador has given the organisation exposure and the work related more effectively via television and we didn't have to pay for it. *John Beard*

The changed conceptual frame is also evident in the minutes of the third meeting. During this session, the view was expressed that IGC had benefited from this event to some considerable extent, but it had not benefited from a shifted perspective after the managing director expressed concerns over how much it was costing to promote the incident. To John Beard, the uniqueness of the media exposure given to the event had created in him a new sense of possibilities for IGC. The move to the new conceptual frame was argued for. For example, the idea that leverage created by the event was entirely positive was brought into question. However, the final round of discussions moved towards a version of development that would harness the leverage of such exploits in the future.

Meeting 3, IGC Development Project **Minutes** **September 2005** **Present:** Luke Houghton (Researcher), John Beard (Manager) **Others involved but absent due to overseas work:** Louise (Manager Philippines), Matthew[4] (Manager Philippines) **Proceedings** *Meeting was called to attention at 10.00am*
1. John Beard explained the Salvador situation particularly: Salvador had increased sponsorship to the organisation; people had gone to see the child overseas; how a trip to Australia and the subsequent operations had brought media attention. 2. John Beard explained how IGC had created a platform through Salvador and had gained a 44% increase in sponsorship over the two years since the last meeting. 3. John Beard explained growth had occurred but other problems had emerged in

[4] Participants do not wish to be identified.

the organisation that had created a resource vacuum in Australia. 4. Future development was seen as using evidence of the work being completed to sell it. John Beard explained how the Salvador case (and other cases since) had shown that, to get big sponsors, IGC needed to show people the project.
Break for lunch at 12.30pm *Meeting Resumed at 1.00pm*
5. Luke Houghton raised the question of using the website to gain sponsorship. 6. John Beard argued that it might work, but any development has to take place through a process where sponsors would be able to see the work by going there. The impact of other programs and events had caused IGC to rethink the way they got sponsors. 7. Other techniques to increase sponsorship were discussed. 8. John Beard mentioned developments in other nations, such as India and other places, that had impacted on IGC's development. *9.* The meeting closed with a discussion on what might work given the new direction IGC was taking.
Meeting concluded at 2.30pm

Table 7 IGC development meeting 3

After this third meeting, the focus clearly shifted to how getting media attention for the programs (in the same manner as in the Salvador incident) was a likely avenue for sponsorship. This is a policy and practice that IGC still adheres to today. The Salvador event was seen as achieving the desired outcome for IGC. But it was only one case, and that needed to be generalised. The meetings indicated the discussion (point 6 in Table 7 above) was now moving towards getting sponsors to the field to see IGC's projects. This was not yet well articulated as a sponsorship strategy at the time of the meeting. In fact, IGC were still using the new sponsorship monies to tour internationally giving their promotion talks to potential sponsors to gain further sponsorship as they always had. In this sense, the previous discussions had only considered how they could use the event to improve the impact of these talks. But the reaction of sponsors, especially in wanting to meet sufferers, meant that IGC was changing what they saw as a viable solution to their funding problem. They moved from talks to bringing sponsors to the IGC field sites. This was very different to what they had been doing before.

The change of conceptual frame had started to reveal new problems.

> More work that gains this kind of exposure will be welcomed. However, using it will require IGC to be systematised so that we can administrate the change. We don't have the resources to be able to handle such a massive scale change like that again without accumulating debt that we couldn't pay. *John Beard*

Since the time of this comment and the third meeting, IGC has taken more steps to implement the new strategy of 'visiting the missions fields' and has built up processes to support this solution.

> [IGC] now has plans to expand its programs to other countries to help it grow and get more people involved in the programs overseas. We have also looked at getting Christian celebrities involved. *John Beard*

A recent trip to the Philippines, for example, gave IGC twenty more sponsors from the Gold Coast after a handful of people had visited one of the existing 'emergency relief' programs. This particular area is noted as being a slum district, so the impact on potential sponsors is high. The reality of encountering such high levels of poverty leaves a lasting impression on sponsors. For IGC this means harnessing the growth it needs to continue its work.

> To grow we simply cannot rely on a Salvador experience, although that certainly helped. What we need to do is focus our efforts on fixing problems like the structure and payment arrangements for IGC. Until this can be resolved there is little point to innovating the organisation. *John Beard*

This new conceptual frame is shown below:

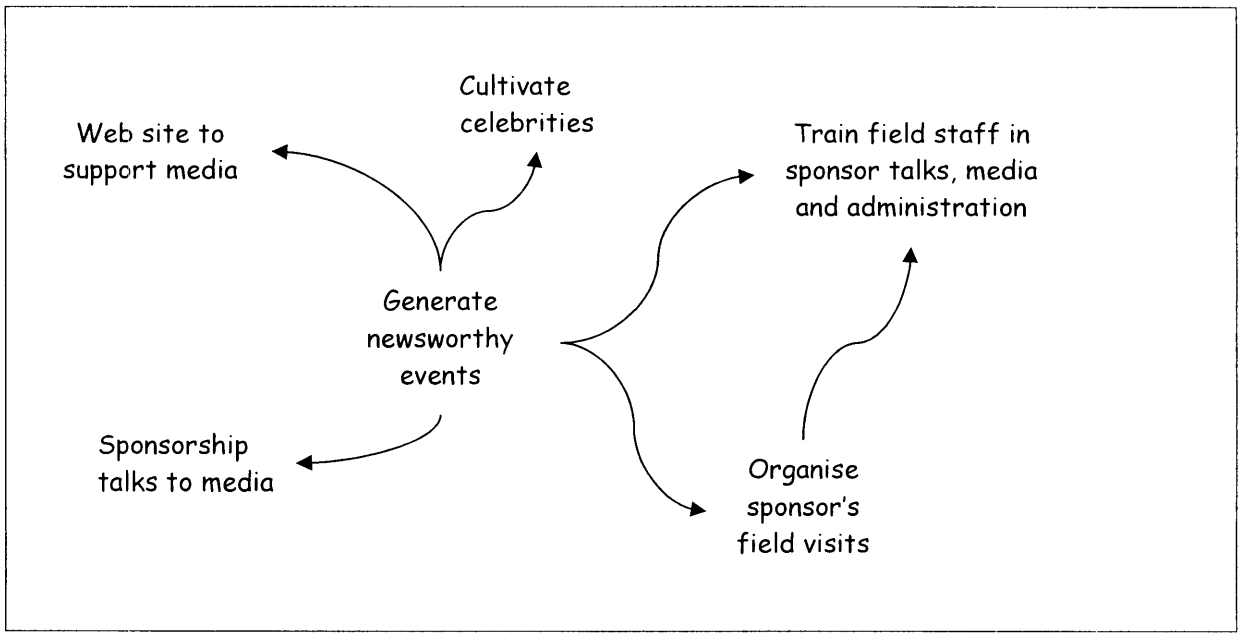

Figure 12 New multiple cause diagram representing the new conceptual frame

The new conceptual frame, and the solutions it suggested, did of course cause new problems to be seen as real. In a recent phone interview, John Beard commented on what problems the new solution to sponsorship had caused.

> Since gaining this exposure we have gained more [interest] but with that we have had to increase the amount of time we think about administrative problems so in another way we have created more work for ourselves ... double the work in fact. *John Beard*

Couple that with the fact:

> We noticed that the attention we were getting showed that our people overseas are simply not equipped for administration. Often, they are quite slow to react to people over here who expect better communication and things like that. The people are quite good at distributing the money but absolutely no good at administrating it. There have been many times where the money sent over is simply too hard to recover. We have tried through this experience to systemise IGC so that our records can be better managed. Our experience is that this leads to happy sponsors because more information is available. Salvador is just one of many examples of how these countries do not see the need for administration. *John Beard*

These problems only now appear to John because he is working from the new conceptual frame that sponsors must visit IGC field sites during which time they must be carefully administered.

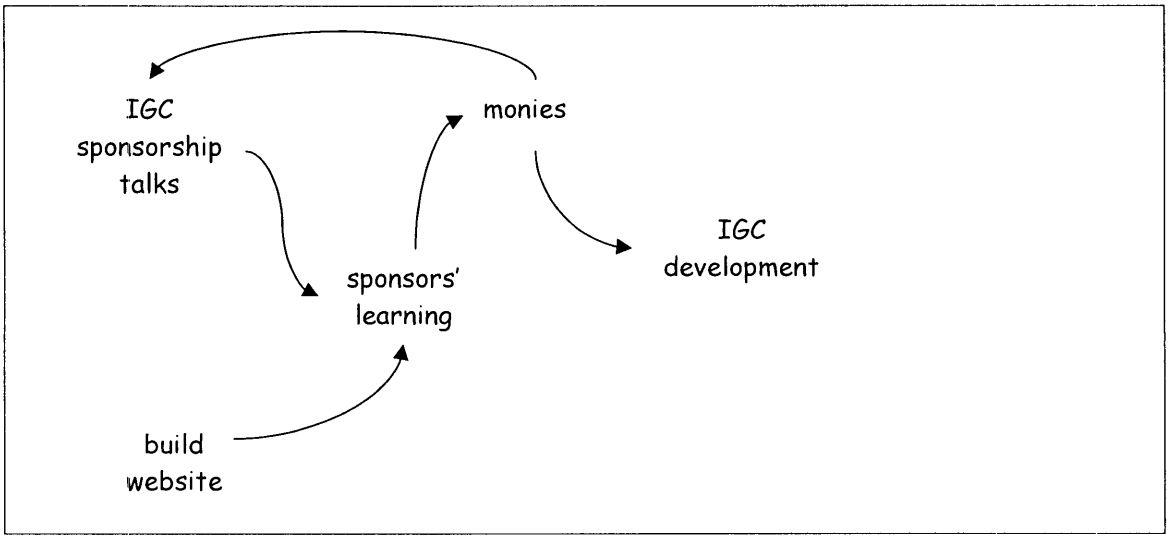

Figure 13 John Beard's new conceptual frame

Before the event of the burned child, IGC focused on developing existing programs by raising monies from talking to sponsors in their home locations and IGC then deciding how that money was to be used. After the event, the new conceptual frame suggested developing publicity opportunities as they came to hand and using these as a way of communicating the funding needs of their community to a broader audience. Since this time, IGC has grown steadily and increased sponsor donations forty-four percent without the aid of marketing or a website.

Salvador is now studying to be a medical doctor (after having had several operations on his back) and his progress is being tracked by IGC's corporate publications.

5.2.2 Conclusion and discussion

In this section the major outcomes of the work will be discussed. This experimental study can be interpreted using the engagement model diagram mentioned in the literature review (see figure 14)

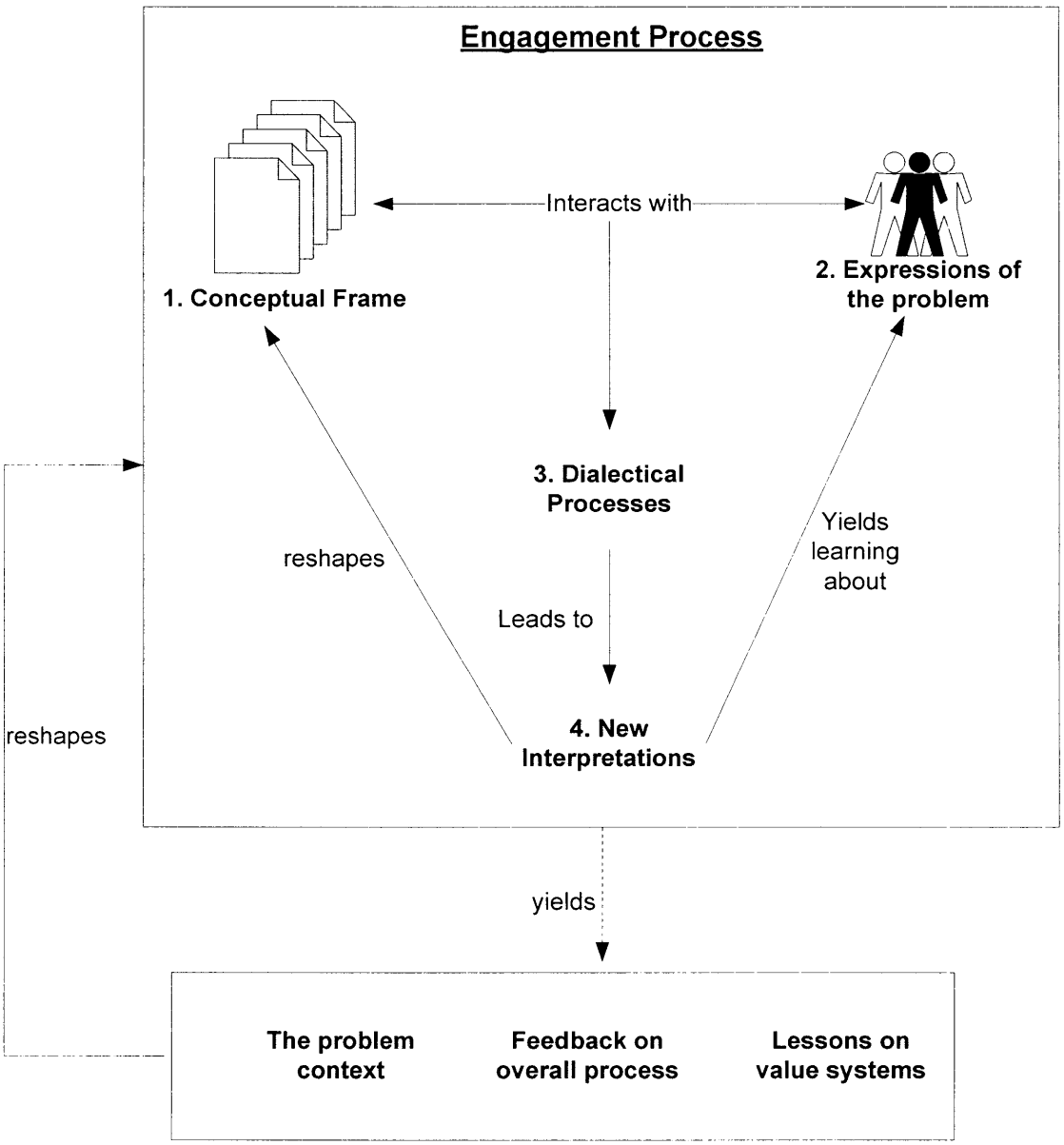

Figure 14 Engagement model diagram

As mentioned in Chapter three the constitutive rules will now be used as a means of interpreting the outcomes of the case:

1. **You must recognise social reality as being consisted of perspectives that change, evolve, conflict and diverge.**

John Beard started with an 'information' conceptual frame that might be summarised as 'inform the sponsors of our problems wrapped in the message of charismatic Christianity and they will give us money'. This was in conflict with his own beliefs about how to raise money and sponsor IGC. The 'information' conceptual frame provides the interpretations of what the problems were and how to solve them.

2. **You must be conscious that action taken in a situation is the result of these perspectives and tensions emerge when actor/stakeholder perspectives conflict**

This led to an expression of the problem as depicted in figure 13, namely that IGC had insufficient funds because its sponsors were not well informed. The solution was to inform them by visits and electronic communications including a web page and newsletter. This was not working, so the problem became that IGC simply did not have enough funds to survive. There were other problems of accountability, but again the 'information' frame suggested this could also be solved by improving the financial records. The 'information' conceptual frame, the problems and the solutions it generated were not working and this gave rise to conflict in the problem situation.

Figure 16 shows this frame as a causal diagram:

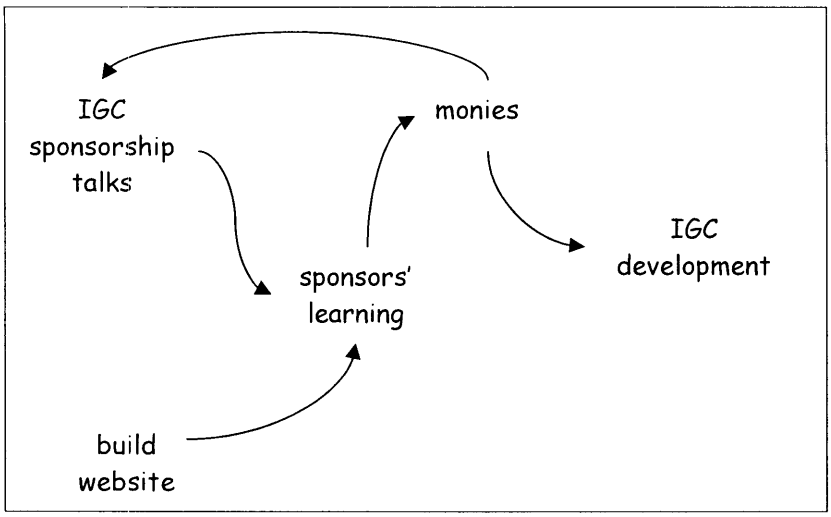

Figure 15 Problem expression as a causal frame

There was tension, dialectic, between what John Beard wanted to be happening and what was actually happening. The engagement model suggests this should have been putting pressure on him and IGC to change to an alternative conceptual frame. However, there is no evidence that John Beard appreciated this need from his own cognition.

3. You must recognise that tensions have to be dissolved through the use of new interpretations (perspective shifting)

The incident of Salvador being burned and the subsequent media attention seems to have been the catalyst for John to realise a new conceptual frame was needed. Therefore, the new 'interpersonal' conceptual frame might be summarised as using the media to provide the opportunity to introduce the sponsors directly to the victims. See figure 16.

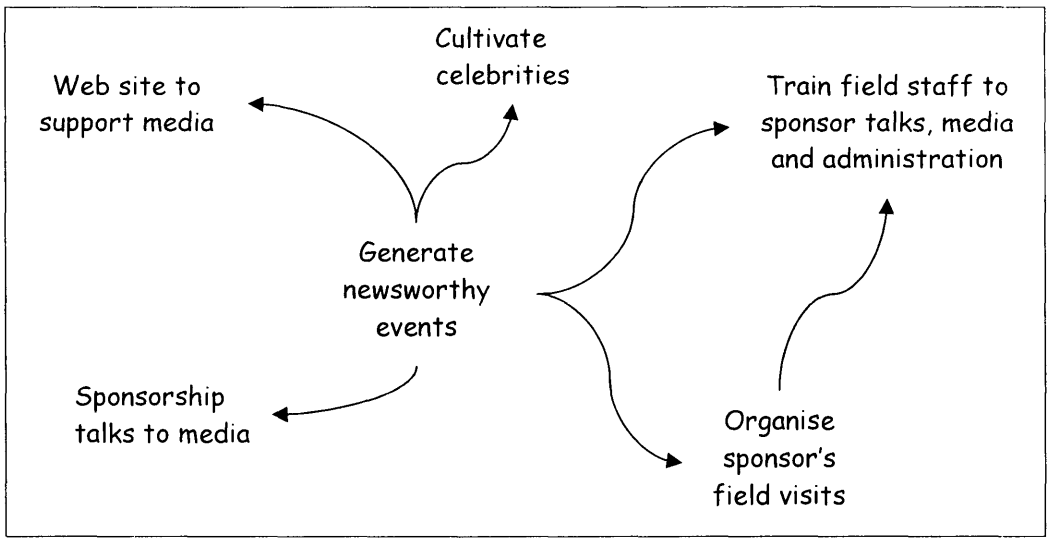

Figure 16 New conceptual frame

4. You must recognise that new interpretations will reframe the problem context and yield different courses of action and learning

This new conceptual frame changes what is seen now to be the problem and suggests possible solutions. The problems and solutions include managing the media and training local staff to deal carefully with sponsors coming to meet the victims for themselves. The new interpretation an understanding (hopefully) that problem solving is about shifting conceptual frames, not merely seeking more and more rationality, data or information.

The interesting outcome of this study is that an external event, Salvador being burnt, seems to have been the trigger that shifted the conceptual frame. A manager who is problem solving may not have this luxury; they may need to shift the conceptual frame from their own cognition or planning processes. As Bigelow (2004) and Nutt (1999) both argue, there are serious constraints placed on how a manager makes decisions, which sometimes hinder the broader process of problem solving. Learning and frame shifting activities are often time dependent, which can limit the ability of managers to solve problems. This is where Ackoff's (2000) advice to think about the sub or supra systems may be a very useful heuristic. In the bus strike example, he suggested shifting from inside the bus system to the wider system of the bus routes. This heuristic for frame shifting may have moved IGC from the informing sponsors

system, to the alternative system that built relationships between sponsors and victims.

5.2.3 Limitations of this study

Although this study provided rich insights into the usefulness of the engagement concept for structuring problem situations it has the major limitation of a lack of evidence to support the researcher's assumptions. It is clear that an external event caused a noticeable shift in the conceptual framing of John Beard but the lack of evidence in this case does not really show enough evidential support for a broader understanding of the model. For this reason the next case study uses interview techniques to capture, store and interpret multiple perspectives and analyse the discourse of key stakeholders.

5.3 Second Learning Loop Case – Firm A

Firm A is an organisation with a long history spanning the breadth of the development of the state of Queensland. For well over a century the organisation has been providing its product to customers from the New South Wales border all the way into the remote far north of Queensland. Firm A is a Queensland government-owned profit-driven firm with a combination of transport services offered for both passenger and commercial services. Beginning in the mid 1800s, Firm A has serviced the needs of Queenslanders starting from Brisbane and slowly working its way north over the period of time in which they have been operating, and services some of the most remote mining areas of Queensland . At present Firm A has over 14,000 employees state-wide and currently delivers freight to northern parts of Queensland on a regular basis.

Firm A, as a government-owned and operated company, employs its 14,000-strong workforce using a traditional hierarchical structure. It is a highly bureaucratic organisation with decision making hierarchies all the way up to the state parliament. The organisation's top official, for example is a minister in state parliament who oversees the work of the company's board and decision making processes. Though not involved in the day-to-day running of the company, the minister has the right to

enforce decisions on the organisation as the need arises. A basic view of the structure of the organisation is shown below.

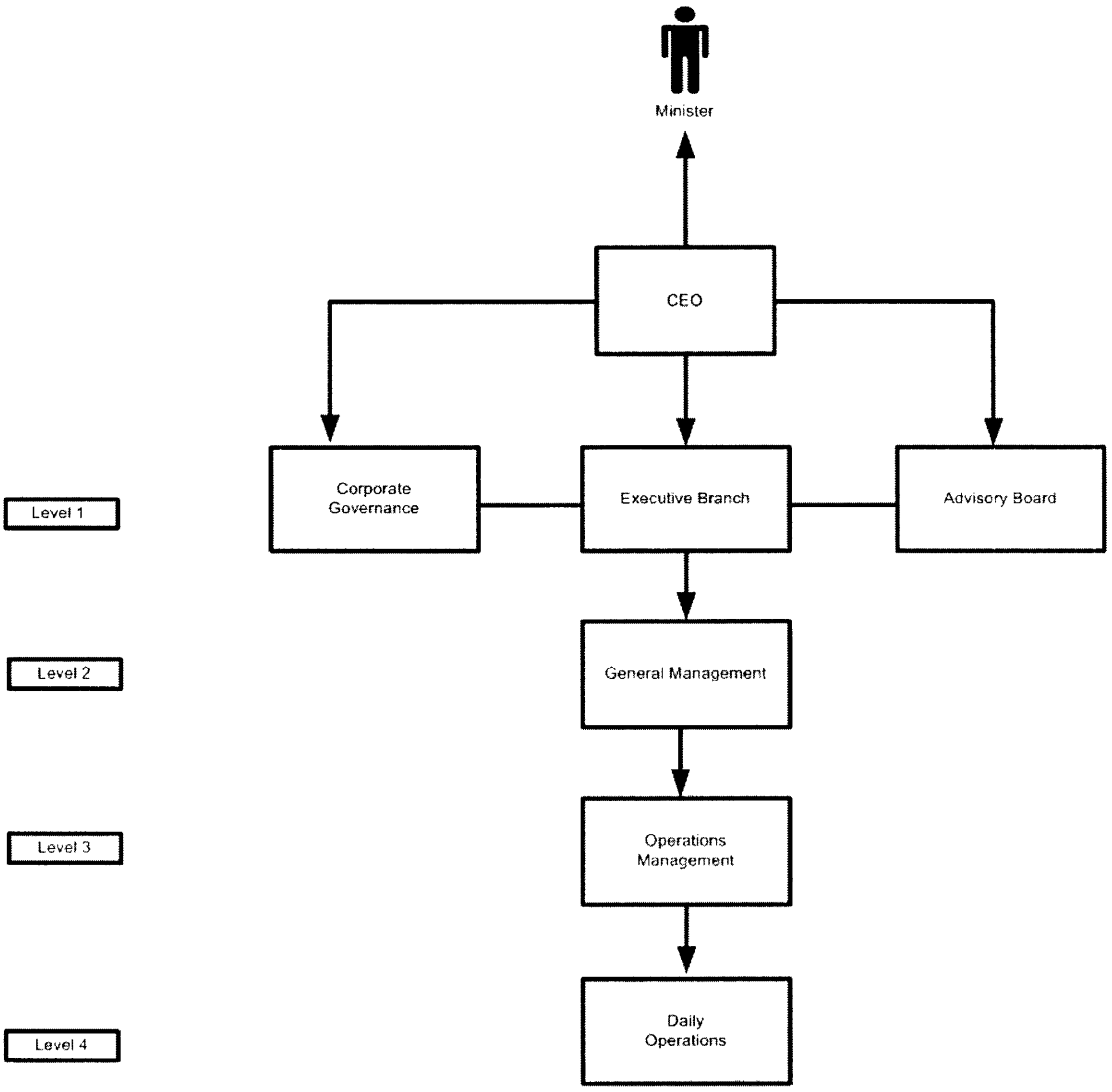

Figure 17 Firm A basic structure

5.3.1 History and problems

Historically the organisation grew out of the colonisation of Australia in the mid-1860s using English technology to build its infrastructure. Scaled down versions of this technology were used to create the infrastructure that now supports the entire state. Through most parts of Queensland, Division A is in control of making sure that the material needed to build Firm A's infrastructure is supplied to those who need it in a timely manner. This involves having steel shipped up from Firm A's supplier and placed at relevant centres for machining, then laying as required. Work stations in

Brisbane's north machine the infrastructure materials that are shipped out from South Australia and then distribute them as required. This supply division (A) is responsible for making sure this happens efficiently, effectively and in response to the needs of the organisation. Division A is made up of a General Manager who then delegates responsibility to several 'operational' managers who make sure that the material continues to be delivered.

Underneath the operations managers are independent yards that house the majority of the division's operational workers, who are responsible for overseeing the shipment of the product from the supplier in South Australia and for coordinating its storage and distribution to appropriate locations around Queensland. The yards are almost completely run by male engineers with a very narrow focus on getting the product to where it is meant to go and on time. Looking back through the history of the organisation, it is not hard to see that Firm A has a long history of being a predominantly engineering-based organisation that prides itself on traditional male cultural values. It is the role of the General Manager to coordinate the silos, keep track of expenditure and manage the overall operations of the supply operations.

Firm A's main issue with the running of supply chain operations started when the current General Manager (whom we shall call Bill – not his real name) perceived that the supply operating system was not very efficient. The nature of the problem was that the supply seemed to be coming through, but nobody seemed to know through what process it was achieved. During one session Bill had with the researcher, he explained his frustration at not being able to understand the processes of the supply or even how the actual steel got to the place where it was. It was not that the manager was incompetent or did not understand his role; it was more a case of what kind of processes are at work within the lower-level supply operations. His desire to find out what made the supply chain 'operate' led to the creation of a multidisciplinary task force designed to enquire into the project.

According to the task force members, the research project was aimed at building an effective methodology bringing together academics and practitioners from various disciplines to work out the best way to optimise supply chains. The optimisation of the supply, through an applicable methodology, was needed because it was not very

well understood what processes were actually being undertaken at the time. The broad process of where the steel was going to and where it was coming from was well understood. However, the process of knowing what happened inside that broad process was unknown. The main aim, then, of this research project was to improve supply chain operations to the extent where these outcomes could be clearly seen. That is, a more optimised and transparent supply was desired. More importantly, the point of the whole research project was to move towards an understanding of how to manage complex supply. Therefore the point of the project was ultimately to improve the operations of the supply.

To tackle the complex problem of improving supply operations, the task force went to the Operations Research literature looking for an existing methodology that could help them in their goal. In their own words they wanted a 'best practice' methodology that would work for the management of their supply chain operations. For the best part this was not considered to be the answer, considering that it was a methodology in use and considered to be the 'best' available. This methodology was the SCOR (Supply Chain Operations Reference) model. The SCOR methodology is not really a methodology in the sense of an approach in Checkland's terms (see his work on the meaning of methodology in his reflective piece – Checkland 1999). SCOR is more like a mathematical logistics algorithm deeply rooted in functionalist epistemology (a copy of the SCOR methodology is included in the Appendix). The SCOR model is one endorsed by and governed through a central body known as the Supply Chain Council. The following extract from an Intel (2001) white paper on SCOR gives some insight into the functionalist epistemology underpinning this model:

> ...(SCOR) is a cross-industry, standardized supply-chain reference model for analyzing and improving supply chain operations. By applying SCOR methodology to internal supply chain projects, Intel has evolved a SCOR best-known method.

The hope of SCOR was that it could provide a frame for the management of Firm A's supply. The model was applied to Firm A's supply and interviews conducted to see if SCOR could help the situation. To problems that were subjective SCOR gave the team only objective answers. They did not take into account the unique nature of both

governmental organisations and typically not-for-profit organisations, nor did they take into account the conceptual frames involved in the management of the supply. By being highly focused on mathematical modelling, SCOR creates the idea that supply optimisation revolves around algorithms and not people. The concept that people are a problem in supply chain optimisation and management has largely been ignored in supply chain and logistics circles as has the interpretive/softer paradigmatic views of research (see Burgess, Singh and Koroglu [2006], for example).

SCOR also fails to take into account the realities of state-owned organisations. For example, at Firm A, neither the CEO of the organisation nor the Executive staff has complete control over the running of the organisation. The minister in charge of the railway has complete control, and any major changes have to go through the minister to be approved. It may be the case that it appears to be a 'token' role, but it carries more authority than that of the CEO's office. SCOR assumes that all organisations are exactly the same and all supply chain processes are likewise the same.

The SCOR methodology focuses primarily on the operations of the physical supply components and excludes any sociological or culture concerns. In the words of the Research Officer (Robert – not his real name):

> We then developed the questions for the formal interviews to confirm or refute what we thought we already knew, that is Social issues seem to have more impact than methodologies and systems…"

Further to this, the people at Firm A found these particular issues with the SCOR model:

- Concentrates far too much on using technical systems and ignores the social system altogether;
- Is based around manufacturing firms – and doesn't take into account self-perpetuating chains (i.e. those that manage and run themselves);
- Measures are based on industry best practice which doesn't take into account industries that for various reasons cannot be benchmarked against similar organisations even in the same industry;

- Doesn't take into account the technology required to communicate across the chain and, more importantly, the skill levels, training and culture;
- Doesn't take into account the technology required to communicate across the chain.

The inadequacies above and perceptions of governance structures mentioned earlier forced the 'best practice' focus to shift into another research paradigm. This approach was to be more 'holistic' and would examine the social issues around supply bringing together a large base of academics from disciplines as diverse as architectural design to information systems. Hence, the project is now less focused on what is the best way to optimise the supply components and more focused on using parts of SCOR and other methodologies to attempt to understand what factors could inhibit large step improvements across Firm A's supply.

5.3.2 Focus of the case

In the latter phases of the project, the researcher was asked to become involved to advise on the social aspect of the supply. The researcher was asked to provide approaches that could help shape, structure and provide a way forward in some of the more difficult areas of the project. The engagement model was used to structure interpretations around two contentious issues for the research team: firstly, the way work was conducted by those in the supply, and secondly, how governance structures/arrangements affected the operation of the supply. By looking at the various expressions of these issues, it was hoped that a conceptual frame for suggesting possible solutions could be carved out. This case, therefore, presents two major uses of the model to help structure interpretations of the above-mentioned points.

5.4 Second Learning Loop Case Study 2: Firm A Case

This case study is presented as evidence of a failure to engage operational managers and workers (collectively called 'operators' for clarity) prior to implementing what senior management saw as the solution to their supply chain problems, an enterprise resource planning (ERP) system (SAP R/3). The senior managers had independently developed a conceptual frame of a seamless, accountable, integrated, computerised

supply chain management system from supplier to user, standardised and highly optimised throughout their entire organisation, enabling them to monitor everything at will. The General Manager and project initiator was Bill Hunter:

> The world has moved on and we are all about supply chains, and managing the inbound logistics... I struggle trying to get and keep that role clearly defined for several reasons. One, is for the legitimacy of the corporation, saying you have that role it means trampling on sacred cows and people who have turf and don't want to reconfigure it and that also has a lot of change implications. Two, just getting the senior executive and others to understand what that new role means, and getting a charter and approval to run that sort of work. And three, even if I can get the internal organisation to understand that there is presently a lack of sophistication around supply chain management, they are also caught in traditional things. So you know – how do we move to trust and controls and collaboration, these buzz words that are around in supply chains? I do not think suppliers understand those roles either very well. I don't think I have the sort of governance structure in respect to contracts, the way we legally set them up, they work against those sort of roles, and the performance management systems and other sorts of support systems that would help not just define a role but also support that role so it can be maintained. *Bill Hunter, General Manager*

The General Manager is expressing problems that appeared to him given his whole–of-supply-chain IT based management system conceptual frame. He thought the organisation needed to move with modern trends in supply chain IT and that meant implementing the large-scale 'process' improvements offered by ERP (Enterprise Resource Planning) systems such as SAP R/3. The core part of the problem as he saw it though was not necessarily that the organisation had not moved with the times, but that the supply chain management IT systems needed to be implemented to drive change. He also commented:

> We have the supply chain optimization section, whose role at this stage is to manage inventory but to do that they need to understand the components of the entire supply chain, and we also have a R and D section – albeit one person – to help us look at ways that we can try and bring in best practice, developed methodologies exclusively around supply chains, and I guess culturally putting all the staff through training and development initiatives which, while aimed largely at a government state purchasing model, does bring in the concepts of supply chain and is warming them up to that bigger role in developing skills and capability and finally we are investing heavily into the development of ERP replacement system which is SAP 3. We are putting staff into that project so when it comes along we have had influence in shaping what modules are bought, and in those they have technologies and modules that handle supply chain capabilities. Also we will have a greater technology. I guess, culturally,

> we are trying to set up some way to create learning across the supply chain. Now that is seminal, it would be the view that trying to work out the methodology to help all of these parties come together and learn. *Bill Hunter, General Manager*

So the senior managers saw an urgent need to purchase and install a SAP ERP system which used the industry standard, Supply Chain Operational Research (SCOR) model. It was thought that this IT system would drive major process changes and force whole-of-supply-chain thinking. The quote below reflects Bill Hunter's belief that the ERP system would force process improvement:

> I think our support mechanisms need to be radically re-jigged ... the R3 upgrade in 2004 is a big part of that as it provides us with large potential to tap into technology to improve supply chain management. *(Bill Hunter)*

His belief in IT driven change was reinforced by much of the literature:

> A second prescription which emerges from the analysis is that it is preferable to modify the business processes of the organization to fit the capabilities provided by the SAP system, rather than modify the SAP system to fit the reengineered business processes of the organization. (Periera 1999)

> By creating a centralized database and standardizing corporate data flow, ERP can make changes and efficiencies take root in a firm ... Even with such advances project managers often wonder 'what are the ingredients of successful system implementation?' (Manadal & Gunasekaran 2003)

> Because the implementation of a cross-functional ES results in major organizational changes, our model is based on forces influencing change. (Scott & Vessey 2002).

> This approach fulfilled ASAP's [SAP development methodology] need for the creation of a business impact map as part of the ERP implementation change management process. We conjecture that BSPA [alternative development methodology suggested by the authors] could play a similar role in any evolutionary systems development methodology. (Panagoitidis & Edwards 2001)

Authors like Quattrone and Hopper (2001), however, are amongst a minority who have questioned the logic that hardware implementations will drive change automatically. Others like Sia, Tang, Soh and Boh (2002) highlight how the very thing ERP promises (integration and high level supply chain optimisation) is often at the cost of a loss of existing management decision making and control systems. IT

ends up determining the way work is done instead of augmenting work practices through collaboration, planning and 'corporate learning'.

As might have been expected by the sceptics it was not long before the senior management appreciated that there was something going wrong with the use of the SAP system. The language being used was that they or the system designers did not give sufficient notice to the 'social aspects' in the supply chain. While the supply chain consisted of heavy engineering parts, supplied to numerous departments, many operations were in very geographically dispersed operations, some staffed by employees of the organisation and some by contractors, many in country or small town locations. The operators dispersed through this internal supply chain did not seem to be engaging with the new IT system, they seemed to be using the conceptual frame of only their own immediate operational relationships rather than that of being able or willing to work through the new IT systems. This local and interpersonal conceptualisation of their work, where they only acknowledged those people and operations they had to work with on a regular basis, was the 'social aspect' of the supply chain. Further, it could be argued resistance to the technological frame occurred. These operators did not seem to see the same overall supply chain system and their place in it.

It is thought, from interviewing the department operators that insufficient engagement had occurred in the technology implementation process, so there was a clash of conceptual frames. The senior managers and enterprise system designers had a whole-of-supply-chain, IT driven change frame, including an accountability view that required all organisational activity to be documented and systemised. The operators had a more localised, small business, inter-personal, conception of how best to achieve in their immediate responsibilities. Therefore, the operators' interpretation of the usefulness of the new IT system was that it did not assist with their particular needs.

The interview evidence that supports the claim that the operations managers used a localised and interpersonal conceptual frame to think about their work, is presented below. It comes from asking four basic questions.

1) The interviewees were asked how they **communicated** with others in the supply chain. The response was vetted in terms of whether it indicated a perception that they needed to communicate with the whole supply chain or merely those at the input or output end of their particular operation. This question was backed up by asking about their working relationship – that is, whom they dealt with.
2) The interviewees were asked what **information** they needed to do their job and where they accessed that information. The response was again vetted to see if it indicated a perception that they were operating in a long supply chain or merely with those immediately around them.
3) The interviewees were asked to define their **job** in terms of the supply chain. Responses that struggled to do so were taken as evidence that the respondent had not well conceptualised themselves in terms of the entire supply chain. Those that answered saying they did what their boss said, were considered an extreme example of not identifying with the supply chain.
4) The interviewees were also asked **what works well** and what could be improved about the supply chain. The responses were again vetted to see whether a local or entire supply chain conceptual frame appeared to be driving their thinking.

5.4.1 Communications and relationships

The following quotes reflect the responses of operators who seemed to be using a local and interpersonal conception of the supply chain. Notice how there is little talk of enterprise wide knowledge management reporting requirement to inform those further up or down their distributed supply chain of what is going on. Moreover, there is little to no discussion of the ramifications of actions in the scope of the complex whole. This first section shows that when making orders or taking enquiries, it is typical to lean on familiar local ad hoc processes rather than structured corporate ones. So in response to being asked how they communicated, a typical answer was:

> ... usually if [we have] got some orders coming up we get some enquiry, [they] will contact me by phone or email and we will discuss it on how best we can do it. – *John Roberts, Operational level*

> It is the usual things like emails and memos and telephones and verbal [communication] and I have found is that the most useful is actual some form of verbal [communication] unless you want to get a technical point [of view] you want somebody to remember. You may also have to write it [down] so they have something to go back to. They go away from the conversation and they say what was I going to do? Oh yes I understand why I am doing that now so they may need some written backup. The other thing I have found is you try to give them a problem, a picture or graph or some visual representation of it is better than giving them a 16 page memo, with beautiful charts and tables. – *Matthew Micheals, Operational Level*

While ad hoc and interpersonal there was some acknowledgement of the need for some recording of information for use by others. Information was both an interpersonal and recorded thing (eg. email). This idea recurs through the discussions on how they communicated; another example is shown below:

> You need to contact people, they need to be reliable with regards to information. If a problem where urgent requirement for [product] comes in, if you do not have a contact they will not jump to your attention straight away and they do. It is an extremely important commodity. Our planning for it has got better over the years. Things still happen so [with] any contact you [should be] able to respond quickly. – *Kieran Bennet, Commodity Facilitator*

> Email, telephone. Hold meetings and we also hold customers planning meetings. We try to hold those, workshops; we might bring everyone together and sort out [problems]. – *Samuel Smith, Operational Level*

The above quotes reference working out orders for the product as it is needed, which is a key function of the ERP system, but it was not mentioned. The following quotes refer to the ordering process and reveal further local and interpersonal conceptions of communications:

> Out of phone and email which is more useful. Email … The sooner we hear a response the better. More important to have it documented. – *Ed Steeves, Operational Level*

> The only interaction I have is with Supply, [Interviewee mentioned key operational staff] and that would be about the total because as I said we are a value adder to a specific middle part of the process. And of course Banyo … We have contact with them on a daily basis. Either myself or members of my staff. – *Allen Malcolm, Management*

> … I think that people I deal with both internally and externally I find very credible, reliable trustworthy. Certainly approachable. I suppose most of my interaction both internally and externally is over the phone or email so it will

> never have that face to face quality. But I think it works very well, what is there. I can't be everywhere. – *Mike Gore, Sales*

A lot of the operators interviewed gave very similar conclusions that assumed that their present systems worked well enough. The following quote shows that while there is use of language about supply chains, it is being thought of in local and linear terms.

> I'm not particularly close to the action in a very comprehensive way. It's really overall Charles' responsibility and I think he does that very well. I only own a piece of that which is essentially [the], I wouldn't call it a quality plan, but it's really that technical component of the production group. Essentially I look after the technology incentive through to the part that leaves the site. That means that the technical operators who work in the operations area [have] a dotted line responsibility to the operations manager. They have quality plans and quality groups that look after a range of products including [the product] and so my involvement in terms of supply chain is ensuring that system is sufficiently robust and capable that we in fact deliver to you what we say we are going to deliver to you. – *Nick Carr, Operational Level (Middle Management)*

This manager is responsible for overseeing the quality assurance procedures, which ensure that the product reaches the customer. However, he leaves the actual quality assuring to other operations passing responsibility to them at the office door. This is typical of the responses given at Firm A and it indicates a style of thinking in fragmented organisations. Below is a typical example:

> [...] that information that Sammy Smith sends – or Ken or whoever is doing that [managerial] role –feeds me [the] information that I need. I talk to them about it and in some cases I get that [communication] at the first week of every month. I don't get it all [from] them. If their requirements are not approved because they've planned projects sometimes the projects don't get actual sign off.
>
> **(Interviewer)** When you talk about the information that is sent, how is this done? For example, face-to-face talk, phone, fax, email
>
> **(Interviewee)** Combination of faxes and email, but the main ones from Firm A are faxes – the most frequent and even daily – and then email which cover the same as the dispatches but over longer periods, like a fortnight or a month. I've kept all those faxes, right back to 1991.
>
> **(Interviewer)** Do the faxes and emails from Firm A contain the same information?
>
> **(Interviewee)** Yep.

> **(Interviewer)** Why …why do you need both?
>
> **(Interviewee)** For cross-checking, really. Faxes are the most important [because] they tell me what length and types were shipped and when. I put these in our [workload] spreadsheet. – *Colin Germain, Supervisor*

This operator has a written, IT based, communications system with his immediate fellow operators but perhaps more important there is a sense of camaraderie between them that all they need is a word from their customers and the job will get done. This suggests communications are based on trust and personal relationships, instead of recording everything on an IT system. Another example which again sees communication as a linear input-output process with immediate operators.

> Well there's, there's two major people that we – well, I – deal with in the [product] coming forward from jobs and require supply which would be Sam Smith who's in charge of supply in the city, also John whose in charge of supplying the [product]. – *Tony O'Connor, Operations level*

Others when discussing communication raised some concerns that shed further light on the interpersonal culture of the organisation. These quotes highlight the 'spirit' of the workplace in general which seems to have been overlooked by the implementers of the ERP project:

> The current work environment absolutely inhibits it because I can't even go and see [anyone] without having to go through locked doors in reception and you can see the behaviours here if someone wants to come and visit you … [They don't even] pick up the phone over there to call me, they don't just pop around and say hi Andre how are you going? So what it's actually doing is building barriers which [restrict] people and their capability to communicate and interrelate and therefore we all continue to live in our little silos, oblivious to what others are doing in the organisation. – *Peter Le Carr, Technology Management*

This operator is clearly concerned over something he sees as a threat to his ability to develop interpersonal relationships. According to this manager a lack of interpersonal contact hinders communications and divides people, the follow quote also supports this notion:

> And, and, it's just, this is just human behaviour, and I can give you plenty of examples over my career in IT where the project teams that have been separated from the main IT area, and that's causing friction. And reverse friction, and I can give an example. Many years ago in a work department where the IT

> branch group was too big and a project moves somewhere else, and the people left behind had some envy about those guys there because they moved onto some so called exciting intellectually stimulating project, so there was a bit of us and them. Over time though, the reverse happened, where that project team did their bit, and they became envious because the guys they left behind seemed to be doing some exciting stuff, but ... it was an 'us and them' [thing]. It's human nature. – *David Stower, Technical Staff.*

Another example is shown below:

> We interact with others; we certainly do not work alone. We rely on [Place A] to do some [production] work for us. We rely on [Place B] when we are short of people. We rely on the logistic group to advise us what [product] when to send it, who to send it to. So there is a bit of interaction. We also react with [others in] Firm A very rarely, but we do on the issue of [production] turnaround. – *Frank Peretti, Manager Inventory*

This quote shows that this conceptual frame is again based on the assumption that the communications is local and personal. This shows a local conceptualisation of the supply chain and its activities. The following quote offers some explantion:

> Yes. Yes. The only dealings with outside parties ... it will be written, even internally with emails but there's still the relationship of the people involved is informal. You've got to understand the subtle difference. You're not on the phone yelling out or things like that and saying negative things. You want things to happen easily. – *Steve Marks, Technical Level*

Even managers who had more of a whole supply chain conceptual frame answered the questions about communications by emphasising interpersonal relations.

> We sort of emphasise while we've been managing the [supply chain] that the staff at [ground level] talk to the staff at [Place A] workshops about any issues that they have about what's going each day so that there's personal contact between those staff and [Place A], between those staff and the [people] in the [Place B] yard so that they are dealing in the supply chain at the level that is important not going up and down through management chains ... So it's more about talking when there's problems and issues. If the crane breaks down, Steve [Whittaker] rings Banyo, and says look, the crane's broken down, you aren't going to get any [product] tomorrow, it's not going back to Frank, for Frank to go to Allen, for Allen to tell them. – *John Connahan, Manager (Commodity Strategy)*

> I couldn't get the team around me to embrace the concept of putting functional across process work teams together. So putting the access enquiry people together out of business development area with the interface risk management people out of the ops area and like people out of the infrastructure area, they just

> [wouldn't]. They wanted to stay with their communities of practice. Although we forced the [IT system] process approach [it just] didn't work. – *Steve Brock, Network Access*

In the previous quote, the operator is speaking about the problem with getting other operational workers to take up the IT communications systems. It should be noted here that SAP is fundamentally a process-driven information technology system designed with rigid business process reengineering ideas in mind (see Quattrone and Hooper (2001)). This shows a discrepancy between communication, discourse and relationships building approach of operators and the process driven approach of SAP. The following quotes goes so far as to suggest operators felt that what they did depended on who they liked not formal authority:

> We don't report to any of those people we are trying to deal with. So from the perspective of the hierarchical approach to the application of our plans, we work entirely on influence. We work entirely on trust. So there is no point you can't come and say, 'I want you to do this.' Because I'm independent of them in that regard. – *Rod Mackay, Operations Planning*

The conceptual frame of 'independence' used in the final sentence of this quote shows a consistent 'local' conception of work and knowledge required to do the task rather than a whole of organisation view. There are no real indicators that the planning officer here feels like he needs the help of others in the supply chain, yet others thought exactly the opposite:

> Okay. My role is that all our freight contracts are with [Group A] Steel Limited and my role is to interface with [Group B] Steel Limited, representing Firm A's interests in that relationship, with a view of obviously ensuring that along with our Operations Planning department, that I'm just one more link in the chain of the whole supply chain if you like, and my role I guess is basically at the door or probably one-step before that, ensuring that we have resources once the manufacturing has taken place and the resources in place to make sure we meet delivery requirements to customer stores, because our centre sales generally speaking are delivered to store. – *Steve Goldsworthy, Transport Manager*

This manager is using phrases like 'one link in the chain' to show that they at least have a broader systemic understanding of the business processes. The following manager shares similar ideas:

> It's a very ill-defined process and the reality is in that part of what this whole supply chain thing is about in fact is to actually give some clarity to the relationship because we've grown up as a family of siblings that we can do

> things as siblings without actually understanding what we're doing, why we're doing it, how we're doing it so I think it's very much an ad hoc [illogical spontaneous flow of ideas] and it's grown as part of the culture and we never even considered it to be an inbound supply, not in an explicit way. We've used the words but our behaviour wouldn't be catered to the fact that our operation would deliver the trains. So it was clear loading there's always a wagon there. We tried to bring some discipline to it but about service and getting more clarity around that would be pretty good to really understanding how those component pieces add up to give you a service which you're actually willing to give to a customer at the end of the day. – *Mike Oldfield, Management*

A contrast can be drawn from the quote above between SAP's rigid process and the reality of interpersonal communications processes that operated through Firm A. Notice, Mike says we use the words, but the processes and the actuality of what we do differs. Here is a striking difference in that community and the organisational culture and relationships is taking precedence in communications.

The interpersonal conceptual frame was also seen as being important for innovation and change.

> I think those neurons that spark off will only sort of spark off when there is the receptor there that is going to get it. For example, I know what happened in the freight crew with the [product] supply out at the south. It was because of a couple of individuals, who through casual conversation almost, that I came in contact with, and I just was perhaps just waxing lyrical about you know, we should be able to be doing something better, because we were talking about, I'd been talking about an idea of having 40 foot containers, or other containers that we could handle [product] in, to get over the handling of [product] at [Place A]... But what did happen was, well, instead of non FIRMC operation handling that [product], and being out a couple of years later, maybe FIRMC can extend itself into that transport role. Build up businesses around that, and all sorts of ideas started to flow out of it a quite simple conversation, statement of ideas, all that sort of thing. – *Steve Brock, Operational Level*

The comments below again confirms little concern with understanding or interacting with other elements in the supply chain.

> The organisations that we mostly deal with indirectly are our technical services people. We get advice from them on technical aspects of the steel that we put into the [product] asset research institutes. We commission research into and around the behaviour of the asset and that informs our decisions, our procurement decisions, and we do have interaction with the suppliers of the steel products for example people, rarely, that's sort of, at the initiative of the steel supplier. The VA people, the producers of switches and so forth. They usually look to make contact once or twice a year, just to fulfil their needs in terms of understanding the end market that they service. I guess we don't

> particularly, I don't particularly feel the need to interact too closely with them. I'm happy to let the experts within our organisation deal with them and manage those relationships. Just a short answer to the alternative sources of issues is no not, not in the short term anyway. – *Immanuel Stevens, Network Access*

The supporting evidence of an interpersonal conceptual frame not considered when trying to implement the new ERP system goes on.

> ...I have a number of staff that work with me. Including staff at [Place A]. Who are somewhat isolated. We run it as a separate division, in effect. Originally it was part of workshops group [Place B]. A decision was made about three years ago by [Steve Brock] that because of the huge material value it was impacting the actual financial position the financial position of [Place B] workshops. So it was decided to move to a separate plant, its own separate, separate P&L's. All its own finances and its fitters positioned underneath me as the finance manager and they answer directly to me. – *Allen Malcolm, Operations Manager*

> **(Inteviewer)** And you work alone or with others in the [chain].
>
> **(Interviewee)** Absolutely with others. I don't do anything by myself. . In fact, when do I do things by myself I create mayhem, so ... continually do is to stop doing things that I should have other people doing and spend time communicating and learning how to help people with their problems so that they do it.
>
> **(Interviewer)** Would you say that is because of the complexities in the supply chain or the interdependence?
>
> **(Interviewee)** It's because my role is to manage a team and there is a job in the team ... and the delivery of materials and there are other roles that manage the use of those materials and to the extent then that I'm there to make sure that at least people have the right resources, that they run into problems then there is assistance in solving them, but for me to get involved in any of the details is counter productive. – *Tony Wilkins, Network Access*

Again the senior managers also reflect this interpersonal conceptual frame.

> We have a fairly complex interaction with others within [the organisation]. Primarily our business development area would sometime initiate projects. We would scope it, in conjunction with services and project division, before we presented the project to senior executives for their approval and then government approval if required. There is a fair bit of complexity in terms of delivering projects in a timely manner to the consumer. – *Tom Flynn, Assets Manager*

Notice that Tom Flynn uses the words 'complex interaction' to describe his relationship. This phrase shows that he is thinking in systemic terms about his role, his relationships and who he needs to communicate with. The general manager:

> I have to work with others. For a start I work with my own team in Supply, which is about 80 people, but with suppliers the transport providers and a lot of groups within FIRMC. I need those sort of people to achieve my tasks for a range of things. One is they approve budgets which in turn funds us so we do work for them. Clearly here is power imbalance straight away because they've got the bucks so even if we have the brains we need their approval to do things. Secondly, I need them for planning purposes, a whole range of activities that I just cannot achieve my tasks without the cooperation and the good will of other people across the chain. – *Bill Hunter, General Manager*

In this quote, Bill Hunter, points out the various concerns he has and how it relates to other people and in a basic way the planning requirements he has. It's also interesting to note that the manager is also thinking about 'power imbalance'. This shows he is theorising beyond his local conceptual frame to see what things impact on his decision making. A similar conceptual frame by another manager is shown below:

> Again I think that perhaps I can use IT because I know most about. The issue I have here is even in advertising. We have to be able to apply a contract and the agreement through relationships because you could have the best contract in the world but if you haven't got the relationship and the relationship isn't working then the piece of paper is worth nothing. You really have to have it as give and take in supply relationships, I think. I also have a conflict in my view by having ISD as a profit centre as ISD then is forced to compete for suppliers of services that they can also supply which is a conflict of interest because then ... I'll give you an example; trying to get the requirements back to a competent management system for instance often you get a quote of $10,000 an outside organisation offers you $2,000 and ten days. ISD gets highly irate about that because they see this organisation as competing with them and undercutting their services and therefore they try and ostracize those people and keep them away from the businesses so the businesses are disadvantaged. That's not good for [Outside Firm] because in the end you end up paying more; it will cost the company more to get services under that regime.
>
> – *Peter Le Carr, Management*

The communication aspect of this manager's frame incorporates a deeper sense of the politicking in the organisation. We see the nature of relationships defined in terms of who holds power, who drives certain decision making and how that impacts on his role. These are all interpersonal considerations. Consider the following two quotes:

> **(Interviewer)** What role do you feel hierarchy plays in social relations? **(Interviewee)** Yeh, yeh. The hierarchical thing, it seems to get in the way sometimes when wraps up a layer of skill or confidence in a silo, but also it has left a cultural-imprinted model of hierarchy. And yes while this gets in the way of the horizontal flow it has a long history and cannot be ignored as it will not go away easily. So even if we changed our organisational chart to represent a horizontal process flow I think our cultural legacy would make it hard to operationalise such an approach. – *Steve Brock, Network Access*

> Because we started having more meetings, we're starting to, we're getting to know each other. In the past it's always been through emails or phone calls, and it's a matter, it's just an issue of wanting to blame or shifting the blame, see whoever's next on the list. But since we started having, sort of meetings, before the, now before the point an email comes through, you'll get a phone call saying 'I'm about to send you an email, and this is what it says'. And you can then work out what the, what the solution is. And therefore next time when he talks to me I told him what we're going to do to fix it. He sends me an email, I'll send him a reply, everybody's happy. So you might have to work it out together now, rather than alone whereas, in the past it was pistols at 20 paces, and whoever got the first shot off was off to a start, because you had people walking in with emails saying 'Look what they've said,' and so we've sort of drawn first. – *S. O'Donnell, Contracts Administrator*

The previous quotes are from management staff. The clear distinction between the local and global conceptualisation of the supply chain here is quite obvious, even if both think interpersonal relations are important. Most of the people above are not involved in the day-to-day ordering of the supply product, but they are responsible for the designing and fashioning of the supply chain process. This different level of conceptual framing leads to a dialectic process where neither party is really aware of the other's view in the day-to-day working of the supply chain. Gaining 'integration' SAP style requires large-scale process engineering (see earlier quotes for example) where day-to-day operational tasks are reworked to fit the system.

5.4.2 Information sources

The second question asked to reveal the conceptual frame of operators was about their information systems. Was it anti-technology? Given Firm A is basically an engineering company it was not expected they would be shy of new technology. It was found that indeed there was extensive use of what might be called 'feral systems' (discussed again later) where operators had bypassed the ERP system and developed

their own IT applications. This was taken as demonstrating a local conception of a need for written asynchronous communications even if it was not perceived that the role of the ERP system was to coordinate and inform all those along the supply chain. The quotes below were chosen to represent supply chain processes that ERP is supposed to be used for but local operators had bypassed with their own IT applications:

> ... I rely heavily on we've got a diary that tracks all material usage on a daily basis so it will have on there how many [of the product] we unloaded today so Bruce will come in write in the diary in what section, how many lengths of [product] he does. That diary then goes into a database internally within here and onto a spreadsheet ... I do the inventory audits probably once every 3 to 6 months ... sort of thing. – *Andrew Newbecker, Construction Engineer*
>
> **(Interviewer)** The information from [supervisors], how does that information come? Is it stored in [enterprise] system?
>
> **(Interviewee)** [no] stored in email and excel. But can be referred back to.
>
> **(Interviewer)** Is that shared with others or not.
>
> **(Interviewee)** No not really. – *Steve Marks, Operational Level*
>
> [we use] emails and telephones. With [Place A] and Infrastructure, once a week, usually Thursday. Thursday's loading day at [Place A]. So therefore we know exactly what, Thursday and Friday mornings is loading day, and it leaves [Place A] Friday afternoon. So by Thursday, we know exactly what's going out, hopefully if there's going to be a problem we, we've addressed it before then. and that's basically all there is. [Place A] faxes the information to us, to here, Allen has a copy, I take a copy, I then inform Infrastructure on what we're doing, see if there's any problems. Infrastructure will then tell me if there is a change in the deliveries, and it's a step back down the line, back to [Place A]. – *Simon O'Donnell, Contracts Administrator*

Notice in these selected quotes that there is no perceived need to get this crucial information back into the main ERP system for either forecasting or knowledge management purposes. Again, this highlights the use of 'feral' systems through the local conceptualisation of a supply chain. Some other quotes:

> You have to have good information storage, albeit in a social rather than technical system. – *Matthew Micheals, Production Manager*
>
> Oh yeah, very much with others. Couldn't do it alone. In terms of working with others, I don't need to worry about what they are doing as such, rather I am

> suggesting I take almost a helicopter view in this, sort of checking where things are at and therefore needing a lot of information on how they are going ... That's right. What I also feel works well is our systems accuracy. Although, I guess, a little bit of question about what doesn't work well, I might talk about limitations in the system but what we do have is very accurate. We never have occurrences where in our documentation there is any discrepancies in the volumes and product we send. Or what we send. I don't have detailed knowledge of the systems but from ... it seems to me that they are very robust. – *Mike Gore, Sales*

> **(Interviewer)** And where do you get this [information] from? People or systems? **(Interviewee)** A lot of it is from the systems and a lot of it is communication between people. Cause usually if Mike Gore has got some orders coming up we get some enquiry, he'll contact me by phone or email and we will discuss it on how best we can do it. Put it into practice. – *John Roberts, Despatch*

Here are two quotes that show how two parts of the supply chain relate to each other by bypassing established systems. The people that send out the goods (despatch) rely on email and telephones to keep track of orders that come from the sales people. With such a large organisation this is surprising, given that sales occur in the millions on a regular basis. Recent problems at the organisation have indicated that such reporting has led to 'missing' stock and may not be as efficient as claimed above. More examples of this kind of thinking are shown below:

> If they are doing the ordering system right then I know about it. The only trouble is sometimes they don't do the ordering system right and they might not order it off the right plan and I don't know about it for two weeks. Generally people ring up so communication is a lot of to-ing and fro-ing, backwards and forwards which is a bit ad hoc, unfortunately. But because if somebody wants brand new [product] they probably need it soon and it's all this other stuff that takes time. You know there is a project happening, there is a project manager that's also in the background who may be saying to us, 'Six months ago I need [product] for such and such.' He is not the person who ordered it so, yeah, we go off the formal thing so we know where to get the information from. – *Samuel Smith, Project Officer*

> I think we would work pretty hard to maintain that, because it is very, you know we've got websites and stuff like that, but they can't see it. But from my point of view, I can see, and it is not to see to be critical, it is to see to help to sometimes, you know what can we do? Like the example of what's happening while it's pouring rain, ... they can send emails, and they can quote information, and we can look at information and share information, it's not top secret, it's stuff that we both need to know and make sound decisions about what are we going to do here. Do we stop, do we keep going here, or whatever. – *Steve Goldsworthy, Transport Manager*

> **(Interviewer)** How do you get the wagons, how do you put that process in place? **(Interviewee)** Via email the wagons are there. If they are not at [Place A], the rotations of the wagons is predictable. Just goes round in circles like a Hornsby set. Goes on Sunday, will come back Monday night. Has a process, it could run itself really. **(Interviewer)** Are you able to track it? **(Interviewee)** Yes. – *Ed Steves, Logistics Officer*

The following quote demonstrates a more explicit connection between the ERP system and the operations of Firm A:

> **(Interviewer)** Why not just use SAP for your records? **(Interviewee)** SAP isn't … doesn't have the functionality. With our three-way checking system the order is raised on SAP but it's only when the boys at [the station] acknowledge receipt for payment that it then goes into the SAP inventory system. That's too … I need information before then and with more function to tell if something is going wrong. The only time SAP would tell you if something is wrong is when the invoice doesn't match the money stated in the order. There is a hell of a lot more happens than that so I need far more information to be able to plan, tell customers what is happening and fix problems when things go wrong. **(Interviewer)** Can you expand on what you do with the faxes and the emails from Firm A? **(Interviewee)** Like I say, it's cross-check. The emails are really only there if something goes wrong. I can then work it out. But it is the faxes that really count coz they are raised when things are actually dispatched. The emails are from a different source and more around what was produced. I keep track of all the faxes in the Excel spreadsheet I have set. I need the system to do my work with the accuracy for supplying [product]. I would struggle to function without it. – *Max Collins, Commodity Analyst*

In these sampled quotes, the local conception of information sharing is clear. They reflect a wide range of local thinking about how crucial information and communication technology is used. In some cases the functionality of SAP, which it is known for, was argued not to exist. This is more than likely a lack of knowledge on behalf of the person who said it, but it also highlights the lack of conception of a broader understanding of the supply chain. However, there were some who used a whole of supply chain conceptual frame to good effect.

> Okay, information technology, I actually have the information assistance coordinator working for me, because we probably are the heaviest user of the information system in the plant. That's said – I never remember these levels – but you know there are different levels of computers, but obviously the plant use the lower levels of computers. We use the management information system, a fair bit. We need information throughout the chain, we need to produce schedules of work. There is a fairly heavy use of computer systems things like HR, that's there just for support. I spent two hours with HR this morning about

> people in the department and how they do appropriate succession planning for various roles including the transport manager, drivers of trains and many people I've got in the department and how to arrange replacements for people within the department. HR services has all the basic systems around performance. Discussing performance management issues with people, so that's important. The importance is that they know they don't have our support which makes it a lot more difficult, and I don't do my job as foreman, I don't get the performance out of the people as well. But I don't, I wouldn't say I was thinking about that all the time or often. – *Rod Mackay, Operations Planning*

What also stands out in this quote above is that manager can't really understand the type of information needed though he is certain he needs it. This confusion in his answer highlights that information needs and hence a data model incorporating a systems wide implementation are not very well defined. Further evidence of this kind of confusion is evident in another source below:

> ... there are too many links and the performance management systems encourages people to drive for sub-optimal outcomes – that is, look good in their silos and ignore the impact on the entire chain. However by getting together we have been able to get a better understanding of the chain and help each other more and be less driven by silos...
>
> **(Interviewer)** Are there systems which assist you?
>
> **(Interviewee)** They are important. The general comment is it because is such a complex chain ... if somebody came in from outside it would be hard to recreate. Our failure has been to document and listen. We have not done as good a job as we could have. We can't use that as an excuse for not doing process management more thoroughly, but I suspect the reason the information systems don't work so well is we haven't been able to tell the IT guys what is needed. We know it intuitively but it is easier to do it than document it. *Tom Flynn, Senior Assets Manager*

Tom Flynn here is indicating a lack of corporate understanding in relation to information needs. He hints at the 'intuitive' use of information systems which is the present practice rather than a predetermined set of instructions or the corporate 'one-size fits all system'. The following quote shows from the frame of another manager that information needs are not clearly defined:

> **(Interviewee)** And whether we have to get product, get stuff downloaded, so that you can work through it, or have to go through to the manual paper trail to get that. We've got our IT people now putting up something that is going to be more user friendly to go chasing details. They are working through that for us at the present time. But I usually find that the systems are more reliable [than people].

> **(Interviewer)** Just going to the people side in terms of reliability, are there variations in terms of reliability? Some people are trustworthy and highly reliable in terms of what they tell you others less so?
>
> **(Interviewee)** No. No, people usually tell you what they believe to be the truth. They tell you what they believe to be the truth and what has actually happened. Now then we actually do the nitty gritty stuff, but sometimes what they believe to be the truth is not completely the truth and the systems will highlight that. So ... but I don't believe people try and be dishonest or tell you something that they don't believe. – *John Roberts, Despatch Manager*

The despatch manager highlights some problems with the intuitive use of information gathering rather than supplying a corporate data model (which he seems to favour). The manager uses words like 'truth' to highlight the difference between what is perceived to be 'good' information and what is likely to be something an operator believes to be of use. The general manager's view here highlights more confusion about information needs:

> R3 [SAP information system] will give us the capabilities at least to a better process but it will not give us the [quality] measure, so we need to have a TQM approach or backed up by activity based costing and measurement system and understand which is the variation and how to manage those. We also need to get a lot better helping people free up the rigidities of the system to be more creative and free up that creativity to come up with more ideas. I probably need to [make sure this happens and help to facilitate] that new creativity and new [make sure new] ideas are working out how so it can be [made] easier. Then [we] can bring forward errors, so we can use mistakes for learning rather than our rigid sort of nature. We hide ideas and mistakes rather than learn from them. – *Bill Hunter, General Manager*

The follow quotes show some general opinions from operators about information technology and its role at Firm A. Notice the non-questioned acceptance of technical systems despite their adequacy:

> [There is a need for] Information technology research and development. Information systems. All those things are relevant. Not sure how I can really build on that. You have to have information systems, ways of tracking the product. – *Keiran Bennet, Commodity Facilitator*
>
> ... the IT sort of stuff is actually critical, because it provides the data, and the information, and all that sort of thing. But, I, I think we're under-resourced, not in numbers of people type of thing, but other resource in terms of capability. – *Steve Brock, General Management*

Notice the language from an earlier quote that is reprised here:

> OK. Information technology, I actually have the information assistance coordinator working for me, because we probably are the heaviest user of the information system in the plant. That's at, I never remember these levels, but you know there are different levels of computers, but obviously the plant use the lower levels of computers. We use the management information system, a fair bit. We need to throughout the chain, we need to produce schedules ... There is a fairly heavy use of computer systems in things like HR, – *Rod Mackay, Operations Planning*

Notice the language of this final quote. Rod Mackay says, "we need to produce schedules ..." then alludes to computerisation at the end of his statement. This was from a management perspective as is the following quote:

> I guess I am part of a five-person HR team which I guess is the top league team at Firm A. The position reports to the GM/HR of Firm A. I guess the HR actions we undertake are signed off ultimately by Brad Smith and Peter Pitt as part of the management. And as you cascade that down, well, Kate Shepard who is now working for Peter, well her enactment of HR strategy in the mill would then be signed off by Peter and his management team. We have consultation with the unions in a department sense. In the mills they have network planning every week. Now the shift supervisors and teams sit down and talk and you have an implementation team as we call it which meets once a month with the union officials which are not necessarily on site now as most of them are from Adelaide. So we have sort of a broad discussion that Jim White will talk about the business. Steve, the safety manager, will talk about safety on the site, which is information sharing with the significant stakeholders in our business. – *Ted Orgin, HR Manager*

The term information sharing here is used to talk about managerial intra-firm relations and the context clearly excludes the perceptions of operators. The context of the language used, highlights the dichotomy between the upper and lower levels of the organisation. The following quote also supports this thinking:

> It has objectives that it wants to meet. From the corporate point of view, there are business unit or group objectives which underpin and support that, and there might be a range of information objectives which are supporting those group level objectives. What we're trying to infiltrate and get the business people to think about is, think about how you meet your objectives from the point of view of a solutions approach. So think about what is the business solution you are wanting to address...

And:

> Now it might sound strange from a technology area [to say] why, what's your problem? What you trying to fix? Because what's happened is that they've had

> a vendor or had something else come in and seen the lovely little thing, and thought that's nice, I want one of them, it's getting people to think up at this level, which we struggle. Then again, that might sound strange, because when what we see and try and push technology solutions at people now, some of the recent examples I have is going back to customers and saying, you need to define what your requirements are and getting abused for it. – *David Stower, Technology Management*

Here is a root part of the conflict. The top down IT approach in conflict with the view that was common in the text amongst operators:

> The question is whether, if you go into high tech support, SAP is a good example in that, you go to a new system that takes you twice as long and twice as many people to maintain the system. So putting in new technology may not necessarily make life easier for, it might make life easier for the people who are on the end reading it all, but people who actually have to log it all in, it's not necessarily ... it may not necessarily be advantageous. – *S. O'Donnell, Contract Administrator*

Information sources are seen by operators as a requisite part of everyday work. Where as the large scale IT view standardises information and creates rigid processes as noted below by the general manager:

> As I said, I think our support mechanisms need to be radically re-jigged as they can have such impact. And the R3 upgrade in 2004 is a big part of that as it provides us with large potential to tap into technology to improve supply chain management. To that extent we have an R and D committee. So we have sort funds from which [organisation] may be willing to look at supply chains so we can work out what support mechanism should be but the ones that need to happen are we have an elementary information management and measurement system. R3 [SAP] will give us the capabilities at least to process that but it will not give us the measures so we need to have a TQM [total quality management] approach or backed up by activity based costing and measurement system and understand which is the variation and how to manage those. We also need to get a lot better at helping people free up the rigidities of the system, to be more creative and free up that creativity to come up with more ideas. I probably need to within that new creativity and new ideas is working our how to make it easier to bring forward errors, so we can use mistakes for learning rather than our rigid sort of nature. We hide ideas and mistakes rather than learn from them. Re-jig policies and controls there. Encourage a different mind set to encourage learning and improvement rather than risk avoidance. – *Bill Hunter, General Management*

The higher-level managers are aware of the need for whole of supply chain information systems although they may not necessarily know why. Other interviewees like the accounts manager explain that IT 'is critical' because it is so

central to how the firm runs. Yet when comparing that opinion with those that actually do the purchasing and ordering, it seems as though most of the product is informally ordered through fax machines. More specifically, the system further down the chain does not make much use of the scheduling and production systems put in place by management teams. When the team discovered this in the text, it highlighted some new interpretations of the problems of the supply chain, namely, that the usefulness of the technology was perceived differently at various levels of the chain. Moreover, the use of technology was not well understood by many, especially those operational day-to-day staff who use it to order the core product of the supply chain. Another 'middle management' staff member highlighted the concern:

> That's what I find mind boggling is that there are managers out there don't have the faintest about SAP and are at the whim of their admin people. They cannot audit their admin people on what they are doing exactly because they just don't have a clue about SAP they rely on their admin people totally. So their admin people can be plugging in the wrong numbers everywhere. – *Andrew Newbecker, Construction Engineer*

Compare this quote with that of a routine product supervisor whose responsibility it is to send and receive orders:

> Yeah, pretty black and white, yeah we just rely on faxes from the blokes in Brisbane. They'll fax us if they need us to send any to [product] to supervisors in Toowoomba or Cairns or whoever. *Technical staff*

5.4.3 Job Definitions

The third question interviewers asked to reveal conceptual frames related to defining workers' role in the context of the supply chain. What was being sought was some sense of managers feeling they were overseeing an entire supply chain system, motivating and directing it. However, most responses only revealed a very confused or local conception of their roles.

> My role is to liaise between each structure and workshops as far as the commercial and contractual and I suppose internal agreement deliveries side of the supply [chain]. I also deal a little with supply, but not a great deal. – *S. O'Donnell, Contracts Administrator*

> My role basically is to supply the operating units with all of the systems practices, procedures, and training methods that they need to make sure that the plant runs effectively, and if there are problems with the operations of the plant that are not necessarily because of people problems because the frontline operators look after the people. If it is to do with the way the process is running or something about the process or something about the product that they are having problems with or don't understand then they will ask my group to take part and try and solve the problems. So we are also part of the problem solving and then once the problem is solved not just to solve the problem as it happens at the time but then to give them some knowledge of what the problem was and give them procedures so they can over came that in the future. *Matthew Michaels, Production Manager*

> As far as my role is concerned my responsibility is basically to check the orders. And then try to [do] the best possible to meet the requirements of those orders. By liaising with the officer planning the rollings, plan the process through the [production] to make sure we have the product available. To load on the [product] trucks to send to the customers when those [product] trucks come up. – *John Roberts, Despatch Manager*

The language here betrays the operators as focused on their own work and a very limited scope of the surrounding workplace. There is very little understanding of the broader context or meaning in their roles:

> I consider myself very much a manager especially being down here; it is not seen from the powers that be as a manager's job in my experience in the … it is certainly a manager's job. There is a lot of responsibility which I take pride in saying that I can achieve ... yeah I consider myself a manager. – *Colin Germain, Supervisor*

> **(Interviewer)** Do you feel your role is clearly defined?

> **(Interviewee)** No. There would be a couple of reasons for that. The major reason is that we are an organisation of [long] heritage, and it has a traditional view of purchasing and the supply is all about buying in things. The world has moved on and we are all about supply chains, and managing the inbound logistics. That is a far more sophisticated task and I struggle trying to keep that role clearly. – *Bill Hunter General Manager*

Some operators also share the local conception and how they handle their information sources clearly indicates this:

> I am a project officer to track logistics and I have several commodities my manager assigns me and one is [the product], one is [partly] worn [product] and others. I am actually a commodity manager. My role is long term planning. I try to collate the information requested is for [product descriptions] in contract and

look at that as a basis what we go out to tender for. – *Samuel Smith, Project Officer (Supply Chain)*

My role is minuscule. I look after [the product] for [external supplier] to make sure that it's there [when requested]. – *John Lewis, Logistics Officer*

(Interviewer) Would you explain your role in the steel supply chain?

(Interviewee) Simply in the commodity strategy area of supply division so I am responsible for the purchasing most transactional contracts commodities within the supply division so I oversee the area that looks at contracts and purchase of [the product].

(Interviewer) Do you feel that your role is clearly defined?

(Interviewee) Yes.

(Interviewee) The role in the steel supply chain is as the manager of a group which is a significant consumer of steel. The steel is purchased on our behalf by a support group within [organisation] and the usage is managed predominantly through our construction team but also through our maintenance teams.

(Interviewer) The role is clearly defined do you think? **(Interviewee)**Is it clearly defined? I think it is clearly defined. – *Mark Rips, Contracts Administrator*

Although this quote above does not in particular highlight a local conceptualisation it does, however, highlight the confusion in the organisation about job descriptions. When thinking about local conceptions and confused job descriptions it becomes more obvious that a wide variety of people are not sure about what information they may need.

Two areas I get involved in. One is the contract valuation and the technical side of it. That only comes up every three – I don't know – six years was the last one. I'm trying to remember. Three plus three, three plus two and that's three years ago now. So whenever the contract comes up for renewal I get involved there. In the supply I supervise and write the specification, [product] specification, [which is] linked to the specification I do all the quality control issues relating to the supplying that's One Steel and also internal customer that's with the end user.

(Interviewer) Do you feel your role is clearly defined?

(Interviewee) If someone other then me came into the job, no, it is not there. – *Steve Marks, Operations Planning*

In this quote the relationship between confusion of role and local conceptualisation is made clearer. The operations planning specialist knows what his job description is, understands his role, but doesn't really understand his overall purpose. A couple of other examples highlight this condition:

> My role is very easy. It is to offload [product] from New South Wales wagons at [Place B] Reload them onto [the] wagons and dispatch material to [Place A] for welding into 110 m lengths. I also dispatch [product] direct to [organisational] customers. But on a very irregular basis. – *Frank Peretti, Manager Inventory*

> My role is to liaise between Infrastructure Services and Workshops as far as the commercial and contractual and, I suppose, internal agreement deliveries side of the [product] supply. I also deal a little with supply, but not a great deal. The most part I get from supply is an email to tell me how much [product] is available. My involvement usually comes when there is a failure at [Place A]. Or there is a failure to supply, or there is from supply [product] or there is a failure, or is a structure to pick up from ... from [Place A]. So I basically handle all those issues and any issues that are referred to me by the Operations Manager in workshops who is in charge of [Place A]. And that's basically what I do in a nutshell. So it's a lot of shuffling paper and solving problems. That's basically what it is. – *Simon O'Donnell, Contracts Administrator*

This second quote shows that the title of contract administrator is highly inadequate for this role and it does not clearly define what is done. Again the local conceptualisation of information needs is clearly seen as is the narrow focus of task and role description. There were many quotes like the above but the following quote summarises a general pattern found in the text:

> Okay, the collection of [product] requirements from TLM which I then feed through to the supplier because we are meant to update monthly our forward forecast. We can only update four months ahead of the time because that's how long it takes for their processes to happen. [The organisation] need to get the right mix of steel, the right of mix of product to manufacture the pig iron to go into the BOC plant to make the right type of billet, the size, shape, the product mix itself. It then requires a certain period of time to cool and has to be treated and otherwise it gets hydrogen cracking problems or gap problems including vertical [product] head. It's then rolled and then they have feed rolling times and manufacture the product. The head hardened [product] takes longer because of the extra processes involved there and four months later we have [product]. So the process takes four months to speed up or four months to slow down overall. Like if you see that certain projects aren't going to happen then put back, it takes four months to turn out the [product] that are required for that project. I don't get involved in what projects are going to happen. I'm just interested in quantity and type required. – *Steve Whittaker, Supply Storeperson.*

The interviewees consistently struggled to conceptualise their role, noted most obviously in the comments of the General Manager.

5.4.4 Works well and improvements

The fourth and last question asked to reveal respondents conceptual frame was what they thought worked well in Firm A and what improvements they would like see enacted.

> It is not uncommon for people to skirt around processes to get things done. – *Ed Steves, Logistics Officer*

> Perhaps it might be regarded as stepping on their circle ... people do protect their own little areas. [Place A] workshop is the same. – *S. O'Donnell, Contracts Administrator*

> But if you do not go and ring somebody and say it is important ... it may not happen and something critical may not happen ... That is where sometimes you need to short-circuit the system to get a good understanding of each other's requirements and not be pig headed. – *Samuel Smith, Project Officer*

The last quote shows a common thread that assumes workplace processes are almost designed not to work. Operators felt designing 'work arounds' was their job:

> I do not think there is a whole lot of thought goes on [in workplace design] so I think the space, and the way we set up the process impact adversely and it affects relationships because we make it hard for people to interact. For example, our obsession with security might make it harder to go to other buildings and interact with those people. Even though they may be close, legal service is a good example. On the same floor but to get in there inhibits my desire to go in there. And the legal component is important to this work they have set an environment that inhibits that random communication. – *B. Hunter, General Manager*

The 'work around' again is evident. The data above and below highlight the desire of workers to find ways around established practices because, according to operators, it's more efficient and effective. The following two quotes, both from operators, highlight this thinking:

> [I am] not particularly close to the action in a very comprehensive way. It's really overall Charles' responsibility and I think he does that very well. I only own a piece of that which is essentially the, I wouldn't call it a quality plan, but it's really that technical component of the production group. Essentially I look after the technology incentive through to the part that leaves the site. That

> means that the technical operators who work in the operations area have a dotted line of responsibility and a dotted line of responsibility to the operations manager. They have quality plans and quality groups that look after a range of products including [product] and so my involvement in terms of supply chain is ensuring that system is sufficiently robust and capable that we in fact deliver to you what we say we are going to deliver to you. – *Steve Goode, Network Access*

> The supply chain, in terms of landing the material into track, is not something I have delved into. I'm not in a position to provide an informed response to that to that question. That sort of, lots of other things that have been occupying my mind in the last couple of years. We are getting [the product] into the [market], so I haven't thought too deeply about it. I do have a sense though that there's lots of opportunity through more disciplined scheduling and programming of works within the, within the network to get a better utilisation of the logistics resources, the [product] sets, the people, and so forth. I've had a classic example recently where we had to shut down our welding plant out at [Place A] because we can't ship [the product] out of there onto site, because the earthworks haven't been, haven't been completed. So, [there is] very little evidence in risk and contingency planning and supply chain alternatives and so forth. – *Immanuel Stevens, Network Access*

Compare the comments from the operation level here with the following quote:

> Parts that work well? I think we've got our process well under scrutiny and well under control from the basis of production. We've got good forecasts from the capacity training processes. As a result of that we've got a good understanding of where we've got a capacity in the system and when those queries might materialise have been loaded. When asked we are able to work around those requirements pre production, and having some degree of inventory to get through those, through those runs. I guess the [product] transport system [is] relatively effective to all of us, together with other products we are moving around the country. We've got a pretty good arrangement with [Company A] at present who are moving all our products. – *Rod Mackay, Operations Planning.*

The dichotomy presented in the previous sections becomes more obvious, when considering that Rod Mackay is a direct supervisor of Immanuel Stevens, shown previously. The two different conceptions of what works well highlight two different views that would lead to different conceptions of what kind of information would be required. For example, the management team who think everything 'works well' rely on information they think is required from people who are working around the system. This produces confusion and poor interpretations of what kind of information is really needed. Two more managers support this confused view:

> I think at the moment it is generally fairly good. [We] have a good working relationship. I really cannot think of too much, I know there is issue with the

> short [product] as in the 12 and 13 m lengths as a result of the way [the product] is produced. We have a huge inventory holding at [Place C] and [Place B]. We need to concentrate on that and get improvements there. It is an issue at welding at [Place A], it has been an issue for years. If anything can be improved it is the reduction of shorts. Apart from that, maybe we need to look at simpler contracts. I think [our] relationships are good enough so you do not have volumes of contracts. Anything that can reduce the admin burden. It is all reduced time. Benefits to us and [others]. – *Kieran Bennet, Commodity Facilitator*

> Well I guess that one thing I just spoke about is really the visibility through the entire chain. From my point of view because my area of concern is when do wagons get there, when do they get there and when are they empty to come back again. Because I have actually, I can see we have service players from our line haul provider that I know that if well we know that delivery of their supply... It's then the execution of that plan and then the live carrying out of that plan I guess to say that it gets there and get it back again. So my view the cycle is not complete until it is back here again is what I'm looking for. – *Steve Goldsworthy, Transport Manager*

Other managers like the one below speak about feedback, but it is alarming to consider there does not appear to be any coming back from operators:

> Well, I think we get good feedback via marketing. We get a weekly report from our marketing group, a written report, and it is emailed to us. And that gives us some idea as to what's going on in the market. So we understand, they basically report on this is progress of the orders for so and so, these are problems that they are experiencing at the moment from those we can generally pick from those, look at it, decide is this a problem and they tell us. You know this is a major problem, this is a minor problem. This has been raised that is not really a concern at the moment. What we generally do then is we generally phone the people involved or I do, phone people like Charles or Steve and say, 'What can you tell us about this?' because, as you realise, in a written report, because it is a one-pager. A one-pager will give you a gist but it won't give you any detail behind it. At times we need more detail. I think that works reasonably well because those guys usually talk up fairly well with it. I think our own internal tracking of how we are producing and that is done by John who you just talked to ... I will give you an example. When we first started looking at producing one of your competitor's orders – it is quite a large ... and we were concerned that the section they actually ordered was the section that we don't roll much of. The problem with that was not that we couldn't roll the section was that we didn't have experience in rolling large volumes of it. *Matthew Michaels, Production Manager*

When asked what works well, higher level managers also revealed a local conceptualisation of the supply chain:

> You would take steel not by [product] but ship central to the network which would be Gladstone etc. You would locate the welder there. Once you allow a sea port of entry you may well not source it from Firm A ...Do you get your supplier to do more work for you. And rethink how Share the knowledge across the social system more rapidly and developing learning systems to get continuous improvement. We may also need more sophisticated information systems to help that to which would require some standard of how we define that chain and that all the parties understand that language. We could rapidly share information in real time. We have the social process, we have better information systems, more relevant and timely. And to make that work we would need better measurement systems and reform our IR, and our governance policies. Would involve sharing our information in a more open way than we do. We need to look at our rewards and recognition agreements which are inflexible and do not allow that rapidly deploying people across the chain. – *Bill Hunter, General Manager (Supply)*

These local conceptualisations operate at different levels and hence managers and operators have different perceptions of what information needs each section required. This dichotomy between operators and management gives the impression that the team is not engaged with each other. Operators are engaged in their own area of interest, but do not consider what is going on outside them. This local conceptualisation prevented the successful implementation of SAP, because data was being defined differently over the various sections. There was a real lack of a corporate data structure (for example). The awareness levels were raised and actions taken and therefore a follow-up study was conducted to see if much had been done to get more engagement between managers and operators.

5.4.5 Follow up study

After the initial study revealed the senior managers conceptual frame of IT driven change was in conflict with the operators local and interpersonal frame, there was some thought given how to combat these mismatched perceptions and understandings. Eighteen months after the first round of interviews, more interviews were conducted to see what had changed. In particular, if and how participants' conceptual frames had changed. It was found that some changed had occurred. The talk now was of data modelling to appreciate operators' information needs.

The first interviewee was the general manager who, as shown earlier in this chapter, was operating under the conceptual frame that the SAP project would provide an IT driven culture change. The following quote shows a change of heart:

> We don't have a process management methodology so we don't really understand our business processes or the bits that add value. Therefore we don't have ... nor do we have standard data models, we don't have a corporate data model, we don't have data referencing. So even if we talk to each other, long before we get to talk to each other we don't even know what our units of measure aren't same and neither our language around the same [concepts]. ... our inventory is blowing out because of a language issue ... so before we go anywhere in communication, we've got a couple of key issues, that we need to sort out structurally as a corporation and then we may [overcome] these problems but we have a structure that's creating conflict. A large part of that is if you look at the IT revolution we focus on hardware, then software but the real issue is corporate or master data model, we never go there. We're obsessed with the technology. That is one problem and the other one is we don't have process maps, macro process maps of our value adding streams. We still struggle to know what business we are in and what processes deliver value. So what we've got is a whole series of functional [silos] working along in some unconscious way where they still create value where they don't know how they do it and therefore we cannot agree on what is the big picture we are all working towards ... what are our agendas? So we miscommunicate on that level because we can't have a higher order to work towards. Also, apart from data referencing we don't have an agreement on what we should measure in those [processes] or how we should measure it. *Bill Hunter, General Manager (Supply)*

The general manager here shows a change of heart from his original position of SAP hardware and software providing an improved supply chain management system simply by it implementation. What follows are some key things he has learned about SAP:

> Well SAP, focuses on those three levels of technology, the hardware, the software, and the ... data modelling. This organisation has been abysmal and given a lot of power to the information services people and [when this happens] you drive things from the information technology perspective. They have all the language that says they are not but in reality they drive things around simplifying things for technological [instead of social] purposes ... As for SAP it's only a tool. ... We keep focusing on SAP and focusing on the technology I think the issue is more that we need to get a process management approach, define our processes and define the data needs of those processes. Then the technology will always change. So I think a lot of the confusion around SAP is that the technology is driving us rather than ... we start trying to build our [social] systems into that reality rather than the other things. ... So it's not about the technology it's about poor management practices and trying to decide what are the rules by which we sort out what is data and we don't need to go get any technology to do that. There is also a problem with SAP in that we have had a lot of problems with data warehousing. Now I

> don't fully understand this and this is where we are fully reliant of technologists. SAP is not a true data warehouse, it's a series of modules and you have all these complex issues about transferring things and we can't do that. Therefore it probably has severe limitations as a system. *Bill Hunter, General Manager.*

It can be seen that the general manager here has changed his perspective regarding an SAP driven change, he now outlines organisational history and culture as needing to be understood. He makes reference to "macro-processes" and process maps. The following quote highlights a changed perspective:

> We have always done a QA [quality assurance] thing and or how SAP did it which is thousands of hickedly pickedly processes and joined them up. Nobody knows what the macro level process are which is one of the reasons why SAP can't realise its potential. Which is not a SAP problem but it may not be able to do it anyway and it certainly creates modules for different things and pretends it wants to connect in ways they don't. So it doesn't have the capability but that aside there is no reason why we shouldn't have mapped our macro processes to see how wealth is created from the customer. *Bill Hunter, General Manager.*

When asked what could help the general manager replied with:

> To have better intellectual workers to help design better decision support type parameters built on the principles of lean manufacturing, logistics and process control and of course the data referencing ... we could then put our decision models over the top of those. *Bill Hunter, General Manager.*

The general manager also expressed the desire to hire more operators with "systems thinking" point of view, something more inclusive of the needs of all the elements in the supply chain system. This changed perspective led Firm A to hire a business process manager, Michelle Rotolone, to investigate the way the business worked from a systems thinking perspective and to see what could be done to create a better working process at the firm. In her role, Michelle had to consult with key process owners and build a corporate process map. Michelle's role in improving the business of firm A will be explored. In particular, her role was designed to improve the engagement between managerial, technical and other staff.

> I do get phone calls from all over the organisation in regards to business process modelling, business process analysis, like risk assessment ... my role is in a little bit of a transition phase because originally it's been very much QA compliance driven and it's involved into business improvement ... to business process management.

And:

> We've got a software tool that can automate processes we haven't used in the past two years because we don't have one single process in the organisation that we could automate. Our own process thinking is not there to use systems. It's got to do with culture and it's got to do with a lot of things. I mean if someone says I won't type an X here into this system because I am not a data entry person and if that person what actually type in X you wouldn't have to bandaid the whole system or the whole process that's what we are dealing with, so and if even if you point it out and say lets get these people to print out or type in X because that what we need in there it's not being pushed forward by management or being supported so that's it. It's the same with SAP R/3 I mean, it has now been put in ... into [Firm A] but I know areas that are already developing there own little systems and spreadsheets around it because SAP R/3 is not giving them what they want and the way they want it. So, that's cultural ... It happens everywhere in a lot of organisations, we are not the only ones, its human nature, I am not comfortable with doing it this way so it's like I want it done this way. *Michelle Rotolone, Process Manager*

We see here the process manager highlighting the concern of culture or traditional ways of working. After spending time trying to understand the processes the business process manager explains the frustration with a lack of real progress despite spending time with employees across a broad section of the organisation. However, they are now at least beginning to appreciate each other's problems.

> We have to be very smart how we question people to get the information we want. You know you have people who really want to get into the detail and people who want to fluff around in the strategic area and not really get down to what the real issue is? So you have to become very smart in how you ask your questions so that you get the information at the end of the day you need to do your maps, your models. ...And that capability at this point in time we don't have many who are able to facilitate a group of people through to get the information they then need. To do the scenario [process] modelling. And you can't design a process on that broad objective so you have to have a very good understanding of what is meant or what the definition is of that objective. To get exactly that out of people is [difficult]. The objectives are being made up by twelve people and maybe everyone of these twelve people has a slightly different idea of that objective so you have to find out what they mean by it and therefore find the commonality and agree on that commonality on what they think that objective is for you to find out what process would give you the information for that objective. *Michelle Rotolone, Process Manager*

As an example, the process manager hints at the confusion of what is meant by strategic objectives. On the operational side the process manager indicated how much easier it was to understand:

> I have found that the operational ones are the easiest ones because people basically sit behind their PC and say that's how I do it. Then you can actually see how they do it. So you are right there and you get the information while they are doing it. So to improve something where you can actually see how it's done or to map that is much easier then mapping the concepts up the top, how they all fit and then move through the tactical areas through to the operational area where its being done. ... to think that back to the overall process, like how does this add value, is hard because what is the overall process to get that information [has been] pretty hard because then you are already starting to move into the tactical area. We just don't have the capability in house to do that and I don't know whether we have it outside either. We are struggling with this. *Michelle Rotolone, Process Manager*

These quotes show that operations managers are now understanding their work locally but also beginning to understand the global information needs. Consider the following quote:

> If we would have the overall direction ... basically the statement of where we are heading and this is what business process management is and there is a clear definition of role. And to say that this person is responsible to produce this architecture and if this was recognised and there is a solid governance structure behind that ... it would work. The concept has to be defined. We are still working in silos and now we are saying that we are going to work at processes you will still have your process management but you will still have your functional management. I don't know if they don't understand it or they don't want to understand it. *Michelle Rotolone, Process Manager*

The business process manager's frame, of the situation, shows that he now thinks there is a systemic problem in the organisation of identifying the strategic purposes of the organisation. This is highlighted specifically about information and data needs below:

> The system has been signed off, the process standard has been signed off in which we are modelling, but we still have everyone else using other systems and other standards, it doesn't mean anything to them. This is frustrating but I do have a fairly good support network so I don't just rely on what [Firm A] does. It does now and then frustrate you because I mean ... especially when they come back six months later and there is a mess. Then they say we now have to do this and I say this is only going to be a bandaid why aren't you finally at the whole lot and [they say] well we don't have time we now have to fix the mess. We have become so reactive that we are chasing our tail constantly and you will never actually have the time to look at the whole lot.

> You are [expected] to meet external expectation [from members of parliament] which are made pretty strong in respect to consequences if you don't do it so then you just [react and] start bandaiding. And next month when you have bandaided this one you are definitely going to have to bandaid the next one. *Michelle Rotolone*

From these final quotes above we can see that the process manager has had a hard time tying the objectives of the organisation to the actual processes at work in the organisation. But due to a change in conceptual frame she is at least trying. She has had a difficult time gaining clear strategies from senior management that can be made in process management terms. It can also be clearly seen here what the business process manager sees as the problem. The re-engagement of the parties, despite the presence of a business process manager, has a long way to go yet. Dave Freeman, a hired consultant for optimising the supply chain inventory processes said it this way:

> Everything we do in supply is either adding cost or removing cost or value to the end customer. ... We have rework to do here and there is a cost for rework the end customer ends up paying for that. So rework, is one of the forms of waste buying more materials than you need is waste, not looking after materials and write offs is waste. If people can understand what all these wastes are how they are actually a part of the cost structure impacts on the end customers then we can get that consciousness as well as the visibility of all the processes and tie them together I think we will get far greater efficiencies and far greater productivity. *Dave Freeman, Consultant*

From this perspective it is clear that the process to reengage management and operators is a matter of consciousness. The same consultant also said the following about operational workers:

> We had one hundred thousand materials in SAP we tried to reduce that number, the business group bucked because they said we might need those materials in a year or we might need them in three years time or whatever. The outcome of our project over the last three years is that we have reduced that material to sixty thousand and we will get that down another twenty thousand over the next couple of years. How did we do that? We did that by working with them, convincing them and helping them to understand that they didn't need to keep them in the system. That we would give them a twenty-four hour turnaround to create any new material they needed for their business. Because they believed us and trusted us that's how we did it, it was the power of the relationships. *Dave Freeman, Consultant*

Despite these kinds of successes at the firm there are still major operational problems that aren't being addressed. What follows are some comments about the nature of the changes from the perspective of an operational worker Graham Pearce:

> I don't think anybody understands anything about anyone's jobs.

Further:

> If our culture was such that we had the rigour to actually populate [SAP] with the information and the data and the insights we need then it might work. Culturally I don't think we are in a position to do that because it's a task that's far removed from the here and now ... [culturally] it's not seen as important now ... If people could understand the reason for doing that it could be linked back to improving our service. But, people think it's got no relevance to me because someone else uses that and they are doing something else with it. ... SAP is inhibitive for that [cultural problems] as a technology it's not well accepted [because] people want their own IT tool, we only use SAP because of its prehistory and where it is at the moment. From a technology point of view how can you move through that [cultural] barrier? Even if you did and you had a technology that someone was really comfortable with then there is still something someone has to do to that to capture it [culturally speaking]. It would probably be done by the seductiveness of it by making it part of someone's work, so maybe it's not just a technical issue, there are hearts and minds that need to be captured. It's not that we are reactive or anything like that it's how we see things like SAP. *G. Pearce, Technical Services.*

Even though people like Dave Freeman were hired to bring about improvements through facilitation and training it appears as though there still needs to be a bigger consideration of conceptual frames held by operators about SAP. What is occurring is a shift in perspective, in this case, from that of an IT change frame to that of a conceptual frame about understand personal information needs. During these interviews several respondents now spoke of the need for a corporate data structure, something not mentioned in the first set of interviews:

> Our struggles with the concept of master data is that I doesn't understand it that well. We've raised a few papers about master data [a corporate data model based approach to] management but it never really gets anywhere because when it comes to paying, the cost of master data systems are quite significant but when it comes to the maintenance of it and if you've got a business which is trying to look at the next amount of dollars of savings it is very hard to put that into tangible terms, to get that to the investors with mustard or whatever. It is fairly critical. I suppose the best examples is when you look at Firm A, we have civil engineers that will come along and develop

> maps of stations and give you the location name and they might have an infrastructure and they run the [product]way past here and when we put it into the ERP system you may have 10 different areas when you think you are all using the same location but nowhere is that one location consistent with Firm A. No-one ever checks this person or that person and they simply get focused on what their they're doing, putting in this dimension saying this is the way it's going to be and you have other people say they can do it their own way and you struggle to get consistency.
>
> **Interviewer:** Maybe conventions apply across the entire organisation?
>
> **Interviewee:** Yes but the trouble is that whoever is putting these conventions in is not sticking to it and it is very hard to put it in place and then stick to it.
>
> **Interviewer:** Is that a bit of a cultural thing?
>
> **Interviewee:** Yes it is. There are a whole system of issues. I think the culture is very slow to adopt and slow to change and we tend to not change. I see the problem is that our IT areas manage the asset on behalf of QR and that they are not really managing the asset and its health and well-being. They are just making it operationally run better and it is also with some of the harder and intangible stuff that they should take ownership for. *M. Bicknell, Business Solutions Manager.*

In this case the problem is now being socially constructed. That there is no consistent data structure across the organisation is linked to being a cultural problem. Other managers and operators make similar points:

> I think you need to understand the system to make a judgment and a lot of people say it's crap but they don't understand the system. There is a lot of drama I believe even though it was a project that was bought in on time and on budget from an operational point of view and it was a very scary thing to do. I believe that a lot of people within Firm A from a culture point of view had just gotten used to R2 [an older version of SAP], which was a big trauma on them, and now we are asking them to flick another page and learn a new one and it takes a lot for Firm A as an organization to say that the expectations have changed. ... There is a mentality of saying that it is not my fault, in this organization. I think you need to say, hold on, it's not my fault and I understand that but how can I make it better. And you make it better by trying to understand the tools that you have and if you do that and there is still a problem then that you have to look at other strategies but at this stage I have all of the tools. *J. Napoliti, Inventory.*

> When we cut across to R3 [new version of SAP] and we no longer had the corporate data warehouse it was like you couldn't walk or talk. Where do I get the data from? Now what people did not clearly understand was that SAP R3 has more flexibility than R2 used to. For our to get data out of there and manipulate it was difficult. With R3 you can get data dumps going straight into Excel so it is far more user-friendly as far as getting data out. The reports in there are far more user-friendly as well. In R2 you might have had to run one or two reports but now R3 would probably give you that report in one. What actually happened was that it forced all of us to learn what R3 could do because we didn't have corporate data warehouse, because it hadn't come along yet and when it did come along there was a series of problems. In the meantime we have had to look for alternative reports and we did the R3, rolled up the sleeves and learned how to use it more effectively. Now that we have done that, you get used to it. So it is not a one-step process but in many ways, because you are using SAP R3 and you know you are getting source data, quite often using other programs such as business warehouse or corporate data warehouse there will be anomalies between what SAP R2 and SAP R3 would give you. You would be looking for reasons why discrepancy occurred. When you work directly with SAPR3 data, you remove that discrepancy element. *F. Nosamento. Operational Worker.*

When asked about the kind of information needs required, this person as an operator, gave a different response compared to earlier:

> The corporate system of recording inventory and anyone recording inventory should be using SAP so that is our holy grail of data. If they are not then we do not have visibility of it which means that if they have a piece of inventory in the grass or behind the door we won't see it, we don't know anything about it, and the only people who do know about it are the ones that walk past it. so even if you had other systems, you wouldn't see them if the guys weren't loading the data into the systems.
>
> **Interviewer:** Do you think that problem is cultural?
>
> **Interviewee:** Yes for sure. I haven't been out walking the track so I don't know. I haven't seen stuff hiding in the grass. You hear stories or rumours that there is but there is no doubt that there are some forgotten things, some legitimate forgotten inventory and perhaps there are some others in under the counter, just in case. I don't think there is anything out there that they are keeping to themselves because they want to make a dollar from it. It is stuff that may be difficult to get and they want us to throw out but they hang onto it just in case or just keep a few under the counter just in case. Those ones, you will never see on the system but the people who know about them are the ones that have them. *F. Nosamento. Operational Worker.*

The needs of the operators are bought to the front of the discussion. In the following example it is suggested that SAP doesn't meet these needs:

> If our culture was such that we had to or could actually populate [SAP] with the information and the insights that we do, culturally I don't think we are in a position to do that because it is just another task away from the here and now. It is not what's important now. Because of my assessment it would have to be, that people would understand the reasons why we are doing that and that comes back to improving our service but it has no relevance to me because someone else is using that. ... on one hand SAP is an inhibitor for that sort of thing. As a technology it is not well accepted because of its previous history and its demand and you can't move through that barrier. Even if you did and we had a technology that we were somewhat comfortable with then it is still another effort that somebody needs to do and it would be a matter of the seductiveness of getting somebody to do that rather than about the task. But there are mindsets so you have two issues. It is not just reactive and how we see things like that. To be frank it is one thing that I need to explore in more detail of what is available in SAP but I do have a gut feeling that a lot of things don't even make it in to SAP because it is local knowledge. *M. Flanigan, Commodities.*

When the conceptual frame shifted from the IT driven change to comprehending the information needs of the group a solution began to emerge:

> I suppose we are now producing so many good reports with such good information, the biggest problem now is how best to utilise that information on a regular basis to move forward with the data that they are providing. As I said there is a lot of good data, producing a lot of good reports, but probably what we are not doing at the moment is saying okay this lot of reports should be regularly reviewed and make certain actions and decisions based on that data. As we have just started with those sorts of reports its more just a flood of data at the moment but not a lot of action as to where that data is going to lead us and what we are going to do with the data so we just need to formalise like an action plan based on that data which we will be moving towards in the next couple of weeks and I think that that will provide some good outcomes for supply and Firm A. *M. Flanigan, Commodities.*

The information need of the organisation is one that is constantly changing. As an earlier quote said, the use of information on the ground was considered "local knowledge". Here we see another example of local knowledge that is poorly defined. The reports spoken of do not match what the data needs the organisation require. The process manager shares her view about the nature of the problem from a process management perspective:

Interviewer: So you have a lot of workarounds with that sort of thing?

Interviewee: Constantly and with SAP R3 into Firm A, but I know areas which are already developing their own spreadsheets and systems because SAP R3 is not giving them what they need and that's cultural. *M. Rotolone, Business Process Manager.*

When speaking of information needs she mentions:

Yes and we have to be very smart in how we question people to get the information we need. You have people who really want to get into detail and some who just want a flutter around in the strategic area but neither will get down to what the issue is. I have seen how people become very smart in how they answer questions. There is lots of work that we've done with strategic planning work, and objectives are being set. But you can't design a process on that broad objective. You have to have a very good understanding of what is meant by the definition of the objective is and to get exactly that out of people and consistency because these objectives are being made up by talking to people and maybe every one of these people have a slightly different idea of these objectives. You then have to find out what these people actually mean by it and find the commonality and agree on it. *Michelle Rotolone, Business Process Manager.*

Another operator highlights the problem of information needs:

One of my biggest problems with technology is that the expertise that we employ ... The technology is fine but people seem to replace technology with a process instead of a process. Technology shouldn't do anything for you, it should just make something existing easier and that should really be the last of our worry sort of things. You shouldn't look to technology to solve problems. We should have a clear process to work something out and hey if technology can come along and make that easier then that's great. But its quite fashionable at the moment to say that we will do that through BBP, EBP or ERP or whatever we want to call it at the moment, that's an internet purchasing thing, but that actual process I feel sometimes doesn't get mulled through fully enough before we say hey were going to do that electronically. ... An old G.M. of mine used to say, if you can't put that in to one page then its far too complicated. You can have supporting documentation obviously but to get that crystal view of what is happening and then go with the technology. *G. Lawson, Commodities Manager.*

Further specifically relating to information:

> An information base if we look at our spend perspective and try and work out our requirements, the information we are limited to is now trying to find information through our SAP system which I probably should know how to work a lot better than I do but not many people seem to be able to work on it really well. This gives out some incredibly sketchy figures, which then go back to the business groups, and we say can you confirm or deny talk to me about this...Generally speaking, usually most of the information we need is often there, certainly for what happens within Firm A. It's a matter of extracting it easily or having staff that understand or know how to get it out of SAP, is a challenge. Most of the things we need to know about because SAP usually forms the basis of most things that we do in the procurement function. Most of the time that information is there but it is really being able to easily access it which is the problem sometimes ... if you know it then you probably could find it and bring it up on the screen but if you want to pull a large quantity of that out into an Excel spreadsheet and analyse or cut and dissect in different ways, that is sometimes a little bit more difficult. Now we are slowly understanding SAP more and being able to do that a bit better than we were in the past. *G. Lawson, Commodities Manager.*

Some other examples of various information needs are shown below:

> Certainly we've pulled data out of SAP and put it into Access databases or Excel spreadsheets to do various manipulations so to that extent yes we are doing that but I don't see them as feral systems. I see those as different reporting tools. At the other end of the equation there are a number of customers who are doing their planning outside of SAP so there is no visibility for the organization because their planning exists in Excel spreadsheets or access databases and isn't rolling up into any corporate plan so that does create a problem. *H. Callaghan, Supply Chain Officer*

Although this shows more evidence of the problem it also shows that operators are working on building their own data from SAP. The following from a business improvement officer shows that a solution is beginning to emerge:

> I think if we can provide ourselves with better reports for people in the field, they can do their planning better. For example, they can get a lot better historical expense reports and therefore improve their planning things like lead-time. At the moment we run a host of reports to build the lead-time report and it takes a good deal of time to pull all of the data out to compile this report. The people in the field can use this report to get a historical look at what their lead times are from vendor's, from order to delivery and then they can see how long it takes from order to delivery and then they can set that in their master data and obviously improve their planning processes. If a guy in the field could run that report themself, it would be more beneficial but at the moment we do write it for them and put it on the Internet but it takes a bit of mucking around to get it out. Yes I think it would improve things like open order reports. We can't run an open order report because you run it in SAP

> and unless you restrict it by document dates it falls over and times out. *Mike Suthers, Business Improvement Officer.*

A solution appeared to emerge in this interchange because it became obvious that a majority of the respondents in the second follow-up study were calling for better structured data models and reports. From a systemic point of view this calls for a better "master data" of "corporate data structure". By changing the focus from the tool (SAP) to the social importance of the information required a different perspective emerged as a meaningful solution. The general manager notes:

> We don't have a process management methodology so we don't really understand our business processes, all the bits that add value. Nor do we have standard entered data or a corporate data model or data referencing so long before we can talk to each other we don't know what our units of measure are and if they are the same. We have a couple of key issues that we need to sort out structurally as a corporation. We might still have communication problems but the real issue to me is master data or the corporate data model. We are obsessed with the technology and we don't have processes... The root cause is our poor management processes and we try to sort out what the rules are for data but we don't need any new technology... [Big] organisations have cracked the master data issues and they are a lot closer to solving the process [issues it] seems and they have taken the power unwittingly away [from Information Technologists]. I think it is our own weakness and fascination with technology and if we were to give in to the technology, [ours] is a unique industry so I don't think it's particularly wise to take a pre-packaged solution of the one size fits all approach. *Bill Hunter, General Manager.*

When that is compared with the comments made in the earlier parts of this chapter the change in frame from the IT driven change to information needs (structuring and modelling) a solution becomes clearer. In the beginning of the project, it seemed obvious to senior managers that the ERP was the solution to the problem. Ultimately, when the frame changed to information needs the real issues of process management begin to emerge. For one further example, consider the general managers quote above with what was originally expected from the SAP project.

> I think our support mechanisms need to be radically re-jigged as they can have such impact. And the R3 upgrade in 2004 is a big part of that as it provides us with large potential to tap into technology to improve supply chain management. *Bill Hunter, General Management*

This changed to:

> The whole information technology movement robbed us because SAP R3 is a data system and not an information system. We need to rename data. The information is that which I can make decisions from. I can use particular types of technology as a repository of information but it is something that is created by people and not processes. *Bill Hunter, General Management.*

Others agree that the SAP IT driven frame did not give the team leaders the mental models they needed to do their jobs in an efficient manner as shown earlier. Some more examples from the text include:

> It is rubbish and I can show you reports down there where we have corporate contracts in place so we are buying the material from the one vendor, and that material may be stopped at eight different plants with eight different lead times. So one may be three days and another one may be thirty days. So stuff is either turning up really late or really early. Either way it is bad for inventory and that is just a basic lead-time. It is only one aspect of the entire thing and the cataloguing guys would probably tell you some amazing stories as well so somebody needs to get in there and improve our master data and improve our planning. It's a big job so I agree with [Bicknell] about the master data. *M. Benetar Commodities Facilitator.*

The respondent was asked why the master data structuring and modelling was so important:

> It costs us a lot of money whereas services problems are more of a financial risk but its not going to stop [product] running but it opens you up for fraud and can affect the bottom line. An example is some guys who authorise jobs using their memory while sitting at the pub drinking beer. Services are one of my pet things and I do agree with [Bicknell] about the master data being critical. Our supply agreements, there are a lot of problems with them; I also call them master data, which cause a lot of rework and invoices to be blocked. We have a high volume low value contracts with people like stationery and hardware, and we are spending a lot of man hours in rework for low value items, so we set up an automated process but because the agreements weren't set up properly, it has generated a hell of a lot of rework so it has taken the people away from doing more valuable things and created more expense and that was a combination of master data and supply agreements. *M. Benetar Commodities Facilitator.*

The business process manager concurs with this thinking and highlights the lack of process thinking at Firm A.

> I don't just rely on what QR does in respect to business process management. It does now and then frustrate you because especially when they come back six months later when they really have a mess and say we now have to do this and you know that it's only going to be a band-did but we don't have time to fix it properly. You become so reactive that you are constantly chasing your tail and you never actually have the time to look at the whole lot because you already then have to meet external expectations which may be pretty strong in respect to consequences if you don't do it. And then you just start mandating and next month once you band-aided this one, you are going to have to band-aid the next one. It is more proactive than others because at least management has identified that they are really know who is doing what so I want to have that picture so that management is realising that if they understand what is currently happening they can actually start looking at improving and changing it. But at this stage they don't even know that and we do have a level of arrogance where people think that they know how it functions but they don't. *Michelle Rotolone, Business Process Manager.*

In this later commentary, the process manager highlights the organisation's systemic difficulty in defining itself. In this we can see the earlier issue of job definition highlighting the broader systemic "process" redesign issue. That is, the processes in the organisation are poorly defined and this led to the idea that SAP, known for its optimisation role within organisations, was seen to be the solution. This conceptual frame created the idea that the process issue would solve itself but instead the issue of what information is required, from the corporate level, to do the job has now taken the focus. By looking at the problem through the frame of information needs or what information the workers at various levels require; the problem becomes a process issue. The above quote from the process manager suggests that people don't know what information they need because they do not understand their roles. Each level of the organisation operates under the assumptions of "local knowledge" (mentioned earlier) and therefore creates information needs on this basis. When the conceptual frame of the IT driven change is used the social element of information sharing, local knowledge, job definitions and roles are not considered because the focus is a technically biased view.

On the other hand when looking at the problem through the context of information needs both the role of the system and the *need* for information to work become clearer. This conceptual frame shows that feral systems were created due to a local conception or local knowledge of one's work environment in which a big system like SAP didn't fit. When considering the information needs of the group the core

problems of the whole supply chain become clearer: it's poorly defined, contains loose connections of localised conceptions and knowledge, no clear definitions of job roles, as a process is effective but very inefficient, a complex connection of processes, communication occurs locally and a host of related issues. When looking at the problem through the SAP IT frame of reference, these issues are not clear, but when considering the social context of information and its requirements across the processes of the organisations these core issues standout. By understanding this social context, the broader process implications can be studied and hopefully improvement for the welfare of the organisation, its customers and employees. Highlighting this change of frame is the general manager:

> ...[We need] systems thinking skills instead of functional excellence looking at trade-offs in a range of variables across a macro process. The other one is to get those interfaces that make people want to use them because they are so easy. *Bill Hunter, General Management.*

In concluding this section it becomes important to note that Firm A are well aware from a systemic view, at least for now, what they need to do in order to (dis)solve the problem. Instead of focusing on IT hardware solutions like SAP, they need to structure data and create clear concise roles through the length of the supply chain. A corporate data structure, despite its variability and possible inconsistency, is required. A solution has emerged when considering the systemic problem Firm A has with inconsistent master data modelling, ill-defined processes and poorly structured strategic objectives. Although these quotes in the follow-up study show some progress has been made in their thinking, it still remains to be seen if anything further will actually be done.

5.4.6 Firm A case conclusion

As was done for the IGC case, it is possible to broadly interpret this case using the engagement model and constitutive rules.

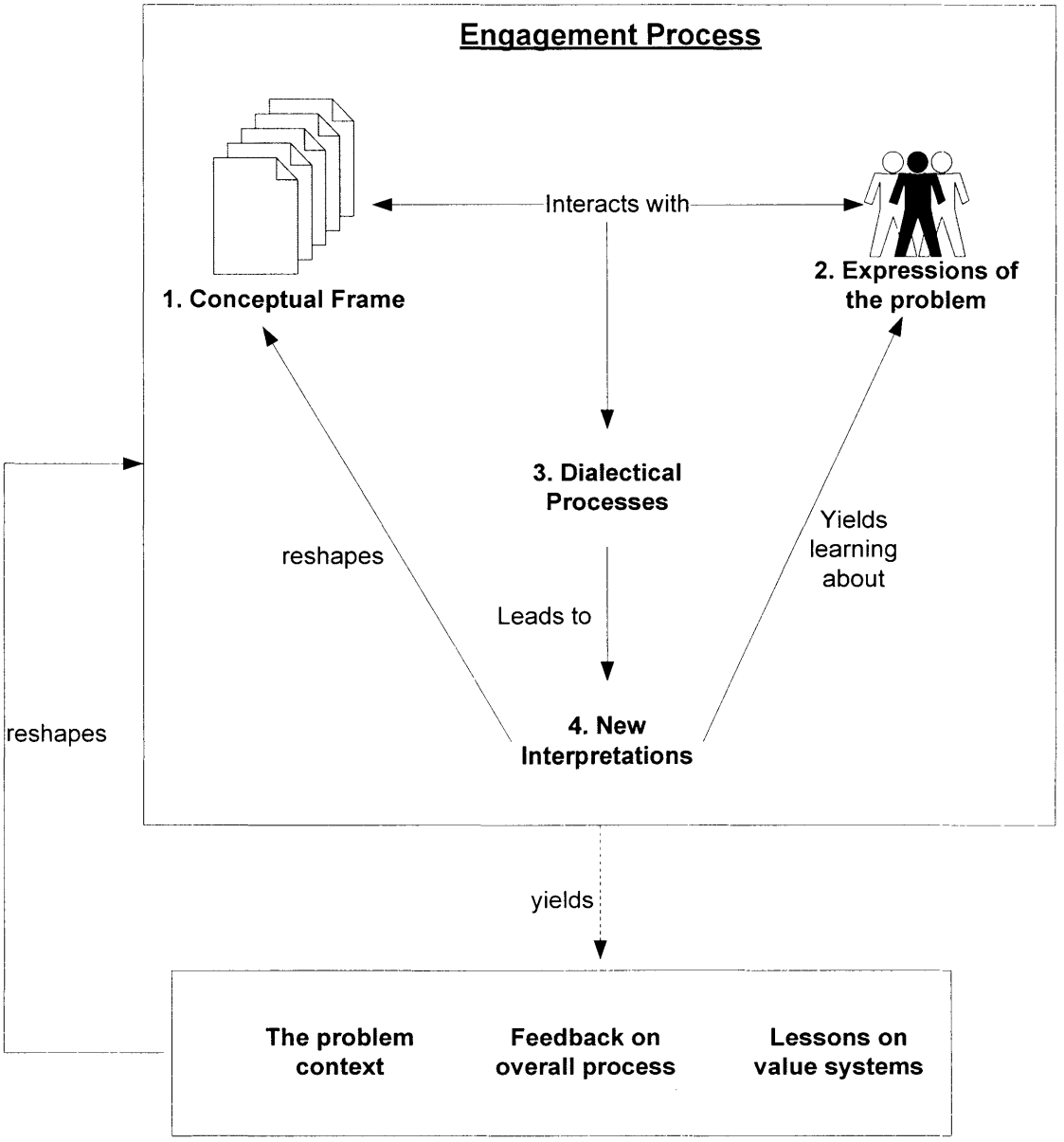

Figure 7 Engagement model reprise

1. **You must recognise social reality as being consisted of perspectives that change, evolve, conflict and diverge.**

The initial 'SAP IT' frame might be expressed as 'if we install the hardware, then when they enter everything they do on the computer we will have knowledge and control along the internal supply chain'. This frame assumes change is achieved through automating procedures. The 'SAP IT' conceptual frame provided particular interpretations of what the problems were and how to solve them.

2. **You must be conscious that action taken in a situation is the result of these perspectives and tensions emerge when actor/stakeholder perspectives conflict**

So initially the SAP IT frame suggested to the management that the problem was that operators were not using the technology properly, including building feral systems. The solution was more training and threats. The training and threats did not seem to be working, tensions – dialectic – between the operators and the managers emerged. Genuine appreciation for the operator's perspective seems to have eventually led the managers to reshape their understanding of the environment.

3. **You must recognise that tensions have to be dissolved through the use of new interpretations (perspective shifting)**

Managers reshaped their conceptual frame to a more 'social', inclusive or multiple frames view that tries to see the problem from the operator's conceptual frame. The learning of the management staff is evident as serious reflection can be seen on the use of the SAP system. They obviously did not mind the technology per se, but were not using the imposed SAP. This frame sees control as understanding the problems of the operators.

4. **You must recognise that new interpretations will reframe the problem context and yield different courses of action and learning**

The managers realise that the problem is with understanding what information a good operator requires (data modelling) and to ask whether the SAP can provide that information. This experience (hopefully) will provide meta-learning for managers to see new systems in terms of all stakeholders instead of framing it from a process centred 'management' frame of reference.

5.4.7 Limitations of this study

There is not a lot of evidence of managers explicitly saying 'we need a new conceptual frame to solve this problem'. However, perhaps as a result of talking to operators with some respect for their situation, the shift in frames does seem to have been made. In terms of Ackoff's systems, the shift has been made from the

management SAP system to the alternative 'system' of operators' and managers' information needs being met in the same space. The idea of a master data model would bring consistency and relevance to the supply chain, but it would need solid support from well thought out strategic objectives. As a side note, Firm A have now hired permanent people to work on making this conceptual frame a reality.

5.5 Summary

In this chapter, the empirical evidence was presented by exploring two cases in which the engagement model was applied. Some key lessons were learned in this case study. The first case study highlighted how an external event moved the conceptual frame of IGC manager John Beard from 'needing' more money to using leverage such as 'celebrity' for example to gain more support. In turn this showed that problem is not just about getting more information or operating in bounded rationality. It is also about recognising new interpretations of problems as dissolving the conditions which caused the mess to exist in the first place. In summary, the case provides many interesting insights about problem solving. In particular:

- John Beard's engagement with the problem was based on an 'information' conceptual frame but shifted with the occurrence of an external event
- The tension of having to make more money was dissolved by the new interpretation
- Problem solving is about finding a new interpretation as in Salvadore's case it gave rise to new 'ways of seeing' that in turn helped find a way forward in the situation

Firm A's case showed that local conceptualisations of work, role description provided a limited frame of reference to interpret problems. The managers were focusing on strategic matters without having an understanding of operators needs. This is clearly evidenced by the implementation of a SAP system that was designed to enhance processes through engineering information technology. In particular both parties were split along a cultural divide and problems were identified and interpreted in a similar matter. In summary:

- The original view was centred on a engineering perspective

- The initial frame began to change when exposed to more perspectives. Managers learned through understanding the broader effects of SAP
- Key assumption was changed is achieved through automated technology
- Tensions were evident in the transcripts between the operators view and managers view
- Managers view was 'reshaped' through learning and reflection on multiple interpretations of the problem
- There was a change of frame from a technical solution to a social one and the need for a better data modelling solution emerged
- The end result shows, at least preliminarily, that perspective shifting opens up the channel for more discussion and hence better interpretations of problems

The following chapter will take these lessons and revisit the research questions to make conclusions for this research.