Making Sense of Wicked Projects

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Key words: Project Management, sustainability, wicked problems, soft systems methodology.

SUMMARY

Standard and accepted approaches to project management are based upon the assumption that a set of defined processes and tools will provide reliable and useful guidelines for most projects, most of the time. However project environments are becoming increasingly complex and chaotic, in which case standard approaches will not be adequate. Projects associated with spatial information, land management and sustainability are no exception. Where there are projects with behavioural complexity there will be wicked problems that cannot be solved – only contained – resulting in wicked projects.

This paper examines the challenge of how best to respond to the problem of managing wicked projects. It argues that the use of a systems thinking approach – soft systems methodology – will support collaboration for shared understanding and collective learning. A model has been developed to support this proposition and is applied to systems thinking case study of a sustainable construction project.

The approach described in this paper is recommended as a useful way for dealing effectively with wicked problems in complex projects.

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1. INTRODUCTION

In the last decade there has been a growing awareness that the group of ill-defined and complex problem sets – described by Rittel and Webber (1973, 1984) as wicked problems – cannot not be solved by rational systematic processes (Courtney, 2001; Geurts & Joldersma, 2001; Whelton and Ballard, 2002; Finegan, 2003; Demaid and Quintas, 2005; Callender *et al*., 2006; Balram and Dragicevic, 2006; Frame, 2007; Palmer *et al*., 2007; Head and Alford, 2008). In a discussion of public policy problems, the Australian Public Service Commission (2007, 1) observe that:

> Usually, part of the solution to wicked problems involves changing the behaviour of groups of citizens or all citizens. Other key ingredients in solving or at least managing complex policy problems include successfully working across both internal and external organisational boundaries and engaging citizens and stakeholders in policy making and implementation. Wicked problems require innovation, comprehensive solutions that can be modified in the light of experience and on-the-ground feedback. All the above can pose challenges to traditional approaches to policy making and programme implementation.

There is now a realisation that projects and programmes that deal with wicked problems – wicked projects – can also be problematic. Wicked projects do not respond well to the structured and rigorous processes and tools associated with the standard project management techniques. However, the literature addressing wicked projects is limited (Whelton and Ballard, 2002; Finegan, 2003; Schwab, 2005; Shurville and Williams, 2005; Johns, 2008) suggesting that further study and understanding of this area is desirable.

The practical intention of this paper is to provide practitioners with a set of models that helps to explain the concept of wicked problems in as they exist in project management. In particular, these model provide a framework for the application of a systems approach to help to improve and support the management of complex and often poorly defined projects.

2. WICKED PROBLEMS, PROJECT MANAGEMENT AND ORGANIZATIONAL COMPLEXITY

The concept of wicked problems in organisations is attributed to Rittel and Weber (1973, 1984) who proposed that, in the design of planning, there is a class of problem that is difficult to define, has no stopping rules, and no ultimate 'best solution'. In particular, complex organisational structure and processes, together with multiple stakeholder values are a common factor in wicked problems (Whelton and Ballard, 2002).

Shurville and Williams (2005) define wicked projects - projects with wicked problem components - as:

- Difficult to define, that defining the nature of the problem is the main problem.
- Containing a large social and political part.

In a case study of project definition Whelton and Ballard (2002) suggest that project teams need to focus upon how stakeholder organisations operate, and how their value sets are developed. Discussing project procurement, Callender *et al.* (2006) observes that wicked problems have no rational basis, are difficult to define within a boundary, and represent highly complex, intractable practical problems. They further state that the challenge is making sense of wicked problems.

2.1 What are wicked problems?

Wicked problems can take a multitude of forms and can be found in many different organisations and environments. Many examples are found in public administration; Brown and Brudney (2003) give illicit drug use, neighbourhood deterioration and juvenile delinquency; and Waddock and Walsh (1999) give school reform, children in poverty and children in legal difficulties, as examples of wicked problems with inter-organisational complexity. More recently, the Australian Public Service Commission (2007) identify diverse policy issues that include climate change, obesity, indigenous disadvantage, and land degradation as wicked policy problems. Similarly planning associated with legislative policy (McHenry, 2002) and legislation, statute and natural resource planning (Lach *et al.*, 2003) are also examples of wicked problems.

Wicked problems can also be found in projects associated with spatial information, land management and sustainability. Balram and Dragicevic (2006) has found the collaborative GIS projects often must address the following wicked problems:

- Stakeholders have different worldviews.
- Constraints change continuously.
- Issues are open-ended.
- It is difficult to understand problems and define the solutions.

In a study of a community-based land management project, Balint (2007) found:

- Profound disagreement between stakeholders over desired states and preferred outcomes.
- Entrenched conflicts between the individual and social group goals..
- The absence of optimal solutions.
- Shifting parameters make it difficult to apply what is learnt from one project to the next.

Part of the challenge of wicked problems is that it is very difficult to fully appreciate the nature of the problem. Therefore wicked problems are rarely 'solved'; rather the task is to design a more or less effective solution that is based upon how the problem has been defined (Pacanowsky, 1995).

Furthermore, Savage *et al* (1991) and Courtney (2001) attributes globalisation as a contributor to an increasing number of wicked planning problems in organisations.

> It would seem that globalisation will lead to increasingly wicked planning problems for all kinds of organisations, both for profit and non-profit, and privately and publicly owned. This is a challenging environment for organisations, to say the least (Courtney, 2001, 21).

Similarly, Becker (2002) observes that wicked problems are typically made up of a dense web of interconnecting factors, making it difficult to understand how one decision will influence decisions in other area. Also, wicked problems arise in the dynamic and uncertain environments where considerable risk is generated. Therefore, considerable conflict is often associated with wicked problems, especially where 'good outcomes' are traded off against 'bad outcomes' within the same value system. Figure 1 provides a model to help to recognise a wicked problem.

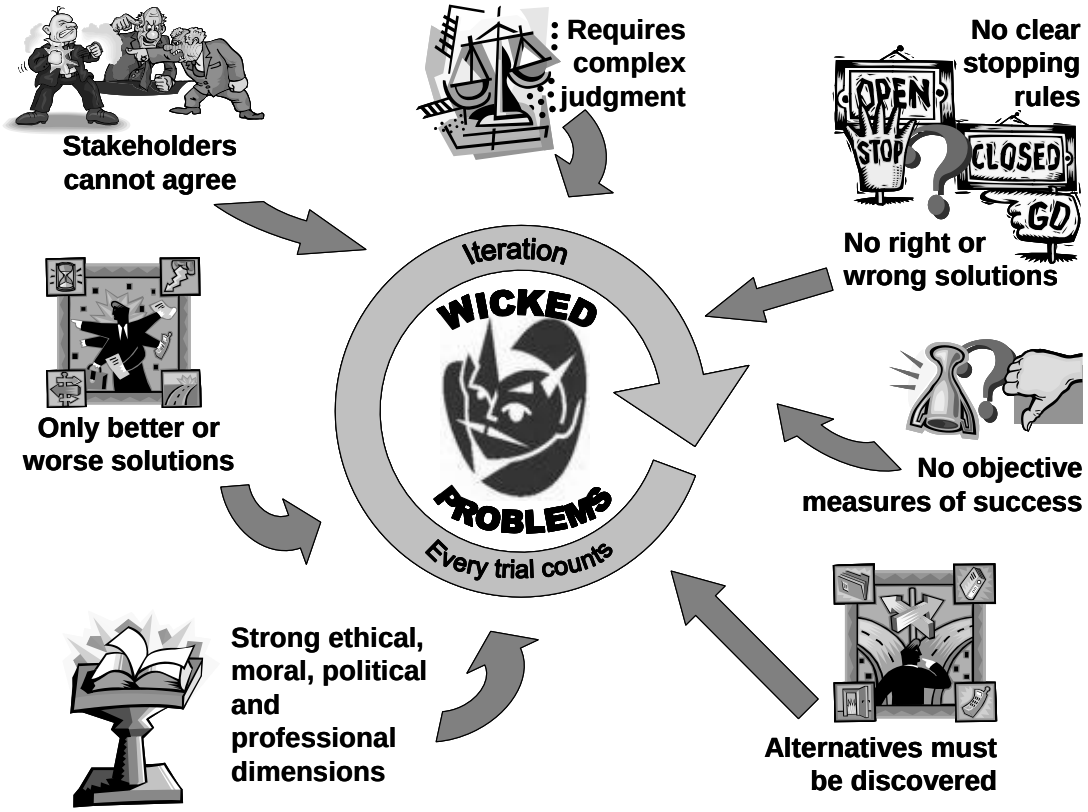

Figure 1 How to recognise a wicked problem (based upon Rittel and Weber, 1973, 1984)
How to address wicked problems in project management?

A common theme in the literature is that the conflicting interests of multiple stakeholders in projects are an indication of the presence of organisational complexity and wicked problems (Buckingham Shum, 1997; Whelton and Ballard, 2002; McHenry, 2002; Bryson *et al*., 2002; Balram and Dragicevic, 2006; Balint, 2007). Gao *et al.* (2002) further observe that great difficulty is faced in managing the human aspects of project related knowledge processes, especially those associated with ethical values, managerial philosophy, personal subjectivity, or cultural behaviour embedded in organisational contexts. Frame (2007) has listed the following as the requirements in addressing wicked problems in projects:

- Extensive consultation.
- Management of conflict.
- Acceptance that simple trade-offs may not be feasible.
- New partnerships will be negotiated and new sustainable practices will be developed.

Drawing upon the organisation complexity perspective of projects, a soft, people-based approach is recommended by Brown and Brudney (2003) as being able to provide structure and a collaborative response to wicked problems. Gao et al. (2002) proposes that the systems sciences, including soft systems thinking, should be used to support the different levels and phases of knowledge management. Similarly, faced with inter-related complexity and wicked problems, Gustafsson (2002) recommends the adoption of a holistic open systems approach.

Furthermore, project-related knowledge creation is closely associated with different worldviews and viewpoints (Yolles, 2000). These worldviews and viewpoints change to reflect the organisational realities, and provide a cognitive space of concepts, knowledge and meaning that is closely linked to organisational culture. Given the perceived importance of viewpoints and stakeholders in knowledge management, stakeholder analysis is also recommended. Bryson et al. (2002) states that stakeholder analysis is particularly useful for turning wicked problems into problems that can be solved, and are worth solving. Stakeholder analysis to deal with wicked problems is also suggested by Savage et al. (1991). Such analysis needs to address the power, intentions and values of both the organisation and key stakeholders. Finegan (1994), Neal (1995) and Green (1999) emphasise the potential for using Soft Systems Methodology (SSM) in the early stages of projects, to help the various stakeholders achieve a common understanding of the problem situation.

3. SOFT SYSTEMS METHODOLOGY AS A SYSTEMS APPROACH

Systems thinking, holistic approaches, and in particular, soft systems approaches are strongly recommended when faced with wicked problems in knowledge management (Cacioppe, 2000; Elliman and Orange, 2000; Yeoman *et al.,* 2000; Ballard, 2002; Gao *et al.,* 2002; Gustafsson, 2002; Rose, 2002; Venters *et al.,* 2002a, 2002b).

A number of studies of projects associated with spatial information, land management and sustainability have recommended the use of Soft Systems Methodology (SSM). In a South African study of cadastral systems, Barry and Fourie McIntosh (2001) describe it as

incorporating systems thinking and systems concepts into an approach that offers the opportunity for incremental improvement that is essential to address wicked problems. SSM provided them with a framework for involving all stakeholders in a continual learning cycle, and forms a theoretical foundation for thinking about and responding to wicked problems. Balram and Dragicevic (2006) recommends that projects using collaborative GIS technologies can benefit by applying SSM to structure collaborative participation. In particular SSM encourages collaborative discussions by elaborating what is possible; what actions can be taken; and what are the limitations.

3.1 What is SSM?

Soft systems thinking is an interpretive approach that is strongly influenced by Vickers' (1968, 59, 176) description of the importance of appreciative systems in dealing with human complexity. Checkland (1999), and Checkland and Scholes (1990) have attempted to transform these ideas from systems theory into a practical methodology that is called Soft Systems Methodology (SSM). In its idealised form, SSM is described as a logical sequence of seven steps (Checkland, 1999, 162-183) illustrated in Figure 2.

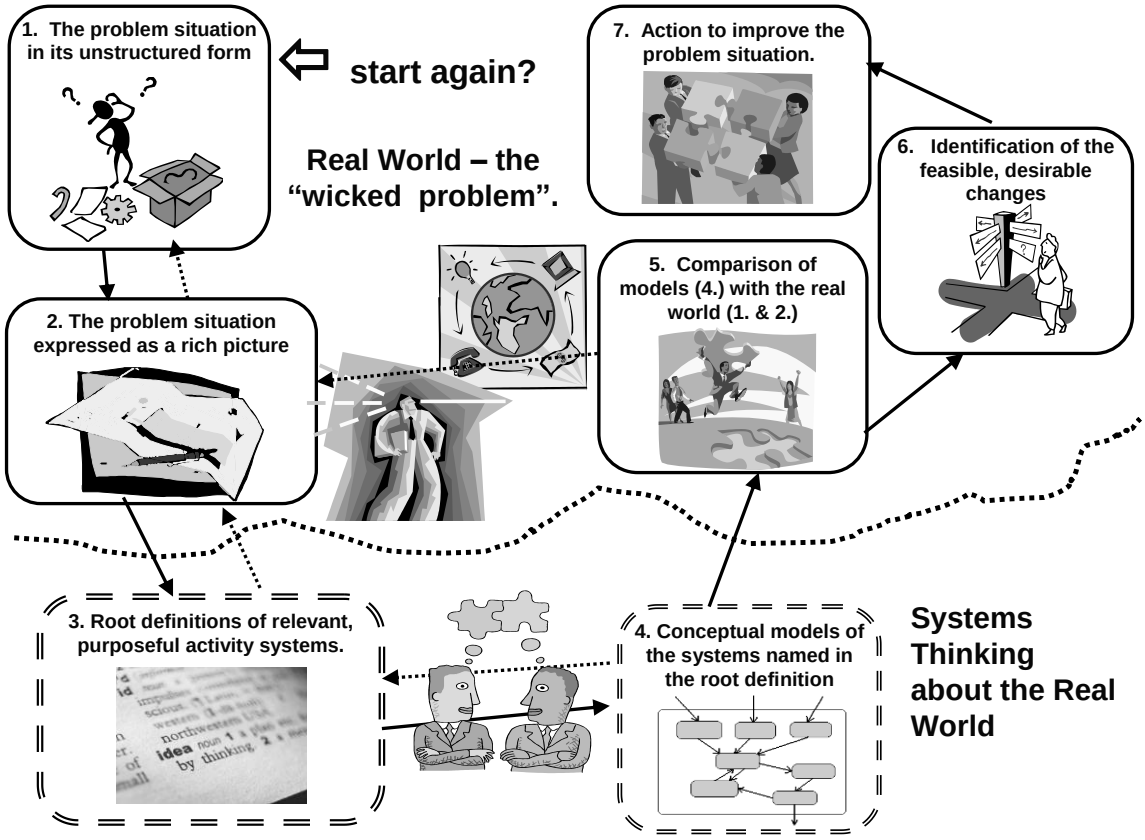

Figure 2 Summary of SSM as a seven-stage process (adapted from Checkland, 1999, 163)

SSM concepts are based on practical application and experience in a wide variety of complex managerial systems. The methodology is designed to allow the human element of such systems, which is typically unstructured and poorly defined, to be incorporated into system design work. It may be used to analyse any problem or situation, but it is most appropriate where the problem "cannot be formulated as a search for an efficient means of achieving a defined end; a problem in which ends, goals, purposes are themselves problematic" (Checkland, 1999, 316).

It is most important to note that the sequence of seven steps is not imposed upon the practitioner. A study can commence at any stage, with iteration and backtracking as essential components. Checkland (1999, 163) observes that

> … in fact the most effective users of the methodology have been able to use it as a framework into which to place purposeful activity during a systems study, rather than as a cookery book recipe.

SSM encourages investigators to view organisations from a cultural perspective. Therefore the component parts that are human beings determine the essential characteristics of organisations. These "people components" can attribute meaning to their situation and define their own purpose for the organisation.

3.2 Applying SSM to Wicked Projects

A significant feature of SSM is that it can be used as an approach to stimulate debate and capture the perceived visions of participants. In this context, Elliman and Orange (2000) recommend the use of SSM to facilitate effective change and improved work practice by allowing the exploitation of individual and socially constructed knowledge and experience. Rose (2002) supports the use of SSM as an appropriate iterative approach for the collection of socially constructed knowledge and sense making. It provides a data collection technique based upon semi-structured interviews and includes participant and non-participant observation, document study and researcher-led workshops.

Within projects SSM emphasises the importance of consulting different sources of knowledge. It also provides a framework for integrating difference ideas, values, and viewpoints. It encourages a shift from a scientific focus on knowledge to a more consensual and participative style that encourages sense-making (Geurts and Joldersma, 2001). SSM has also been specifically recommended as an approach to help improve knowledge management in sustainable construction projects:

> To this end SSM is employed in devising technological systems which ostensibly only process data, but with a clear ambition of improving/supporting knowledge practices within this community. Since sustainable construction practice is constantly emerging, so such interventions must be conceived in a flexible and emergent manner. SSM, as an action research methodology, embodies such flexibility, allowing an iterative approach to develop. Through various cycles of interactive intervention, models of purposeful

> activity are developed and adapted to changing knowledge practice (Venters et al., 2002a, 7).

Similarly, in a discussion of the application of soft approaches in the construction industry, Green (1999, 337) observes that

> The increasing concern amongst clients for construction professionals to understand their 'business processes' before embarking on design makes SSM especially applicable in the current context. SSM potentially offers a means by which construction professionals and client representatives can derive a common understanding of the client organization's business processes.

This is supported by Neal's (1995) recommendation that SSM is a valuable approach to requirements definition, especially in the provision of a stakeholder analysis that can identify the key viewpoint and important stakeholders. Savage et al. (1991) and Schmitz and Whitworth (2002) also emphasises that stakeholder analysis, particularly focused upon the stakeholders' power, intentions and values, is a key response to wicked problems.

A key feature of SSM is the support of learning about the successfulness of past interventions. Staker (2000) proposes that a knowledge repository can be built that contains the outputs from each iteration of SSM. The repository would contain Rich Pictures and Conceptual Models as graphical images, and Root Definitions as objects representing human activity systems.

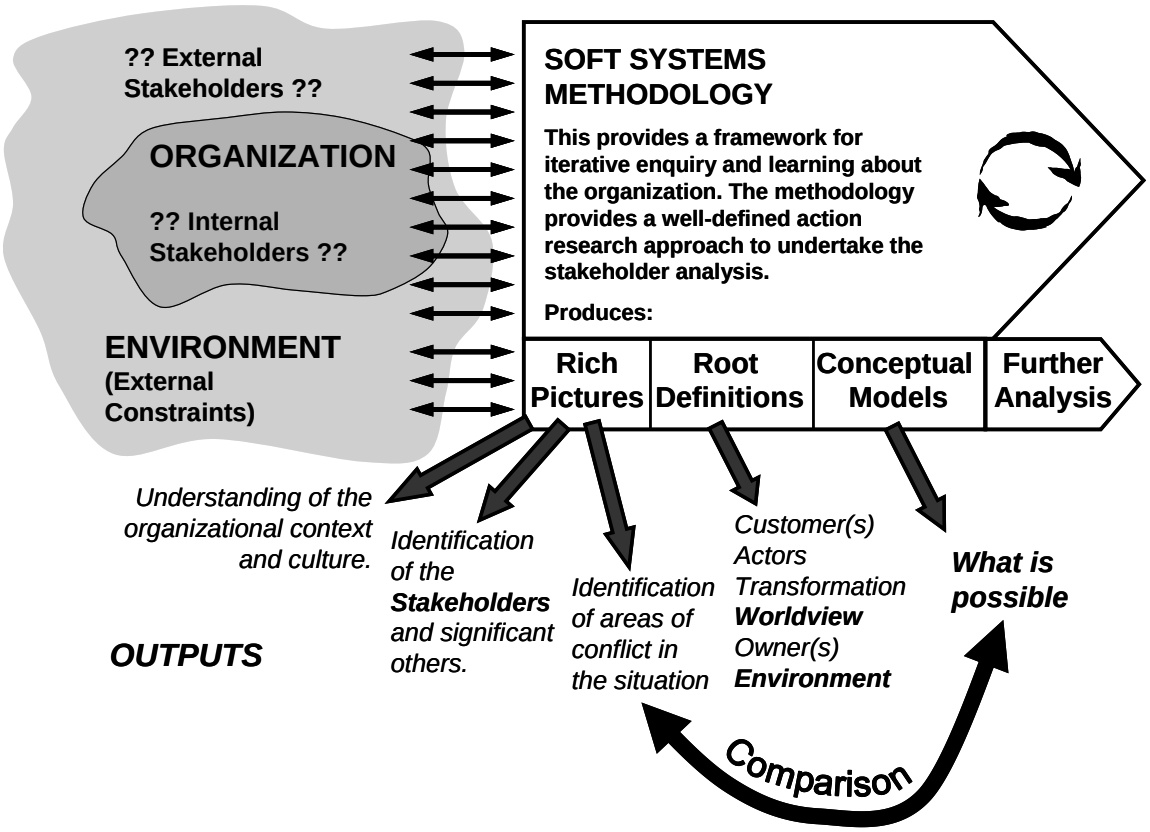

Figure 3 A model that uses SSM to better understand wicked projects

Based upon the strength of SSM in addressing organisational complexity the above model (Figure 3) has been developed to provide a framework to better understand, learn and take action in wicked projects. .

This model can be used for stakeholder analysis, providing three types of output that are particularly useful:

1. The Rich Pictures provide an opportunity to identify specific stakeholders, and significant others, within the context of the area being investigated.
2. The Root Definitions include a statement of the worldview of each identified stakeholder. This is an expression of why the stakeholder has an interest in the investigation or intervention.
3. The Root Definition also defines the environment of the organisation and the stakeholders. This is significant as it helps to understand the source and nature of any external constraints upon the situation, and its possible solution.

Furthermore, comparison and gap analysis using the Conceptual Model and the Rich Picture can provide insight into what is possible within the project, leading to a better understanding of what actions can be taken to

4. A SYSTEMS THINKING CASE STUDY OF A SUSTAINABLE CONSTRUCTION PROJECT

Sustainability projects, for example a sustainable construction project, provide excellent case study of wicked problems and wicked projects. Palmer *et al.* (2007) observes that such projects have the following wicked problem properties:

- They transcend discipline boundaries and require collaborative, higher level thinking.
- The knowledge required ranges from empirical to value oriented.
- New and different types of knowledge are required for the project.
- Ethical and moral perspectives must be taken into account.

Similarly Demaid and Quintas (2005) are concerned that the task of managing the different types of knowledge required for sustainable projects presents an array of complex and wicked problems that demand serious interdisciplinary responses. They warn that there is a considerable scope for misunderstanding where misinformation, misinterpretation and misplaced faith substitute for knowledge and understanding.

Within this context, SSM, together with learning processes that support broader and deeper perspectives, is recommended as providing a useful transdisciplinary approach to sustainability (Palmer *et al.*, 2007, 2):

> Soft systems methodology … is a tool which draws on systems think to help us address wicked problems by including multiple stakeholders and moving beyond up front claims about who is right or wrong.

4.1 Case Study – Rich Picture

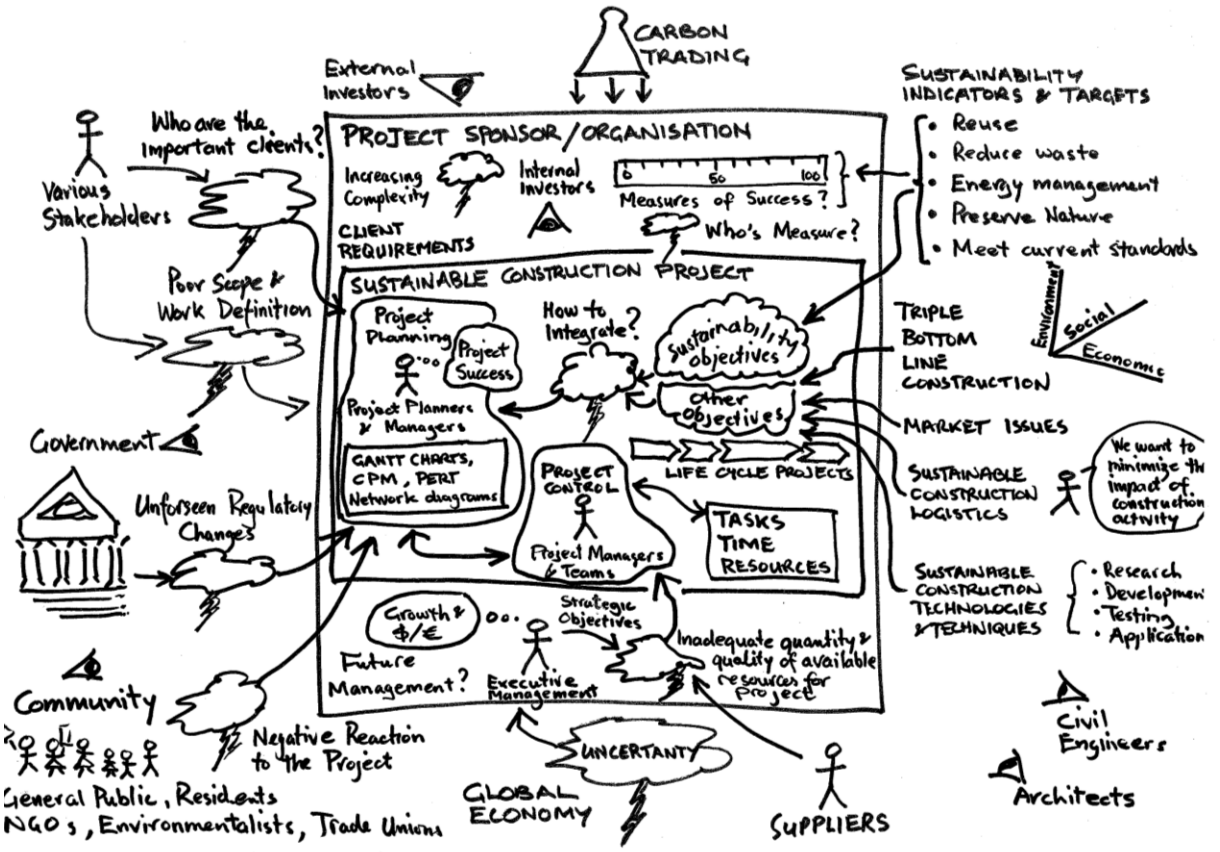

Figure 4 Rich Picture of a Sustainable Construction Project

The Rich Picture in shown Figure 4 illustrates part of the application of the model described in Figure 3. It shows different actors and organisations interacting with the project team within the sustainable construction project and provides a snap-shot of what is perceived to constitute the real world situation.

The many different stakeholders associated with the project are identified, and their important concerns expressed. In particular, this Rich Picture shows that there is a central and important dilemma faced by the project team. This is how to integrate traditional project planning and project control with the changing needs of a variety of stakeholders, sustainability objects that have many different measures of success, the need for flexibility in a uncertain global economy, and the need to now consider total life cycle projects (form conceptual planning through to disposal and reuse).

Within the context of a wicked project, this Rich Picture shows how to portray the situation so that issues which point to alternative approaches, or assist the understanding of conflicting positions, are brought out into the open and understood (Demaid and Quintas, 2005).

4.2 Case Study – Root Definition and Conceptual Model

ROOT DEFINITION A system owned by the developer, building owner, and other investors , who with the support of project manager are able stakeholder requirements and knowledge of traditional project management, and sustainability and related objectives, select and develop an integrating framework to plan and control the project. The project will only be sustainable if a total lifecycle approach is applied, and the needs of the occupants are considered together with expections and constraints imposed by the broader community, carbon trading and global economy, and the triple bottom line.	**Customer:** Developers, investors, occupants **Actors:** Project Manager, various consultants **Transformation:** Based on stakeholder requirements and knowledge of traditional project management, and sustainability and related objectives, select and develop an integrating framework to plan and control the project. **Weltanschauung:** Sustainability is only possible if a total lifecycle approach is applied to the project. **Owner**: Developer, building owner, other investors **Environment:** Broader community, carbon trading and global economy, triple bottom line.

Table 1 Root Definition and CATWOE of a sustainable construction project

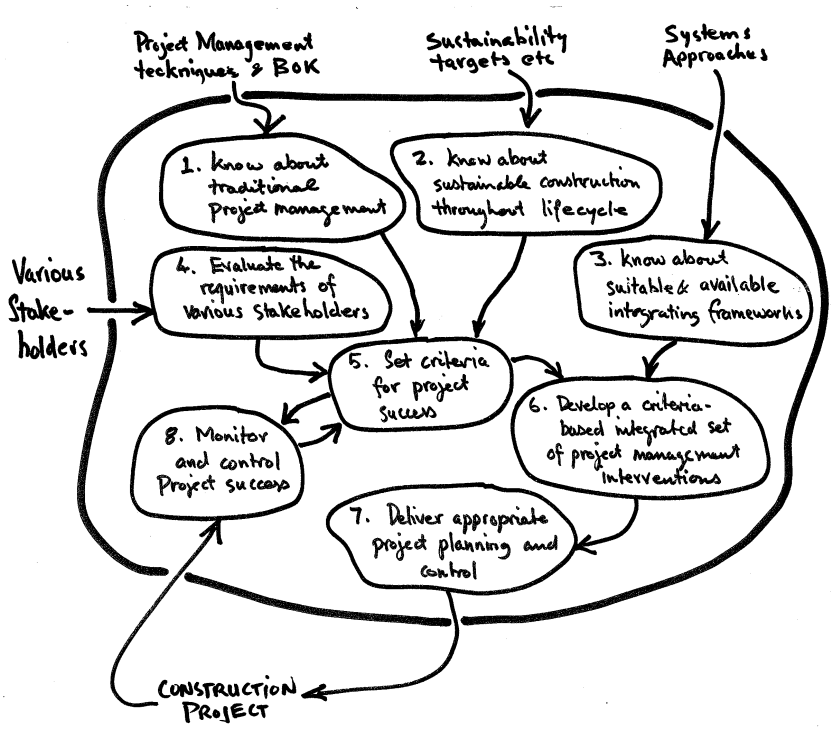

Figure 5 Conceptual Model of a sustainable construction project

The root definition and conceptual model shown in Table 1 and Figure 5 above provide an explicit description of how the central dilemma of this wicked problem can be addressed. Furthermore, comparison of the "ideal activities" expressed in the Conceptual Model with the

"wicked mess" shown in the Rich Picture can be the catalyst for debate, argument, reflection and revision. These pictures and models are meant to be used to stimulate vigorous discussion and learning within the project team and especially with the various stakeholders. It should serve to stimulate the collaborative participation recommended by Balram and Dragicevic (2006).

5. CONCLUSION

Wicked problems can be immensely difficult to solve (Becker, 2002). Frame (2007) warns that addressing wicked problems will probably not be cheap or quick, and the final quality of the outcome will be difficult to predetermine. A number of authors, including Green (1999), Barry and Fourie McIntosh (2001) and Ballard (2002) have identified SSM as offering a systems thinking framework for responding to wicked problems. Also, Geurts and Joldersma (2001), Balram and Dragicevic (2006) and Palmer *et al.* (2007) recommend SSM to help make sense of wicked projects.

This paper has defined wicked problems and provides a model to help to recognise a wicked problem (Figure 1). The Soft Systems Methodology (SSM) is summarised in Figure 2, and the model shown in Figure 3 illustrates how SSM can be used to derive meaningful outcomes that can be applied to knowledge work and knowledge management. The model is then applied to a case study showing how the Rich Picture, Root Definition and Conceptual Model are formulated and used.

To conclude, it is recommended that systems thinking approaches should be applied when dealing with the confusing situations that incorporate human, organisational and technical aspects. In particular, using SSM encourages group learning and is ideal as a group decision-making approach. It is strengthened by the active involvement of different participants and stakeholders, and encourages joint ownership of the problem solving process. Finally, SSM is recommended where there is organisational complexity and the challenge of effectively dealing with wicked problems within projects.

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