Analytical Methodologies to Guide Interventions in Informal Settlements

Lani ROUX and Michael BARRY, Canada and Jennifer WHITTAL, South Africa

SUMMARY

Informal settlements are complex and constantly evolving and also influenced by social, historical, political, legal and economic factors. The intrinsic characteristics of informal settlements have made planning and development very difficult. Frequently, interventions have viewed informal settlements as a unit. As such, planning decisions have been based on incomplete understanding and hind-sight often shows responsive actions to be injudicious. An examination of a range of holistic approaches may facilitate a more efficient and effective decision making and development implementation process.

This paper suggests systems theory because it embraces the concept of holism. Systems theory has been applied successfully in cadastral research and this paper argues that it can be used more extensively in the context of informal settlements. The paper outlines some of the aspects that contribute to complexity within informal settlements. Using this outline, informal settlements are categorised in Jackson's 'ideal-type' grid of problem contexts. This categorisation assists in identifying the most appropriate systems approaches. The Soft Systems Methodology of Checkland, critical pluralism of Mingers, coherent pluralism of Jackson and postmodern system methods are identified and discussed. An attempt is also made to illustrate the use of the different approaches in relation to informal settlements. This paper shows that systems theory provides additional methodological tools for development researchers or practitioners working with informal settlements.

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1. INTRODUCTION

Although complexity is an acknowledged characteristic of informal settlements, planning and management decisions are often based upon a reductionist view of problems. This perspective generally disregards the inter-related impacts of social, historical, political, legal and economic factors. In addition, simplistic views of informal settlements tend to ignore the constantly evolving nature of informal settlements as well as the imbalances in power amongst residents. Partial understanding of informal settlements can result in interventions which lead to unintended consequences such as social instability. Different approaches are required in order to address informal settlement problem situations and development from a holistic perspective (Barry 1999).

This paper considers systems theory as a basis to obtain a broader and more integrated understanding of informal settlements. It is expected that development decisions based on such an understanding will be better informed and result in more appropriate interventions.

The paper first discusses complexity and informal settlements. Then research in the cadastral field that has used systems theory is listed. Jackson's ideal grid of problem contexts is employed to categorise informal settlements and identify the relative systems approaches. The Soft Systems Methodology (SSM) of Checkland (1999), multimethodology of Mingers (2006) and Jackson's (2003) Critical Systems Practice will be discussed in detail. In addition, the application of the different approaches will be simulated in an informal settlement context. Finally some remarks on postmodern systems thinking will be made.

2. INFORMAL SETTLEMENTS

The complex nature of informal settlements is reflected in the variety of definitions that exist for the term. For the purpose of this paper an informal settlement is "a settlement where land is occupied according to a set of rules and processes that are not entirely legal" (Barry 1999, p. 5). Informal settlements thus exist on a continuum of legality; from complete illegality as in the case of an invasion of land, to land allocated formally but managed by the community after the social modification of the land management rules (Barry 1999).

Interventions in informal settlements involve a great variety of stakeholders. A case investigated by Barry (2006) of the Marconi Beam informal settlement upgrading in Cape Town provides a good example. Marconi Beam had an existing internal administrative structure consisting of four area committees representing eight street committees. The area committees reported to the settlement committee. A development trust was formed, which consisted of informal settlement leadership, municipal officials and professional people who lived in the area. Two non-governmental organisations were also involved in the project as well as a project management company and the local authority. A number of different factions

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outside the administrative structures of the informal settlement were also identified and these were continually changing. All these stakeholders had different and sometimes contradictory or competing interests.

Informal settlements exhibit complexity in other ways. Smit (2006, p. 109) identified some of the issues that contribute to the complexity of informal settlements in Cape Town: "the physical form of the settlement, poverty and vulnerability, social problems within the settlement and rural-urban linkages". The physical layout of informal settlements is closely linked to social networks as well as economic activity and this contributes to the apparently chaotic layout of such settlements. This informality is magnified by the impermanent structure of dwellings and the low level of service provision. A great degree of social differentiation can also be identified within informal settlements, although the majority of inhabitants are unemployed or have very low household incomes. Community schisms have also been identified by Smit (2006) and these factions may be delineated according to politics or the length of time of occupation.

Thus we are arguing that interventions need to be able to deal with informal settlements as complex phenomena. This paper proposes the use of systems theory, which accommodates complexity, as a methodological approach for development interventions in informal settlements.

3. SYSTEMS THEORY AND CADASTRAL RESEARCH

Checkland (1999, p. 3) defines a system as "a set of elements connected together which form a whole, this showing properties which are properties of the whole, rather than properties of its component parts". Those properties that are only perceived at the level of the whole are termed emergent properties (Checkland 1999).

Systems Analysis and Systems Engineering were used extensively in World War Two and Checkland (1999) identifies these as hard systems thinking, as opposed to soft systems thinking. He stated that the fundamental distinction between hard and soft systems is "the use of the word 'system' is no longer applied to the world, it is instead applied to the process of dealing with the world" (Checkland 1999, p. A10). Both hard and soft systems thinking is focussed on solving real-world problems, but in the case of hard systems the goal is known and clearly defined, whereas in soft systems the problem is unstructured and there is only the potential of alleviating a problem situation (Checkland 1999). In recent research in cadastral systems, soft systems approaches that aim to address complex social system have been used successfully.

Çagdas & Stubkjær (2008) identified systems theory in three doctoral research projects in the cadastral development field: Nkwae (2006) developed a conceptual framework for modelling and analysing peri-urban land problems based on Soft Systems Methodology (SSM); Zevenbergen (2002) used systems thinking to analyse land registration systems and Rakai (2005) also used SSM to develop a neutral framework for modelling and analysing aboriginal

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land tenure systems. Most recently, systems thinking was used by Whittal (2008) to identify a theoretical and methodological framework for fiscal cadastral reform.

Within the context of informal settlements Barry and Fourie (2002a, 2002b) and Barry (1999) used systems thinking to evaluate cadastral systems in uncertain situations. All these studies showed the usefulness of systems thinking within the cadastral field. However, identifying useful systems approaches to address specific real world problems can be challenging.

4. PROBLEM CONTEXTS AND INFORMAL SETTLEMENTS

It is possible to make an informed choice about a variety of systems approaches to follow when considering informal settlements by understanding the problem context. Jackson (2003) has identified two dimensions to consider when analysing a problem situation: the systems dimension, which provides a continuum from simple to complex systems, and the participant dimension, which considers the values, beliefs and interests of people involved in the situation. Although Jackson's framework is not accepted by all and has been critiqued by Mingers (1993, 2006) in particular, it is adequate for the purpose of exploring the use of systems theory in informal settlements here, since it aids in understanding the problem context and identifying appropriate systems approaches.

The participants in the problem context are divided according to relationship type. In unitary relationships the participants share the same values, beliefs, interests and purpose. They are also involved, to an extent, in the decision-making process about how to achieve their objectives. Participants in a pluralist relationship have compatible interests, but they do not share the same values or beliefs. Compromise can be reached if participants feel they have been involved in the decision-making process and this can be achieved by creating space for debate. This temporary accommodation would allow action in unison on agreed objectives. However, if participants are in a coercive relationship compromise is not possible. These participants have very few common interests and most likely have diverging values and beliefs. Thus decisions will be made by those with the most power and enforced by using coercion (Jackson 2003).

Jackson (2003) also identifies two types of systems: simple systems which are stable with few subsystems and structured interactions, and complex systems which evolve over time and consist of many subsystems and structured interactions.

The 'ideal-types' of problem contexts grid constructed by Jackson (2003) thus assists in understanding problem contexts and also provides a guide on how different systems approaches were developed as responses to different problem situations. Therefore this grid can also be used to decide which systems approach is best suited to a problem situation. Table 1 shows Jackson's placement of the various systems approaches in terms of their effectiveness in dealing with the 'ideal-types' of problem contexts. It can be seen from the grid that hard systems thinking, the first systems approach, is concerned with solving simple-unitary problems. The other systems approaches developed as problems situations were identified in

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which systems were more complex and the relationships between the participants more diverse (Jackson 2003).

		PARTICIPANTS		
		Unitary	Pluralist	Coercive
SYSTEMS	Simple	Hard Systems Thinking	Soft Systems Approaches	Emancipatory Systems Thinking (Critical Systems Heuristics)
	Complex	Systems Dynamics Organisational Cybernetics Complexity Theory		Postmodern Systems Thinking

Table 1 Systems Approaches related to Problem Contexts in the System of Systems Methodologies (Jackson 2003, p. 24)

Where would informal settlements as a problem situation fall in the grid of Jackson's 'ideal-type' of problem contexts? If we consider the earlier discussion on informal settlements we can place informal settlements in any of the blocks depending on the focus of the problem situation. Hard Systems thinking may be appropriate if the problem is, for example, service provision. Some informal settlements may have residents with largely the same beliefs, values and interests and the settlement can be identified as a simple or complex-unitary. However when considering the descriptions of informal settlements in the literature, it will be more likely that they would be categorised as complex-pluralist or complex-coercive, because of their highly diverse nature and their complex power hierarchies.

In this paper we concentrate on the systems approaches that fall under the complex-pluralist or complex-coercive categories: soft systems approaches and postmodern systems thinking. The soft systems approaches identified by Jackson (2003) include Strategic Assumption Surfacing and Testing (SAST), Interactive Planning (IP) and Soft Systems Methodology (SSM). Of the three, SSM was selected for this discussion because it:

> ...enables intervention in ill-structured problem situations where relationship maintaining is at least as important as goal-seeking and answering questions about 'what' we should do as significant as determining 'how' to do it. (Jackson 2003)

However this does not preclude the potential contributions of SAST and IP in informal settlements, because both methodologies have useful ideas, but for the purpose of this paper the focus will be on SSM.

The following section discusses Soft Systems Methodology and postmodern systems thinking, with the addition of pluralist approaches, and considers how they may be used to assist in providing a more integrated understanding of informal settlements.

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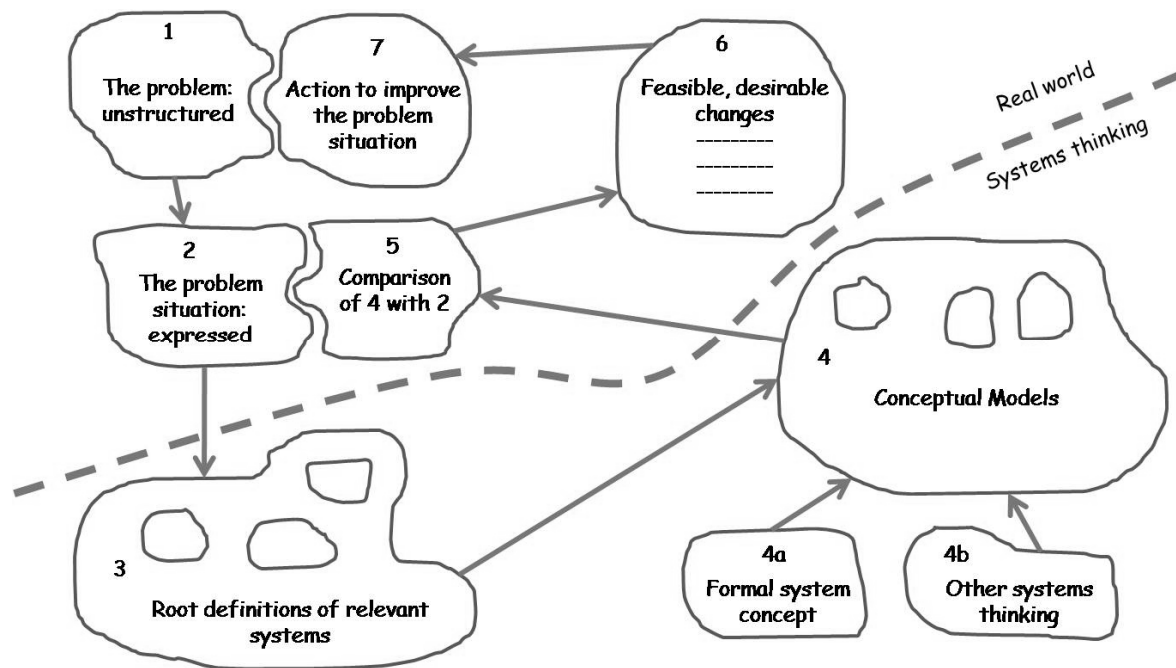## 5. SOFT SYSTEMS METHODOLOGY AND INFORMAL SETTLEMENTS

5.1 Soft Systems Methodology (SSM)

According to Jackson's (2003) 'ideal-type' grid of problem contexts using SSM is appropriate for problem situations within which the participants have pluralist relationships and the systems can range from simple to complex. Checkland (1999) developed this approach, using action research, as a response to situations within business organisations that could not be modelled using hard systems thinking. Problems suited to SSM are identified as those which are recognisable but cannot be defined (they may also be putative problems), so-called unstructured problems (similar to Rittel and Webber's (1973) wicked problems).

SSM is a systems approach that is phenomenologically based (Checkland 1999) and in addition it is accepted that it falls under the interpretive paradigm (Holwell 2000; Jackson 2003). It incorporates features such as a regard for meaning, a concern for understanding how social reality is continuously socially constructed and reconstructed by individuals and groups, and a focus on holistic understanding including the social, political and historical aspects that impact the problem situation (Holwell 2000). Another important feature is that SSM incorporates different perceptions of reality or *Weltanschauung* (Checkland 1999). All these features manifest in human activity systems which are defined as "notional purposive system[s] which expresses some purposeful human activity" (Checkland 1999, p. 314).

Initially, SSM was constructed as a 7 stage methodology as illustrated in Figure 1. The figure clearly shows that the methodology itself is a system and as in any other system a change in one element is likely to affect others. For this reason it is possible to back track and iterate during the intervention and it is also possible to work in the different stages simultaneously. The dashed line indicates that the methodology uses two kinds of activities: real-world and systems thinking activities. In the real-world activities participants must be involved, but this is optional in the systems thinking activities, which may be wholly conducted by the systems practitioner. The translation into systems language during the systems thinking activities provides understanding of the real-world problem situation (Checkland 1999).

Stages 1 and 2 are viewed as the expression phases and the initial analysis is done by recording the structure and how the structure and process relate to each other (the climate). Stage 3 is when the systems relevant to the putative problem are named and root definitions are developed. In stage 4 the root definitions are used to build conceptual models of the human activity systems defined by the root definitions. This stage also considers if other systems thinking is pertinent to the problem and if the models are not fundamentally deficient. In stage 5 the models are compared to the real-world situation and used to generate debate. Changes are identified in Stage 6 that fulfil two criteria: they must be culturally feasible and desirable. Action is taken in stage 7 (Checkland 1999).

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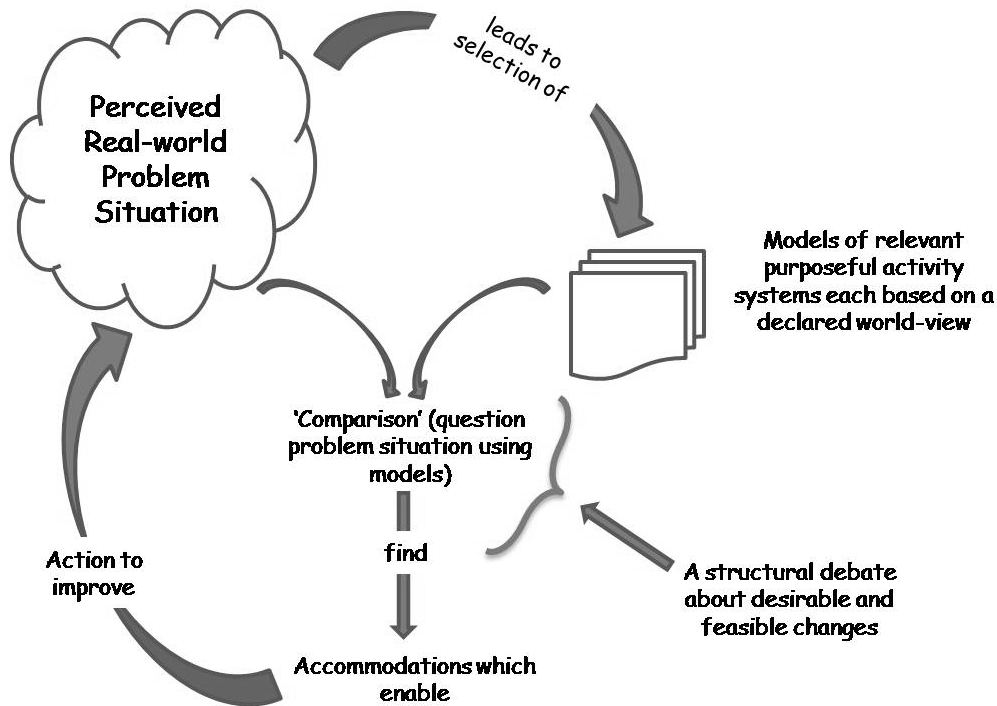Eilat, Israel, 3-8 May 2009

Figure 1 Checkland's (1999, p. 163) 7 stage methodology

Various methods are used as part of the methodology. A rich picture is one such method and is an "expression of a problem situation compiled by an investigator, often by examining elements of structure, elements of process, and the situation climate" (Checkland 1999, p. 317). This method is used during stage 1 and 2. In addition three forms of analysis can be done here. Analysis 1 is concerned with the intervention and the roles of client, problem-solver and problem-owners. Analysis 2 looks at social systems analysis, roles, norms and values and analysis 3 focuses on politics and how power is obtained and used within the organisation (Checkland 1999).

Root definitions are used to build purposeful activity models. Checkland (1999) states that it is important to include CATWOE elements in the root definitions and these characteristics are **C**ustomers, **A**ctors, **T**ransformation, *Weltanschauung,* **O**wners, and **E**nvironmental Constraints. Customers are those affected by the system, actors are participants who carry out the activities of the systems, transformation is the process of changing inputs into outputs, the *Weltanschauung* is the point of view that makes the root definition meaningful, the owners are the agencies that own the system and the environmental constraints are factors of the environment that cannot be changed (Checkland 1999).

As previously mentioned SSM evolved through application. Thus the 7 stage methodology was replaced by the two stream methodology and then the latest incarnation of the methodology, the Four Main Activities methodology (Checkland 1999). One of the main reasons for this progression was that Checkland (1999) wanted the methodology to reflect its flexible use and this change can clearly be seen in Figure 2.

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Figure 2 Checkland's (1999, p. A9) 4 Main Activities methodology

The Four Activities methodology still starts with a problem expression phase, but includes cultural and political aspects. The second step is building the purposeful activity models. In the third step the situation is debated using the models and an attempt is made to identify changes that would improve the situation (which are desirable and culturally feasible) and reach accommodation between conflicting interests so that these changes can be implemented. In the fourth step action is taken. The same methods mentioned above can be used in the Four Activities methodology (Checkland 1999).

SSM is an approach with clearly defined activities; it is flexible in terms of the methods used and uses cyclical learning that works well with complex social processes (Jackson 2003). However, Jackson (2003) argues that SSM has a limited domain of application and that is best suited to pluralist situations where stakeholders need to reach an agreement about action for improvement. This is linked to arguments made from an emancipatory perspective which states that SSM prescribes, to an extent, to the idea of a consensual world view. Also, SSM depends a great deal on participation, but does not explain methods for achieving this. Jackson (2003) also criticizes SSM for being isolationist and that it is useless when faced with extreme coercive behaviour.

SSM has been used in the cadastral field by Augustinus and Barry (2006), Barry and Fourie (2002a), Nkwae (2006), Rakai (2005) and Whittal (2008). The appropriateness of SSM as a tool for investigation and development of informal settlement will now be explored.

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5.2 Informal Settlements and SSM

In assessing the use of SSM in informal settlements a hypothetical informal settlement is imagined which exhibits a variety of attributes common to informal settlements in South Africa. This conceptualisation of the upgrading of a generic informal settlement is informed by the Marconi Beam informal settlement as described by Barry (1999). The first assumption is that the hypothetical informal settlement is inhabited by residents who have pluralist relationships and that the systems are complex. This means that the basic interests of participants are the same even though they do not share the same values or beliefs and that there is the possibility of temporary agreement. The first step is to express the problem situation by constructing a rich picture (Figure 3) of the informal settlement before upgrading planning starts.

The bias is on those who seek to improve the lives of those in the settlement. We have largely excluded those – perhaps a middle class land owner proximate to the settlement - who would rather the entire community was evicted and the settlement bulldozed. For simplicity the boundary of the system is also very narrowly defined and excludes neighbouring suburbs, the city etc.
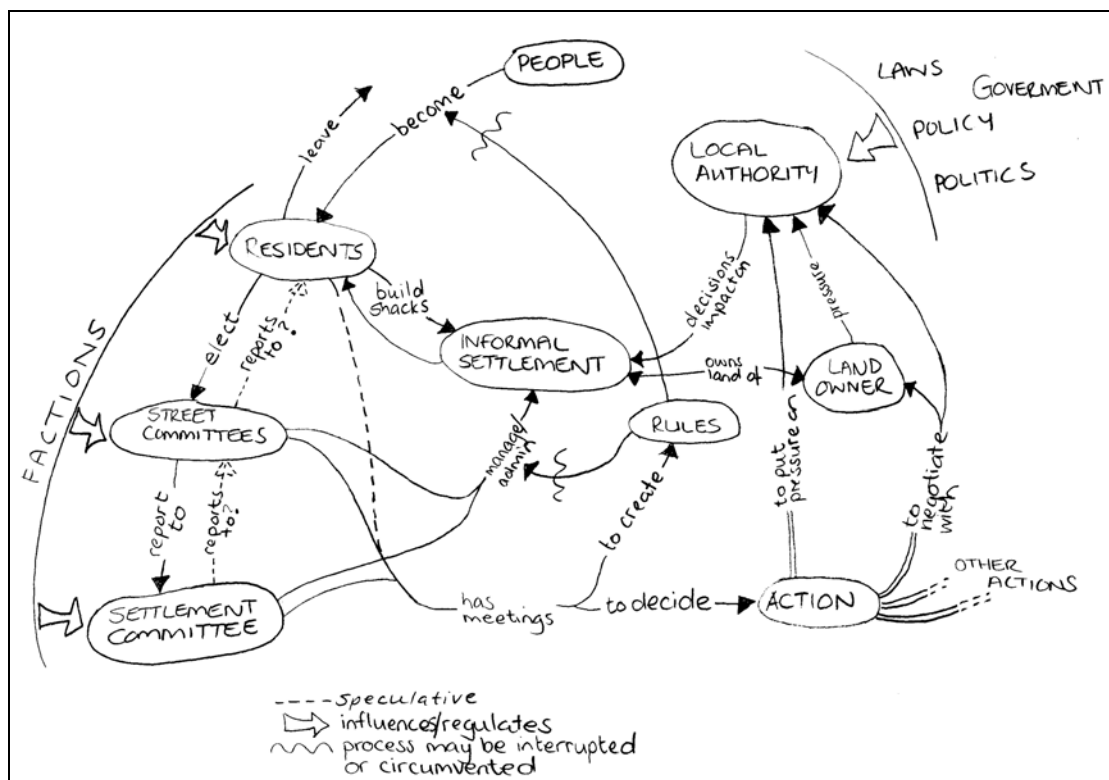
Figure 3 Rich Picture of an Informal Settlement

This rich picture (Figure 3) is focussed on the decision making and information flow in an informal settlement; note that this has been simplified for discussion purposes. The structures that can be identified are the internal power hierarchy, the external powers and the possible

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internal reporting structure. There is also uncertainty surrounding the pattern of communication within the informal settlement – how are residents informed of decisions or changes? The impact of factions should not be disregarded since it can cause the power hierarchy to become dysfunctional. The basic activities of deciding to negotiate with the local authority, and management and administration of the informal settlement by the settlement and street committees can be identified as processes. Again, there is uncertainty around the monitoring by residents of the negotiation process and the management and administration of the informal settlement. For example, if the residents agree that newcomers will be admitted to the settlement according to rules that they agreed upon, how do they know that the street committees and settlement committee are following these rules.

The climate, which is the relationship between process and structure, is problematic. The structure indicates that information should flow continuously between the residents and committees in both directions, but if this happens is not known. The factions also impact on the structure of the internal power hierarchy. The information flow from residents to committees can be interrupted at any point if any of the factions are in disagreement with decisions. Both the uncertainty of the patterns of communication and the impact of factions indicates a precarious internal power hierarchy. Thus the structure does not match the process of decision making or information flow.

A CATWOE analysis of one human activity system can be done as summarized in Table 2. There are of course a number of other possible human activity systems that can be identified.

| **C**ustomers	Residents of Informal Settlement
Actors	Settlement Committee, Local Authority, Land Owner
Transformation	From threat of eviction to some level of security of tenure
Weltanschauung	Right to shelter
Owners	Residents of Informal Settlement
Environmental Constraints	Government policy and laws, political environment

Table 2 CATWOE - Informal Settlement

A root definition can be constructed using this analysis:
> The residents of the informal settlement believe they have a right to shelter, and mandate the settlement committee to negotiate on their behalf with the local authority and the land owner, to prevent eviction. The environmental constraints are government policy and law, as well as the political environment.

The root definition results in the conceptual model in Figure 4 that shows the system for decision making and negotiation. The model can be read as follows: The Residents of the

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informal settlement mandate a Settlement Committee to negotiate for rights (to prevent eviction). The performance of the Settlement Committee is monitored by measuring the number of demands met and allowances made. The Settlement Committee negotiates with the Local Authority and the Land Owner, who may come to an Agreement. The Settlement Committee then reports the Agreement to the Residents. If the Residents are not satisfied with the Agreement they can mandate the Settlement Committee to enter into negotiations again.
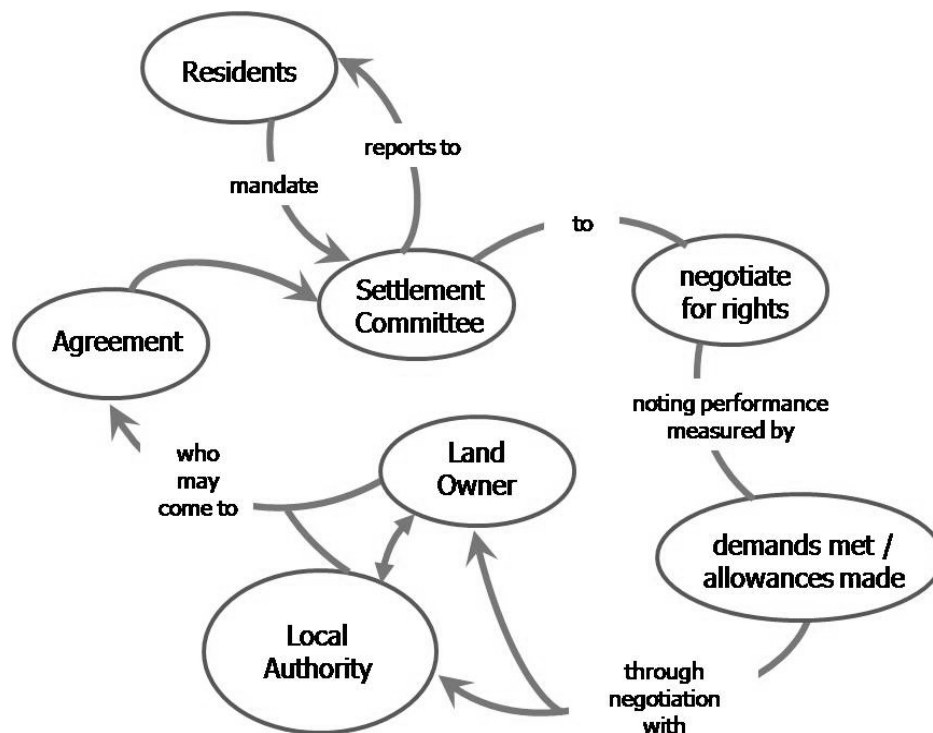
Figure 4 Conceptual model – Informal Settlement

At this point the conceptual model will be compared to reality and debated by participants. A factor that was noted in the rich picture was the influence of factions. A systems facilitator may bring this into the debate and ask various groups (residents, local authority officials, settlement committee or all stakeholders) to discuss the impact of factions on the model. This highlights the learning aspect of SSM. The debate may thus reveal to the residents the counter-productive nature of fragmentation in the settlement or to the local authority that there is more than one group and the realisation that the settlement committee may not be the only "authority" in the settlement. In this case additional iterations should be done until feasible and culturally desired changes are agreed upon and implemented, assuming this is possible.

This is a superficial analysis of the activity system in an informal settlement that is related to internal decision making and negotiation, but serves to illustrate possibilities for the use of SSM in informal settlement development. The focus was on decision making and negotiation, because it clearly reveals one of the pitfalls of using SSM: agreement needs to be reached between stakeholders before action can be taken. In the above case, would it be possible for

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stakeholders to debate the decision making and negotiation system constructively and come to an agreement? In the Marconi Beam informal settlement there were many incidents of confrontation and intimidation by factions throughout the upgrading and relocation process (Barry 2006). Thus debate and agreement may not be possible when destructive power dynamics are also evident.

Soft Systems Methodology may be more appropriate than hard systems methods in modelling informal settlements, but the systems practitioner may find it lacking, especially when dealing with extreme coercive situations. And, the Marconi Beam case demonstrates that a situational culture may move back and forth between pluralist and coercive. The next section will discuss pluralist approaches, in which any methodology or method may be used in conjunction to alleviate a problem situation.

6. PLURALIST SYSTEMS APPROACHES

Pluralist approaches are essentially concerned with using more than one systems approach, methodology or method in combination (Jackson 2003). A recurring theme in discussions of pluralist approaches is that of paradigms. To prevent confusion and for the purpose of this paper a paradigm is a "set of ideas, assumptions and beliefs that shaped and guided [the activity of a particular scientific community]" (Jackson 2003, p. 37). Worldview will only be used in relation to the *Weltanschauungen* of SSM. Each paradigm makes philosophical assumptions about epistemology, ontology and axiology. Ontology is concerned with "the nature of being" (*The Oxford Dictionary of English (revised edition)* 2005) or "the domain of real objects of scientific knowledge" (Mingers 2006, p. 149). Epistemology is "the theory of knowledge" (*The Oxford Dictionary of English (revised edition)* 2005) or the "domain of theories, experiments and concepts" (Mingers 2006, p. 149) and expresses how knowledge is acquired – a way of creating knowledge. The "study of values" (*The Oxford Dictionary of English (revised edition)* 2005) is axiology. The functionalist, interpretive, emancipatory and postmodern paradigms are the four most commonly used in social theory (Jackson 2003). Mingers (2006) adds critical realism to this list in his discussion of pluralist approaches.

There are arguments against the use of methodologies and methods in this pluralistic manner. The main ones being the incommensurability of paradigms, objections from organisational and academic research cultures, as well as the psychological difficulty and practical constraints of using different methods (Mingers 2006). There are a variety of different pluralist approaches that address the question of incommensurability of paradigms in different ways, for example, discordant pluralism (Gregory 1996), pragmatic pluralism (Taket & White 1996) etc. For this discussion two approaches: the multimethodology (critical pluralism) of Mingers (2006) and Critical Systems Practice (coherent pluralism) of Jackson (2003) are used to demonstrate two positions in response to the incommensurability of paradigms argument.

Mingers (2006) refutes the incommensurability of paradigms position and provides arguments in favour of multimethodological interventions. He uses Habermas' three worlds (Habermas 1984, 1987 cited in Mingers 2006, p. 201), the material, personal and social to show that different approaches concentrate on different aspects and by using different paradigms it is

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possible to deal with the real world more effectively. Also, certain methods are better at addressing the various phases in an intervention, identified as appreciation, analysis, assessment and action Mingers (2006). Triangulation or the confirmation of findings is also achieved by using different methods that fulfil a similar function.

Mingers' (2006) multimethodology is essentially a way to use more than one method or methodology in a systems intervention of a real-world problem. There are four possible combinations: (1) methodology combination, using a variety of whole methodologies, (2) methodology enhancement, enhancing the primary methodology with the additions of methods from elsewhere, (3) single-paradigm multimethodology, mixing parts of methodologies from the same paradigm and (4) multi-paradigm multimethodology, the same as single-paradigm multimethodology, but incorporating methods from different paradigms (Mingers 2006).

To achieve the above, Mingers (2006) suggests a critical process for designing a multimethodology. First he identifies two stages of intervention, the initial design of the project and the monitoring process of reflection and design. In the initial design stage the problem context is identified in terms of problem content, intellectual resources and interventions systems. The relations between the three systems are described by asking 'questions of context' as specified by Mingers (2006). The methods and techniques are combined that are appropriate to the problem context and Mingers provides a framework for mapping methods to assist in the identification of appropriate ones. The framework identifies the ontological, epistemological and axiological assumptions of methodologies and maps them relative to Habermas' three worlds as well as to the four phases of a project (appreciation, analysis, assessment and action) (Mingers 2006). This framework provides a guide for the practitioner to ensure that methodologies and methods are critically analysed and understood before use in a multimethodological design. During the project the reflection and design activities ensure that the methods are still valid in response to the context and the developments.

Jackson (2003) also suggests the use of multiple methods as part of Critical Systems Practice (CSP), however with some differences. In contrast to Mingers, Jackson states that the methodologies and methods should be used within their paradigms (Mingers 2006). Also he does not subscribe to the idea of an overarching paradigm, whereas Mingers argues that since flaws and weaknesses have been pointed out in all the paradigms there is no reason for not accepting Critical Realism as a transcending paradigm although he concedes that it may be superseded over time (Mingers 2006). However, Jackson's (2003, p. 305) position is different to that discussed by Mingers and he writes that there is one condition to using multiple methods and that is "there must be explicit recognition of the paradigm(s) the methods are being used to serve."

CSP is viewed by Jackson (2003) as an approach that protects paradigm diversity by ensuring that the paradigms and methodologies are clearly identified. Jackson provides generic methodologies relating to the functionalist, interpretative, emancipatory and postmodern

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paradigms (Jackson 2003). These are used within four phases of creativity, choice, implementation and reflection as the practitioner sees fit.

6.1 Informal Settlements and Pluralist Approaches

These pluralist approaches provide a more extensive toolkit for resolving problem situations in informal settlements. The approach of Mingers, Jackson or any of the other pluralist thinkers can be used depending on the researcher's personal point of view regarding the question of paradigmatic pluralism. The choice of method or methodology is highly dependent on the context and type of intervention, and the practitioner needs to carefully consider what would be most effective and appropriate.

One important element allied to critical realism that may prove particularly useful in interventions is reflection. Informal settlements are constantly evolving entities and interventions need to be flexible to respond effectively to these changes. Action can only be effective and efficient if problem context, method, design and result are under continuous, critical reflection.

Both the multimethodology of Mingers and CSP of Jackson provide ways of using more than one methodology or method in a problem situation. However neither approach specifically addresses situations with coercive behaviour and this only becomes possible if a practitioner includes a methodology or method that does consider this issue. The following section will discuss the postmodernist perspective.

7. THE POSTMODERN PERSPECTIVE

Postmodern systems thinkers see complexity and coercion as part of any problem situation and they believe suppressed viewpoints must be brought to the surface and diversity encouraged. They are also sceptical of universal guarantees of success (Jackson 2003).

Of particular interest are Foucault's ideas about knowledge and power. According to Foucault (1979, p. 27) "power produces knowledge...[and] ...power and knowledge directly imply one another". Jackson (2003, p. 259) interprets this as "knowledge offers power over others; the power to define others". Thus patterns of domination and marginalization are established and those with power (and knowledge) are benefitted (Jackson 2003). The power/knowledge connection is clearly demonstrated by the following extract from a discussion of land registration:

> The introduction of a modern registration system ...may provide opportunities for 'land grabbing' by those who are better informed, are more familiar with formal processes, and have better access to officials... (Feder & Nishio 1998, p. 38)

There are however more complex forms of the power/knowledge connections. For example, a discourse that identifies a person as an 'outsider' or 'community member', "both empowers and disempowers the group of individuals formed as that object" (Alvesson & Deetz 1996, p. 209).

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The power/knowledge connection influences most of the methods used by postmodern systems thinkers and as indicated above they may be useful in systems interventions in informal settlements. Only two, genealogy and deconstruction, will be discussed here.

Genealogy is concerned with revealing the characteristics of grand narratives and assisting people in identifying the power and knowledge structures that determine them as individuals (Jackson 2003). Totalizing discourses, grand narratives or metanarratives form the grounding for certain positions (Alvesson & Deetz 1996). In the development field we can identify "globalization" as one of many grand narratives. From the postmodernist perspective, discourses influence people and, in turn determine their actions. In le Roux and Graaff (2001) we find an example: they discuss the hidden theoretical and ideological assumptions held by people in the development field in South Africa and how these are often evolutionist. Thus in this case, the evolutionist discourse determines their actions. Once the structures of knowledge and power are understood, people can act in a subversive manner on a local level to effect change and in this way those who were marginalized by dominant discourses can regain power (Jackson 2003).

Derrida's deconstruction could also prove to be useful in informal settlement interventions, as it aims to reveal the biases in text and thus identifies contradictions (Jackson 2003). According to Derrida (1976), everything is text, and examples are conversations, discussions and interviews, transcripts of these, meeting minutes, project reports and project plans. Some argue that even corporate culture can be seen as text (Alvesson & Deetz 1996). Taket (2002, p. 128) lists the following examples of deconstructive strategies that can be used by facilitators or participants:
- Focussing on marginalised elements
- Exposing a false distinction
- Exposing a false identification
- Looking at claims or assertions which depend on something other than what is clearly stated, especially those that make explicit or implicit claims of 'naturalness'
- Examining what is not said, what is omitted (deliberately or not)
- Paying attention to disruptions and contradictions
- Examining the use of metaphors
- Examining the use of double-entendres

Taket (2002, p. 127) states that this "leads to the exposure of the ideology assumed in the text, and spaces can be opened where different or more varied ideas can be offered." In the context of informal settlement development, deconstruction strategies could be used to facilitate discussion as well as argument. This may prove useful in gaining deeper understanding of different stakeholder's positions and power structures in an informal settlement. It may also assist the residents in identifying and prioritising their needs.

The postmodern perspective is new in systems thinking and is still being developed and there is still a great deal of discussion on its usefulness in the systems and operational research fields (Boje 2006; Midgley 2004; Ormerod 2003; Weiss 2000; Zhu 2006). However, it does provide an approach that attempts to deal with coercive relationships within a problem situation and at least may provide better understanding.

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8. CONCLUSIONS

In conclusion, previous research has demonstrated the value of systems thinking in the cadastral field. Systems thinking has also been used in informal settlements research and this paper argues for more extensive use of systems methodologies and methods in such research.

Knowledge of the nature of informal settlements from case study narratives indicates that they can be positioned in Jackson's 'ideal-type' grid of problem contexts as complex-pluralist or complex-coercive and in this way appropriate system approaches can be identified.

In the context of this paper the focus was on SSM, pluralistic approaches and postmodern systems thinking. SSM is a methodology that attempts to alleviate unstructured problems and it also incorporates a variety of worldviews. It is also flexible in its approach. It may prove useful in informal settlements categorised as complex-pluralist, but becomes problematic in situations with more coercive relationships, because it requires that consensus is reached before action can be taken.

In addressing complex real world problems, a pluralist approach can also be used. The pluralist methodologies of Mingers (multimethodology based on critical realism) and Jackson (CSP) demonstrate how increased flexibility can be achieved by accessing a greater variety of methods and how critical reflection may keep the design and methods used current and appropriate.

The use of systems methodologies and methods could include postmodern approaches, particularly for informal settlement research. This paper discussed the methods of genealogy and deconstruction as a potential response to coercive behaviour by creating space for dialogue and argument.

The authors thus argue that understanding and intervention may be improved by using systems theory because it provides a more holistic understanding of informal settlements. Speculative applications in informal settlements were demonstrated in this paper, but future research needs to apply these suggestions in actual informal settlement cases.

REFERENCES

Alvesson, M & Deetz, S 1996, 'Critical theory and postmodernism: Approaches to organizational studies', in SR Clegg, C Hardy & WR Nord (eds), *Studying organization: Theory and method*, SAGE, London, pp. 191-217.

Augustinus, C & Barry, M 2006, 'Land management strategy formulation in post-conflict societies', *Survey Review*, vol. 38, no. 302, pp. 668-81.

Barry, M 1999, 'Evaluating Cadastral Systems in Periods of Uncertainty: A Study of Cape Town's Xhosa-speaking Communities', PhD thesis, University of Cape Town.

Barry, M 2006, 'Formalising informal land rights: The case of Marconi Beam to Joe Slovo Park', *Habitat International*, vol. 30, no. 3, pp. 628-44.

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Barry, M & Fourie, C 2002a, 'Analysing cadastral systems in uncertain situations: a conceptual framework based on soft systems theory', *International Journal of Geographical Information Science*, vol. 16, no. 1, pp. 23-40.

Barry, M & Fourie, C 2002b, 'Wicked problems, soft systems and cadastral systems in periods of uncertainty: South African experience', *Survey Review*, vol. 36, no. 285, pp. 483-96.

Boje, D 2006, 'What happened on the way to postmodern?', *Qualitative Research in Organizations and Management: An International Journal*, vol. 1, no. 1, pp. 22-40.

Çagdas, V & Stubkjær, E 2008, 'Doctoral research on cadastral development' in press, *Land Use Policy*, viewed 12 December 2008 via Science Direct.

Checkland, P 1999, *Systems Thinking, Systems Practice*, John Wiley & Sons Ltd, Chichester.

Derrida, J 1976, *Of Grammatology*, trans. GC Spivak, The Johns Hopkins University Press, Baltimore.

Feder, G & Nishio, A 1998, 'The benefits of land registration and titling: Economic and social perspectives', *Land Use Policy*, vol. 15, no. 1, pp. 25-43.

Foucault, M 1979, *Discipline and Punish: The Birth of the Prison*, Vintage Books, viewed 17 February 2009, via Social Theory.

Gregory, W 1996, 'Discordant pluralism: A new strategy for critical systems thinking', *Systemic Practice and Action Research*, vol. 9, no. 6, pp. 605-25.

Holwell, S 2000, 'Soft systems methodology: Other voices', *Systemic Practice and Action Research*, vol. 13, no. 6, pp. 773-97.

Jackson, MC 2003, *Systems Thinking: Creative Holism for Managers*, John Wiley & Sons Ltd, Chichester.

Le Roux, P & Graaff, J 2001, 'Evolutionist Thinking', in J Coetzee, J Graaff, F Hendricks & G Wood (eds), *Development: Theory, Policy and Practice*, Oxford University Press Southern Africa, Cape Town.

Midgley, G 2004, 'Five sketches of postmodernism: implications for systems thinking and operational research', *Journal of Organisational Transformation and Social Change*, vol. 1, pp. 47-62.

Mingers, J 1993, 'The system of systems methodologies--a reply to Schecter', *Journal of the Operational Research Society*, vol. 44, no. 2, pp. 206-8.

Mingers, J 2006, *Realising Systems Thinking: Knowledge and Action in Management Science*, Springer Science and Business Media, Canterbury.

Nkwae, B 2006, 'Conceptual Framework for Modelling and Analysing Periurban Land Problems in Southern Africa', PhD thesis, University of New Brunswick.

Ormerod, R 2003, 'Taket's suggestions for the OR toolkit', *Journal of the Operational Research Society*, vol. 54, no. 12, pp. 322-3.

Rakai, MET 2005, 'A Neutral Framework for Modelling and Analysing Aboriginal Land Tenure Systems', PhD thesis, University of New Brunswick.

Rittel, H & Webber, M 1973, 'Dilemmas in a general theory of planning', *Policy Sciences*, vol. 4, no. 2, pp. 155-69.

Smit, W 2006, 'Understanding the complexities of informal settlements: Insights from Cape Town', in M Huchzermeyer & A Karam (eds), *Informal Settlements: A perpetual challenge?*, UCT press, Cape Town.

Taket, A 2002, 'Facilitation: some contributions to theorising the practice of operational research', *Journal of Operational Research Society*, vol. 53, pp. 126-36.

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Taket, A & White, L 1996, 'Pragmatic pluralism - An explication', *Systemic Practice and Action Research*, vol. 9, no. 6, pp. 571-86.

The Oxford Dictionary of English (revised edition), 2005, Oxford University Press, Oxford.

Weiss, R 2000, 'Taking Science out of Organization Science: How Would Postmodernism Reconstruct the Analysis of Organizations?', *Organization Science*, vol. 11, no. 6, pp. 709-31.

Whittal, J 2008, 'Fiscal Cadastral Systems Reform: A Case Study of the General Valuation Project 2000 in the City of Cape Town', PhD thesis, University of Calgary.

Zevenbergen, J 2002, 'Systems of Land Registration: Aspects and Effects', PhD thesis, Technische Universiteit Delft.

Zhu, Z 2006, 'Complementarism versus Pluralism: Are They Different and Does It Matter?', *Syst. Res*, vol. 23, pp. 757-70.

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