

## Chapter 7 Social systems framework

### 7.1 Introduction

In this chapter, the social systems theory selected in Chapter 5 is developed and discussed further. In Chapter 5, it was discussed and motivated at conceptual level only. Here, it is developed into a social systems framework, with which to address the research question:

- What is an appropriate social systems framework with which to study the impact of an IT intervention in a remote, rural African community?

The social systems framework embodies the systems theory and concepts to be applied, and it suggests the elements to be used for data collection as well as analysis. The two main components of the systems framework are structuration theory, which will be used to describe the socially based self-producing mechanisms of the system, and the theory of autopoiesis. Structuration theory and autopoiesis theory are combined making use of Mingers' (2002; 2004; 2006) suggestions on the use of autopoiesis in social systems.

The social systems framework is a culmination of several previous sections of the study. The framework makes use of theory that has been covered in Chapters 4 to 6, in particular, Giddens' structuration theory from Chapter 5, the theory on social autopoiesis from Chapter 6, as well as limited aspects of Checkland's SSM, discussed in Chapter 4. The framework also draws on the general systems and modelling background of the researcher, who has been involved in the field of Operations Research for many years. A motivation for using this combination of principles is presented in Chapter 5, using the suggested criteria for selecting a social systems framework.

In addition to building on previous sections, the framework lays the basis for the empirical chapters to follow. As such, it is forward looking, anticipating the collection and analysis of data, some of which have been done, in the hermeneutical style, parallel to and informing the development of the systems framework.

The elements of the framework are all developed to eventually address the problem statement as discussed in Chapters 1 and 2: The framework is designed to assist in describing the social structure of the systems of interest, in order to assess not only their individual self-producing

ability and sustainability but also mutual influences, so that the influence of the ICT4D system on its systems served can accordingly be assessed.

This chapter is organised as follows. It departs with a section describing the preparatory work to be done as part of the systems exercise. The pre-work entails a background study on the social systems of interest, as well as stating assumptions and simplifications made as part of the modelling exercise. The systems model is subsequently presented. The elements of the model are introduced, and their application to the case study is discussed and selectively illustrated by examples.

## **7.2 Preparatory work: background and assumptions**

Before embarking on modelling a system, some preparation is required. Firstly, background information on the situation needs to be obtained, and secondly, the modelling assumptions need to be stated.

### **7.2.1 Background sketch on the community**

Generally, background information on the system of interest needs to be collected. In Checkland's Soft Systems Methodology, the first of the four major activities entails "finding out about a problem situation, including culturally/politically" (Checkland, 1999: A15). Checkland suggests drawing a rich picture. For each conceptual system that is further developed, a root definition is sought, considering the aspects of the CATWOE mnemonic, namely Customers, Actors, main Transformation, World view, problem Owners, and Environmental constraints (Checkland, 1999: 224; see also Chapter 4). Daellenbach and McNickle (2005) suggest a similar way of starting, including a rich picture, followed by specifying the system of interest (and implicitly the boundary) and listing who the problem owners, decision maker(s), analysts and customers are. A general background sketch is in any case required as part of an interpretive field study, as suggested by Klein and Myers (1999). They refer to the "principle of contextualisation", that requires the background and history of the case setting to be provided (Klein and Myers, 1999: 72). Hence, this is a general requirement of the research method, as well as the natural starting point of a systems approach.

In this study, the principle of contextualisation is applied by performing a background study of the overall case setting, followed by a contextual study of each social system identified in

the case. The essence or root definition of each system is distilled by means of a CATWOE description. According to Checkland and Holwell (1998:164), developing root definitions can be part of systems design ('mode 1' use of SSM) or a reflective process ('mode 2' use). In this framework, they would be part of the researcher's sense-making and are therefore reflective.

## 7.2.2 Assumptions and simplifications

When moving from the real world to the conceptual systems world, some assumptions and simplifications need to be made. A systems description is a simplified version of the real world, some elements of which are selected to be included as system components and processes. These elements are selected to represent the situation, and chosen in line with the aims of the modelling exercise. Generalisations are made about these components: for example, if there is a "manager" in the systems model, he/she is assumed to have a standard set of characteristics, the same for all "managers" in the system. Generalisations related to a system based on the Zulu culture may mean that similar habits are assumed among all people practising that culture, within the system boundaries. As such, an ideal type of the Zulu culture is created, in order to simplify the description and analysis. When using a theory in research, assumptions and generalisations are similarly made. A selection of real world aspects are chosen as focus areas, and the interplay between these are studied in a specific way. When using a social theory based on autopoiesis, some particular aspects of the system will be focused on, such as its self-producing mechanisms and organisational closure. An assumption around a systems boundary is required. Assumptions and generalisations need to be justified, since the modelled version needs to adequately represent reality.

An important assumption in this study is the way a social system is defined. Giddens' (1984) definition of a social system will be used, referring to the social practices of actors that are repeated over time and space.

Another key assumption that is made about the Tugela Ferry community being studied, is that for the purposes of the study, it consists of two social systems, namely a Zulu social system and a Christian mission system. In practice, these systems overlap, they are not the only groupings to be found, and clear boundaries are not always apparent. However, in this study, they are selected as focus areas in terms of their social practices, and analytically separated. This assumption is motivated and discussed in Chapter 8 that follows.

To conclude the discussion on the pre-work section of the systems framework: apart from a general background description, including a description of specific elements of further interest, the assumptions and simplifications that go hand in hand with the particular systems approach or theory, need to be declared and motivated. These are given in Chapter 8, before commencing with the systems description in Chapter 9.

### **7.3 Outline of the social autopoiesis model**

This section specifies the system elements and processes that will be focused on, for a conceptual systems description. In defining the elements, the two major inputs are the theories of structuration (Giddens, 1984; Mendelsohn and Gelderblom, 2004) and autopoiesis (Varela et al., 1974; Maturana and Varela, 1987; Luisi, 2003). Both of these theories consider reinforcing cycles of behaviour that produce the identity of a system, and in this case they will both be applied to two social systems, namely the Zulu and mission systems. Giddens' structuration theory is used to describe the autopoietic 'engine' of the system, in particular, the reinforcing, self-producing and boundary creating mechanisms. Giddens' elements of action and social structure are applied as they are provided in the social theory (Giddens, 1984; Mendelsohn and Gelderblom, 2004). In particular, these elements will be used to see what light they can shed on the self-producing nature of the social systems. From the theory of autopoiesis, the elements of organisation and autopoietic structure are considered, as well as aspects such as structural coupling, structural drift, and sustainability, the latter as suggested by Luisi (2003) in his appraisal of autopoiesis.

#### **7.3.1 Giddens' structuration theory as the autopoietic engine**

This section starts with a motivation for the use of Giddens' structuration theory as described in Chapter 5, somewhat different to the way it is usually applied in IS literature. Thereafter follows a discussion of the key elements or building blocks of structuration theory that will be included as elements of the systems framework.

##### **7.3.1.1 The use of structuration theory in IS and in this study**

Within the IS literature that makes use of social theories, Giddens's structuration theory is the most widely used and perhaps the most influential (Jones et al., 2004; Jones and Karsten, 2008). Avgerou (2009) mentions the use of structuration theory by ICT4D researchers appropriating social theories, notably within the "social embeddedness" research stream in ICT4D, where the local context is viewed as significant. Since technology does not feature

explicitly in structuration theory, and Giddens is not interested in the practical application of his theory (Rose and Scheepers, 2001), the practical application of Giddens' work in IS research remains a topic of discussion and debate (e.g. Jones and Karsten, 2008; Poole, 2009). Among the most popular ways to apply structuration theory in IS, is to use the dimensions of the duality of structure (Giddens, 1984: 29; discussed in Chapter 5), as key variables. The interplay between the information system and its social context is investigated in terms of the structures of signification, domination and legitimation (see Figure 7.1 below). This is also the way in which structuration theory is often applied in ICT4D (e.g. Andersson and Hatakka, 2010; Nyella and Mndeme, 2010). Variations on Giddens' original work where technology is given a more prominent role for the benefit of application in the IS field, include adaptive structuration theory (DeSanctis and Poole, 1994) and Orlikowski's (1992) work on the duality of technology (Jones and Karsten, 2008).

Apart from the more widely known appropriations of Giddens stated above, Jones and Karsten (2008), in their review of 331 IS papers, discuss those that explicitly make use of structuration theory in a variety of other ways of application. They mention papers that focus on particular concepts, such as social and system integration, the knowledgeableability of agents, and time-space analysis of social practices. The use of specific structuration concepts in IS research is also discussed by Walham and Han (1991). Jones and Karsten (*ibid.*) furthermore mention a substantial group of publications that critically engage with structuration theory, focussing for example on perceived shortcomings in the theory or the ways it has been used in IS research. From Jones and Karsten's discussion, it appears that there is no set way in which to use Giddens; in addition, there are many opportunities to extend the existing research base. Among these Jones and Karsten (*ibid.*) state the opportunity to explore and interpret structuration more thoroughly, the opportunity to give more attention to the social and institutional context within which IS is studied, and the opportunity to study contexts where social actors' agency is constrained.

For the current study, the opportunities identified by Jones and Karsten as stated above will be kept in mind, but are secondary to the study's main research aims. The researcher wishes to make use of Giddens in the manner it has been taught to her during a Sociology majors course in contemporary social theory (Mendelsohn and Gelderblom, 2004), where Giddens was interpreted in the larger context of social theory, rather than in an IS context. This is believed to be important and appropriate for a study that focuses on the social context *per se* in an ICT4D case. In this case, the social context is first described and studied as social systems of

interest, whereafter the influence of ICT on the social systems is studied. This is different from the more commonly studied interplay between ICT and the social context.

The summary of Giddens’ structuration theory in Chapter 5 will be used as the theoretical basis for its application in the systems framework. The summary in Chapter 5 is broadly based on Mendelsohn and Gelderblom’s (2004) interpretation, supplemented by reading of selected primary literature (Giddens 1979; 1984). Structuration theory concepts are included in the systems framework as separate, but interrelated elements. Further, the application of the dimensions of the duality of structure in the framework differs from its usual application in two key respects. Rather than using the labels of ‘signification’, ‘domination’ and ‘legitimation’, the structural rules and resources underlying them are used as labels. To the researcher, the notion of ‘normative rules’ is something broader than signified by the term ‘legitimation’, for example. Also, rather than using the three well known dimensions of the duality of structure, a fourth is added by separating the allocative and authoritative resources that are usually thrown together in the dimension of ‘domination’. In the Tugela Ferry case where access to resources is a key concern, this separation assists in highlighting the respective (but interrelated) roles of these resources.

STRUCTURE	signification	domination	legitimation
MODALITY	interpretive schemes	facility	norm
INTERACTION	communication	power	sanction

**Figure 7.1: Giddens’ dimensions of the duality of structure  
(Giddens 1984: 29)**

STRUCTURE	interpretive rules (signification)	resources (domination)	normative rules (legitimation)
MODALITY	interpretive schemes (stocks of knowledge)	facility	norm (rights and obligations)
INTERACTION	communication	power	sanction

**Figure 7.2: Giddens’ dimensions as by Mendelsohn and Gelderblom  
(Mendelsohn and Gelderblom 2004: 93)**

### 7.3.1.2 Overview of application of structuration theory

The concepts of the systems framework that are described below are the ones used for *data collection*. Some data collection examples are presented as well. A less elaborate version of the framework has been used for *data analysis*, as presented in Chapter 9. The framework presented below is summarised after its discussion, in Table 7.1 of this chapter.

Firstly, the elements of structuration theory are introduced as system components. The elements of action that will be used here are temporality, knowledgeable and capability, as per Mendelsohn and Gelderblom (2004) and Chapter 5. Whereas the inclusion of temporality here may seem unusual, time cycles are regarded as an important factor underlying agency in Tugela Ferry. Concepts of knowledgeable and capability will not only be considered in the context of mundane social interaction, but also in a practical context. For example, capability is related to the ability to mobilise material resources, which have a wider practical application than just the social.

The elements of social structure are resources (allocative and authoritative) as well as social rules (interpretive and normative). This study recognises that the elements of action and structure are interrelated in the structuration process, as stated in Giddens' duality of structure. At the same time, the "loosening" of the building blocks of action, structure and their underlying elements, for analytical purposes, enables a more detailed analysis and multiple linkages to be made. An important linkage that is made possible when using the structuration concepts as stated, is between the elements of structuration and the elements of autopoiesis. For example, the contribution of knowledgeable and capability to a social system's self-producing organisation can be investigated.

### 7.3.1.3 Social action

#### *Temporality*

Giddens' conception of agency is situated in time. Social action is repetitive within time cycles, whether days, weeks, seasons or generations. Structuration theory recognises the temporal existence of social actors, and the associated routines in which actions are embedded. According to the duality of structure, the daily social routines of actors contribute to long-term institutional practices, which are also the medium of daily routines.

When applied in the case study, the element of temporality considers how time is perceived by the Zulu and mission systems. Time cycles and related rituals that are central to the Zulu identity as well as to the mission's identity, are investigated. (Giddens is concerned with the "flowing" nature of time). Since the Tugela Ferry people are living among the hills, in close contact with the elements and exposed to nature, and since they have a strong social identity with associated time-related rituals, temporal events appear to have a determining influence on their identity. These recurrent and routine practices are perceived to be key aspects of self-producing behaviour in the particular systems.

### *Knowledgeability*

Knowledgeability refers to what social actors know about society and how to act in it. According to Giddens, humans are highly knowledgeable about what to do in social encounters, although much of this knowledge is practical and cannot necessarily be expressed (Giddens, 1984: 22). People make use of interpretive schemes and have commonly understood shorthand for communication, as discussed in Chapter 5. In terms of the duality of structure, knowledgeable agents know and apply rules of structure during social action, and in turn generate those rules. Social rules are absent but made present through the knowledgeability of actors (Mendelsohn and Gelderblom, 2004: 65).

In the case study, the element of knowledgeability has been used to investigate the "stocks of knowledge" (Giddens, 1984: 4; Mendelsohn and Gelderblom, 2004: 64) about social interaction that is held by the people of the Zulu and mission systems, as a requirement of their interaction within those systems. Their ability to socially interface with surrounding systems was also investigated. Social knowledge is implicit: there is a pre-understood common understanding between people sharing this knowledge, enabling them to "read" a situation in its context, even when many things are left unsaid. This kind of knowledge is taken for granted by the people using it and can possibly only be articulated in contrast with a different group or culture's social knowledge. When visiting Tugela Ferry, the implicit presence of a different and unique kind of knowledgeability is striking. In the case of the Zulus in particular, cultural interpreters living in the community were consulted by the researcher to try and gain a basic understanding of this knowledge, in particular the "practical consciousness", or continuous acting out of everyday practical knowledge, and its identity creating nature. An example that has been encountered is the way people in a traditional setting act when another person enters the room. People's gestures, who speaks first and the way people address each other are determined by relative seniority, which is again related to

age and gender. In an IT training context, the course presenter may be oblivious to such social cues and deal with a situation inappropriately. The presenter may then be faced with a response such as lack of participation, not understanding where it originates from.

### *Capability*

Capability considers the ability to intervene (or not) in a course of events, and to the availability of alternative actions, not necessarily consciously considered. The concept of power is related to capability. Giddens mentions two kinds of power: strategic and relational. Strategic power refers to the general ability to intervene, get things done and effect change. Relational power refers to the ability to influence the agency of other people in order to achieve an outcome. The opposite of capability is powerlessness. In terms of the duality of structure, capability refers to the ability to command allocative and authoritative resources, which are in turn produced by exercising power (Giddens, 1984; Mendelsohn and Gelderblom, 2004; Section 5.5.1.3 of this study).

In the Zulu context, one could look at people's means to intervene if a child becomes sick, or a drought affects the crops, or alternative income sources are sought. The researcher's impression of the community is that many of the Zulu people are often at the mercy of their circumstances, and that their ability to intervene is limited. At the mission, the people in its employ are perceived to make an effort, within their means, to enhance the opportunities available to their members, as well as to the Zulu community at large.

#### **7.3.1.4 Social structure**

Social structure refers to the "patterning of social relations" (Giddens 1984: 16). It exists as memory traces in the minds of actors, and is made present as it is instantiated in the social actions of actors. Social structure consists of social rules and resources. The use of rules can be inferred from the knowledgeableability of agents and the use of resources from their capability, as observed when they act. Rules and resources are interrelated, and are only separated for purposes of analysis, as discussed in Chapter 5.

### *Rules*

Social rules refer to the knowledge of social procedures that we tacitly draw upon during social interaction. These are the stocks of knowledge, as referred to in the section on

knowledgeability above. They inform our knowledgeable actions, and from the regularities in our actions, these rules can only be inferred. Rules are dependent on the context where they are applied. Giddens distinguishes between constitutive and regulative rules, which are different aspects of rules rather than being mutually exclusive (Giddens, 1984: 18-20; Mendelsohn and Gelderblom, 2004: 89; Section 5.5.1.6 of this study).

*Constitutive or interpretive rules* are used to classify behaviour in a particular situation. They are the sense-making rules, which we use to figure out what an action means. Words, body language and facial expressions are interpreted in the particular context where they are observed. When interacting with a different culture, assistance is needed to interpret this aspect of communication.

*Regulative or normative rules* are those that specify what should be done in a social situation, or what is acceptable behaviour. In the case study, Zulus are perceived to have regulative rules that are governed by one's place in the social structure, as determined by age, gender and rank. These rules are usually not spoken and are not directly accessible to an outsider. The mission communicates a strong set of value-based rules, making it clear what kind of behaviour is acceptable or not, based on biblical values.

### *Resources*

Resources provide the means for people to perform tasks. Resources are usually distributed unevenly through society. Resources can be mobilised to provide social power to people, while social power can again be used to gain more resources. According to Giddens (Mendelsohn and Gelderblom, 2004), reinforcing or constraining cycles can be observed, where access to allocative and authoritative resources can have a mutually strengthening effect, and enhance people's capability (as an element of action). Capable people are in a position to increase their resources. Conversely, people with few resources have a lower capability which constrains their ability to accumulate resources.

*Allocative resources* are those that assist in commanding the natural world. It can be any kind of material, technology/equipment or produced goods. Examples are money, ground, livestock, and means of shelter, food storage, transportation, and farming. Lack of access to such resources can constrain or disempower people.



*Authoritative resources* are those that assist in exercising power over people. Royal lineage or seniority in an organisation could be authoritative resources. In the Zulu community, one's gender, age and lineage, among other, influence your social standing. Diviners have authoritative power, as they are perceived to be in contact with the authority of the ancestors. In the mission, a pastor conveys a message from God, and therefore has authoritative power. According to Giddens, as explained in Mendelsohn and Gelderblom (2004: 93), authoritative resources were the base of power in non-capitalist societies, whereas allocative resources are a more important power base in capitalist societies. The strong authoritative resource base of the Zulu culture may be ascribed to its non-capitalist tradition.

According to Giddens (1984: 262), the means of storing allocative and authoritative resources are important characteristics of a society. Access to information is an authoritative resource, and the ability to store information can enhance this resource. Information collected during this research indicates that the Zulus have a strong oral tradition, possibly with special ranks of people forming the "repository". Mixed levels of literacy mean that people do not have equal access to written stores of information. Providing people of a lower social rank with a means to store and access information during IT training may upset existing implicit power structures.

### **7.3.1.5 Social practices**

Social practices are the tangible embodiment of the structuration process. Giddens refers to the following levels of socially embedded structure (Giddens 1984: 25,164; Section 5.5.2 of this study):

- Social practices: social activities which are regularly repeated by actors;
- Social systems: social practices repeated over time and space, by many actors;
- Institutions: social practices deeply embedded in time and space; and
- Society: a strong cluster of institutions, often going along with a particular locale or type of locale, and a shared social identity.

As can be seen from the above, social practices are the ingredient of social systems, as defined by Giddens. Social practices link the process of structuration, and thus the elements of action and structure, with the notion of a social system.

The two systems of focus in the case study, as systems served, each have a rich set of social practices, many of these found in rituals. Work that has been done to describe the two social systems using the other framework elements of structuration, together with supplementary material on cultural practices, are used to describe the social practices.

Considering the levels of socially embedded structure noted above, the Zulu community as well as the mission has institutionalised practices and to some extent operates at the level of ‘society’. The notion of social system as applied to the case study also considers the more deeply embedded social practices.

### **7.3.2 General autopoiesis elements**

Key elements of autopoiesis theory (Varela et al., 1974; Maturana and Varela, 1987; Luisi, 2003) are used in the subsections that follow to describe the two systems investigated, as well as the interaction between them. The elements of autopoiesis have been introduced in Chapter 6. Their application in a social context is not straightforward. For each element, its original definition is presented again below before commencing with a social application, the latter taking into account aspects of Maturana and Varela’s (Chapter 6), Giddens’ (Chapter 5) and Mingers’ (Chapter 6) work, other literature on social autopoiesis (Chapter 6) as well as the practical situation faced with on the case study.

#### **7.3.2.1 Organisation**

A system’s organisation refers to “the relations between its components that realise the system as a whole” (Varela et al., 1974: 188). It can also be regarded as a system’s functional description, by which the system can be distinguished or identified. In a social autopoiesis model using structuration theory, the distinguishing relations of a social system would be its particular processes of structuration. In the systems framework, the processes of structuration are described with reference to the elements of social structure of the system. Thus, the *identifying social structure* of the system can be used to describe its organisation. Practically, we need to keep in mind that neither the processes of structuration nor the social structure is visible to the observer – these are only inferred from action and/or social practices.

As an example of data relating to the element of organisation, the identifying social structure of the mission is its Christian faith and associated biblical values. This value system is observable as it is preached from the pulpit as well as in attempts by its members to practise it. In particular, the officials of the mission have realised that they will win over the Zulu

community by their deeds rather than their words. In this spirit, they have attempted practical interventions in the Zulu community that display a caring value system and that provide practical help, such as an orphan care centre.

### **7.3.2.2 Structure**

It is potentially confusing that structuration theory and autopoiesis theory each has its own definition for the term “structure”. The phrase “social structure” will be used when referring to Giddens, to make it clear from the context which term is referred to.

Structure, in the autopoietic context, refers to the observable characteristics of a system, in terms of its components and their relations. It is the particular embodiment of its organisation, since one kind of organisation can be embodied in different structures (Turpin, 2009; Maturana and Varela, 1987: 47; Section 6.2.1 of this study). The observable instantiations in Giddens’ social system are social practices. In this study, social practices are associated with a visual richness in their instantiation, and artefacts that symbolise social practices will also be included in the definition of structure.

Examples of artefacts that symbolise social practices are the parts of dead animals which decorate the houses of Zulus who practise ancestral worship, such as horns of a buck that are fixed to the roof of a dwelling. An example of a unique structural element found in another social system in Tugela Ferry, namely the Shembe church, is the manner in which places of worship are demarcated with white stones on the ground. These white stone circles or squares can be seen from afar, and everyone living in the vicinity knows what these stones signify.

### **7.3.2.3 Organisational closure**

An autopoietic system is open from a structural point of view and actively engages with its environment. However, for a system to be considered autopoietic, it needs to be organisationally closed. Organisational closure refers to the means by which a system creates its own boundary, in order to have a functionally autonomous existence. One of the largest debates in social autopoiesis literature is about whether and how organisational closure can be shown for social systems. Whereas a biological system has a clearly identifiable boundary, the same is not true for social systems. The notion of a boundary that appears most feasible in the social domain is a boundary of distinction (see section 6.3.6.1). Even with such a boundary, it is difficult to show organisational closure and many scholars believe it is not possible. However, the literature review on social autopoiesis in Chapter 6 concludes that the principles



of autopoiesis could be applied to a social system without having to claim that the system is autopoietic or organisationally closed.

The above stated conclusion is followed rather than trying to make an argument for the organisational closure of the Zulu and mission systems. In the case study, an investigation is made as to what factors contribute towards the organisational closure of the systems, and what factors work against closure. This forms part of the investigation into reinforcing, identity creating, self producing and sustainability creating mechanisms in the systems at hand, which contributes to the notion of ‘development’ in ICT4D, and the mechanisms countering sustainability and thus development.

#### **7.3.2.4 Structural drift**

Structural drift refers to the changes in structure over time, as part of the mutual adaptation between the system and its environment (which can include other systems). In autopoiesis theory, structural drift assumes the conservation of organisation. However, in a social system the distinction between changes in organisation and structure is less clear. Social structure (being the social system’s organisation) and social practices (being the social system’s structure) continually influence each other.

For example, a traditional Zulu family who live in a hut made of reeds and mud may upgrade to a brick house. A brick house provides the possibility of alternative living arrangements, since it can have multiple rooms, as opposed to huts that are single roomed structures. A traditional household would consist of multiple huts, including a cooking hut, whereas a brick house can have a kitchen. Modern houses can be electrified. One of the common pieces of electrical equipment observed in a modern Zulu house, is a television. The television is not just an artefact but brings along with it the underlying cultures and value systems of the programmes broadcasted. This may have a structural influence, such as promoting clothing fashions. However, it could also have an influence on organisation if it influences the culture, value systems and associated social practices of the television watchers.

In this study, the term “drift” will hence be used to refer to changes occurring in the social system over time, whether related to their social practices or their social identity.

### 7.3.2.5 Structural coupling

Structural coupling refers to the recurrent interactions between two or more systems, or between a system and its environment, such that a change initiated by one triggers a structural change in the other, and vice versa. Through a series of non-destructive mutual triggers, they manage to co-exist in a compatible way (Maturana and Varela, 1987: 75; Section 6.2.3 of this study).

When applying this concept in the social domain, it can assist to study the ‘horizontal interdependence’ and ‘vertical complementarity’ that form part of Roode et al.’s (2004) notion of human development. Roode et al.’s (ibid.) definition was developed to apply in an ICT4D context, where it is acknowledged that socio-economic development requires a self-reliant social system that has successful interdependence relationships with surrounding systems.

The case study investigates how the mission and Zulu systems co-exist and influence each other. The structural coupling between these two systems and their respective environments are also studied. For example, in the relationship between the mission and the Zulu community, it appears that the mission assists, within their means, to enhance people’s capabilities as well as their material resources (medication, food, access to welfare grants), using the language of structuration. In this way, numerous orphans and sick people are dependent on the mission for their physical wellbeing. The mission is dependent on the goodwill and social acceptance of the Zulu community in order to stay and operate as they are. As such, they respect the interpretive rules and knowledgeability of the Zulus, but introduce new normative rules with a biblical value system. The mission benefits from the harmonious relationship, which helps to provide an appropriate setting where they can practise their spiritual calling, and as such act out the interpretive as well as normative rules that guide the mission’s members.

For the ICT4D project, knowledge of the structural coupling between the mission and traditional Zulu systems is essential. The ICT4D project team only has access to the mission; the barriers of language, culture and geography prohibit them from direct access to remote rural people. However, the aim of the ICT4D project is to contribute to the socio-economic development of the Zulu community at large and not only to the mission. If the ICT4D project can show that, because of the structural coupling between the mission and Zulu systems, the Zulu community can indirectly benefit from the IT training that they provide to the mission people, they can show that they have achieved their broader aim.

### 7.3.2.6 Sustainability

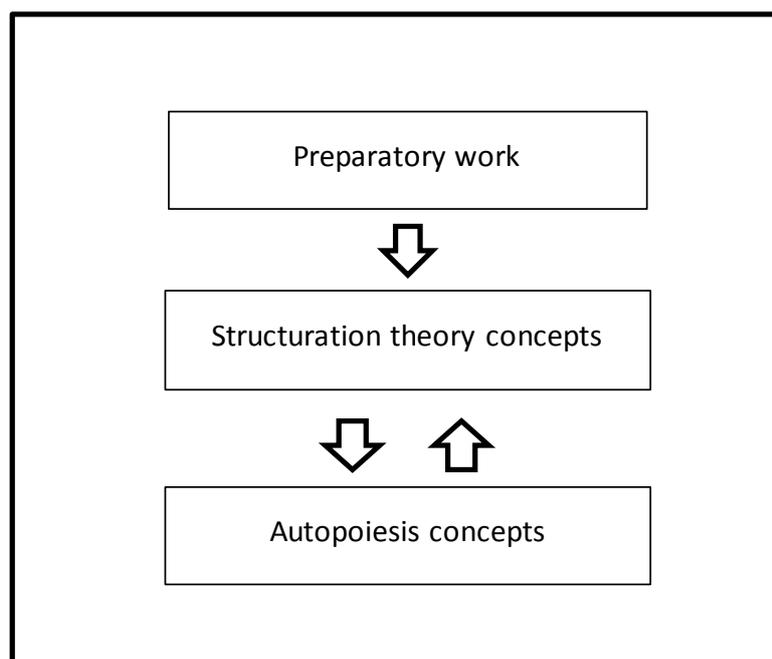
According to Luisi (2003: 51), an autopoietic system is one that is self-sustaining, or able to maintain itself. As discussed in section 6.2.10, an autopoietic system is autonomous (Maturana 1981). Autopoiesis implies autonomy as well as sustainability, but not the other way round. Autonomy and sustainability, as related to autopoiesis, are useful concepts to apply to a social system.

The question of sustainability is key in ICT4D. In Chapter 2 it is argued that an ICT intervention that contributes to the sustainability of the social system in which it is introduced, contributes to development. A way is then needed to assess the sustainability of the social system, and how sustainability is influenced. Luisi's (2003) work which links autopoiesis and sustainability indicates that autopoiesis concepts can be used to study sustainability. Self-producing mechanisms that strengthens the system and work towards autopoiesis, will work towards sustainability. Problems with sustainability will indicate that self-producing mechanisms are not effective.

In the case study, the sustainability and related dynamics in the Zulu and mission systems are investigated. Work performed under previous headings, such as the description of the internal system dynamics based on structuration theory, and the study of the systems' structural coupling, will be used to assess the sustainability of the two social systems. Once this is done, the effect of the ICT4D project on the sustainability of both the social systems served will be investigated.

### 7.3.3 Systems framework: summary and synthesis

A summary of the systems framework is presented in Figure 7.3, while a detailed diagram with all the elements of the framework is given in Table 7.1. Giddens' dimensions of structuration theory are used to seek reinforcing cycles of behaviour that are core to the identity of the systems investigated, and in this manner describe the systems from the inside. The general autopoiesis elements and characteristics of the systems are described when applying the framework to provide, in addition, a description from the outside. The descriptions of the basic autopoiesis elements are used together with the information generated by structuration theory, to assess the autopoietic or self-sustainable character of the two systems, and their interaction with each other and their environment. After describing the Zulu and mission social systems (as systems served) in this manner, the ICT4D project is also described, as the serving system. By considering mutual influences among these systems, it can be assessed whether and how the ICT4D project influences the self-producing mechanisms of the systems served. Such an analysis is used to assess the contribution of the IT literacy training towards the sustainability and socio-economic development of the systems served.



**Figure 7.3: Overview of the systems framework**

<b>Preparatory work</b>
Background sketch, including a CATWOE description of each system Stating of assumptions and simplifications

<b>Concepts of structuration: description from within the systems</b>				
Giddens' dimension:	Structure of signification	Structure of domination	Structure of domination	Structure of legitimation
Element of structure:	Rules (interpretive)	Resources (allocative)	Resources (authoritative)	Rules (normative)
Element of action:	Knowledgeability (of interpretive rules)	Capability (to apply allocative resources)	Capability (to apply authoritative resources)	Knowledgeability (of normative rules)
For a social system: Rituals (notion of temporality: daily, lifetime and institutional time spans) Social practices				

<b>Concepts from autopoiesis theory: looking at the systems from outside</b>	
Use Giddens to populate:	<ul style="list-style-type: none"> <li>Organisation</li> <li>Structure</li> <li>Drift</li> <li>Organisational closure</li> <li>Structural coupling</li> </ul>
Derived concept:	Sustainability

**Table 7.1: Elements of the social systems framework**

It is noted again that although the systems framework elements are independently listed, they are all interdependent, and only separated for purposes of analysis. Giddens' dimensions of action and structure are simultaneously part of the processes of structuration. The identity creating structuration processes within the system is part and parcel of its organisation, as it appears under the autopoiesis heading. The information collected under the elements of structuration contributes to the description of the autopoiesis elements. The interdependence

of the framework elements may result in some repetition of information during the analysis exercise, or when repetition is avoided, the descriptions of some system elements appear shorter than other. All in all, the interdependence between elements is believed to strengthen the overall framework.

### **7.3.4 Use of the framework for data collection and analysis**

Research that is performed in a deductive manner, where data is collected and interpreted by means of a theory, requires a set of variables to be stated that will guide data collection and analysis. In this study, the elements of the systems framework presented in Table 7.1 are used as a guide for data collection. This does not mean that system elements are directly presented to interviewees, or that information collection is limited by the theoretical lens only. The system elements described above are academic terms, remote from the life world of people in the Tugela Ferry community, many of whom are illiterate and do not have English as first language. As such, a much richer set of data is collected with the aim of mining it for themes related to the system elements. The process is deductive since the theoretical framework remains at the back of the researcher's mind while asking questions and listening to people talking about their life worlds.

Data collection and analysis is done by broadly applying the principles of hermeneutics (Myers, 2009). According to the concept of the hermeneutic circle, the overall understanding of the situation is constantly reviewed in the light of new data collected, and vice versa. In this study, the research process has been hermeneutic. Research has been done in an iterative manner, where initial data collection has influenced the systems framework as well as subsequent data collection. Interpretation of data has started at the same time as data collection and has influenced further data collection. The elements of the systems framework were established relatively early on in the hermeneutic process, and have remained a reference point guiding data collection and analysis subsequently. However, the understanding of the system elements and their application has been modified with rereading of the theoretical material.

Under the heading of each element of the systems framework presented above, its application to the case study is discussed. Examples are presented to illustrate the use of the elements and guide data analysis. The result of the data analysis to follow is a systems description. The systems description is done at a conceptual rather than detailed level, with the aim of demonstrating the framework as well as assessing its value. Data analysis is done by means of

a continuous hermeneutical interpretation, keeping the systems framework, underlying theory, illustrative examples as well as an initial systems description in mind. The data analysis exercise is described in more detail in Chapter 9.

## 7.4 Conclusion

A social systems framework has been presented in response to the research question:

- What is an appropriate social systems framework with which to study the impact of an IT intervention in a remote, rural African community?

The framework's main supporting theories are Giddens' structuration theory and the theory of autopoiesis, with inputs from Mingers's work on social autopoiesis. The framework is unique in that the concept of social autopoiesis has not been developed into an operational framework and practically tested in this manner before.

The systems descriptions that follow from the framework will help to assess the self-producing dynamics of the two systems served, and their interdependence on each other and their environment. This creates a means to investigate the impact of the ICT4D project on the two systems, to see whether and how it contributes to the socio-economic development and sustainability of the systems at hand. As such, the elements of the framework build up towards assessing a social system's sustainability, which is a novel way to regard sustainability in an ICT4D context.

In Chapter 5, it has been shown that at conceptual level, the framework meets the stated criteria for a social systems framework, and in particular how its application can assist to meet the research aims of the study. In Chapters 8 and 9 that follow, the framework will be applied empirically when used as an instrument for data analysis on the ICT4D case study. In this way, the framework's practical value can also be assessed.