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Opening the black-box of technology within the Capability Approach

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[1] Machine with knowledge of cattle management

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Chapter 1: Introduction

1-1 Technology and the Capability Approach

Today, still people in many parts of the world face anguishing problems; they live in scarcity of food, shelter, health, education and without a prospect of any improvement of their living conditions. They are mainly living in so-called developing countries. Often these countries are also threatened by political and social oppression, great inequalities, great deficiencies and diseases, and conditions like HIV. Development projects in such countries are not always successful. But how to determine successful development and what elements are related to that success?

In the lower Zambezi valley of a developing country Zimbabwe, the Non Governmental Organisation (NGO) Practical Action (PA) in cooperation with the community based organisation (CBO), Lower Guruve Development Association (LGDA), ran two development projects. During both projects the ability of the local people to determine their own development was highly respected. The projects were initiated, carried out and evaluated in a highly participatory manner. During the first project it was identified that local people were hardly able to support themselves, due to poor farming techniques. It was also identified that the governmental knowledge dissemination system did not provide the local people with appropriate information in an effective way. The system had to deliver information that the audience would understand and could apply. Therefore, in the first project, PA and LGDA set out to improve knowledge provision on livestock production and management and crop cultivation to improve local people's livelihoods. Being secured of their livelihoods, people would be able to improve different aspects of their lives. In some district wards, this first project was complemented by the second project, named "*local content, local voice*". During this project an information and communication technology (ICT) was introduced in the community. The ICT aimed at an even more efficient and continual information dissemination among people.

In their article about the project "*local content, local voice*", Grimshaw and Gudza (2010, pp. 86-90) define development, based on Amartya Sen's Capability Approach (CA), as a process of expanding the real freedoms people enjoy. Although referring to the CA, they have not further analysed the project making use of the CA and its central concepts and ideas. The CA is a framework to assess human development. Scholars working on the CA see poverty in terms of deprivation of capabilities.

Development should aim at the increase of capabilities that people enjoy and the increase of people's agency in defining their own development goals.

Although the CA offers us a framework to evaluate human development, it does not offer us an extensive explanation about the nature of human capabilities and of how certain human capabilities come about. Scholars working on the CA acknowledge the importance of resources, like technologies. Technologies can expand human capabilities depending on individual, environmental and social factors. These factors can also limit the use of technologies and thereby limit human capabilities. However, it seems that scholars working on the CA implicitly have an instrumental vision of technology and see them as passive instruments with characteristics that are merely able to expand its users' capabilities (Oosterlaken, 2009a). So far it seems that they have not considered the complex interaction between technological and social changes and thereby they are not sensitive to how socio-technical changes can expand or diminish human capabilities.

The complex relation between technology and society is analysed by scholars working in the disciplines Philosophy of Technology (PoT) and Science and Technology Studies (STS). Two perspectives which are particularly useful to analyse how the socio-technical configuration evolves are the Actor-Network-Theory (ANT) (Akrich, 1992; Latour, 1992, 1997, 1999) and the Domestication framework (Sørensen, 1994, 2006). Scholars working on both perspectives acknowledge that technologies and humans mutually influence each other in a network. Concepts within the ANT are useful to analyse the network and the mutual shaping within the network. On the one hand, the characteristics of technologies (which are inscribed in the technology as a script on the basis of presumed use) influence the network and on the other hand, the users' intentions exert influence. The concepts within the domestication framework are useful to scrutinise how this mutual shaping actually occurs. What humans and technologies are, and are capable of doing depend on the actual constitution of their surrounding network. Will changes in this socio-technical network be responsible for the coming about or the diminishing of human capabilities?

Nowadays, approximately one year after both projects in the lower Zambezi valley ended, the community has incorporated the ICT within their culture and still uses it with great enthusiasm. Because the projects have already ended, it is now possible to analyse whether the enjoyed capabilities today are the same as those intended by the project initiators. It is also possible to investigate how the network surrounding the technology changed. Subsequently an analysis of how elements within the network surrounding this specific ICT lead to human capabilities can be made. By answering these questions, I will address my general question: "*How do the script of a specific ICT and the human capabilities of the people using the technology co-evolve in the process of domestication?*"

I will answer this main question on the basis of ethnographic research done among community members in Zimbabwe and a literature study of documents on the development projects. During this ethnographic research I have conducted forty-four semi-structured interviews and did four participatory observations. During these interviews and observations I focussed on relevant people in the network surrounding the ICT. I analysed on what basis the ICT was defined, how it was actually used and how it influenced human capabilities.

1-2 Purpose of the research

This research aims to contribute to a richer understanding of the relation between technology and the CA. As Robeyns (2005) already indicated:

> "*Note that the capability approach is not a theory that can explain poverty, inequality or well-being; instead, it rather provides a tool and a framework within which to conceptualize and evaluate these phenomena. Applying the capability approach to issues of policy and social change will therefore often require the addition of explanatory theories"* (p. 94).

In this research I will make use of theories from STS and PoT in order to contribute to an explanatory theory that focuses on how technologies expand human capabilities.

This theory will provide a possibility to apply the CA to technological development for developing countries. Thereby the outcomes will hopefully be relevant for people living in developing countries. It will benefit them if less technology projects fail and when technologies better expand their enjoyed human capabilities. For this reason the purpose of this study is also to provide PA, LGDA and other technology promoters working in developing countries with theoretical insights, which could be applied in practice.

1-3 Thesis´ outline

This report is divided in three parts. In part I, I will sketch the theoretical background and aims of the research. In chapter two, I will present my theoretical framework, where I will introduce the theories I will use in the report. The first theory is the CA, which is a framework to assess human development. Subsequently I will introduce the ANT and the domestication framework. In the end of this chapter, I will identify a gap between the theories which I want to fill in by an analysis of a case study. In chapter three I will present the methodology which I used during my ethnographic research in the Lower Zambezi valley in Zimbabwe. In this chapter, I will also present my research questions and limitations to the research.

In part II, I will describe and analyse the case study. Chapter four provides context; the history of Zimbabwe and its culture is described and special attention is paid to the characteristics of the Lower Zambezi valley. In the first part of chapter five, the two development projects will be introduced and the characteristics of the ICT will be scrutinised. In the second part, the projects will be analysed in terms of the CA. In this chapter I will answer the first and second research question (see chapter three). In chapter six, I will answer the third and fourth research questions, by analysing how relevant people enacted the ICT in their daily lives. I will also describe which human capabilities these actors actually enjoyed.

In part III, I will contribute a hypothetical explanatory theory by which I will try to close the gap identified in chapter three. The main research question will be answered in chapter seven. In this concluding chapter, I will analyse how the actual human capabilities related to the conflict between the script written in the technology, and the use intentions of the local people.

Part I

Chapter 2: Theoretical Framework

Introduction

In recent years the Capability Approach (CA) has gained wider attention as a framework to assess development. Scholars working in this framework consider the various things a person may value being or doing as the most important aim of development. It considers resources, like technologies, as important means to this end. Technologies, however, have a more complex interaction with humans and society than is considered by the scholars working on the CA. The disciplines Philosophy of Technology, and Science and Technology Studies, provide some useful insights in this complex interaction. At first, I will discuss different views regarding the role Information and Communication Technology (ICT) plays in development. This discussion serves as a background to introducing the CA. In the following paragraph, I will introduce the Actor Network Theory (ANT) and the domestication theory, as tools to analyse the reciprocal influence of humans and technologies. Finally, I will identify the gap in the framework, which I will try to fill in part two of this report.

2-1 Information and Communication Technology for Development (ICT4D)

Information and Communication Technologies (ICTs) are often seen as promising solutions to the anguishing problems faced by people living in developing countries. Proponents of implementing ICTs in developing countries align diffusion of technologies with economical and social development (Zheng & Walsham, 2007). They see the lack of information and knowledge as the most important reason for poverty and they say that the knowledge gap between the elite and the poor is growing due to the increasing "digital divide". Proponents think that provision of ICTs to marginalized groups can close this knowledge gap. Their focus is primarily on access and usage of ICTs; they presume that access and usage will automatically empower its users (Gigler, 2004).

Opposed to the presumed intrinsic value of ICTs, critics point at possible social exclusion in an e-society (Zheng & Walsham, 2007). ICTs can certainly contribute to the empowerment of the poor, but it will not necessarily do so. Within the ICT4D debate, the positive stance towards ICTs is contested by pointing at the influence of socio-economic inequalities. ICTs can exacerbate social exclusion instead of closing the "digital divide" (Zheng & Walsham, 2007). Critics argue that ICTs are able to provide marginalised people with opportunities to empower themselves, but are also able to reinforce

existing power inequalities. These power inequalities can be political, socio-economical and cultural, and when reinforced by ICTs, marginalized groups can be inhibited to disseminate their indigenous knowledge.

> *"Thus, rather than the lack of knowledge of poor communities, the existing political, socio-economic and cultural barriers between the urban elites and the poor, inhibit marginalized groups to make their information and knowledge known and disseminated, blocking their participation in the dominant society's political and economic system"* (Gigler, 2004, p. 3).

Empowerment by ICTs is complex and depends on the dynamic relation between people, social context and technology (Gigler, 2004).

Responding to this ICT4D debate, Gigler (2004) argues for a more "people centred" approach. According to Gigler, the proponents as well as the opponents of ICT4D have as "*the focal point of their investigation technology and its societal, economic and political impact"* (Gigler, 2004, p. 1). Instead the focal point of the investigation should be the development goals and priorities defined by the marginalized people themselves. ICT intervention should incorporate these prioritized goals. To arrive at real benefits, ICTs should be locally appropriated and the information provided by ICTs should be contextualized (Gigler, 2004). The CA developed by Nobel Prize laureate Amartya K. Sen is particularly useful to identify these development goals.

2-2 The Capability Approach

According to Sen, quality of life is not about the possession of commodities but lies in the living itself. It is not about the resources, but about what the resources enable people to do and to be what they value. According to Sen, only human beings and their flourishing are of intrinsic importance and should be considered as the ultimate objective of development. Utilities, like money, are merely instrumental means to achieve the objective. In order to measure the quality of life Sen proposed an alternative space for assessing well-being. In this space the genuine opportunities people enjoy, to live the life they value, are evaluated. Development should be seen as increasing the freedom that people enjoy to do and to be what they value. Hereby mainstream economic theories and egalitarian approaches focussed solely on material inequality had been challenged by Sen by arguing that inequalities relate to a lack of opportunities, freedoms and choices (Zheng & Walsham, 2007).

At the core of the CA are the genuine opportunities a person enjoys, and *"the various things a person may value doing or being"* (Alkire, 2005, p. 118). Sen calls the genuine opportunities "freedom", and the various things a person may value doing or being "functionings". To capture freedom and

functionings, Sen introduces the concept "capabilities", which are the alternative combinations of functionings that are feasible for a person to achieve (Crocker, 2009, p. 168).

In the field of the CA there is still a debate about how capabilities should be measured and assessed, and whose criteria should be used during assessment and measurement. It is hard to measure capabilities, because they consist of different opportunities to achieve valuable functionings, between which people can choose. An achieved functioning is measurable but it is hard to measure all the different opportunities a person enjoys. There is also a debate about which criteria should be used to assess whether functionings are valuable or not. Should we use a universal account of valuable capabilities, and assess local circumstances against this universal account or should we respect different traditional ways of thriving? The former faces epistemological problems, because where does this account of valuable capabilities come from and how to assess that this account is the best? The latter respects differences but makes it hard to find a basis for criticism of injustice and oppression done by other cultures (Nussbaum & Sen, 1993, p. 4).

According to Sen, individuals and groups should have the freedom and responsibility to decide how to live their own lives. Individuals and groups should be agents of their own lives. According to Sen, agency and well-being are *"two distinguishable but linked aspects of human life"* [2] (Crocker, 2009, p. 150). Sen defines agency as *"the freedom to set and pursue one's own goals and interests"* (Zheng & Walsham, 2007, p. 3). One's own well-being can be such a goal, but it is also possible to set and pursue the well-being of others or to respect social and moral norms. Well-being is defined as someone's own *"wellness", "personal advantage" or "personal welfare"* and consists of capabilities and functionings (Crocker, 2009, p. 151). Both agency and well-being are important elements of the CA in Sen's view.

Many scholars working on the CA acknowledge the importance of resources, like technologies, but they emphasise that there is no direct relation between goods and the functionings its owners can achieve (Robeyns, 2005). To build their argument, they point to the conversion factors which enable persons or groups to make valuable use of the resources. Converting the characteristics of a resource into a valuable functioning occurs via three conversion factors. The first, personal conversion factors, includes a person's physical condition, sex, intelligence, skills, endowments etcetera. Second, social conversion factors, which include public policies, social norms, societal hierarchies, customs, power relations, discriminating practices etcetera. Third, environmental conversion factors, which include geographical location, climate and infrastructure (Robeyns, 2005). By focussing on these conversion

[2] Nussbaum does not make the distinction between agency and well-being, and does not restrict well-being to personal welfare. She thinks that functionings and capabilities capture this distinction sufficiently (Crocker, 2009, pp. CH4 p21, 30-31)

factors it becomes clear how capabilities might be limited. Figure 1 shows the relation between resources, capabilities and functionings and how choice and the conversion factors mediate these relations according to scholars working on the CA.

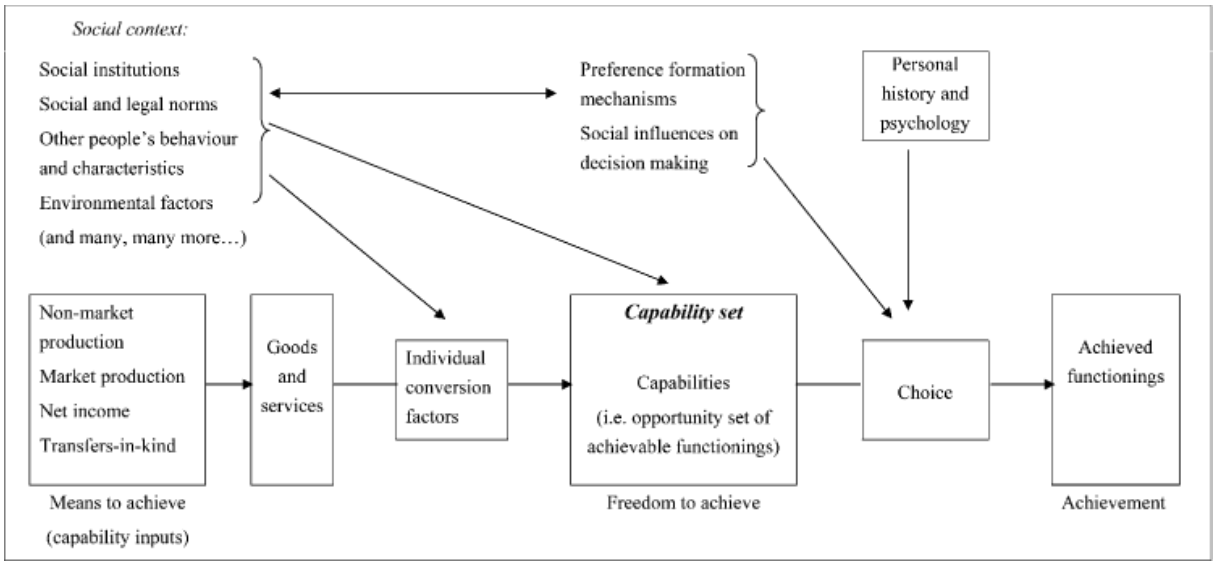

Figure 1: A non-dynamic representation of the relation between goods and services (including technologies), a person's capability set and his/ her social and personal context (Robeyns, 2005).

2-3 Technology and human capabilities

How technologies, when the conversion factors are met, exactly expand users' capabilities is not explained by the CA. Robeyns (2005) has pointed out that the CA needs to be extended by other theories to explain the actual process of increasing capabilities. The application of the CA to technology would therefore also require additional theories.

Although a specific technology, the bicycle, is often used to elucidate how technology expands its user's capabilities (Robeyns, 2005; Sen, 1983), the study of the role technologies play in human live is still underdeveloped in the theory of the CA (Oosterlaken, 2009b). Sen (1983) says the possession of a bicycle enables its owner to move about in a way that he or she may not be capable of without the bicycle. The capability to move about in this specific way is enabled by the transportation characteristics of the bicycle. Furthermore, the moving about will possibly give the possessor of the bike utility, happiness or pleasure. Sen sees a sequence from a commodity, to characteristics, to capability to function, to functioning, to utility. The owner of the bike can freely choose to use the bike or not, thereby people determine the ends towards the means are put. Oosterlaken (2009a) argues that scholars working on the CA have an implicit instrumental vision of technology, because so far they have portrayed technologies only as neutral means which can be put into use towards the ends that users choose – as the bicycle example illustrates. So far Sen has not paid any attention to the

complex interaction between technology and social changes and thus has not acknowledged yet that it is not merely artefacts, but rather socio-technological constellations which lead to capabilities.

To understand how these socio-technological constellations exactly expand human capabilities, it is necessary to understand the nature of capabilities. Nussbaum (2000) makes a distinction between: basic capabilities, internal capabilities and combined capabilities. Basic capabilities are a person's personal endowments. The internal capabilities are the developed states of those endowments due to for example training or nurturing. The combined capabilities are the combination between external conditions with internal capabilities which make certain functionings possible. According to Nussbaum, the focus should be on the combined capabilities; these are the capabilities that ultimately matter from the perspective of the CA. Her ideas resemble the ideas of Smith and Seward, who argue that human capabilities are contextual and relational in nature, since a person's capabilities depend on the specific combination of his/ her individual capacities and his/ her position in a social structure (Smith & Seward, 2009). From this interaction the capabilities to do or be something emerge. Oosterlaken (2010) argues that technological artefacts need to be added to this interaction as well. Technologies, social structures and individuals mutually constitute each other. A person's capacity and his/ her position in the network (including other humans, technologies and institutions) determine his/ her capabilities.

Particularly useful to analyse the relations within a network, consisting out of humans, technologies and institutions are the Actor-Network-Theory (ANT) (Akrich, 1992; Akrich & Latour, 1992; Latour, 1992, 1997, 1999) and the Domestication Framework (Lie & Sørensen, 1996; Silverstone, 1994; Silverstone, Hirsch, & Morley, 1992; Sørensen, 1994, 2006). The ANT and the domestication framework are sensitive to the **mutual** shaping between technology and social changes. Insights gained from ANT and the domestication theory will enable a better understanding of the relation between technologies and human capabilities.

2-4 Actor-Network-Theory, the sociology of associations

Technologies are much more than passive instruments and to give credit where credit is due, we should understand technologies as mediators. Mediators which also constitute, transfer, and translate meanings and human behaviour (Latour, 1992). Technologies constitute relationships, contain morals and translate action. On the other hand, technologies do not determine human behaviour, since users can refuse to use them or choose to use them differently (Latour, 1992). How are we to understand this relation between user (subject) and technology (object), and thereby come to a better understanding of how human capabilities expand?

Akrich (1992) and Latour (1992, 1993) both try to overcome the radical dichotomy between subject and object. This distinction is deeply integrated in philosophy since the enlightenment. According to Latour (1993), objects and subjects are made simultaneously. Instead of the subject-object distinction, he often talks about the distinction between humans and non-humans (which includes technologies). In his view, the materialists (technological determinists) who claim that technologies act autonomously, and the social constructivists of technology who argue that human action shapes technology, are both mistaken when they explain the relation between technology and humans. Latour treats humans and non-humans equally and refers to both of them as actants. What actants are, and are able to do, depend on how they are bound up with each other in a network. Within this network the exchange of human and non-human properties takes place, which confines and enables the existence and roles of humans and non-humans. According to Latour the *a priori* distinction between humans and non-humans is false, because they are mutually involved (Latour, 1999).

Within the network of actants, actants become, they come in existence, they emerge. To make this becoming clear, Latour (1997, p. 24) talks about essence and existence. The bulb of metal and plastic which we call a car, a driving device, only becomes a car within its network of other actants, like drivers, roads, petrol stations, traffic rules, mechanics, factories, sleeping policemen and so on. Only within this network it is possible to speak of the essence of a car. Also a driver would not exist without this network. Latour rejects a pre-established essence and says that the essence of actants arises from the existence of its links with other actors within the network. This network is constantly evolving, since actants will be dismissed out of the network, introduced into the network, or replaced by new actants. Thereby new relations will be established and therefore essences will be temporal. How actants relate determines how entities are being present to human beings and how human beings are constituted. *"The twin mistake made by the materialist as well as the sociologists is that they start with the essences, those of subjects or those of objects"* (Latour, 1999, p. 180). Instead of an actant's existence being determined by its essence, its essence is determined by the existence of its relations with other actants in the network.

To grasp an actant's temporal essence, we have to study how the relations between humans and non-humans develop and fall apart. With the help of the four meanings of mediation it is possible to understand the collective[3] of humans and non-humans. The first meaning is translation becomes clear through Latour's example of the gunman (Latour, 1999, pp. 176-178). Suppose a man who wants to take revenge on someone else, because he was picked on by that person. The program of action of the

[3] The collective refers to associations of humans and non-humans. Latour refuses the opposition between society and nature, which according to him is, like the subject object distinction, a product of the enlightenment. The nature society distinction blur "*the political process by which the cosmos is collected in one liveable whole*" (Latour, 1999, p. 304). The association between humans and non-humans makes the political process central and emphasis the mediated character.

man was “take revenge upon person x”, but he soon finds out that he does not have the physical power to hurt the source of the harassment. So he decides to incorporate another actant, a gun, in his network: he makes a detour. The man together with the gun, the gunman, is able to take revenge, but the man’s original program of action is translated by the gun’s program of action (“shooting”) and becomes “take revenge on person x by shooting”. This is the program of action of the gunman, which exists due to the translation of the original programs of action by the intentions of the different actants involved in the network. Action is not a property solely of the man, but the actorship is spread out over him and other actants to which he relates. The complexity of how actants relate and jointly perform an action is what Latour calls composition, the second meaning of mediation. “*Action is simply not a property of humans but of an association of actants,* ...[which] *are in the process of exchanging competences, offering one and another new possibilities, new goals and new functions*” (Latour, 1999, p. 182). This exchanging of competences, possibilities, goals and functions between actants, humans and non-humans usually remains hidden. The blending between the actants is made opaque by a process, called black-boxing, which makes the network invisible. The third meaning of mediation is reversible black-boxing, or the folding of space and time. By means of reversible black-boxing it is possible to analyse the intermingling of actants. The last meaning of mediation is delegation. It is possible to delegate the realization of a program of action from a human being to a sign or even to a thing. This shifting in medium is actorial, from a human to a sign, to a thing. The shifting is also spatial and temporal; a thing is able to do its job day in day out on the same spot. With the meanings of mediation in mind it is possible to understand the reciprocal relation of humans and non-humans.

The first two meanings of mediation; translation and composition, replace the subject object distinction. To capture these two meanings in a diagram, Latour introduces the terms substitution and association, which enable us to analyse the temporal essences of humans and non-humans. To analyse the temporal essence it is important to acknowledge that the essence is determined by the existence of a specific network, the composition of different actants. Latour tries to capture this part by association, the OR dimension in figure 2. Secondly, it is important to acknowledge that actants translate programs of action of other actants within the network (translation). In figure 2 substitution and association are explained from the perspective of a hotelkeeper, who has the following program of action: “all visitors should hand in the key when leaving the hotel”. To accomplish this program the hotelkeeper can simply do nothing next to relying on morally correct behaviour (according to the hotelkeeper) of the visitors. But this will, most likely, end up in disappointing results. The amoral visitors have their own program of action, an anti-program seen from the perspective of the hotelkeeper, which is: “carrying the key everywhere I go since I pay for the room”. To counter this anti-program of action, the simplest solution would be to ask the visitors to hand in the key when they leave. This will extend the network with an oral message and will slightly change the hotelkeeper’s initial program of action since he or she will not rely anymore on the morally correct behaviour of the visitors. Instead the visitors will

hand in the key because they were asked to do so. But even when asked, most people will not obey. The hotelkeeper introduces a permanent sign in the network, which says: "please hand in your keys when leaving the hotel". But to be absolutely sure that every key will be returned, the hotelkeeper can attach a giant key ring to every key. This new association will also translate the former program of action into "hand in your keys because otherwise you have to carry the heavy load". So the number of associations and the translations of programs of action enable us to say something about the temporal essence of the actants involved.

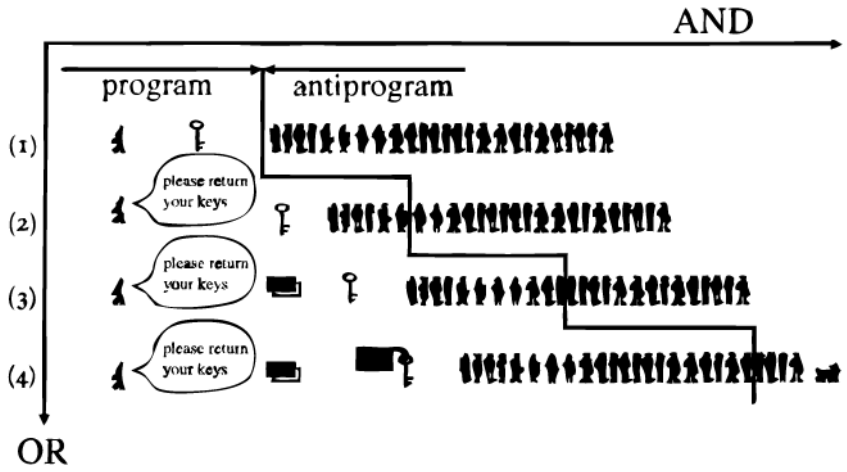

Figure 2: Substitution (OR) and association (AND) (Latour, 1997, p. 58).

Technologies are able to constitute and extend associations within social structures. Akrich (1992) shows how an electricity meter within an electricity network was able to allocate property in Ivory Coast. Before the network, the elders collectively owned village property, but when the authorities started to think about electrification they decided that a more stable allocation of land was needed. The villagers had a choice to join the network and thereby be able to receive electricity but lose some of their independence, or they could choose not to become part of the network and thereby also miss the advantages. The authorities did not leave the option open to negotiate a different kind of network with different kind of measuring tools. In general the villagers agreed to join, and thereby they entered a relationship with the state and became registered as individual citizens. *"In general an individual becomes a citizen only when he or she enters into relationship with the state. In the Ivory Coast this was effected through the intermediary of cables, pylons, transformers, and meters"* (Akrich, 1992, pp. 215-216). Later on, the network was used to collect income taxes. Thereby the network fostered citizenship, influenced social structures, and subsequently influenced the enjoyed capabilities.

When technologists develop a technology and define its characteristics, they envision the world in which the technology will be inserted. Akrich (1992) shows that the materials used to build a car depend on a complex network. The designers assume the stresses the materials have to bear. These stresses closely relate to the speed of the car, which in turn relates to engine performance, legislation,

police control, the drivers, values attached to certain behaviour etcetera. The technologists envision the future users of the technology and envision how the technology will be associated with other actants in a network. They inscribe the technology with the characteristics of these associations and envisioned users. Are the users competent, do they have a specific taste, or specific motives etcetera? Technologists materialise a script by developing a technology. Like a film script, this script determines which roles the various users are supposed to play, which is called prescription.

The script, however, does not determine the use of technology. The use of technology is determined in the **conflict** between the script in the technology and the user's intentions. The script contains the designer's assumptions about the user and the network. The actual use might be an anti-program that deliberately differs from intended use, or a program of action which unintentionally differs from the intended use. Artefacts presuppose a user with specific qualities and prescribe certain tasks to him/ her. But according to scholars working in the domestication framework, neither Latour nor Akrich are very clear about what features of a script determine human action. According to them the script in the technology as well as the users determine the actual use (Lie & Sørensen, 1996). People, in interaction with other actants, can create their own technological practices. The actual use of a technology also depends on how individuals and groups of individuals enact technologies and thereby create their own networks of humans and non-humans within the limits of the cultural, environmental, social, political situation (Sørensen, 1994).

2-5 Domestication of technology

With its focus on practice, meaning and learning aspects of technology, the domestication framework adds some concrete sensibilities to the rather abstract ANT vocabulary. Sørensen (1994), working on the domestication framework, which he tries to link with ANT, criticises Latour and Akrich, because both attribute a privileged position to the designer. The designer creates the socio-technological by inscribing a technology and delegating certain tasks to the non-human. The consumer on the other hand is passive and can only choose between joining the network and resisting to join the network set up by the designer. But according to Sørensen (1994), consumers are not passive, but instead they actively create networks and bonds between humans and non humans. Sørensen calls these consumers "tinkerers". Tinkering occurs within a network consisting of economic, cultural and political relations that limit and enable the tinkering practice. So, next to consuming, users are also producing by negotiating meaning and creating bonds between humans and non-humans. Thereby they constitute the network that determines the essences of the actants involved.

Silverstone distinguishes four phases to capture the different processes leading to domestication of technologies and media. These phases occur when people engage with technologies or media. The first

phase is: appropriation, which occurs at the moment an object or media content is taken possession of by a person or a group. Secondly, objectification is the phase in which the object or media content is classified in their own epistemology. The classificatory principles are revealed by its use and its physical spatial disposition within its environment. Thirdly, incorporation, how the technology is used, and incorporated in the routines of daily live. Incorporation focuses on the temporal aspects whereas objectification focuses on the spatial aspects. Finally, conversion, during which the inside world of the household, or the extended family, convert the meanings of technologies and media content which are created in the outside world, a new relation will be established (Silverstone, et al., 1992). These phases describe how the entry of a technology or medium is managed into a household. The phases can be seen as how technologies or media are physically positioned, how they are fitted in our time schedules and routines, and how we display them to others to exhibit ourselves. Later on the number of phases is slightly extended by Silverstone (1994).

According to Sørensen (2006), the domestication framework has a wider potential than its household origin. The application of the domestication framework in non-western cultures have come under criticism by scholars arguing that the paradigm has its roots in western categories (Tenhunen, 2008). But according to Sørensen (2006), there exist two versions of the domestication framework. One is used in media studies and the other is used in technology studies. The latter version is mainly developed by Norwegian researchers, and is *".... less about the household consumption and more related to the construction of a wider everyday life"* (Sørensen, 2006, p. 46). It is thus more concerned with the negotiated space of designers' views and users' needs and interests. This version of the domestication framework invites a focus on three features of technology: Firstly, the construction of a set of practices related to an artefact, ranging from using routines to extending the network of the technology. The second feature is the attachment of a meaning to a technology by its users. Finally, the learning processes of practices and meanings which are attached to a technology (Sørensen, 2006, p. 47). This framework has already been put into use in Norway where a Norwegian researcher analysed the domestication of the car. It has also been put into use in non western cultures by scholars analysing the interaction of technology, culture and human action (Lim, 2006).

In accordance with ANT, scholars working on the domestication framework see the "taming" of an artefact as a translation of the program of action inscribed in the technology through the way users read, interpret and act upon the script. *"...Domestication may be seen as process through which an artefact becomes associated with practices, people, meanings and other artefacts in the construction of intersecting large and small scale networks"* (Sørensen, 2006, p. 47). Artefacts are mutable and can have different meanings depending on how the network of socio-technical arrangements is

constituted[4]. But the domestication framework adds some concrete sensibilities to the rather abstract ANT vocabulary. Firstly, it lays emphasis on the temporal aspect of enactment of a technology, the phases of domestication as described above and the observation that use may differ over time. Even if a technology is discarded out of the network at the end of its life cycle, it will leave its traces in the network, since it has changed the network when it was still accepted. Secondly, through its focus on practice, meaning and learning, the domestication framework also adds subjectivity to ANT. The domestication framework has a focus on the reciprocal enactment between humans and non-humans over a longer period of time, seen in a wider context of cultural dynamics, rituals, routines, and patterns of everyday life.

Sørensen's analysis of the Norwegian car nicely shows the dynamics involved in the domestication process. He shows how the domestication framework adds subjectivity, concrete sensibilities, and a temporal aspect to the ANT. Sørensen claims that it makes sense to speak of the "Norwegian car", even if it is not designed or produced in Norway, and is technically identical to the Swedish or Danish car. This is because the domestication process of the car depends on its specific context, in this case Norway. In Norway the initiation of the car as a "rail-free vehicle", in the late nineteenth century, was met with contestation. The car was met in a specific way; many municipalities introduced strong regulations or were even forbidding the use of the car (some actors thought that cars would damage the roads). On the other hand proponents emphasised the possibilities that cars would bring. The appropriation dispute was influenced by the Norwegian culture, environment and the social and political situation. Also the building of the infrastructure, the regulation of car ownership, and the construction of roads contained specific Norwegian qualities. Qualities like the lack of a Norwegian car industry and the high costs of road building in a large country with respectively few inhabitants and many mountains. New institutions were established to regulate cars, traffic and roads, and thereby came to manage the domestication of the car in Norway while there was no powerful car industry present. Sørensen sees "*a complex interaction between a wide variety of objects, resulting in a strong and powerful but also fluid and malleable network, due to conflicting efforts of domestication*" (Sørensen, 2006, p. 50).

This fluid, malleable network determines the ownership and use of technology. The Norwegian meaning of the car changed over time from luxury good to a taken for granted household good. The meaning of the car will remain in a continuous dialogue and negotiation with moral aspects of use and ownership. It is not the case that Norwegians exercise a free choice when they consider to have a car or not, because their living environment is organised in a specific way. Nowadays the infrastructure

[4] This dependence on the network is nicely shown by de Laet and Mol (2000). With their example of the Zimbabwean Bush Pump, they show that the meanings attached to the technology depend on the network surrounding it. The criteria for what counts as proper functioning, installation, and maintenance differ per network.

has an inscribed assumption of high car ownership which becomes visible if one analyses where shops, houses, offices, airports, sport facilities and crèches are located. Car ownership has become a social standard. Also the use of the vehicle, for at least driving, is highly disciplined by policemen, road bumps, traffic signs, traffic rules, mandatory technical controls etcetera. All these disciplining mechanisms, which were and still are open for debate, determine the use of the object to a certain extent (Sørensen, 2006).

Conclusion: opening of the blackbox within the Capability Approach

The CA, and the ANT/ the domestication framework try to render "reality" in a holistic picture. Sen argues that the capabilities of humans depend not only on the availability of technical resources, but also on the social structure, environment and individual characteristics. This resembles Latour's idea that the essence of humans, what they are and are able to do, depends on how they are constituted within the network.

As Sen is not familiar with the recent developments within the disciplines Philosophy of Technology and Science and Technology Studies, we can only speculate what his thoughts are on the question whether this human essence is pre-established or not. His work seems to imply that when the conversion factors are not met, humans would be deprived from their essence. They are deprived from their freedom to choose in accordance with their own conception of the good life. As mentioned before, it seems that he has an implicit instrumental vision of technology. It seems that he sees technologies as neutral means which can be put into use, at least when the conversion factors are met, towards the ends that users choose (Oosterlaken, 2009a). Latour rejects that technologies are neutral means, and would say that scholars working on the CA face the same problem as the social constructivists of technology, namely that they treat the essences of the human as being pre-established. Scholars working on the ANT see technologies as mediators instead of merely means. Technologies are anthropomorphic, they are humanoid in the sense that humans created them and delegated certain human tasks to them, and in the sense that technologies shape human life, they prescribe certain behaviour to its users (Latour, 1997, p. 73). Latour and Sørensen emphasise that use of a technology is determined in the conflict between the script in the technology and the user's intentions of how to use the technology. Through this conflict, technology receives its essence. It is impossible to treat humans and technologies as two separate entities, they co-constitute each other within a network. Both the technology and humans derive their essences from a network.

The reciprocal adjustment of actants within the network raises the question; where lies the agency? According to Sen, only human beings and their flourishing are of intrinsic importance and should be considered as the ultimate object of development. Resources, like technologies, are merely

instrumental means to achieve the object. But it is impossible to speak about humans and about technologies separately. The domestication framework enables to scrutinise how this co-constitution process takes place. In order to take human agency seriously the CA should acknowledge the influence of non-humans, like they acknowledge the influence of social structure and environment. Human agency is influenced, translated, restricted and enabled by non-humans.

Chapter 3: Research Questions & Methodology

Introduction

In the concluding paragraph of previous chapter, I identified a gap within the literature of the Capability Approach (CA). In this chapter I will elucidate my research methodology that I followed to fill this gap. I will start this chapter by explaining the aim of the research. Subsequently, I will list my research questions. Thirdly, I will describe my research methodology, and I will finish by stating my research limitations.

3-1 Aim of empirical research

Although there is an intuitive link between technology and the CA, there is still little understanding about the actual interrelations between technology and human capabilities. It would be naive to say that technologies do not contribute to human capabilities. But the acknowledgement that humans and non-humans reciprocally adjust each other in a network, makes it hard to distinguish between human capabilities and technologies like is done by Robeyns (2005) (see figure 1). How should the relation between human capabilities, technologies and the elements constituting the conversion factors be understood?

To understand this relation, I gathered empirical data by means of an ethnographic study in Zimbabwe. I analysed two development projects during which an ICT was introduced in a rural community by project initiator Practical Action (PA). During this study, I examined how human capabilities come about during the use of a specific communication technology. I analysed whether this coming about was influenced by the script (characteristics) written in the technology, the way the technology was put into use or the conflict between both. How should the schematized representation of the CA be adapted to represent the interplay between the elements of technology and their connection with the elements of the CA? From the literature on the ANT and the domestication framework it can be suggested that technologies interact with almost all elements of the CA (figure 3).

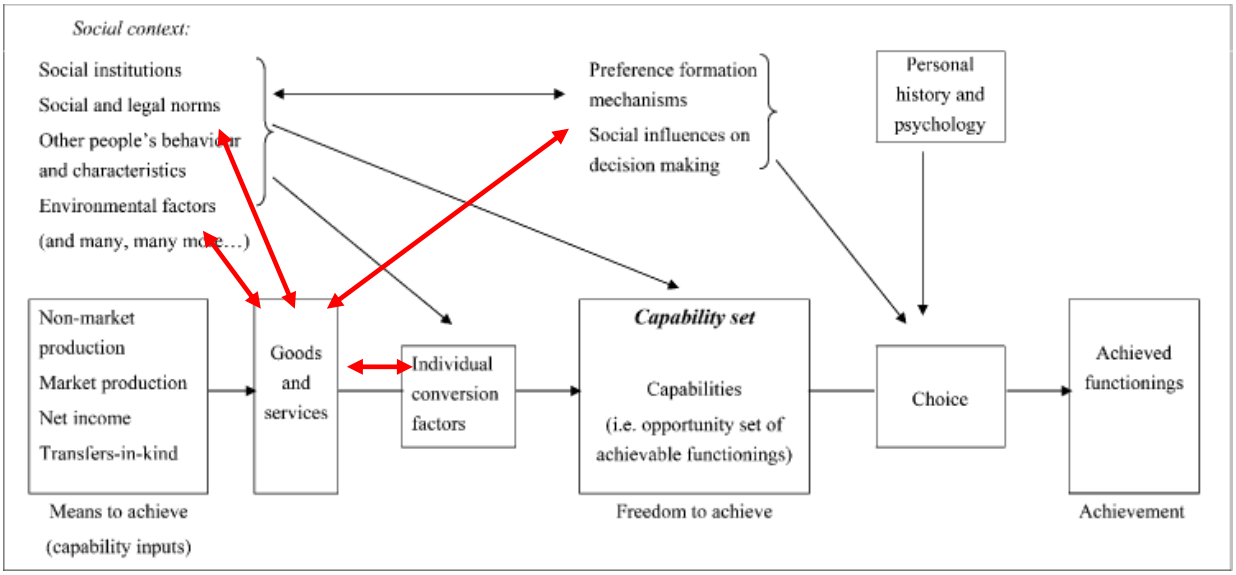

Figure 3: Adapted representation of the relation between goods and services (including technologies), a person's capability set and his/ her social and personal context (Robeyns, 2005) (adaptations are in red).

3-2 Thesis' research questions

To guide the analyses, I developed the following research questions. These questions will be answered in the second part of this report. The general research question addressed in this thesis is:

> "*How do the script of a specific ICT and the human capabilities of the people using the technology co-evolve in the process of domestication?*"

To answer this general question, I have defined four sub-questions which will guide the research:

S1. "*What were the initial aims of Practical Action and how were those aims inscribed in the specific ICT?*"
S2. "*How can those aims be interpreted in terms of the Capability Approach?*"
S3. "*How is the network of relevant actors changed due to the introduction of the specific ICT?*"
S4. "*To what extent are the actual capabilities of those relevant actors increased or decreased due to the introduction of the specific ICT?*"

3-3 Research methodology

To answer these questions, I performed an ethnographic study of three months in Zimbabwe. I gathered empirical data by means of interviews, observations and a literature study. Research question S1 was answered by means of a literature study, and by interviews done among employees of PA. During the literature study I analysed documents owned by PA about the development projects. I

analysed how the development process occurred, which actors and social groups were involved and how they were involved. When elements were not clear, the literature study was extended with specific interviews. Research questions S3 and S4, were investigated by means of interviews and observations. These interviews and observations were aimed at understanding how the specific ICT was used in everyday life by the members of local culture. I analysed the set of practices related to the technology, ranging from using routines to extension of the network, and from the attachment of a meaning to the related learning practices. Research question S2 invited a theoretical analysis. The general research question was answered by means of a reflection on the answers given on questions S1 to S4. During this reflection I also relied on the theoretical framework as described in chapter two.

During the empirical study, I used a qualitative research method, since my aim was to gain a deeper understanding of how a specific ICT influenced human capabilities during the process of domestication. For this study I used ethnographic semi-structured interviews. Semi-structured interviews allowed me to probe deeper when the interviewee touched something interesting, while I did not lose the focus of the interview. During the interviews I focused on how the specific ICT was being used and domesticated as well as on which capabilities were and were not enjoyed. Therefore, the interviews consisted of two parts. The first part of each interview focussed on the positive as well as the negative impacts on the enjoyed capabilities of the interviewee. The second part focussed on how the ICT was domesticated in the interviewee's society.

To structure the first part of the interviews I used the list of central human capabilities as defined by Nussbaum (2000, pp. 78-80) (see appendix II) and the list of basic forms of human good as defined by Finnis (Finnis, 1980, pp. 86-90) (see appendix III). Although I do not contribute to the discussion whether universal capabilities as defined in Nussbaum's list exist, I tried to identify all valued benefits and detriments surrounding the development projects by paying attention to these defined capabilities. The central human capabilities on the list are categories which could be realised in different manners. Members of a community should further specify the central human capabilities in accordance with their local believes and circumstances. Nussbaum's list is a result of years of cross-cultural discussions and the included capabilities are, according to her, central to human life. I also used the list of basic forms of human good as defined by Finnis to structure the interviews. This list is applied by Alkire (2002), who analysed small-scale development projects in terms of capabilities, and livelihoods. Not all categories were affected by the project. Like the categories "*bodily integrity*" and "*religion*" were not or hardly affected by the projects. The application of Nussbaum's list and the list of Finnis enabled some useful insights which would otherwise be untouched.

To structure the second part of the interviews, I focussed on the different phases of domestication as defined by Silverstone (Silverstone, et al., 1992). As stated in chapter two the phases of domestication

are appropriation, objectification, incorporation and conversion. I focussed on who owned the technology, when and how the technology was used and the attached meaning to the technology.

Forty-four semi-structured interviews were complemented by four participatory observations. These observations were done to verify some answers given during the interviews (whether actual behaviour corresponded to reported behaviour), and to analyse customs, habits, and routines in use. The observations were done in a structured manner. During the observations I focussed on by whom, how, for what reason, when, and in what situation the technology was used.

During both the interviews and the observations, I focussed on different people relating to the technology. I analysed how the following relevant people: village heads, male farmers, female farmers, elderly persons, traditional healers, livestock animators, health animators, village heads, a livestock officer and development agents, incorporated the technology in their lives and what influence it had on their capabilities. These actors were chosen on the basis of the hierarchy present in the Mbire district and on general differences, like the difference between men and women.

I also analysed the capabilities of the same categories of relevant persons who had not incorporated the technology in their daily life. In Mbire there are seventeen wards of which seven were included in the first project. Of these seven wards, five were included in the ICT supplementation project "*local content, local voice*". I focused on two wards (ward seven and nine) which were included in both projects, and on one ward (ward six) which was included in the first project but was not included in the supplementation project. I compared the analysis of people who had incorporated the technology in their daily life (ward seven and nine) with the analysis of people who did not incorporate the technology in their daily life (ward six).

3-4 Limitations

The first limitation of this research is the highly contextualized information, which makes it difficult to collect similar data. My conclusions in this thesis are based upon the single case study in Zimbabwe. To make definite statements more case studies need to be done. For that reason I will conclude this report with a hypothesis.

The second limitation is that the local community was suffering from a donor dependence syndrome. This syndrome caused people to have a feeling of dependency on development agencies. This dependency was also reflected in how they responded to questions asked during interviews. They answered what they thought I, as an interviewer, wanted to hear. By pleasing the interviewer they hoped to receive more aid and technologies. Although I tried to probe deeper during my interviews

and I made clear that I was not employed by PA nor by LGDA, this donor dependency syndrome caused people not to speak easily their mind.

The last limitation was the language difference between the interviewer and interviewee. Although the official language in Zimbabwe is English, most people in Mbire did not speak it properly. Often I made use of translators, who translated from English to the local language Kore kore, which is a Shona dialect. This made the interviews less direct. I could not check whether the translator did not guide the interviewee by translating in a specific way. To minimize this influence I told the translators to translate as neutral as possible. Also I found that the central capabilities were very abstractly defined. Explaining the capabilities was difficult without giving direction to the answers of the interviewee. People were not familiar with certain words I assumed to be known, like "entertainment". These words were interpreted differently than I expected which led to unexpected twists during conversations.

Part II

Chapter 4: The Cultural and Social Context of the Lower Guruve Area in Zimbabwe

Introduction

In Zimbabwe, people born in 2008 have a life expectancy of 44 years ("Zimbabwe statistics," (n.d.)). Especially in remote rural areas the situation is impoverished. To improve the situation a modern ICT is introduced in the north east of Zimbabwe in the rural area of the Mbire district. This ICT is introduced in a totally different society than the "Western" society where the technology was developed. The introduced ICT is an mp3 player accompanied by a portable loudspeaker, and serves as a medium for information dissemination. To understand the cultural and social context in which this technology is introduced, this chapter briefly describes the characteristics of Zimbabwe and pays special attention to the circumstances in the Mbire district.

4-1 Brief history of Zimbabwe

In 2008, the total population of Zimbabwe was twelve million. 71% of the population of Zimbabwe belongs to the Shona culture whereas 16% belongs to the Ndebele culture which comes second in number of people (Owomoyela, 2002). Shona people rather call themselves by their chiefdoms or dialect groups instead of using the term Shona. But where do these chiefdoms come from?

The first known inhabitants of Zimbabwe were the stone-aged Khoisan hunters, who left diverse rock paintings like those found in the Matopo Hills. At the end of the second century the first Bantu people arrived and heralded a new era, the early Iron Age. The Bantu culture lasted for roughly thousand years but became replaced as soon as the ancestors of the present Shona people arrived and brought a number of changes. These ancestors, consisting of different groups, placed greater emphasis on cattle and they improved mining techniques (Bourdillon, 1987).

The giant stone walls of Great Zimbabwe serve as a reminder of a developed Zimbabwean culture between the thirteenth and fifteenth century. However, by the middle of the fifteenth century the mighty empire collapsed because of exhausted soil, which in part was the result of a large population who exploited the soil over a long period of time with underdeveloped technology. The decline of the Great Zimbabwe Empire forced people to move away. A large group migrated northwards and spread

west and east to cover the area what now belongs to the Kore kore people: the ancestors of the current population of the Mbire district (Bourdillon, 1987).

During the eighties of the nineteenth century, the British South Africa Company (BSAC) invaded the country. In first instance the Shona people did not offer resistance, but when the Ndebele people went to war against the British in 1893, the Shona people joined them. This war became known as the first Chimurenga. Chimurenga is a Shona word for revolutionary struggle. Despite the resistance, the British defeated the Ndebele, and the white minority rule started. Hut taxes, and land reforms were introduced throughout the country. The Zimbabweans did not accept the white minority rule and entered a second Chimurenga in July 1966. This war was won by Robert Mugabe's Zimbabwe African National Union and Joshua Nkomo's Zimbabwe African People's Union ("Chimurenga," (n.d.)). After declaring independence free elections were organized and Robert Mugabe was elected as the head of state in 1980 (Bossema, 1999).

From 2000 onwards, Zimbabwe suffered a socio-economic decline. The country experienced food shortages, during which food assistance was given by the World Food Programme. This assistance was suspended in 2004/ 2005 due to the prevailing political situation. Meanwhile the national currency suffered a hyper inflation. Social sectors, especially health and education, were severely affected. The country suffered from a political and governance struggle and in 2008 the government banned NGOs in the country. In February 2009, an inclusive government was formed, which introduced a multi-currency system. Nowadays, more than 80% of the Zimbabwean population is estimated to be unemployed and 25% of the adult population is estimated to be infected by or living with HIV/ AIDS.

4-2 The Mbire district

The semi-arid Mbire district is situated in the Lower Zambezi valley, nearby the Zambezi River and the border with Mozambique (see figure 4). The district lies in a low altitude area which is a semi-extensive farming region. The area faces high temperatures (ranging from 20° – 40° C) and receives poor annual rainfall (less than 500mm), all of which falls during the two month rain season (between November and January). During the rainy season floods occur, causing diseases, destroying crops, roads, and bridges, while during the rest of the year evaporation is much higher than the precipitation (Mahaja, 2008). Because of this semi arid climate, the only suitable activity in the Mbire district is livestock production and drought resistant crop cultivation.

Figure 4: Zimbabwe and the Mbire district (source: Google earth and Practical Action the red emphasis is mine).

The Mbire district is dominated by small-scale subsistence farming. For subsistence purposes farmers grow crops like sorghum, ground nuts, maize, and cow peas, and they keep livestock (cattle, chickens, donkeys, sheep, and goats). Farmers use their cattle for draught power, and milk production. Small livestock, on the other hand, is primarily used to eat. Sometimes crops and livestock are produced for commercial purposes. Although some farmers are involved in small-scale commercial activities, almost all farmers rely on subsistence farming[5].

In 2008, 115.952 people were living in the district who almost all shared the same Kore kore heritage that is reflected in their culture (Mahaja, 2008). The Mbire district is divided into seventeen wards. A ward is populated by 4500-6000 people, and has many villages. In each village there are 30-100 households settled, each consisting out of 4-6 persons (Mahaja, 2008). Each household has more than one hut, which each has its own function (see figure 5)

Figure 5: Collection of cottages of one household (picture made by the author).

[5] N. Zuze, animator livestock, interview, April 8, 2010

The political life of the people living in the Mbire district is organised by two structures; the traditional and the national structure. The traditional structure is recognised by and exists next to the national structure. It is led by five chiefs, which are supported by three sub-chiefs in total. Chiefs were appointed by a spiritual medium a long time ago. Nowadays their positions are inherited by their sons. The leadership of chiefs crosses the boundaries of the wards in the districts. The village heads rank below the sub-chiefs. The village head leads his/ her village. After the village heads rank four project members (livestock, small grain project, agricultural project members, and small committees), just above the rest of the community. Next to this traditional structure there exists a national structure which is governed by the parliament. On ward level the District Administer has the highest rank. The council chairman comes after the district administer, which in turn ranks above the councillors who all represent their own ward. The authority of persons belonging to the traditional as well as the national structure is highly respected and valued by the rest of the community members.

The life in Mbire communities is characterised by gender inequalities, based on tradition. The gender inequalities are present in many ways. First of all, girls have poor access to education, especially after primary level[6]. Secondly the responsibilities within the society differ per gender. Women are responsible for looking after the family. Their tasks consist of cooking, collecting water, taking care of the garden side (where vegetables are grown for own consumption) and cleaning. According to people living in the Mbire district, men have a natural endowment to rule over a large group of people. Therefore men are responsible for participating more actively in the strategic matters. They are also responsible for building and maintaining the house and in time of scarcity they have to leave home to find a job to provide a source of income. Both sexes, however, work in the fields. Thirdly, it is socially accepted, and used to be very common, that men have more than one wife. Nowadays however, men usually stick to one wife, but this is mainly due to financial reasons. Although these gender imbalances are still present in the society of the Mbire district, they are slowly changing[7].

The district's infrastructure and the offered services in the district are poor. Mbire used to have access to the electricity grid, but this broke down due to a lack of maintenance during the economic turndown. The same holds for running water; the pipelines are there but no longer working (people now rely on boreholes). The region is not covered by a telephone landline nor is it covered by a mobile phone network or fm radio network. The only access to the district is by unpaved bicycle tracks and unpaved roads. These roads as well as all bridges are in very bad condition especially during and after the rain season. As the only district in Zimbabwe, Mbire is not serviced by a governmental hospital.

[6] Mr. Shoko, Tsetse Control development agent, interview, June 18, 2010
[7] N. Zuze, animator livestock, interview, April 8, 2010

The present health centres, schools and governmental knowledge extension services in the district lack sufficient human and material resources.

4-3 Traditional knowledge and ways of disseminating knowledge

Based on their traditional knowledge, the ancestors of the local people survived for centuries. Specialist knowledge about human and livestock health was, and still is, only known by traditional healers. These traditional healers have a great knowledge of herbs, and are believed to be able to communicate with the spiritual world (Bourdillon, 1987, p. 149). Today they are still active in the society; each village has on average two healers[8]. People still rely on the traditional healers, although their numbers are generally decreasing. Those who still use the services of the healers, visit them for treatment of diseases and for preventive medications and treatments. Although "western" medicine becomes more common in the district, some people believe that a disease does not come by itself, but is caused by witchcraft and therefore is better treated by traditional healers[9].

Next to traditional healing, there also existed methods for knowledge production and dissemination. Knowledge was produced, and shared during Dare meetings. A Dare meeting is a traditional gathering called for by the village head, and joined by all men living in the village. During these meetings their war tactics and solutions to the problems faced were discussed. This knowledge was disseminated through the cascade structure on which their community was built. Through this structure information was effectively passed from person to person by word of mouth and was rapidly known by all community members[10].

These traditional methods are extended by the governmental knowledge extension system. This system consists out of the following departments: Agricultural and Rural Extension Services (AGRITEX), Tsetse Control, Livestock Development, Veterinary Services, Natural Resources Management, and Health. Development agents who work at those departments have the duty to provide the people living in the Mbire district with the information they need: the *"Role of the AGRITEX extension officer is informal teaching, advising farmers about better methods concerning crops and livestock"*[11]. To disseminate knowledge the development agents visit the community and teach them orally on topics relating to their department (see figure 6). These visits to the community do not occur regularly and each department visit the community at different times. Due to the economic downturn this system is facing problems like a brain drain of experienced labourers, and inadequate resources to update content or to travel to the different communities. This results in two of

[8] N. Zuze, animator livestock, interview, April 8, 2010
[9] Mr. Shoko, Tsetse Control development agent, interview, June 18, 2010
[10] L. D. Gudza, Practical Action, interview, May 19, 2010
[11] Mrs Musandaira, Agritex development agent, interview, April 28, 2010

the major identified problems: the existing language differences between the knowledge disseminators and knowledge receivers, and the inappropriateness of written documents (the literacy level in Mbire is 75% which is low compared to the national level of 90,7% (Grimshaw & Gudza, 2010, p. 6)). The system is also facing the problem that the different development departments do not coordinate their meetings, which results in a community fatigue. Thereby the governmental knowledge extension system fails to provide the people on a regularly basis with basic information (some very remote areas are not visited at all, especially during the rain season).

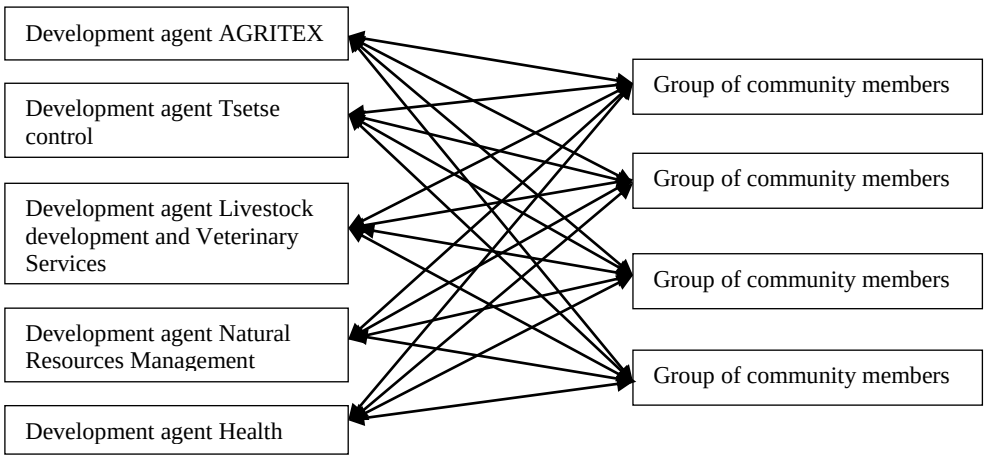

Figure 6: Representation of the governmental knowledge extension system.

The local NGO, the Lower Guruve Development Association (LGDA), also contributes to the development of the district. LGDA is located in Guruve. It is a local non-political and non-partisan organisation which is organised "*through Village, Ward and Regional Development Committees at the lower levels, and the LGDA Board and General Assembly at the highest policy making levels*" (brochure LGDA). The organisation represents and promotes the interests of communities in the Mbire district and runs programs aimed at food security, fighting the HIV/ AIDS pandemic, providing safe water and sanitation, and bringing goods and services to the deprived region. LGDA was the implementation partner of the NGO Practical Action; together they introduced the ICT in the Mbire district.

Chapter 5: Initial Aims in Terms of the Capability Approach and the Script of the mp3plus

Introduction

In this chapter I will answer the first two research questions: S1) "*What were the initial aims of PA and how were those aims inscribed in the specific ICT?*", and S2) "*How can those aims be interpreted in terms of the CA?*". I will start with introducing the two projects which Practical Action (PA) initiated in the Mbire district. Secondly, I will analyse how the projects' aims led to the definition of the specific ICT introduced in the district. I will focus on the ideas PA had about how the technology could be used and incorporated in society. Finally, I will interpret the projects in terms of the Capability Approach (CA). In the following chapter, I will focus on how this technology is actually used and incorporated by a number of relevant actors of the community. In Chapter seven, I will compare the actual use within the network with the presumed use and presumed incorporation of the technology, in order to analyse how the actual enjoyed human capabilities come about.

5-1 The projects initiator Practical Action

To overcome the challenges faced by the governmental knowledge extension system, mentioned in the previous chapter, PA ran two development projects in the Mbire district. PA, formerly known as Intermediate Technology Development Group, is an international technology and development organisation. It is founded in 1965 by Schumacher, one of the founding fathers of the appropriate technology movement. PA aims at bringing about a world free of poverty and injustice by means of technologies which benefit all (Practical Action, 2006, p. 5). Their efforts, skills and resources are focussed on the following four programmes (Practical Action, 2006, p. 6):

1. Reducing Vulnerability, which works with poor people affected by natural disasters, conflict and environmental degradation to reduce their vulnerability;
2. Markets and Livelihoods, which helps poor people to make a better living by enabling producers to improve their production, processing and marketing;
3. Improving Access to Services, which helps poor communities gain improved access to useful services like safe, clean water, food, housing and electricity; and
4. Responding to New Technologies, which helps poor communities respond to the challenges of new technologies to improve the lives of poor people.

In their work, PA tries to put people first, to work in partnership, to have a concern of future generations and to respect diversity (Practical Action, 2006, p. 5). In the Mbire district, PA tried to overcome the challenges faced by vulnerable poor communities. They tried to improve the livelihood options of the local people by means of improving their farming techniques and by introducing supporting tools.

5-2 The non-technological project (EC Block Grant project)

The first development project in the Mbire district was part of a larger EC Block Grant project (funded by the European Commission) which covered five regions in Zimbabwe. For the project in the Mbire district, the local community prioritized the objective "*improvement of their livestock feeding systems*" (Mahaja, 2008). PA in cooperation with implementation partner Lower Guruve Development Association (LGDA) undertook this project. The project ran from January 2007 till December 2009, in 7 of the 17 wards. To improve local people's livelihoods, its specific objective was "*to improve livestock health and product value of resource poor households in the Mbire District*" (Mahaja, 2008, p. 6).

Based on a baseline survey (Mahaja, 2008) in two wards of the Mbire district, information needs of the local people were identified. The survey describes the food security and livelihood status of the population. It states that because the Mbire district is plagued by frequent draughts and occasional floods, the area is well suited for livestock production which can be supplemented by cultivation of draught tolerant crops. However, because of inadequate feeding, the livestock in Mbire was in bad condition. Due to this bad condition animals were less valuable on the market and animal draught power, on which 90% of the farmers relied, was less efficient. Consequently, less efficient draught power caused delays in crop cultivation, which in turn led to smaller crop yields. The above mentioned problems formed a vicious circle of challenges that had multiple effects. For instance children were dropping from schools and many people were not able to maintain their houses, because of a lack of money and resources (Mahaja, 2008). Successful provision of appropriate information on farming techniques should break the vicious circle and should provide the community with opportunities to improve their livestock health and product value, which in turn should facilitate other capabilities like the capability to be healthy, the capability to work or the capability to play[12].

Employees of PA and LGDA identified the existing governmental knowledge extension system as ineffective; the knowledge either did not reach the farmers at all or was conveyed in inappropriate

[12] L. D. Gudza, Practical Action, interview, May 19, 2010

form[13]. They found out that written documents were unsuitable as a dissemination method as some community members were illiterate and that language differences between the development agents and the community made effective communication hard to achieve. In order to overcome these weaknesses the project implementers decided to promote a farmer-to-farmer form of extension using the already existing animators. The animators, employed by LGDA, were selected by and lived in local communities. For the purpose of the project, members of a community were asked to organise themselves in groups. Each group chose one of its members to be a group representative. Seven livestock animators together with an additional 751 group representatives were trained by the livestock officer of the LGDA in livestock health, management and production. The training of the animators was more intense than that of the group representatives, who received only one lesson. The animators and group representatives were expected to share their knowledge with the rest of the community, if they remembered the lessons well (Dengu, Chikaura, & Mwanyisa, 2010, p. 19) (see figure 7). When a group faced a problem, the group representative should be asked first whether he or she knows a solution. If not they might call upon a meeting with the animator. If the animator would not be able to find a solution he or she might refer the group members to the development agents (the knowledge node of the governmental knowledge extension system as described in § 4-2-2) or he or she might consult the livestock officer. A real bottleneck of this system was the fact that the livestock officer did not have enough time to teach the animators thoroughly. The pilot project of PA, in which an ICT inspired on a podcasting[14] system was introduced in the farmer-to-farmer communication, aimed at removing this bottle neck[15].

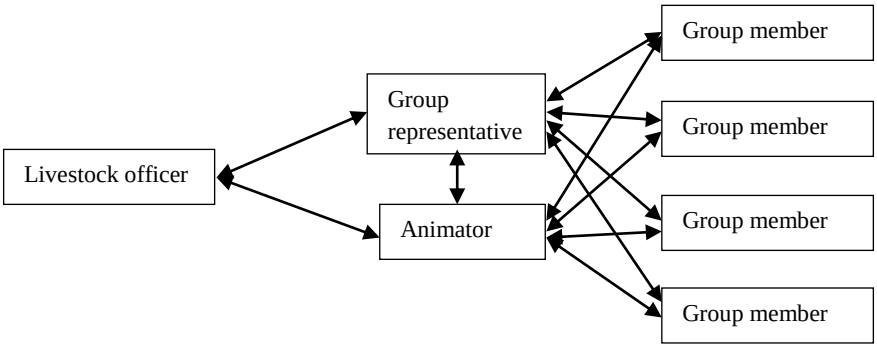

Figure 7: Representation of the EC Block Grant dissemination model.

[13] L. D. Gudza, Practical Action, interview, May 19, 2010
[14] Podcasting is a method of publishing files. The publisher creates a "feed" on the internet, to which users are able to subscribe. If you are subscribed you will automatically receive new files if they are added on the feed.
[15] J. Machingura, livestock officer, interview, May 22, 2010

5-3 The technological pilot project "*local content, local voice*"

5-3-1 The project

The second project, named "*local content, local voice*", was initiated to pilot the use of technology developed to enable voice based information to reach marginalised people (Practical Action Southern Africa, 2007). This project ran from the 1st of October 2008 to the 31st of March 2009. It ran initially in 2 of the 7 wards, which were also involved in the EC Block Grant project to which it complemented. Given the enthusiasm of the community and initial successes after one year PA decided to expand the project to five wards in total[16]. During the "*local content, local voice*" project a technology was introduced which provided a new medium for the farmer-to-farmer approach.

The project was inspired by "*Connecting the First Mile*" (Talyarkhan, Grimshaw, & Lowe, 2005), an extensive research study on how ICTs can be utilized for development purposes. This research was conducted by PA UK in cooperation with the Cranfield University. The researchers identified that many ICT4D projects in developing countries face the same problems, like low levels of literacy, little or no money, language problems, and highly contextualised knowledge requirements. The authors characterized this as the challenge of "connecting the first mile", and tried to find the best practice to connect the first mile (Talyarkhan, et al., 2005). In order to find the best practice, employees of PA and the Cranfield University did a literature study as well as analysed a specific ICT4D project in Cajamarca, a rural region situated in the Andes in Peru. The authors argue that although information provision is central to development, for an ICT4D project to succeed, processes should be in place that enable people to transform information into knowledge. The authors argue that the provided information needs to resemble the development goals as defined by the beneficiaries themselves, and that attention is being paid to the local context where the transformation of information into knowledge has to take place (Talyarkhan, et al., 2005). The ideas in Connecting the First Mile resemble the emphasis of the CA that people should define their own development goals and that transformation of resources in capabilities depend on specific conversion factors: individual, social and environmental.

Based on the case study in Cajamarca the method of knowledge dissemination was identified as an important factor. Because provision of information does not necessarily lead to knowledge, certain factors should be in place. Information written in English cannot be turned into valuable knowledge by illiterate people who are not familiar with the English language. In Cajamarca, the researchers observed that the use of the telephone by far exceeded the use of the internet. They ascribed this phenomenon to people's reliance on their traditional method of disseminating knowledge; word of mouth in local language. Based on this observation a new type of technology was introduced in

[16] This was limited by resources. If resources were abundant all wards would have been included in the program (L. D. Gudza, Practical Action, interview, May 19, 2010).

Cajamarca, inspired on podcasting technology, which uses audio instead of text messages to disseminate knowledge (Talyarkhan, et al., 2005).

Next to the method of dissemination, the characteristics of the information were identified as important factors as well. The information provided should be contextualised: it should fit the capacities and environment of the information receivers. To successfully connect the first mile it is important, according to PA, that the provided information is contextualised. Contextualised means that information is applicable and useful in the context of the community, but also that it is adapted to the requirements of the local knowledge dissemination systems (Talyarkhan, et al., 2005).

To increase the effectiveness of knowledge dissemination in the Mbire district, PA embraced characteristics of the traditional knowledge dissemination system. Before employees of PA decided on an ICT suitable to complement the EC Block Grant project, they did a supplementary analysis of the Mbire society and its knowledge system. This additional analysis was to determine the size and nature of the pilot project. "*Given the problems of language and literacy and the cultural norms of telling stories and using drama as ways of spreading stories and knowledge informally we decided that it would be worth exploring the development of local content in local* voice" (Practical Action Southern Africa, 2007, p. 3). Podcasting was deemed very suitable in light of these findings.

5-3-2 The media content of the devices

It was planned that the ICT would disseminate the same information as developed during the EC Block Grant project. This shared information was based upon the needs expressed by the local people. PA and LGDA did not want to prescribe certain topics, but would develop content for lessons to address community knowledge needs.

The content of the lessons suitable for the ICT would be developed with a certain student in mind. Firstly, the composition of the lessons would be based upon the least educated persons in the community, so all people would be able to benefit[17]. Secondly, like the information disseminated during the EC Block Grant project, the lessons would be on livestock health, management and production and related crop cultivation. Therefore the farmers who did not have livestock or crops would not benefit. Thirdly, according to the livestock officer;

> "*The farmer does not want to waste time with detailed information; the aim of the farmer is to produce. Therefore detailed knowledge is not required for the farmer. Detailed*

[17] Mainly women are less educated. By means of adapting the lessons to the requirements of the least educated persons, employees of PA also tried to address gender inequality (L. D. Gudza, Practical Action, interview, May 19, 2010).

information is for academics. The farmer needs simple, clear and relevant information for use"[18].

On the basis of the aim of the EC Block Grant project the livestock officer, as an expert on livestock management, would decide on which topics would be relevant for the project and how these topics had to be presented. Fourth, most lessons would be based upon scientific theories. Next to scientific theories also some lessons would cover traditional methods. Traditional methods would "*... if fused with scientific knowledge and shared among communities in local voices and language,* [presumably] *fill the knowledge gap that exists among the communities*" (Grimshaw & Gudza, 2010, p. 6). Based upon expressed desires by the community it was assumed that people would use the traditional method if for instance medicines would not be available in the community. Lastly, because the project had limited time, the livestock officer had to select information he felt, as a livestock scientist, was most needed by the farmers[19]. During this selection of information he envisioned, based on analyses, a certain user (the average farmer). So, during the development of the content of the lessons a certain user was envisioned who belonged to the least educated persons in the community, who owned livestock and crops, who was concerned with practical matters, and who was in need of what the average farmer would need.

The supplementary project was executed in two phases. During the first phase an ICT called SecondVoice was defined and demonstrated to the community. Unfortunately this ICT failed to work properly. Therefore during the second phase PA introduced a different ICT, namely mp3 players accompanied by external loudspeakers.

5-4 SecondVoice

5-4-1 The development process of SecondVoice

"We kept on thinking on a system in which we have a knowledge body that resides in the community and can be accessed by the community on demand. We said to ourselves; if we are talking about knowledge, let us now build a digital knowledge repository in local voice and in local language, which resides in the villages, which is accessible by the communities 24 hours a day seven days a week, where there is no barrier of the roads having been washed away or extension officers failing to come to the communities. Podcast technology was seen as the most suitable way. We were really scanning the available technologies and tried to look for something suitable, something that would also be culturally acceptable,

[18] J. Machingura, livestock officer, interview, May 22, 2010
[19] J. Machingura, livestock officer, interview, May 22, 2010

something that would not upset gender balances, something that young and old would be able to get used to, and something that regulatory restrictions would not have problems with"[20].

Taking into account information about the local people and their culture, SecondVoice was selected as a suitable ICT. In 2007 this technology was specially designed for the rural poor by designer Tom Donaldson of the company Pencil Technologies. Its design aims to overcome the problems faced by people living in rural communities in relation to creation, distribution and consumption of essential information. SecondVoice did not require internet, or a mobile phone network. It did not need batteries, but was solar powered. The device was portable and dissemination of knowledge via SecondVoice was free of charge. But most importantly it did not require literacy; knowledge was disseminated by word of mouth (Grimshaw & Gudza, 2010). With these characteristics, SecondVoice was assumed to be able to connect the first mile and to be able to empower the marginalised people living within the first mile[21].

With the SecondVoice devices people could record, replay and share any audio file. A microphone, installed in the device enables recording of sounds. These sounds were stored in the memory of the device and could be replayed at any time. To replay sounds earphones were installed. Dissemination of audio files between devices happened through Bluetooth technology. When two SecondVoice devices passed each other within a certain distance, it would be possible to exchange content. The owner of the device could determine to whom he or she targeted his/ her content. Targeted content could travel via other devices to the targeted device. An example of how SecondVoice might have worked is: someone recorded on his/ her device an explanation of how to grow crops, and disseminated it to other devices. The owners of the devices that received the explanation were able to replay the audio file, and by doing so to learn how to grow crops. It was also possible that someone recorded a question and disseminated it, hoping that someone else would listen to it and would share his/ her answer. By means of SecondVoice, people living in a marginalised community could automatically receive new information, and they were able to disseminate their own, local knowledge in their own language without need to be literate.

The employees of the company Pencil Technologies designed the devices on the basis of an egalitarian principle. They presumed a context where every community member would own a SecondVoice device. Every member would be able to participate in the knowledge production and sharing by means of the device. By providing every member in the community with a device, the power was balanced as equally as possible.

[20] L. D. Gudza, Practical Action, interview, May 19, 2010
[21] *Ibid*.

5-4-2 The envisioned socio-technical network of SecondVoice

Given the possible legal challenges and the need to account for each piece of content; the general feeling among employees of PA was that only a few members of the community would receive a device. PA was aware that they would get into trouble with governmental regulatory authorities if all people were able to record their own content, as some political messages could be developed and transmitted and this could go against the standing national laws. The security agents from the President's office would hold PA responsible for all content disseminated by the ICT devices. They are very suspicious of ICTs, since they can easily be utilized to disseminate political messages (and more specifically: messages which are not in favour of the incumbent government). Although PA preferred to give every person in society a recording enabled SecondVoice device, the fear was that if all devices were able to record, people would disseminate political messages which would not be accepted by the President's office[22]. For that reason the employees of PA planned to modify the script written in SecondVoice, and would disable the voice recording function on most devices. Based upon the tradition of 'Dare' meetings and the cascade model (see § 4-2-2), employees of PA planned to provide only the animators and village heads with a SecondVoice device. The village heads, after listening individually to the information, would orally disseminate the information to other village members during Dare (group meetings). The role of the animators would have been to cycle around the villages equipped with a device and thereby "automatically" disseminate the content on his/ her device to other SecondVoice devices within the Bluetooth range. Figure 8 schematises this dissemination model of Second Voice. Because only a few members of the society instead of all would receive a device; the essence of the technology changed.

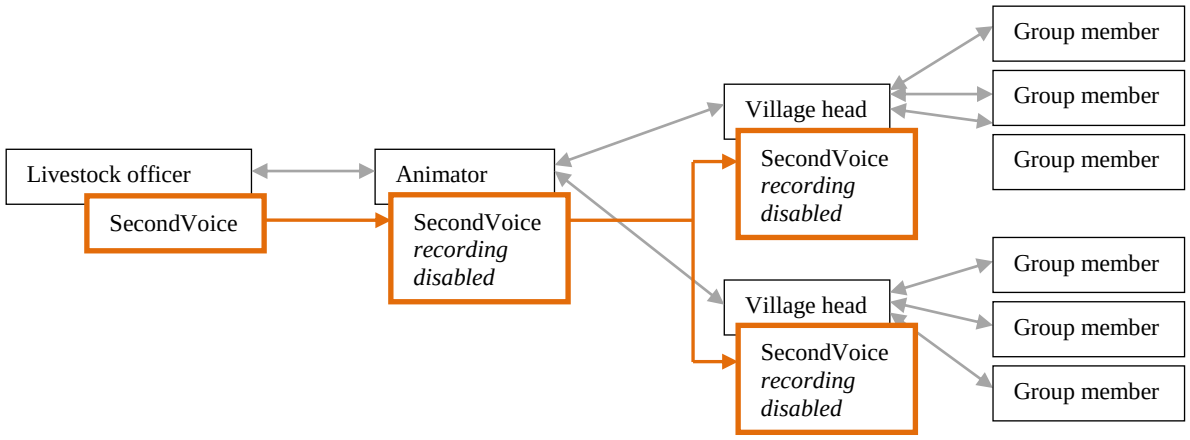

Figure 8: Representation of the SecondVoice dissemination model.

Employees of PA assumed that the information generated by experts could be disseminated more efficiently by means of SecondVoice. According to them, SecondVoice would "*...allow voice files to be passed via the natural* [presumed] *social networks of people passing by each other*" (Practical

[22] L. D. Gudza, Practical Action, interview, May 19, 2010

Action Southern Africa, 2007, p. 9). They assumed that SecondVoice itself would not cause changes in the way people conducted their lives, since the technology "... *uses everyday human activity to provide flexible, free-to-use, mobile communications"* (Practical Action Southern Africa, 2007, p. 10). The disseminated information, on the other hand, could cause changes. It was believed that the ICT would only foster effective communication among the different stakeholders in society (Practical Action Southern Africa, 2007, p. 8).

5-4-3 The script of SecondVoice

Certain tasks would have been delegated to the SecondVoice devices and the devices would subsequently prescribe a certain role to its users. First of all, the devices would take over the teaching of the livestock officer. In this new configuration, the livestock officer would become a knowledge worker, whose role would be to develop livestock knowledge and to record the lessons, which would be disseminated among the SecondVoice devices subsequently. The configuration would prescribe a new role to the animator. The animator would only focus on updating the content on the devices instead of teaching the farmers. The village heads would be able to listen to the lessons stored on the device and subsequently teach the farmers. The lessons would be recorded in a different place, at a different time and the content would not change. By the introduction of SecondVoice the nature of the knowledge dissemination system would change as well as the understanding of concepts like time and space.

5-4-4 The demonstration of SecondVoice to the community

Prototypes of SecondVoice were demonstrated to the relevant stakeholders in the community. At the demonstration meeting 25 participants were present; eight among them represented security organs, the rest represented PA's development partners in the district. Participants were representing the district administration, rural council, President's office, police department, political commissars, department of livestock development, agricultural and rural extension services, Ministry of Health, and LGDA. Among the representatives of LGDA were animators and community representatives. But during the demonstration meeting the SecondVoice devices did not work properly; the charging system was not reliable[23]. Because of this reliability problem, the file-exchange mechanism was not successfully tested. After the demonstration the employees of the company who developed SecondVoice were requested to revise the technology so it would function properly, and further demonstration and capacity building could be repeated. But because the developers of SecondVoice ran out of funds, they were unable to revise the technology, and the company withdrew from the project partnership.

[23] L. D. Gudza, Practical Action, interview, May 19, 2010

However, during the demonstration of SecondVoice alternative ICT solutions were revealed. The participants of the meeting gave feedback on the devices (Practical Action, 2007). Those attending the demonstration were pointing to: the need for an on board loudspeaker to share information collectively, the need for identification of the producer of the information, the need to limit the abilities of users to record content to prevent potential abuse, the need to be able to connect it with car batteries for recharging if the solar panel would not be sufficient and the need for a screen to make selection of information easier (Practical Action, 2007). Not all participants raised the same points; for example to limit the recording abilities to prevent potential abuse was expressed by those representing the President's office. The participants also expressed their desire to expand the content to other relevant areas as well, like health, environmental and social issues[24].

5-5 The "mp3 technology"

5-5-1 The development process of the "mp3 technology"

Based on this feedback, employees of PA defined a new ICT solution. After the withdrawal of Pencil Technologies, new ICTs that responded to the evaluation comments of the stakeholders had to be found. PA used the following selection criteria: 1) the technology had to be audio capable to allow knowledge dissemination based upon their own dissemination system (voice), 2) at least one device should also be able to record information, 3) the devices had to be robust enough to withstand the environmental conditions, 4) the speakers should produce enough volume for at least a group of 50 people which are gathered outside. The feedback given during the demonstration meeting "... *showed that the* [standard] *mp3 technology in combination with the speakers would suit perfectly the circumstances given the limitations the project faced, like limited funds*"[25].

5-5-2 The envisioned socio-technical network of the "mp3 technology"

Although the characteristics of the mp3 technology and its presumed surrounding network emulated SecondVoice to a large extent, there were also some differences. Firstly, not all mp3 devices could record, which was according to Gudza (2010) *"…even better because of regulatory authorities*". Only one of the mp3 players had a function to record audio messages. This device was used to record the lessons that were subsequently uploaded in a database on a laptop. So, next to the mp3 players there was also a need for a laptop and a digital database. All mp3 devices were updated with lessons by connecting them to the laptop and downloading from the content database. Secondly, the new ICT ran on batteries, instead of a solar panel. These batteries needed to be charged and exchanged. For the technology to operate, employees of PA put "*a mechanism in place to make sure that there were*

[24] J. Machingura, livestock officer, interview, May 22, 2010 (The demonstration took place during the peak of the Cholera outbreak in Zimbabwe. So the Heath department expressed their desire to make the community aware by means of the ICT.)

[25] L. D. Gudza, Practical Action, interview, May 19, 2010

always batteries to work with"[26]. The livestock officer, who travelled between the Mbire district and Guruve apart from supervising the project, also had the responsibility to charge and to change the batteries. In Guruve the batteries can be charged, since Guruve is connected to the national electricity grid. The presumed network, on which the mp3 technology was based, differs from the presumed network on which SecondVoice was based.

Based upon the structure of the EC Block Grant project, employees of PA and LGDA planned to provide the livestock animators with the mp3 players and its external loudspeakers (in this report this configuration is called: mp3plus). During the EC Block Grant project, the livestock animators were already used to disseminate knowledge. However, with the mp3plus the livestock animators would depend less on the teachings of the livestock officer, since the technology would be able to provide them with lessons when they want. The mp3 players would also provide the community members with a more reliable reference point. They would rely on the direct source of the information, instead of on an animator who might unintentionally transform the information because of a lack of memory. It was planned that the livestock animators would take the technology to their organised meetings. Once all people were gathered for the meeting, the animator would play the lessons on the mp3plus and the community members would listen to an original lesson, created by an expert. The animators would take notes of questions and comments expressed by the community members and would take them to the content developers[27]. Like in the EC Block Grant project, the livestock officer would be responsible for appropriate, relevant lessons. The livestock officer decided to incorporate the development agents of the AGRITEX and the Veterinary department (of the governmental extension system) in the socio-technical network, because he presumed that they were experts in their own fields, had up to date knowledge, were willing to cooperate, and knew what is needed in the community. The lessons recorded by the development agents needed to satisfy some demands made by the livestock officer, for example the content had to be brief and to the point and with clear guidelines[28]. Thereby the role of development agents would be different in this network as compared to the governmental extension system; they would become knowledge workers. If the development agents would like to record a lesson, the livestock officer would bring the recording enabled mp3 player. Subsequently the livestock officer would upload the lessons on all mp3 players and distribute them to all animators. In figure 9 this presumed operation is schematised. This new ICT was not demonstrated to the community.

[26] L. D. Gudza, Practical Action, interview, May 19, 2010
[27] J. Machingura, livestock officer, interview, May 22, 2010; N. Zuze, interview, May 27, 2010
[28] *Ibid*.

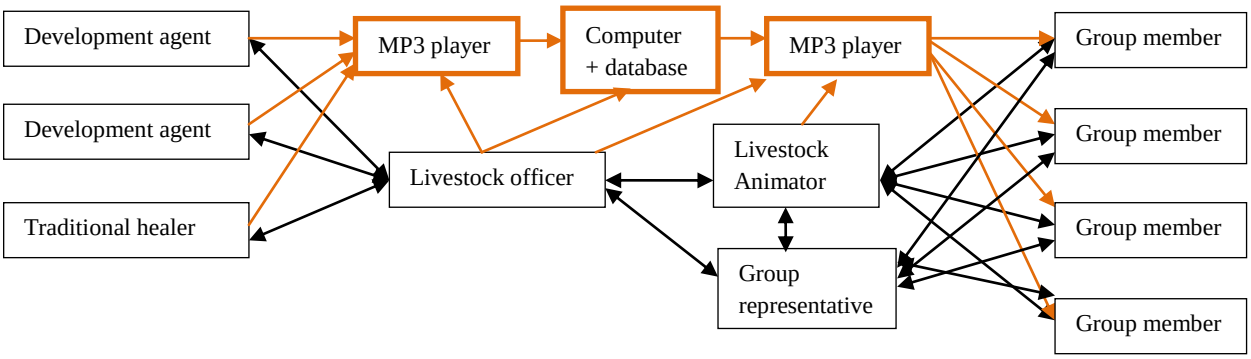

Figure 9: Representation of the mp3plus dissemination model.

5-5-3 The script written in the mp3plus

The mp3plus pre-scribes a certain user with certain endowments and abilities. Firstly, to be able to receive information, disseminated by the device, the users should not face hearing problems. The technology also restricts the distance people sit away from the speakers, and it restricts the number of people listening to the device due to the limitation of volume. Secondly, it assumes that users have certain capacities to transform information into valuable knowledge without visual information. Thirdly, to successfully operate the devices it requires certain skills and knowledge; therefore the LGDA livestock officer and the animators were trained in the operation (figure 10). Fourth, it is assumed that users would not mind a less interactive dissemination method[29]. The mp3plus is less interactive than the initial SecondVoice, and far less interactive than the traditional manner of dissemination by word of mouth. The new ICT prescribes a user without hearing problems, with the capacity to transform non interactive audio information into knowledge, and its operator should have knowledge of the device.

Figure 10: Training meeting (source: Practical Action).

[29] J. Machingura, livestock officer, interview, May 22, 2010

Certain tasks were delegated to the mp3plus, the medium for information dissemination changed partly from a human to a machine, which changed the nature of dissemination. Before the mp3 devices the information was disseminated by development agents, who organised group meetings during which they educated the people by word of mouth. Each development agent was only concerned with their department's focus (Tsetse Control, AGRITEX, Veterinary or Health) and thereby only disseminated content relevant to their own field. Although development agents were still visiting the wards to disseminate information, their tasks became complemented by a human (animator who operated the device) in combination with non-humans (mp3 player, loudspeakers, and batteries). The non-humans took over the oral instruction as well as the task to memorise the information covering all topics of four development departments. Thereby the dissemination changed in character from human to non-human actors. However, they still relied on a trained person to operate the devices correctly, and to select the content which needs to be shared. Also the spatial nature differed between the governmental extension system and the new composition. The governmental system was facing problems like a lack of human resources and equipment, such as motor vehicles and motor cycles. Especially during the rain season, when roads were impassable, development agents were not able to disseminate information effectively to remote areas. The new composition, in contrast, stayed in the ward, since the animator was a community member. The mp3 device together with the speakers and batteries were given to the animator but is owned by the ward. *"The players are ... mobile 'knowledge libraries' that anyone can access on demand"* (Gudza, 2010). Information stayed with the people in the wards, since it was stored in the mp3 device, thereby the spatial nature of dissemination changed. This new composition also led to dissemination of information on a regular basis. This new knowledge system would not face spatial limitations and would be available on demand. With the mp3plus the actorial, spatial and temporal nature of knowledge dissemination changed because the character of dissemination changed from human to non-human actors.

5-6 The projects' aims in terms of the Capability Approach

Although employees of PA did not undertake the above mentioned projects with the CA in mind, the ideas behind the projects show some similarities with it. In order to get a complete picture, the projects are analysed in terms of the following CA notions: agency, well-being, and conversion factors (Nussbaum, 2000; Sen, 1999).

5-6-1 Agency

According to Sen (Sen, 1999, pp. 189-191) agency, which means that people are in control of their own life and can determine their own development is as important as their personal well-being. People should define their own development goals. To what extent were the people living in Mbire in control

of their own development? In the following section I will scrutinise the different phases of the project to see to what extent local people had a determining role.

During the initiation of the projects, local people could determine, to a certain extent, their development. The EC Block Grant project was based upon baseline surveys. PA conducted baseline surveys in a participatory manner. Employees of PA found that: "*without the community's participation we would never know the critical requirements*"[30]. Subsequently, based on the baseline surveys, the employees of PA defined the actions of the EC Block Grant project. The local people could prioritize six predefined actions which suited their context best. In the Mbire district the "*farmers have prioritised an intervention to improve their livestock feeding systems through the use of by-products from adapted crop varieties*" (Practical Action, 2006, p. 8). During the initiation phase the local people could to a certain extent determine their own development. However they could not define their development goals themselves, they could only prioritize and agree upon predefined actions.

During the implementation phase, local people could indirectly exert influence on their own development. Both projects in Mbire were implemented in cooperation with the local development partner, LGDA, which is a community-based organisation. It organises community appraisal meetings, during which local people can express their desires. Based on these desires, LGDA makes a proposal for a development project, and searches for funders. The project proposals are presented to the community on which they democratically decide whether to proceed or not. Following this procedure, the EC Block Grant project was presented at the district level, during which the attendees accepted the project. Subsequently an awareness meeting was organised in the wards, during which the community accepted the project as well. During these meetings the local community could democratically decide in which wards projects would take place[31]. Due to the procedure followed by implementing organisation LGDA, local people were able to exert influence on their own development by democratic votes.

Also the process of selecting the technology was done in a participatory manner. During the demonstration meeting of SecondVoice the participants were encouraged to express their opinion, and to give feedback on the ICT. Their remarks were taken in consideration and led to a revision of the technology. Although the local people could not directly define the ICT solution, they were able to exert influence on the definition process and they could also reject the technology.

[30] L. D. Gudza, Practical Action, interview, May 19, 2010
[31] J. Machingura, livestock officer, interview, May 22, 2010

The President's office limited the agency of people since based upon their policy PA had to define a different ICT than initially intended. SecondVoice was based on an egalitarian philosophy, all owners of a device could record and share information. All owners would be in control of the knowledge production and dissemination. Like explained above, PA planned to adapt the SecondVoice devices to the demands of the President's office. Also in contrast with mp3plus, the original SecondVoice was far more egalitarian. With mp3plus only a few people were in control of the knowledge production and dissemination while initially with SecondVoice all people would be in control.

In the new configuration, the livestock officer of LGDA was in control of the development of the knowledge lessons, but after implementation the local people could express demands and needs according to which the content would be updated. The livestock officer, who is born in the community and is a community member, developed all the lessons during the EC Block Grant project. When the EC Block Grant project was complemented by the "*local content, local voice*" project, he invited new development partners partly based upon community demands. Thereby he redefined the socio-technical network. These new partners, AGRITEX and the department of veterinary services, were selected and incorporated in the network according to the relevance of their expertise for the aim of the project. These partners were enthusiastic to record information for the ICT project as well, but their lessons had to satisfy certain demands put upon them by the livestock officer of LGDA[32]. When the lessons were broadcast to the community, the local people could express their demands and needs to the animator. By expressing their demands the local people could influence the knowledge dissemination.

The projects were evaluated in a participatory manner as well. In the review process at the end of the project all partners, including government staff and local authorities, community members, field staff and management were involved (final Evaluation p5). All these people were encouraged to express their demands, individually and collectively.

5-6-2 Well-being

The projects aimed to increase the well-being — which is related to one's own life and not to commitments with the life of someone else (Robeyns, 2005) — of local people by increasing their livelihoods. Livelihoods; the ability to support oneself, resemble the basic capabilities within the CA. Basic capabilities "*...refer to the freedom to do some basic things that are necessary for survival and to avoid or escape poverty*" (Robeyns, 2005, p. 10). The projects aimed at improving the skills and techniques local people have to survive and to escape poverty in the Mbire district.

[32] J. Machingura, livestock officer, interview, May 22, 2010

Although the projects only aimed at increasing the basic capabilities, they also provided a means to other ends. Like Robeyns (2005) acknowledged; some ends are simultaneously also means to other ends. Employees of PA and LGDA expected that the end of the EC Block Grant project; to improve livestock's health and product value and thereby the livelihoods of people, would also improve other capabilities, like the capability to be healthy[33].

5-6-3 Conversion factors

To ensure that that local people would be able to convert the provided information into knowledge, employees of PA analysed the limitations faced by people living in the wards. While defining the means by which the information would be provided to the people, these limitations had to be taken into account. "*There was always a problem of effectiveness of the traditional knowledge dissemination method, because officers lacked expertise, present gender imbalances, and because the language used by the officers was not in sync with the language used by the communities*"[34].

During the baseline survey analysis and the additional visits to the wards, different personal conversion factors were identified. It was found that the literacy level was relatively low compared to the national level that not all people were capable of speaking English and that people also faced difficulties in understanding Shona dialects different than their own.

Next to the fact that the "*local content, local voice*" project was inspired on the tradition of local knowledge dissemination methods, it also had to take into account existing cultural practices and social norms. Firstly, in the Shona culture existed great gender differences. Although gender balance was not mentioned in the project proposals as one of its aims (Practical Action, 2006; Practical Action Southern Africa, 2007), the projects promoted equal share of women and men[35]. This gender imbalance limited women to enhance their knowledge on livestock management and crop cultivation. The projects made sure that the information was understandable and executable by both sexes. Therefore the information was mainly based on the capacities of women, since women are less educated in the district and have less experience with livestock management and crop cultivation. Secondly, the social structure and social norms of the local society were known. These structures and norms were followed during implementation: "*LGDA, our implementing partner advised us on the district's social structures; there are norms in the society you have to follow*"[36].

The environmental challenges which the program faced were also identified during the baseline survey and the additional visit to the district. The baseline survey, recognised that "*people in Mbire can*

[33] L. D. Gudza, Practical Action, interview, May 19, 2010
[34] *Ibid*.
[35] J. Machingura, livestock officer, interview, May 22, 2010
[36] L. D. Gudza, Practical Action, interview, May 19, 2010

survive through two things; livestock keeping and crop production"[37] and identified crops (guar bean, sorghum, and cow beans) and livestock suitable to the environment of the district. So, the information provided focussed on those two activities. Also the environment in which the technology would operate was analysed. Factors identified were: absence of a working electricity grid, no mobile phone coverage and absence of an installed landline, no radio coverage and a bad road infrastructure especially during the rainy season.

Conclusion

PA, in cooperation with LGDA, ran two development projects in the Mbire district. The first project had the community prioritized objective to: "*improve livestock's health and product value of resource poor households in the Mbire District*" (Mahaja, 2008, p. 6). This project aimed at the improvement of local farmers' livestock production and management techniques by orally disseminating information to poor people. The second project was initiated to complement the first project by means of an ICT. This ICT should make the dissemination of knowledge content more efficient by providing a reference point for farmers and animators, which is accessible on demand.

The aim to efficiently disseminate knowledge on livestock production and management techniques became inscribed in specific ICTs. These ICTs and their proposed surrounding network had to fulfil this aim in a specific manner. The technologies became inscribed with specific programs of action (see § 2-3). These programs of action were further specifications of how to accomplish the aim of the project.

In the district, PA and LGDA identified the existing governmental knowledge extension system as ineffective due to various factors that included skills, resource limitations and a bad to non-existent supportive infrastructure. During both projects they proposed specific socio-technical networks, which would enable more effective knowledge dissemination. In figure 11 the difference in composition of these networks, including the network of the governmental knowledge extension system, are schematized. Whereas the aim to disseminate knowledge on livestock management and related crop cultivation stayed the same during the projects, the proposed networks became more complicated, which resulted in a more complicated program of action.

[37] L. D. Gudza, Practical Action, interview, May 19, 2010

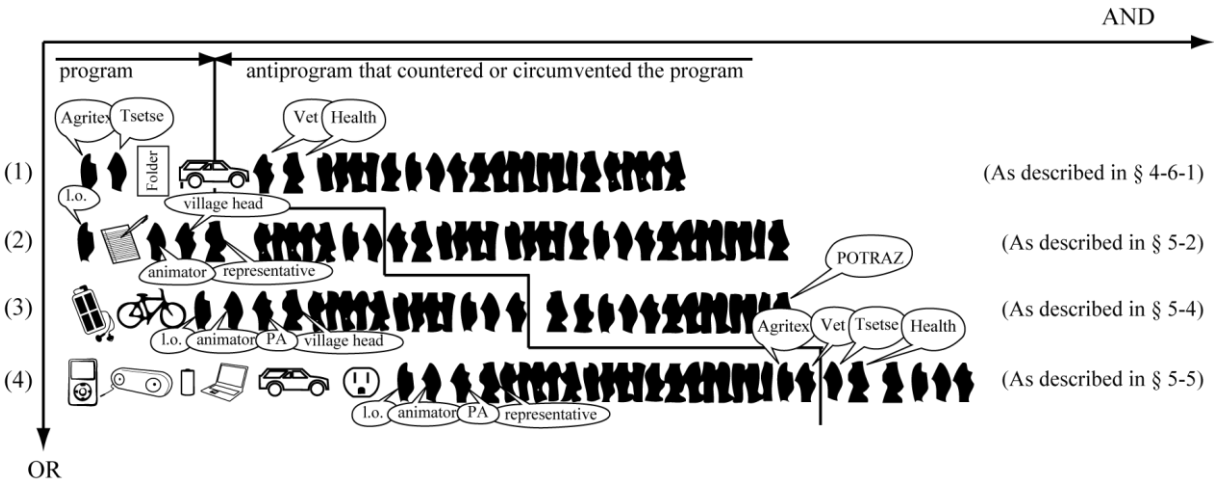

Figure 11: Substitution and association of different knowledge systems in the Mbire district (adapted version of the schematisation made by Latour (1997, p. 58)).

Within the governmental knowledge extension system ((1) in figure 11) development agents from different departments went to the community members to disseminate knowledge. Their program of action was to "*orally disseminate knowledge, related to the department's area of expertise, to community members during their own organised meetings*". But since the development departments lacked sufficient human and material resources and bad to non-existent supportive infrastructure, knowledge dissemination did not occur on a regular basis.

The network introduced during the EC Block Grant project (2) existed next to the governmental extension system. The aim was to deliver knowledge on livestock management and related crop cultivation to poor people living in the Mbire district. To make sure that knowledge would be disseminated, PA and LGDA introduced a composition of actants. Each actant had a role. As is shown in figure 11 the composition existed of: a livestock officer (l.o.) who developed the information and taught the animators and group representatives. Animators who took notes in a notebook during the lecture. They also organised meetings with the community members and subsequently disseminated the learned information by word of mouth. The group representative tried to solve problems in a group of community members and coordinated meetings with the animator. The meetings were attended by interested community members. The community members who were not interested did not join the group meetings; they ignored the program of action of the introduced composition. The program of action of this network was to "*orally deliver knowledge on livestock management and related crop cultivation to poor people living in the Mbire district by educating a few members of the community who will disseminate this knowledge to the rest of the community*". This network could be improved, because the livestock officer did not have sufficient time to teach all animators and group representatives on the more complicated topics thoroughly.

Employees of PA selected SecondVoice as a suitable ICT to improve dissemination. SecondVoice was a device that fostered knowledge sharing among people based on egalitarian principals. The program of action inscribed in the devices read as follows: "*enable every person in a specific rural community to produce, disseminate and consume information whenever, wherever they want without depending on external resources (like batteries)*". To fulfil this program of action the developer of SecondVoice had a specific composition in mind. Every person in the community would be equipped with a SecondVoice device. However, the broadcasting authority of Zimbabwe, POTRAZ, required, under the broadcasting act of the country, to have all data transmissions licensed. PA complied and got the technology licensed and permission was given to transmit voice within the 100 metre radius using Bluetooth technology only. Furthermore, the egalitarian basis of SecondVoice was an obstacle for the security agents representing the President's office. They developed, in Latourian terminology, an anti-program to this proposed network by holding PA fully responsible for all content disseminated by SecondVoice.

Since PA could not control the information produced, disseminated and consumed within this specific configuration, they planned to alter the program of action written in the SecondVoice devices. PA planned to disable the recording function of most devices, and due to limited funds they planned to provide only the livestock officer, the animators and the village heads with devices. They altered the program of action to: "*deliver knowledge to rural people by enabling one person to produce information, and to enable a few persons to disseminate and consume knowledge whenever, wherever they want without depending on external resources (like batteries)*". This means that the agency of most community members would be less respected as compared to the situation before the alterations were made. PA planned to incorporate this configuration in a specific composition of human and non human actants (3). This composition existed out of a livestock officer who produced the information by recording lessons with a SecondVoice device. The animators who with a recording disabled SecondVoice device moved around in the wards by bicycle to disseminate the recorded information to all devices. Village heads, who listened to the recording on their devices and subsequently taught the interested community members by word of mouth. The program of action of this specific composition is countered by community members who were not interested to join and by the security agents (President's office) who would hold PA fully responsible for all content disseminated.

Because the SecondVoice devices had a reliability problem, a new ICT had to be defined. Based on feedback given by security organs, development partners and community members, PA selected standard mp3 players accompanied by external loudspeakers as a suitable ICT to complement a human extension officer. The mp3 players were not specially designed to accomplish the project aim, therefore their program of action did not necessarily correspond with the projects' aim. PA proposed a specific composition of actants to make sure that the standard mp3 players accompanied by the

external loudspeakers would lead to more efficient knowledge dissemination (4). This composition existed out of employees of PA who trained the relevant persons in successfully operating the necessary devices. The livestock officer who was responsible for the production of information. He decided to incorporate the development agents from the AGRITEX and Veterinary departments. For recordings he had an mp3 player which was able to record, and needed local people who spoke the right Shona dialect, Kore kore. The recorded lessons were stored in a database on a laptop. The livestock officer was also partly responsible for dissemination, since he uploaded all lessons on the mp3 players. These players did not have a recording function and were accompanied by external loudspeakers. The mp3 players were given to all animators. The animators organised meetings with the interested community members and shared the recorded lessons. The community members were organised in groups, each represented by a group representative. The group representative coordinated the meetings and tried to solve problems before animators were consulted. When animators did not know how to solve problems he referred people to the development agents. All mp3 players ran on batteries. These batteries had to be charged using a charger connected to the electricity grid located in Guruve, 120 kilometres away. To transfer batteries from Mbire to Guruve, they had to be taken by car. The program of action was countered by uninterested community members and the President's office, which still held PA fully responsible for all content disseminated by the technology. The program of action of this composition is: "*deliver knowledge to rural people by enabling a few persons to produce information on livestock management and related crop cultivation, one person to record and to copy information to all devices and a few persons to disseminate and consume information whenever, wherever they want in groups of maximum 50 people if sufficient power is left in the charged batteries".*

The complexity of the socio-technical networks differed per knowledge dissemination system. Corresponding to this complexity, also the program of action became more complicated. Table 1 gives an overview of the knowledge dissemination systems, their program of action and the actants involved.

Certain tasks were delegated to the mp3plus. The actual knowledge dissemination would happen by the devices and the devices also would memorise all content. The devices would stay in the wards and in combination with other actants and actors would be able to disseminate knowledge all day. Thereby the mp3plus changed the understanding of concept like time and space.

Table 1: The programs of action and the involved actants of different knowledge systems.

	EC Block Grant system	**SecondVoice as originally proposed by PA**	**Mp3 technology as introduced**
Program of action (specification of how to accomplish the aim of the project)	"*orally deliver knowledge on livestock management and related crop cultivation to poor people living in the Mbire district by educating a few members of the community who will disseminate this knowledge to the rest of the community*"	*"deliver knowledge to rural people by enabling one person to produce information, and to enable a few persons to disseminate and consume knowledge whenever, wherever they want without depending on external resources (like batteries)*"	"*deliver knowledge to rural people by enabling a few persons to produce information on livestock management and related crop cultivation, one person to record and to copy information to all devices and a few persons to disseminate and consume information whenever, wherever they want in groups of maximum 50 people if sufficient power is left in the charged batteries"*
Proposed network of actants	Livestock officer	Livestock officer	Livestock officer
	Animators	Animators	Animators
	Community members	Community members	Community members
	Group representative	Village heads	Group representative
	Notebook with a pencil	SecondVoice devices	Mp3 players which is able to record
		Recording disabled SecondVoice devices	Mp3 players which are only able to replay
		Bicycles	Loudspeakers
		POTRAZ	Laptop with database
		The security agents (President's office)	The security agents (President's office)
			Batteries
			Charger
			Electricity grid
			Car
			Employees of PA
			Development agent from the Veterinary department
			Development agent from the AGRITEX department
			Persons speaking the right dialect

Chapter 6: Domesticated Version of the mp3plus and the Actual Human Capabilities

Introduction

In this chapter I will answer research question S3), "*How is the network of relevant actors changed due to the introduction of the specific ICT?*", and question S4), "*To what extent are the actual capabilities of those relevant actors increased or decreased due to the introduction of the specific ICT?*". According to Sørensen (1994), users themselves adapt the network during the process of domestication and thereby give form to the essence of the technology (see § 2-5). During my ethnographic research in Zimbabwe, I analysed how a number of relevant actors domesticated the mp3plus, how they were positioned in the network surrounding the mp3plus and what their actual human capabilities looked like. In the next chapter, I will analyse how the actual human capabilities relate to the domesticated use and/ or to the script in the technology.

The domestication theory assumes separate stages between the development and enactment of technology. However, these stages were mingled during the development projects in the Mbire district. As discussed in the previous chapter, both development projects were initiated and executed in a highly participatory manner. Employees of Practical Action (PA) did not want to be prescriptive, but instead they involved stakeholders, and representatives of the local community in the definition of the development goals and in the actual development process. This participatory approach makes it hard to distinguish the two theoretical phases. In the Mbire district there was no clear distinction between the development and enactment of the ICT. The projects' participatory approach resulted in the fact that the development and enactment of the ICT ran parallel as much as possible. Although the mp3plus was already based upon feedback given by local people on SecondVoice, it was still further enacted by the local people after introduction in the community; for that reason I will describe the domestication process from the moment that mp3plus was introduced in their community.

6-1 The domesticated version of the mp3plus

6-1-1 Role of authority in the domestication process

The domestication process of the mp3plus was very much controlled by the people with higher authority. The Mbire society has a clear hierarchical structure with a high power distance between different ranks (see § 4-2-1). The community members at the bottom of the hierarchy do whatever is

demanded from them by higher ranks. The villagers will obey the village heads and councillors if they demand not to use, or to use the technology in a specific way. The village heads and councillors also approved the technology before it was introduced in the wards[38]. In this way authorities exerted much influence on the domestication process.

6-1-2 Who owned the mp3plus?

Once the technology was agreed upon, PA donated the mp3plus to the community members. These devices were collectively owned, but were under the control of the livestock animators living in the wards. The interviewed community members were demanding more devices, especially people living in the wards that were involved in the EC Block Grant project, but were not involved in the "*local content, local voice*" project. Some people felt that they cannot afford to buy the technology (even not collectively with all people in the ward): "*People in ward six cannot manage to buy the technology, it is too expensive*"[39]. But the general feeling among persons living in the beneficiary wards that I interviewed was that people were able to contribute to the payment of the devices[40]. However, before people collectively would buy a device, they felt that "*...there needs to be a discussion because there are different views. Such a discussion has not taken place since nobody brought such an idea to the people yet*"[41].

Since there was only one device per ward available and the content was planned to be only on livestock management and production the devices were only given to the livestock animators. These animators were responsible for the ICT devices. However, this responsibility was taken in different manners. The livestock animator of ward nine took good care of the technology and made sure that it stayed under his supervision; *"I only give the device to the other animator if we stay together*"[42]. However in ward seven the health animator collected the podcast machine whenever he felt like it. "*If I, as a health animator, need the machine I just go to collect the machine. During most of my meetings I use the machine*"[43]. During the process of domestication, the health animator appropriated the ICT differently than was intended by the projects initiators, according to them only the livestock animator would control the mp3plus.

6-1-3 When was the mp3plus used?

In the knowledge dissemination system, the podcast devices had acquired a rather prominent place. They were used on different occasions. First of all, the animators used them during their own

[38] N. Zuze, animator livestock, interview, May 27, 2010
[39] Mr. Mupfumbira, male farmer, interview, May 8, 2010
[40] Some people even think that "*it would be better if people have to pay, because it removes the symptom that we are being given for free*". (C. Guwsani, group representative, interview, April 19, 2010).
[41] E. Kamota, female farmer, interview, May 22, 2010
[42] N. Zuze, animator livestock, interview, May 27, 2010
[43] S. Kasera, animator health, interview, May 1, 2010

organised group meetings (figure 12). During the project, animators had to visit each group once a month. People went twice a month to group meetings, once to each animator (health and livestock). "*I visit each vidco* (village development committee, there are two villages in each vidco) *once a month*"[44]. Sometimes the development agents instructed the animators on which topics they had to educate the people. For instance the development agents instructed the animators to broadcast a specific lesson on prevention when they heard about an outbreak of a disease. Subsequently the knowledge on preventative treatment spread rapidly all over the ward. Secondly, people gathered together when they faced a problem. If they were not able to solve the problem they called for a meeting and invited the animator[45]. These two types of meetings were prescribed by LGDA and PA.

Figure 12: Group meeting (photo made by the author).

Next to the prescribed use, the local people also enacted the technology. Firstly, the devices were used when people individually went on a visit to the animator with a question[46]. In the beginning of the project people did not visit the animator individually, but in the course of the project more and more people came whenever they faced a problem they were not able to solve[47]. Secondly, the animators also broadcast during meetings organised by other people, for instance by LGDA or village heads[48].

[44] S. Kasera, animator health, interview, May 1, 2010
[45] J. Muzika, animator livestock, interview, May 8, 2010
[46] Observation, April 15, 2010
[47] N. Zuze, animator livestock, interview, May 27, 2010
[48] J. Machingura, livestock officer, interview, May 22,2010

Sometimes the development agents were present during such meetings as well, but their teaching was replaced by an mp3 broadcast. The development agents were there to answer questions after the lesson. The implementation of an mp3 broadcast in the meetings worked very efficiently like one development agent expressed: "*Technology saves me time, therefore I have now more time to be prepared during questions, and to polish or to develop lessons*"[49]. Thirdly, because some people did not understand the lessons completely, local people started to give demonstrations as well. Initially the animator gave only theoretical lessons, so called awareness meetings. But when "*we saw that people did not understand the lessons completely, demonstrations started*"[50]. During these demonstration meetings animators showed how to put the theoretical guidelines into practice. Later on they also started to play the lessons along the demonstrations. Since the introduction of the ICT the focus of the meetings became more and more on demonstrations. Although these three types of usage were not prescribed, employees of PA and LGDA foresaw them[51].

Figure 13: Demonstration meeting (photo made by the author).

6-1-4 How is the mp3plus used?

The use of the ICT during group meetings was incorporated in the existing habits and routines. The group meetings during which the devices were used, were organised similarly to the traditional meetings organised by development agents. If the animator wanted to meet with a group, he/ she

[49] C. Murenza, Agritex development agent, interview, May 11, 2010
[50] S. Kasera, animator health, interview, May 1, 2010
[51] L. D. Gudza, Practical Action, interview, May 19, 2010; J. Machingura, livestock officer, interview, May 22, 2010

informed the village head and the group representative what time, and place he/ she would come. The village head and group representative subsequently informed all group members and called for the meeting. When all group members and the animator were there, the meeting opened with a Christian or a traditional prayer executed by the village head or a chairman: "*The meeting is opened by the chairman. Everyone put their hats off. The chairman starts the prayer by clapping his hands while stooped before a tree. At the same time all men present clap their hands, whereas women do not*"[52]. After the prayer, the important people present were introduced to new attendants. After introduction, the animator read the minutes of the previous meeting, and subsequently asked whether new matters arose during solving the problems discussed at the previous meeting. After this discussion, the animator broadcast new lessons, which was followed by clarification and a discussion[53]. These steps were exactly the same as during other organised meetings in the Mbire district, for example like the meetings organised by the development agents[54].

Also the content was incorporated within the society. Many topics, or at least the solutions presented to problems relating to a topic were new to most listeners. Due to the long tradition of their own local knowledge system, which was more based on spirits and witchcraft, people did not take the new explanation for granted. Therefore, after the lessons discussion started, this was used to give further clarification and to discuss the contradictions between new and old solutions. "*Community now debate causes of for example cholera. Some people do not believe that it is caused by a lack of personal hygiene*"[55]. Traditional healers, important knowledge nodes in the traditional knowledge system, were also visited to clarify the difference between the "modern" and the "traditional" methods. If the newly introduced methods were executed, they did not disturb the local culture, on the contrary they were often seamlessly incorporated in the traditional customs and routines:

> "*The technology did not disturb our culture; it gives us knowledge which we did not have before, like on personal hygiene. People all eat from the same plate, but they now wash their hands properly before having supper. This will prevent a cholera outbreak, but traditional way of sharing food remains*"[56].

6-1-5 What is the meaning of the mp3plus?

The number of times people attended meetings, and the number of attendees per meeting increased due to the introduced means of knowledge dissemination. Local people saw the information disseminated by the ICT as valid since they believed the content to be developed by well educated

[52] Group observation, April 19, 2010
[53] S. Kasera, animator health, interview, May 1, 2010
[54] C. Murenza, Agritex development agent, interview, May 22, 2010
[55] R. Mubvundika, animator health, interview, April 19, 2010
[56] Mrs. Kamwaza, group representative, interview, May 8, 2010

people[57]. People did not trust the animators and extension workers, because they were not highly educated and therefore they might make mistakes and forget critical parts. "*The technology grasps all information whereas in ward 6, the animator has to do it with notes and gets confused sometimes*"[58]. The ICT was seen as all-knowing and the content was seen as the truth, flawless and very valuable to the community.

On demand of the community members the content was extended to other areas, like human health[59]. Although other knowledge areas were incorporated, most topics still concerned livestock management and related crop cultivation for supplementary feeding[60]. Therefore local people attached the meaning "kamuchina kemombe" (machine with knowledge of cattle management) to the technology (Grimshaw & Gudza, 2010).

6-1-6 Restriction to the domestication process

The domestication process was also restricted by LGDA and PA to overcome certain social factors. The President's office was of major influence, as fears were always there that the meetings could be misconstrued by the President's office to be organised by the opposition political parties. Another fear was that officers from the President's office could suspect that content being shared was of a political nature in favour of the opposition. For these reasons LGDA and PA had chosen LGDA as knowledge node, which controlled all knowledge content production and uploading. They did not allow everyone to record and disseminate their own content, and thereby restricted the domestication process due to political fears. Different community members had ideas how to utilize the technology, as the councillor of ward nine expressed: "*... I could use the technology to market myself as a councillor to say how good I am for the community*"[61]. Another reason LGDA was the knowledge node, was because they wanted the technology to reside in the community. Most development agents on the other hand were not locals and they often resided in the community for only a short period of time. Because of their low salaries, they were not motivated to work and therefore the community would not be able to access knowledge all the time. This would mean that the farmer-to-farmer approach would not succeed[62].

However, since the project ended in March 2009 no new or revised content has been recorded. In the present network, where LGDA owns the recording equipment, laptop and database, people are dependent on LGDA for the recording of new content. LGDA on their part, depends on donor funds to

[57] C. Guwsani, group representative, interview, April 19, 2010
[58] Mr. Mupfumbira, male farmer, interview, May 8, 2010
[59] J. Machingura, livestock officer, interview, May 22, 2010
[60] *Ibid*.
[61] T. Mutaiwa, councillor, interview, April 19, 2010
[62] J. Machingura, livestock officer, interview, May 22, 2010

sustain projects once the funding has ended. But since LGDA does not have funds for going to the development agents to manage recordings, no recordings are made. As described in chapter four LGDA is located in Guruve, so development agents have to travel to Guruve to record information. Guruve and Mbire used to be the same district, but nowadays they are separate entities with each their own development departments. Due to different local authorities and cultural practices, development agents cannot go from one district to another without permission. To record information in another district is very unusual. Therefore "*the livestock officer of LGDA should come to Mbire to record information*"[63], this is however impossible without funds.

6-2 The actual network and the actual human capabilities of relevant actors

On the basis of interviews done among relevant actors and the analysis of the domestication process, I drew the socio-technical network (figure 14). The development projects primarily increased the basic capabilities enjoyed by local people. "*There was evidence found that the programme had significantly contributed to household food and livelihood security of participating communities through increases in production and productivity"* (Dengu, et al., 2010, p. 5). In the following section I will describe the interviewed and observed relevant actors; in terms of their role in the network, their relationship with other actants like technologies and social institutions, as well as their actual human capabilities.

[63] C. Murenza, Agritex development agent, interview, May 22, 2010

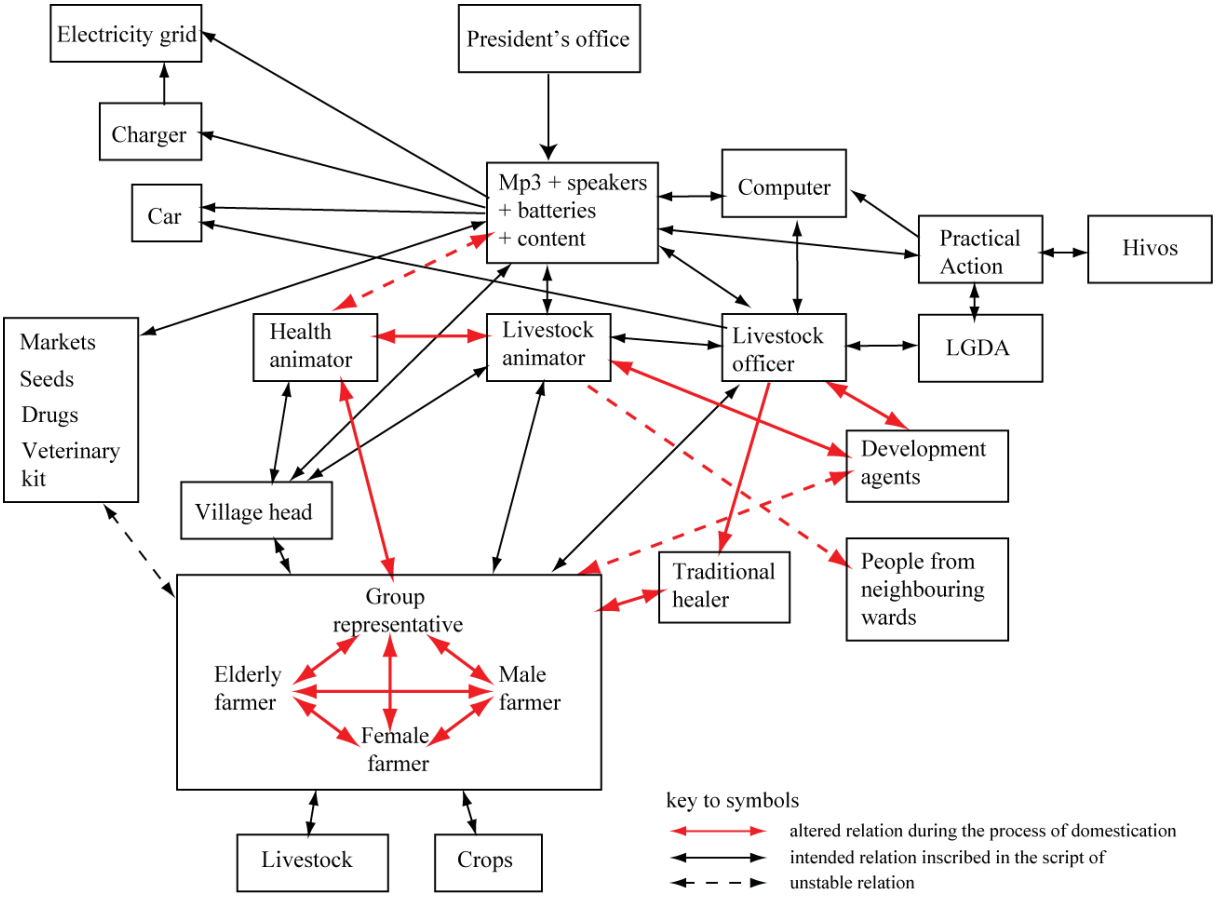

Figure 14: Representation of the network surrounding the mp3plus in the period of the fifth of April to the third of July.

6-2-1 Farmers

Network surrounding the farmers

The introduction of mp3plus caused changes to the network surrounding the farmers. Nowadays, farmers rely much more on the animators and the ICT for knowledge provision, than directly on the development agents. But, their relation with the development agents improved, because the people believed that the lessons broadcast by the mp3plus contained true information, since they were made by knowledgeable people. When they found out that the development agents also created some lessons, they started to trust the development agents more than they did before the project[64]. Also the relation between farmers changed. The mp3plus fostered "*... group work and group harmony which did not exist before. When groups ask for lessons we share experiences and ideas*"[65]. So, the technology improved farmers' relation with each other, and with the development agents.

Some farmers were more actively involved in the network than others. They lived closer to the animator or the development agents and therefore were able to visit them more often with individual questions or demands. Also the farmers who had livestock, crops or both were much more involved in the network since there was much to gain for them. Community members who were involved in

[64] N. Zuze, animator livestock, interview, May 27, 2010
[65] M. Mutoni, male farmer, interview, May 1, 2010

carpentry or services (like the traditional healer) were less involved in the network, since there were no lessons recorded concerning these topics.

Capabilities enjoyed by farmers

The basic capabilities enjoyed by the farmers increased, because their farming techniques improved. The lessons were primarily aimed at the farmers with livestock and crop cultivation. They benefited more than other actors in the network. Their farming techniques improved, which led to improvement of their livelihoods. As expressed by male farmer Mamyemwe, their "*... treatment of cattle improved, we are now able to provide food to our animals, and we are now able to supply enough water to our livestock*". And as indicated by traditional healer Charewa (who owned livestock and cultivated crops), "*before the technology was there, corrals were built in the ordinary way but nowadays we are able to build sustainable cages, due to these corrals I do not lose an animal per year due to attacking hyenas*". There was, however, a difference in effectiveness between the wards which had and which did not have the mp3plus. In the wards which had the mp3plus the milk production increased from two to five litres per cow per day[66]. Whereas "*milk production in ward six* [which did not have the mp3plus] *increased from two to three and half litres per cow per day*"[67]. Although there were differences between the beneficiary wards, all farmers improved their farming techniques, and subsequently their livelihoods/ basic capabilities.

The improved basic capabilities led to improvement of other capabilities. Firstly, farmers had more self esteem, as expressed by male farmer Kamba, "*before the technology, if an animal was dying then I could not take action, but now I can. I am happy since I am a full farmer now!*". Secondly, the improved farming techniques led to increased income that enabled other capabilities. As male farmer Mutoni indicated, "*because of my increased number of cattle and increased crop yields, I am now able to pay school fees for my children*". Thirdly, since the knowledge provision was efficient, people had more time to do other things: "*I now have more time to practice religion*"[68]. The improved basic capabilities led to improvement of other capabilities as well.

The community, as a group, was more self-supporting. The projects "*... facilitated group work and group harmony which did not exist before. When groups ask for lessons we share experiences and ideas, we even share drugs* [for sick cattle] *among each other*"[69]. The mp3plus provided a reference point for the farmers as well as for the animators. This reference point resided in the community, and thereby made knowledge dissemination more sustainable. Because all community members had access to knowledge provision and collectively owned the mp3plus, they were more self-supporting.

[66] S. Kamba, male farmer, interview, May 1, 2010
[67] W. Manyemwe, male farmer, interview, May 8, 2010
[68] M. Mutoni, male farmer, interview, May 1, 2010
[69] M. Mutoni, male farmer, interview, May 1, 2010

Although the interviewed farmers were very positive about the mp3plus, they also identified a negative impact. In the lessons broadcast by the mp3plus tools, seeds and drugs were mentioned which were necessary for successful livestock management and crop cultivation. Nowadays, farmers have the knowledge on how to cultivate crops and to manage livestock, however often, "*...resources to do so are not available, this makes me sad because I know how to treat but do not have the means*"[70].

When resources were not available, farmers relied on the traditional method. This traditional method was also disseminated by the mp3plus. Both methods, the traditional and the "modern", were seen as valuable. The former was seen as valuable especially when people did not have the money to buy resources which were necessary to execute the "modern" method[71].

6-2-2 Female farmers

Network surrounding the female farmers

The improved gender balances in the community changed the relationship women had with other actants in the network. Nowadays more women attend the group meetings, and more women are able to be actively involved in livestock management as well as crop cultivation. The projects made people aware of the equal endowments of men and women[72]. However, gender imbalances were still found in the society, also relating to the mp3plus. Firstly, during group meetings, men had better seats (stumps), close to the animator (most animators are men) and the mp3plus, whereas the women sat on the ground[73]. Secondly, men were more actively involved in the discussion after the broadcasts. Sometimes their speaking volume was impossible to hear for the women who were sitting approximately 10 meters away (see figure 15)[74]. Thirdly, women needed to ask their husbands permission to individually go on a visit to the animator[75]. Although gender balance improved with the introduction of the mp3plus, the position of women in the network differed from the position of men.

[70] C. Ushongani, male farmer, interview, May 1, 2010
[71] A. Charewa, traditional healer, interview, May 1,2010
[72] P. Chakasara, elderly female farmer, interview, June 16, 2010
[73] Group observation, April 19, 2010
[74] *Ibid*.
[75] N. Zuze, animator livestock, interview, May 27, 2010

Figure 15: Awareness meeting with men sitting on the left hand side and women on the right hand side (photo made by the author).

Capabilities enjoyed by female farmers

The participation of women in the community improved. One of the interviewed women described the change as follows: "*...during the lessons I was afraid to ask questions, because of the way I was treated by the development agents, now with the mp3plus I am not afraid to ask questions anymore; there is a better gender balance*"[76]. Women became aware of their natural endowments. They had more confidence to participate more actively in meetings and farming activities[77]. The general feeling among interviewees was that "*since the project women are more contributing than before*"[78].

This improved participation led to improvement of women's basic capabilities. Women were more involved in livestock management and crop cultivation. These activities used to be the domain of men. But since women were more involved, they also contributed to the livelihoods of the household, as Mrs. Munhuwa (2010) indicated: "c*urrently I am aware of how to handle livestock, my cattle are increased; I have six now".* The necessary knowledge to do so was especially useful for widows who took care of livestock and crops on their own. The basic capabilities enjoyed by women improved and these increased capabilities led to more self determination, as the plan of female farmer Munhuwa indicates: "…*I can sell my increased number of cattle and with the money I hope to be able to buy a grinding mill in the future*".

[76] M. Munhuwa, female farmer, interview, April 28, 2010
[77] P. Chakasara, elderly female farmer, interview, June 16, 2010
[78] J. Muzika, animator livestock, interview, May 8, 2010

6-2-3 Elderly persons

Network surrounding the elderly persons

The introduction of mp3plus led to better incorporation of elderly persons in the socio-technical network. Before the development projects started, the elderly people did not understand the lessons conducted by the development agents. But, since the introduction of mp3plus lessons were understood[79]. Elderly people relied more on the technology and the animators than they did before on the development agents. Although the lessons were effectively broadcast by the mp3plus, some elderly persons preferred a human being above the technology for the actual knowledge dissemination, because they could talk face to face[80]. The mp3plus successfully reminded them of the critical parts. The elderly people who did not have access to the mp3plus said:

> "*... because of age I tend to forget things after the meeting, even if I ask. The technology can be of value to this ward, because it will remind us. I expect myself to go to the animator very often to be reminded*"[81].

Capabilities enjoyed by elderly persons

Because the mp3plus incorporated elderly people in the network like other farmers, they enjoyed the same capabilities as them (described above). Their basic capabilities improved. These basic capabilities enabled other capabilities as well.

6-2-4 Traditional healer

Network surrounding the traditional healer

With the exception of some traditional healers who recorded information, most healers were not directly incorporated in the network. In the Mbire society there existed two types of traditional healers: 1) healers who totally depended on their healing services, and 2) healers who next to their services, also cultivated crops and managed livestock to provide for their livelihoods. The latter were directly impacted by the introduction of the technology similarly to how farmers were impacted. The former type related indirectly to the technology. Because the mp3plus provided other people with information, it was seen as a competitor for the traditional healer. A healer in ward nine expressed that since the introduction less people visited him[82]. The introduction of the technology in the network aroused the interest of the community members in the difference between the "modern" and the traditional method. As a traditional healer in ward seven expressed: "... *people are visiting me because they want to know the difference between the traditional method and the new method*"[83]. Some healers

[79] G. Chimonga, elderly farmer, interview, June 16, 2010
[80] *Ibid*.
[81] Mr. Kapenge, elderly farmer, interview, May 8, 2010
[82] C. Mukami, traditional healer, interview, April 13, 2010
[83] A. Charewa, traditional healer, interview, May 1, 2010

directly related to the technology. Employees of PA and LGDA incorporated, on demand of the community, a few traditional healers in the network to record some of their traditional knowledge. This knowledge was planned to be necessary in times when farmers did not have money. Traditional knowledge is now available to the community via the ICT; the community members do not have to visit the healers concerning those topics anymore. However, most traditional healers were indirectly impacted, since they were visited less frequently or with different reasons due to the introduction of the mp3plus.

Capabilities enjoyed by the traditional healer

Also the capabilities which traditional healers enjoyed were indirectly impacted. Although traditional healers welcomed the technology, their own capabilities decreased since less people visited them. Their clients were their only source of income. Less income led to more dependency on other people[84]. Healers with less income were less capable of providing for their livelihoods. Their own basic capabilities therefore diminished (except for the healers who were also involved in livestock management and crop cultivation).

6-2-5 Livestock animator

Network surrounding the livestock animator

The network of the livestock animators changed a lot with the introduction of the mp3plus. First of all, they closely related to the technology, because they were the controller and the operator of it. They did not have to rely on their own notes anymore nor on their own memory. Instead the technology provided a reference point for all content. This relation changed how the livestock animators conducted their lessons. Instead of giving the lessons orally, they now simply broadcast the lessons, and gave, if needed, clarifications afterwards. Secondly, the livestock animators gained an extra responsibility within the network. They had to report the problems faced by the community members to the development agents and the livestock officer. Therefore they had a close relationship with them. Thirdly, their role in their own community became more important. As livestock officer Machingura noted: since the project ended "*..., animators do not receive allowances anymore, but they are still doing their job, because they want to maintain their pride*". Finally, the livestock animators started to relate to people from outside the project. These people were living in neighbouring wards, but heard about the new technology and the benefits gained by the community. They started to attend meetings and to demand the animator to visit their wards as well. Thereby the relationships of the livestock animators changed by the introduction of the mp3plus in the socio-technical network.

[84] C. Mukami, traditional healer, interview, April 13, 2010

Capabilities enjoyed by the livestock animator

The basic capabilities enjoyed by the livestock animators were increased because they also owned crops and livestock. These animators, as the controllers of the mp3plus, had access to the stored knowledge whenever they wanted. They also had an extensive training by the livestock officer on livestock management and crop cultivation. This training and the continuous access to lessons improved their knowledge of farming techniques. These farming techniques enhanced their capabilities to gain their livelihoods (their basic capabilities).

The role of the livestock animators in their own community became more important. Different community members relied more on them, since they were important actors in the knowledge dissemination system. Due to this reliance, their prestige in the community increased, which resulted in more self esteem and dignity.

6-2-6 Health animator

Network surrounding the health animator

The role of the health animators, and their relations slightly changed. Two lessons covered by the mp3plus concerned health issues. The health animators could make use of the technology at meetings where it was already present. However, as described above, in some wards the health animator just collected the machine whenever he or she felt like it. When the technology was present, the health animators were seduced to broadcast a lesson on the mp3plus instead of giving an oral lecture. As was exemplified by the health animator Mubvundika: "*today I gave a lesson on cholera, because it is recorded in the machine*". In this case the content of the lessons was determined by what was available on the device. The health animators related to the mp3plus since some recorded lessons concerned their expertise.

Capabilities enjoyed by the health animator

The introduction of the technology caused a few changes in the capabilities enjoyed by health animators. Health animators fulfilled the same duties as before the "*local content, local voice*" project. However some of them related to a livestock officer who was willing to share the technology with them. Thereby they also increased their self esteem. Like the livestock animators they became more important actors in the knowledge dissemination network.

6-2-7 Village head

Network surrounding the village head

The role of the village heads did not change much. They approved the technology before it was allowed to be introduced into the network of the community. They were always able to dismiss the technology from the network or to demand a certain use of the technology. They also informed group

members when there was an awareness or demonstration meeting. These tasks already belonged to the village heads before the introduction of the mp3plus in the network.

Capabilities enjoyed by the village head

The capabilities of the village heads did not change much next to the changes which they experienced as being a farmer as well. Their role as village heads did not change and neither did changes in the network surrounding them caused changes in their enjoyed capabilities as village heads.

6-2-8 Livestock officer

Network surrounding the livestock officer

The introduction of the mp3plus changed the role of the livestock officer. Instead of only teaching the livestock animators, as during the EC Block Grant project, the officer was now also responsible for the recordings, the management of the database, the data transfer to all mp3 players, and the charging of the batteries. For this reason he related to many actants within the network. He related to the mp3 players, of which one was also able to record audio lessons. Once audio lessons were recorded, the livestock officer uploaded them in the data base on the computer, using a laptop and other necessary hardware related to the mp3 player. Lessons could be copied to other mp3 players from this same database. For charging the batteries the livestock officer related to a charger, and to an electricity grid. Since the electricity grid did not reach the Mbire district, he needed to go to Guruve, where electricity could be found. This however was a two hour drive by car. Therefore the livestock officer also depended on a car, which is available when LGDA ran projects in the community. The livestock officer also related to the different development agents and traditional healers to record the content. He made use of their expertise, and wanted to involve them in the project; to create a sense of partnership. To record the content in local voice and local language the officer also related to other community members. The officer also depended on the livestock animator for feedback on demands and needs expressed by the community.

Capabilities enjoyed by the livestock officer

The livestock officer did not gain much from the introduction of the technology except for saving time. Before the introduction of the mp3plus, the officer could not educate the animators enough because of a shortage of time. The mp3plus complemented his real life teaching.

6-2-9 Development agents

Network surrounding the development agents

The introduction of the technology caused big changes in the network of the development agents. Although before the project started, the agents had difficulties in visiting the community due to a lack of human and material resources, today they visit the community even less. Their "*... relation with the*

farmers changed, since nowadays only my voice is going there"[85]. Their voice had been recorded with the technology, and the animators broadcast their lessons in the community in absence of the development agents. Nowadays, the agents are relying on feedback of the animators to update knowledge in response to the demands and needs of the community members. On the other hand if the agents thought it was necessary that the community was aware of something, they asked animators to broadcast certain topics: "*Last week there was an outbreak of Anthrax disease, and the veterinary department asked me to give practical lessons on immunization of cattle*"[86].

Since the agents did not have to visit the wards that often anymore, they saved time. According to a development agent of the Veterinary department his *"... role has become easier, I have now time for other duties*"[87]. Since community members "*... are more and more relying on podcast technology, some department agents are afraid to become jobless*"[88]. But instead of becoming jobless, their role in the network changed from teachers to knowledge workers.

Capabilities enjoyed by the development agents

Since the introduction of the mp3plus in the network, the development agents did have a better relation with the community members. When the community members found out that some of the content was created by development agents, their confidence in the agents increased. People became more aware of the role of the development agents in their society. This confidence and awareness was created by the composition of the lessons. In the beginning of the lessons authors needed to mention their name, profession and department. Local people were aware of the development agents and made use of their services more often.

Conclusion

During the domestication process, local people enacted the technology slightly differently than was intended by PA and LGDA. They demanded lessons from the development departments Health and Tsetse Control, which led to their introduction in the network. The Health department, for instance, recorded lessons concerning human health (cholera, and personal hygiene). Because of these added lessons, people without livestock and crops became also attracted to the technology. Also people from neighbouring wards were welcomed in the network. As is shown in figure 16, some actants were added to the proposed network during the process of domestication.

[85] Mr. Dengu, Veterinary development agent, interview, April 15, 2010
[86] N. Zuze, animator livestock, interview, May 27, 2010
[87] Mr. Dengu, Veterinary development agent, interview, April 15, 2010
[88] Mr. Shoko, Tsetse Control development agent, interview, April 15, 2010

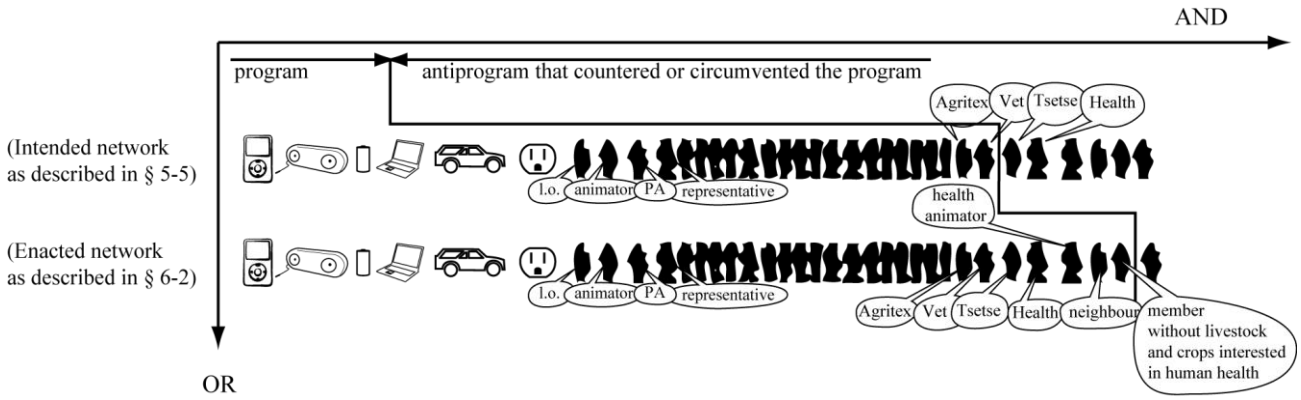

Figure 16 Substitution and association as result of the process of domestication (adapted version of the schematisation made by Latour (1997, p. 58))

The relations within this network were also slightly adapted during the domestication process. The health animator related more closely to the technology than expected. The livestock animators started demonstration meetings. Local people started to go on a visit to the animator for individual lessons. And the development agents also started to make use of the mp3plus during their own organised meetings, where they asked animators to broadcast a specific lesson and gave elucidation afterwards.

Although a few more actants were added and relations were slightly adapted during the process of domestication, the network resembled to a large extent the intentions of PA and LGDA. PA and LGDA already had an idea about how mp3plus should be incorporated in the society. This script was followed to a large extent by the community members. LGDA is a local organisation which has some authority in the region. It was very possible to replace some proposed actants with other actants, like the rechargeable batteries by batteries available on the local market. It was also very possible to alter relations within the network, for instance by circulating the mp3plus among different community members. However local people followed the proposed (but not prescribed) structure of PA and LGDA to a large extent.

Most local people improved their basic capabilities by having access to the mp3plus and thereby to knowledge. People who owned livestock or crops went to the meetings organised by the animators. The knowledge dissemination by the mp3plus was more efficient than by word of mouth. People who were only involved in the EC Block Grant project (who did not have an mp3plus) increased their capabilities but in a lesser degree than people who were related to the mp3plus. Those increased capabilities led to improvement of other capabilities as well. Like the capability to follow education since people now earned money to pay for school-fees, the capability to play, since livestock management and crop cultivation were done more efficiently, the capability to determine one's own life, since women now know how to provide for their own livelihoods.

The actually enjoyed capabilities depended on a person's position in the network. Farmers who also related to livestock and crops benefited the most from the projects, since both were covered extensively by the lessons. Although female farmers generally increased their capabilities, the extent of the increase depended on how they related to other people in the network. Some female farmers, for instance, had to ask permission of their husband to individually visit the animator. Elderly persons were incorporated in the network. To what extent they increased their capabilities depended on the number of times they went to group meetings and their possibility to individually visit the animator. How often a person was able to individually visit the animator depended on the distance between their houses. The livestock animators had a rather prominent place within the network. They enjoyed the same capabilities as the other farmers. But, because they were directly related to the mp3plus they increased their capabilities more intensely. Due to their prominent place in the network, they became also very proud and confident. Since the development agents were incorporated in the network their capabilities changed as well. Their duty in the network was to produce knowledge. They became related to the animators who disseminated the knowledge. Because of these relations, they now were more capable to perform other duties as well. But since they did not relate to the community members directly, they were less able to do some enquiries among them. The capabilities enjoyed by people who did not relate to the various topics covered in the lessons did not increase. The capabilities enjoyed by the traditional healers even diminished because the mp3plus took over part of their clientele.

The domestication process was restricted by LGDA and PA. They restricted it mainly because the President's office held PA responsible for all content disseminated by the technology. For this reason LGDA and PA were not able to hand over the recording devices to the community. However, handing over the recording devices to the community would foster further domestication. With the recording devices the community members would be much more in control what kind of content would be recorded and disseminated.

Part III

Chapter 7: Conclusion and Discussion

Introduction

In this chapter I will answer the general research question: "*how do the script of a specific ICT and the human capabilities of the people using the technology co-evolve in the process of domestication?*". In this chapter, I will argue that in Zimbabwe the increase or decrease of human capabilities depended on the network of the mp3plus. Three characteristics of this network determined changes in the human capabilities enjoyed by a specific user of the technology: the composition of this network, the position of this user within the network, and the nature of the relations between the actants.

I will start this chapter by repeating briefly the argument made in chapter two; that there seems to be a gap within the Capability Approach (CA). Secondly, I will describe the influence of institutions on the network surrounding the mp3plus. Thirdly, I will link with the case-study and argue that the network in the Mbire district was expanded and altered by the script of the mp3plus as well as by the users' intentions during the process of domestication. Subsequently, I will argue that the actual network surrounding mp3plus determined the actual human capabilities enjoyed by the users of the technology. I will argue that Robeyns (2005) representation of the relation between goods and a person's capability set needs to be replaced by a network representation. The above mentioned three characteristics of the network determined the human capabilities enjoyed by a specific user of the technology. Fifthly, I will argue that the theoretically distinction, within the domestication framework, between development and enactment depend on the context. Lastly, I will give some concluding remarks.

7-1 Identified gap within the Capability Approach

In part one I identified a gap within the CA. The CA is a framework to assess development. Within the framework development is defined in terms of human capabilities. The expansion of human capabilities is considered the goal of development. Resources, like technologies, are considered as means to achieve that objective. These resources could lead to expansion of human capabilities when individual, social and environmental conversion factors are met.

It seems that scholars working on the CA see technologies as neutral means. In their views these technologies can be put into use towards the ends, which users can freely choose in accordance with their own conception of the good life. For instance, if a person wants to move from A to B, he or she

can go by car if the conversion factors are met: the person possesses a car and has the individual qualities to drive it, has a licence and roads are available between A and B. If this is the case the person can freely choose to pursue his/ her desire. It seems that within the CA, scholars do not recognise the interaction between social and technical changes. This is also illustrated by the representation of Robeyns (2005) (figure 17). In her representation no interaction between goods and the social context is schematised.

As shown by scholars working on the ANT and the domestication framework, there is a complex interaction between technological and social changes. Technologies shape human life; they prescribe certain behaviour to its users. On the other hand, humans can also shape technologies by enacting them according to their own intentions. The actual use is determined in this conflict between the script and the users' intentions.

7-2 Influence of institutions on the network

In Zimbabwe, the exact definition of the mp3plus and the composition of the network surrounding the ICT were influenced by external institutions and factors. As stated in chapter five, the exact definition of the ICT was influenced by the security organs of the President's office, technology developers and funders. The President's office supported the implementation of the ICT, but also held PA responsible for all disseminated content. PA decided to select and adapt the ICT in such a way that not every user would be able to record. Further the selection of the technology was influenced by the Pencil Technologies withdrawal from the network. The result of the withdrawal was that an introduction of revised SecondVoice devices became impossible. PA had to find a new suitable technology with the restriction of limited funds. Like an employee of PA indicated: "*we wanted actually to use solar panels to charge the systems, but because of lack money, since the project is donor funded, this feature was no longer possible*"[89]. The limited funds made it impossible to design a customized technology suitable for the Mbire circumstances. Instead PA had to use a standard technology already available on the market. Also the national electricity provider influenced the network. This institution decided not to recover the electricity grid in the Mbire district, which had its influence on how the network was composed.

7-3 The expansion and alteration of the network

7-3-1 The influence of the mp3plus on the network

The in the Mbire district introduced technology was far more than merely a mean; it prescribed a user and a network. Firstly, the technology disseminated knowledge only by audio messages. The mp3plus excluded deaf and hearing impaired persons from the network. Also people who did not have the

[89] L. D. Gudza, Practical Action, interview, May 19, 2010

capacities to turn the audio information into valuable knowledge were excluded. Secondly, the volume of the loudspeakers that accompanied the mp3 players, limited the number of participants in group meetings. Thirdly, the technology was inscribed with a dependence on batteries. This had an impact on the network, since the supply of batteries had to be included. Fourth, the mp3plus was also inscribed with a dependence on content developers. Thereby it constituted relations between the technology and the content developers and also between the content developers and the audience of the broadcasts.

Also the content presumed a certain network and prescribed certain relations. The lessons, mainly on livestock management and related crop production, presumed a user involved in those activities. The provided information about those activities created new and broke existing relations within the network. For example, on advice of the mp3plus people were able to treat their cattle themselves, instead of consulting a traditional healer.

The mp3plus also influenced the nature of the relation between user and technology. This relation influenced how the technology was used. The mp3plus seduced health animators to broadcast one of the few recorded lessons on health instead of to disseminate one of the many other lessons by word of mouth. When the technology was available to them the health animators were seduced to use the technology and were guided by the content available, as is expressed by the health animator of ward nine: "*Today I gave a lesson on cholera because it was recorded in the machine*"[90]. The mp3plus translated the program of action of its users.

7-3-2 Users' freedom to make the technology their own

Also the users altered and expanded the network. This already started during the demonstration meeting of SecondVoice, were relevant stakeholders expressed that the ICT could also be utilized to disseminate information related to different development departments. "*The community was asking why cannot you incorporate this, because we do not see the development agents around*"[91]. The Health and Tsetse Control departments were added and the AGRITEX department became more involved in the network. Next to the development departments, also curious neighbours were welcomed in the network by the local people. Neighbours attended the group meetings and the animators sometimes went to neighbouring wards.

During the enactment of the technology, users altered their relationship with the mp3plus. Firstly, in the beginning only group awareness meetings were organised. But local people started to visit the animators for individual lessons. Secondly, the local people started with demonstration meetings to clarify the lessons. Thirdly, the livestock animator and health animator used to teach on different

[90] R. Mubvundika, animator health, interview, April 19, 2010
[91] J. Machingura, livestock officer, interview, May 22, 2010

subjects. Nowadays, the two animators - when equipped with the mp3plus - broadcast on all topics. Fourth, the content of the mp3plus was seen as the truth, flawless and very valuable to the community. Farmers found the technology interesting, because it contained to their opinion true information. People also attributed anthropomorphic characteristics to the mp3plus by saying that the technology was all-knowing. The users constructed a meaning and a set of practices related to the mp3plus and thereby changed the nature of their relationships with the technology.

The essence of the mp3plus and the composition of its surrounding network were continuously evolving. The number of demonstrations increased in course of the domestication process, as well as the number of people who went for individual lessons (broadcast by the mp3plus). Also in the future the essence of the mp3plus and the network surrounding it will continue to evolve. If new actants will be added to the network or present actants will be discarded out of the network, the essence of the mp3plus will change. If, for instance, the President's office would change their policy, the recording equipment could be handed over to the community more easily. Thereby the community would be able to produce their own content. The already existing plans to connect the Mbire district to the electricity grid would also change the essence of mp3plus. The technology would not rely on cars going to Guruve anymore, instead batteries could be charged in Mbire. Changes in the composition of the network will change the essence of the mp3plus.

7-4 Enjoyed human capabilities depend on the characteristics of the network

7-4-1 The composition of the network determines the human capabilities

How a specific user put the mp3plus into use was partly determined by the composition of the network. In the Mbire district, the technology was mainly aimed at dissemination of knowledge on livestock management and crop cultivation and therefore related to the livestock officer and the Veterinary department. The content partly determined what Latour calls "the essence" of the technology. If the department of carpentry had created most lessons, the essence of the mp3plus would be different. Instead of the attached meaning "Kamuchina Kemombe" the mp3plus would be seen as "machine that knows about carpentry". This new composition of actors would change the essence and would obviously enable other capabilities of other members of the community.

7-4-2 The nature of the relations within the network and the enjoyed capabilities

Also the nature of the relationships between actants in network influenced the increase or decrease in human capabilities enjoyed by a specific user. As said above, users attached a set of practices to the technology. This set of practices influenced how they related to the mp3plus. The demonstrations,

which were executed while the mp3plus broadcast the related lesson, led to a better understanding of the content. Also the lessons broadcast during individual visits were understood better than the lessons broadcast during group meetings. Also how people related to other persons in the network influenced their capabilities. How a person related to the animator, for example whether he/ she lived close by, determined whether a person was able to go on an individual visit. Some female farmers had to ask permission of their relatives to attend group meetings or to ask the animator for individual broadcasts. The constitution of the relation between users and the mp3plus influenced knowledge transfer and thereby enabled capability expansion.

7-4-3 The relation between a person's position in the network and his/ her enjoyed capabilities

An increase or decrease in human capabilities is also affected by the specific position of a user in the network. The livestock animators benefited the most, since they closely related the mp3plus and had access to knowledge all the time. People who related to livestock and crops gained a lot of capabilities, but for persons who did not have livestock or crops, there were less interesting topics to enhance their capability set. The basic capabilities of some traditional healers even diminished, since they indirectly lost clientele to the mp3plus, who received knowledge from the machine instead of from the healer. People who were hearing impaired were not able to absorb the information and people who lived close to the animator went more often to demand for an individual lesson. The development agents did not have to travel to the community anymore and thereby gained more time to perform other duties. All these actors occupied a different position in the network and subsequently their capability set was influenced differently.

7-4-4 Replacing Robeyns representation

The interaction between the script and the users' intentions determined 1) the composition of the network surrounding mp3plus, 2) the nature of relations within the network and 3) the position occupied by an actant within the network. How the mp3plus was put into use and subsequently what bearing it had on the user's capability set depended on all three elements. In my view, the representation provided by Robeyns (2005) does not accurately describe how human capabilities come about. It seems that Robeyns did not incorporate the mutual shaping between technical and social changes in her scheme. According to her, human capabilities come about if the three conversion factors (individual, social and environmental) are met (see figure 17).

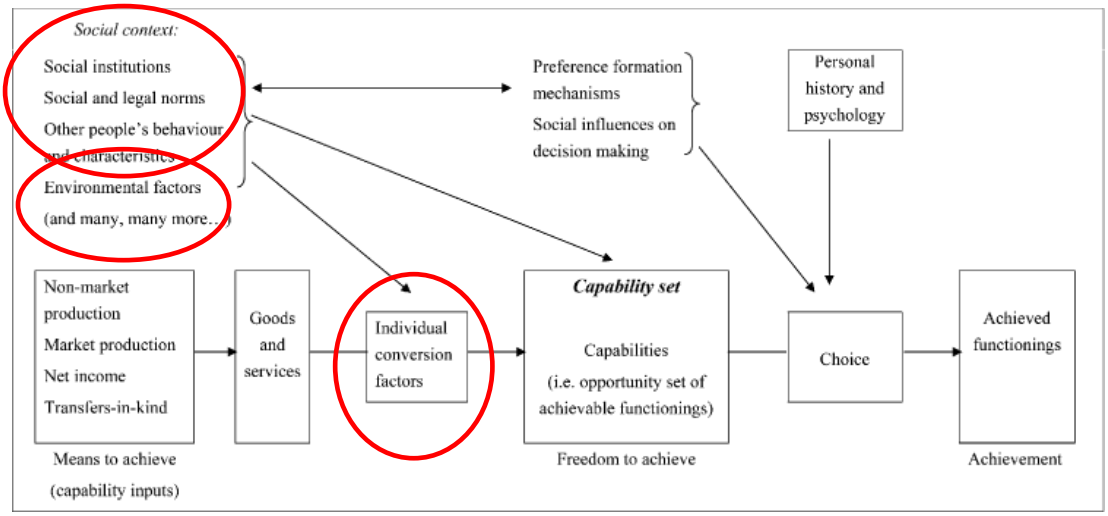

Figure 17: Robeyn's (2005) representation (red emphasis is mine).

Her representation has to be replaced by a representation which is sensitive to the interaction between technical and social changes. As described above this mutual influence takes place in a network consisting out of humans, technologies and institutions. In figure 18, I propose a new scheme describing the coming about of human capabilities. The coming about of capabilities depends on a person's position in the network, the composition of the network and the nature of the relationships within the network.

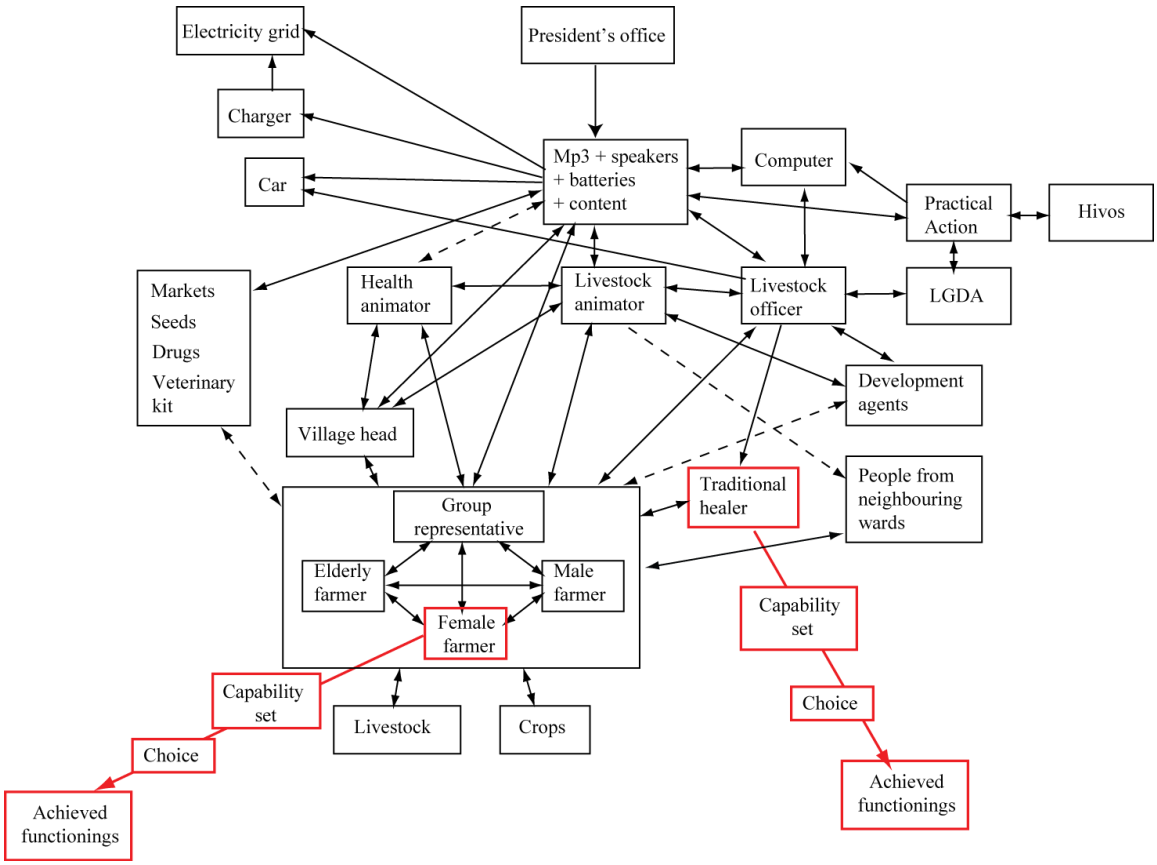

Figure 18: Representation of the coming about of human capabilities in the Mbire district (exemplified in red for female farmer and traditional healer).

The environmental and social conversion factors correspond with the relation between the composition of the network and a person's place within the network. The individual conversion factors correspond with the nature of his/ her relationship with the technology. This representation, however, is sensitive to the mutual interaction, since it treats technology as an actant. Note that the network is always evolving.

7-5 The development and enactment of technology

The extent to which the development and enactment of the technology can be separated is context depended, Within the domestication literature the development and enactment of technology are presumed to be separate phases. During the development of the mp3plus these phases were mingled because of the chosen participatory approach. During this participatory approach the agency of the community members was respected; the community members were involved in the initiation, execution and evaluation of the projects as well as in the definition process of the technology. The enactment of the technology by the local people already started during the development phase. As is indicated in chapter five the local people already expressed demands during the demonstration meeting of SecondVoice. And as indicated in chapter six, PA and LGDA did not prescribe a specific use, but instead were very willing to meet local people's wishes.

Within the domestication literature, Frissen and van Lieshout (2006) are already "... *experimenting with an approach that aims to include user perceptions as much as possible in the configuration process*" (p. 257), with the aim to "… *break through the more or less taken-for-granted views on 'idealized uses' and diffusion processes*" (p. 257). The literature on the domestication framework can provide relevant insights to a participatory approach to technological development. For the practitioner, a further research in this area might be interesting because it might increase the success of cross-cultural technological development projects.

Technologies defined in a participatory way based on the ANT and the domestication framework might increase the likelihood of people incorporating the technology in their daily live. Scholars working on the ANT and the domestication framework emphasise the importance of the socio-technical network. By analysing this network NGOs are able to work with great precision. Such an analysis will show that networks are not homogeneous. So, if NGOs want to increase human capabilities they have to ask of whom? By analysing the network NGOs are able to make more precise predictions about how an introduction of a technology might influence different actors in the network. This analysis will also show that the network is evolving by the mutual influencing of the included actants, human as well as non-human. Most NGOs are aware of the fact that networks are not

homogeneous and of fact that outside factors are influencing the network. However the ANT and the domestication framework will add more sensibility to this socio-technical network and will emphasise the mutual shaping between actants within the network.

Conclusion

With this report I try to contribute to the research on the relation between technology and the CA. It offers a case study of a socio-technical configuration and the enjoyed human capabilities within a developing context. On the basis of this case study I try to contribute to an explanation of how human capabilities come about, showing the influence of the network, including users, institutions and technologies as important actants. Together with the philosophical underpinnings of development offered by the CA, this explanation can possibly provide practitioners with deeper insights in cross-cultural development.

Although it is too early for definite statements, I hypothesize the following: Firstly, how technologies influence human capabilities depends on the composition of the network surrounding the technology. Secondly, the human capabilities also depend on the nature of the relationships between actants within a network. Thirdly, how technologies influence a person's capability set also depend on his/ her position in the network. The composition of a network and the nature of the relation within are determined by the interaction between the script written in the technology and the users' intentions. To test these hypotheses further, a significant number of case studies need to be done.

In this report I discussed the potential contribution of the domestication framework and the ANT to the CA, vice versa the likely contribution of CA to the domestication framework and the ANT might be worth to analyse as well. Scholars working on the domestication framework and the ANT do provide us with profound analyses of socio-technical relations. However, they do not make ethical claims about these relations. In my view the CA can offer these theories an ethical framework. Scholars working on the CA make ethical claims about the good life and what development should aim for. How the CA could be linked with the domestication theory and with the ANT needs further attention.

Appendix I: List of Interviewees

Table 2: list of interviews

Interview	Name	Ward	Function	Date
1	Group meeting	9	Group, including a village head, a group representative, and farmers	13-4-2010
2	Mr. Chengeta Mukami	9	Traditional healer	13-4-2010
3	Mr. Tendekai Kazembe	9	Agritex development agent	15-4-2010
4	Mr. Dengu	District	Veterinary development agent	15-4-2010
5	Mr. Shoko	District	Tsetse Control development agent	15-4-2010
6	Mr. Stafnes Mafungu	9	Male farmer	15-4-2010
7	Mr. Bainos Mavhuna	9	Male farmer	15-4-2010
8	Mr. Rupiya Mubvundika	9	Animator health	19-4-2010
9	Mr. Tapiwa Mutaiwa	9	Councillor	19-4-2010
10	Mr. Charles Guwsani	9	Group representative	19-4-2010
11	Mr. R.B. Nyamaka	9	Male farmer	21-4-2010
12	Mrs. Musandaira	9	Agritex development agent	28-4-2010
13	Mrs. Mester Munhuwa	9	Female farmer	28-4-2010
14	Mrs. Julias Rumbidzai	9	Female farmer	29-4-2010
15	Mr. James Mvunduka	9	Village head	29-4-2010
16	Mr. Passmore Jack	9	Youngster male farmer	29-4-2010
17	Mr. Sheperd Kasera	7	Animator health	1-5-2010
18	Mr. Socrates Kamba	7	Male farmer	1-5-2010
19	Mr. Abraham Charewa	7	Traditional healer	1-5-2010
20	Mr. Chrispan Ushongani	7	Male farmer	1-5-2010
21	Mr. Matanda Mutoni	7	Male farmer	1-5-2010
22	Mr. Kamwaza	6,7, 8, 15	Group representative	8-5-2010
23	Mr. Mupfumbira	6	Male farmer	8-5-2010
24	Mr. Watchmore Manyemwe	6	Male farmer	8-5-2010
25	Mr. Kapenge	6	Elderly farmer	8-5-2010
26	Mr. Joshue Muzika	6	Animator livestock	8-5-2010
27	Mr. Lawrence Gudza		Team leader for Practical Action's Responding to New Technologies program in Zimbabwe	19-5-2010
28	Mrs. Evangelista Kamota	15	Female farmer	22-5-2010
29	Mrs. Paulin Mutoni	7	Female farmer	22-5-2010
30	Mr. James Machingura	District	Livestock officer LGDA	22-5-2010
31	Mr. Chrispan Murenza	7	Agritex development agent	22-5-2010
32	Mr. Noel Zuze	9	Animator livestock	27-5-2010
33	Mr. Partson	District	Civil servant	28-5-2010

34	Mr. Mukutzikini	7	Village head & sub chief	12-6-2010
35	Mr. Muradzi	7	Male farmer	12-6-2010
36	Mr. Kazera	7	Youngster male farmer	12-6-2010
37	Mr. Baureni	7	Elderly farmer	12-6-2010
38	Mrs. Masiyandima	7	Elderly female farmer	12-6-2010
39	Mr. Noel Zuze	9	Animator livestock	16-6-2010
40	Mrs. Dorcas Chimati	9	Group representative	16-6-2010
41	Mr. Gatsi Chinonga	9	Elderly farmer	16-6-2010
42	Mrs. Plaxcedes Chakasara	9	Elderly female farmer	16-6-2010
43	Mr. Shoko	District	Tsetse Control development agent	18-6-2010
44	Mr. Dengu	District	Veterinary development agent	18-6-2010

Appendix II: List of Basic Human Capabilities

The following central human functional capabilities are on Nussbaum's list (Nussbaum, 2000, pp. 78-80) :

1) Life.
The ability to live a human life of normal length, which is not reduced as to be not worth living.

2) Bodily Health.
The ability to have good health; including the ability to procreate, to be adequately nourished, and to have shelter.

3) Bodily Integrity.
The ability to move from place to place with respect for one's bodily boundaries.

4) Senses, Imagination, and Thought.
The ability to use the senses, to imagine, to think and to reason. This ability is informed and cultivated by adequate education.

5) Emotions.
The ability to feel attachment to things and people outside ourselves.

6) Practical Reason.
The ability to engage in critical reflection about how to live one's life and the ability to form a conception of good and bad.

7) Affiliation.
Affiliation is twofold. A) The ability to live with and toward other human beings. The ability to recognize and show concern for others and to engage in social interaction. The ability to have compassion for the situation of others. The capability to have friendship. B) The ability to be treated as dignified human being by others.

8) Other Species.
The ability to live in relation to animals, plants and the world of nature. The ability to live with concern for other species.

9) Play.
The ability to be involved in recreational activities. Activities done for the sake of the activity itself.

10) Control over One's Environment.
Control over one's environment is twofold. A) the ability to participate in political choices. B) The ability to hold property.

Appendix III: List of Basic Forms of Human Good

The following basic forms of human good are on Finnis' list (Finnis, 1980, pp. 86-90):

1) Life.
Life relates to all aspects of the vitality which are necessary for self determination. It includes bodily health and the freedom from organic malfunctioning or injury. Life also includes the transmission of life by procreation.

2) Knowledge.
Knowledge should not merely be considered as instrumental but also as valuable for its own sake.

3) Play.
Play is engaging in a performance which has no point beyond the performance itself. Such a performance can be social or solitary, intellectual or physical et cetera.

4) Aesthetic experience.
Often aesthetic experience is part of play. However, an aesthetic experience does not need to involve an action of one's own. Aesthetic experience is the inner experience of appreciation of something beautiful outside the person.

5) Sociability (friendship).
Sociability in its weakest form is harmony and peace between humans. In its strongest form it is friendship. "...*friendship involves acting for the sake of one' friend's purposes, one's friend 's well-being*" (Finnis, 1980, p. 88).

6) Practical reasonableness
The ability to effectively choose one's actions, and lifestyle. A person is able to shape one's own character. This involves a certain amount of effective freedom but also certain skills.

7) "Religion".
The ability to establish and maintain a relationship between oneself and the divine. To search for answers to questions of the origins of the cosmic order and of human freedom and reason.

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