Connecting Africa – African Connections

Africa's engagement with information and communication technologies (ICTs) and their role for development – the case of telemedicine in South Africa

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abstract: Information and communication technologies are increasingly attracting widespread commentary as to the forms of social and cultural change, with which they are associated. Telemedicine, as one of these technologies, is said to solve many problems in the health sector. In South Africa, like elsewhere in Africa, medical services lack in most areas of the country. Distribution and funding is skewed in favour of the urban population and those who can afford medical services. Despite the access to health care facilities South Africa is experiencing an HIV/AIDS pandemic of shattering dimensions. The possibilities that new technologies present to health care are announced to be significant. This paper looks into the new the new links that appear when information and communication technologies (ICTs) are deployed in these contexts. The rather questionable success of implementing standardised ICT-solutions for development in the last decade will be discussed by providing two empirical examples. It will be argued that by providing new infrastructure through ICTs in Africa it is often neglected that these technologies need to be translated in the contexts they are supposed to function and that the new connections between different epistemic communities (i.e. medical practitioners, engineers, patients or public health actors) are lacking common language and understandings.

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1 Introduction

Information and communication technologies (ICTs) are pervading sectors of state and society in nearly every sense. In Africa, moreover, this process is subject to specific adaptations. In the last decades ICTs were rapidly integrated into the development aid paradigm as well as the good state narratives (Unwin 2009). They seem to bridge various problems in the fields of health care, education or the access to expert knowledge. This goes along with the common assumption that these technologies trigger off a "revolution". After the invention of analogue technologies of inscription (in the sense of Kittler 1990, in German *Aufschreibesystem*) e.g. writing and the printing press, the computer and all

related digital ICTs are assumed to lead into a new digital society (Castells 2000). It is often argued that today ICTs are one of the main driving forces for the reconfiguration of all spheres of society (Baecker 2007). It is important to keep in mind that the use of information as a systematic way of organising things is, of course, much older and can be traced back to discoveries of the enlightenment (Headrick 2000: 9) or the imperial expansion of Spain (for instance Philip II of Spain who held his empire together through files (Elliott 2009)). For the last wave of globalisation and the related digitalisation, however, Manuell Castells puts it this way:

> Information technology is to this revolution what new sources of energy were to successive industrial revolutions, from the steam engine to electricity, to fossil fuels, and even to nuclear power, since the generation and distribution of energy was the key element underlying the industrial society (Castells 2000: 30).

In technical terms of hardware and software, ICTs can be characterised as technologies, which "allow the capturing, processing, storing and interactive transmission of information. This includes common forms of telecommunication and also technically more sophisticated Internet applications, but excludes all kind of mass media, i.e. television and radio" (Bertolini 2002: 25).

The objective of this paper is to understand ICTs within African contexts. Here, information might play a different role and should be seen in another light than in Euro-America. Here, the network society and even more the digital are hard to find. The last years brought various multimillion-dollar projects by international and national state and non-state actors with the aim to close the connectivity gap between Africa and the rest of the world. These attempts to connect Africa will be summarised in the first part of this paper. Two analytical frames will be followed. While first looks on how ICTs provoke new configurations, the second asks how these technologies are translated in African contexts. In the second part of the paper two empirical examples on developing and implementing ICTs for health care in South Africa will be introduced.

2 Connecting Africa: ICTs and the production of social order

Africa has a peculiar history of technologies of knowledge in which the colonial state played a crucial role in making strong (but often unsuccessful) attempts to establish its hegemony over information for instance in education or health care. The number of Africans who had access to a bureaucratic state system based on the use of files and documents was limited. However, Africans adapted and reconfigured these technologies of inscription introduced by missionaries and the colonial state in their own interests (Peterson 2004). On the other hand, if it is true that Africa was and is in many ways marginal to current globalisation processes (Zeleza 2003) then the infrastructure of analogue and digital technologies of inscription, information and communication are just another example to proof that. Systems of documentation, data processing, telephone landlines, fibre optic cables and satellite networks are either poorly developed or weak and vulnerable. Peter Hugill's bold statement in his historical analysis on the influence of information technology at the beginning of the 20th century might give an idea, why huge efforts are recently made to connect the unconnected. He states: "If information is power, whoever rules the world's telecommunication system commands the world" (Hugill 1999: 2). This might be exaggerated in some ways. Nonetheless, by moving science and

technology in the foreground power relations, dependencies or hegemonies might be seen in a different light.

To understand the role of ICTs for development this paper will follow two questions as an analytical frame: (i) how do new *configurations* emerge through the implementation of ICTs (ii) how are these technologies *translated* into African contexts and vice versa. It seems that scholarly focus has been rather on what technologies of inscription, information and communication do to African users and contexts, instead of what African users and contexts do with them, e.g. creative adaptation. The new (i) configurations that emerge in techno-social networks due to the introduction of new technologies provoke new links between different actors and institutions and simultaneously provide new forms of organising knowledge and social order. Studying these (re)configurations reveals both, the impacts of technologies on the ground and the various inscriptions into ICTs made by designers and developers. In anthropological terms the question arises how ICTs influence the relations between data, information and knowledge, and how the social production of knowledge and its political status are perhaps reconfigured by the use of ICTs. The inverse and analogous question is how users and social contexts reconfigure the development of technology. When ICTs diffuse, the investigation of emerging (ii) chains of translations show how various actors are shaping technologies, while deploying them in new settings (Rottenburg 2009). Again, this is not a new phenomenon: translation already constituted a key aspect of the colonial project. Instructions, regulations and new technologies had to be translated into the new overseas contexts in order to function. This gave the colonized elites an important role as brokers (and manipulators) of information to establish hegemonic order throughout the heteronomous political territory (Eckert 2007; Lawrance 2006; Schaffer 2009). Across all kinds of different arenas and at all times people tend to be creative in their translations of circulating technologies and models by de-scribing and re-inscribing them and by combining formerly disconnected elements into new techno-social networks (Akrich 1992; Latour & Woolgar 1986). In these chains of translations a heterogeneous network of users, developers and other actors are involved in the shaping of a technology. This process supports the argument that globalisation is not a homogenising process (Appadurai 1996: 17) but influenced by various adaptations.

The body of literature that is directly concerned with information and communication technologies is largely divided, and in the context of Africa only a few relevant studies from a social science perspective can be identified. There is a fast growing strand of literature mainly by consultants, project planners or developers that deals with the development or improvement of the technology itself. These studies evaluate new devices, suggest implementation plans or, more recently, report experiences and “lessons learned”. They follow the rhetoric of "revolution" that frequently accompanies talk about ICTs for the use in development. The late 1990s coined the term ICT4D (information and communication technologies for development), and within this discourse it was generally accepted that ICTs potentially support the poor and marginalised in their access to information and knowledge. It is often argued that by bridging the information gap through spreading ICTs, economic growth will be accelerated, agriculture, industrial productivity and the efficiency of public administration will be increased, and the competitiveness of developing countries strengthened (Ndou 2004). The problems enumerated in this type of literature range from low connectivity for broadband Internet over high costs for connections to what is called "digital divide" (Barendregt 2006). Such imaginaries of so

called "technical fixes" can easily be refuted (Rottenburg 2009: 106-107). The complex technological and institutional pre¬suppositions that ICTs require to function are often missing in many African contexts. Neglecting this aspect has far-reaching implications yet thus far only few recent works on Africa address this issue directly (for instance Mercer 2005).

3 African Connections: Epistemic communities and the translation of telemedicine in South Africa[1]

> "Telemedicine is a potential solution to Africa's health problems but Africa will not be able to run telemedicine along current developed world models" (Mars 2006: 402, my translation).

Telemedicine in South Africa began in the early 1990s with linking radiologists to the state hospital in KwaZulu-Natal. The National Department of Health's Telemedicine Project was rolled out between March 1999 and September 2000 and established 28 pilot telemedicine sites in six of the nine provinces. The initial applications were teleradiology, using X-Ray films, teleultrasonography for antenatal services, telepathology and tele-teleopthalmology (Gulube & Wynchank 2001). Of these projects only the teleradiology services linking three rural hospitals with the Pretoria Academic Hospital, could really be deemed a success.[2] The lack of success lead to the situation that the second and third phase of the project, to expand telemedicine capabilities to 71 and then to 200 sites, was never undertaken. Around this time, the Medical Research Council of South Africa (MRC) established a Telemedicine Research Centre as a joint project with the Department of Health. This is now the MRC Telemedicine Lead Programme[3] with a brief to evaluate existing and planned telemedicine systems; coordinate national telemedicine activities; investigate new technologies and practices; establish telemedicine standards in telemedicine and establish Tele-Education for health care professionals. In 2004 the MRC and the Department of Electrical and Electronic Engineering of the University of Stellenbosch started to develop a telemedical workstation for primary health care. This project will provide the first set of empirical data of this paper. The second set will come from a project by Cell Life, a non-governmental organisation at the University of Cape Town and the attempt to use cell phones for the management of antiretroviral treatment.

[1] Most of the data that will be presented her is product of a 6 months fieldwork (August 2007-February 2008) in South Africa. In addition to that, various conferences and other subject related meetings were visited in 2007 and 2008. A number of primary sources such as evaluation reports and other publications are to some extent also include.

[2] It seems that the initial enthusiasm of the 1990s has given way to more reflective views of the place of telemedicine in health care delivery, as many of the pilot projects have failed to be sustained once their seed funding ran out. Yunkap Kwankam, eHealth Coordinator of the World Health Organization ironically described this situation, as "suffering from pilotitis" since most of the projects never leave the pilot phase status. See also Broens et al. (2007), Wootton (2008). In the context of South Africa Gulube & Wynchank (2001) are making this point.

[3] When the acronym MRC in the following is used it refers only to this program not to the Medical Research Council as a whole.

3.1 Grabouw - translations

If you leave Cape Town on the N2 highway you will reach the Sir Lowry Pass after about 45 minutes. The pass takes you through sharp curves up a mountain. Reaching the top means leaving behind the beauty of False Bay with Table Mountain in its background. A few kilometres after the pass, a little town called Grabouw sets on the extensions of the highway. Grabouw hosts a small community clinic where the Medical Research Council started its first pilot phase with the newly developed Primary Health Care Telemedicine Workstation (PHC workstation). The development of this PHC workstation is often presented proudly as the first *indigenous* technological solution. It can be seen as a counter product to the many similar devices coming from Euro-America or China. Previous attempts to introduce telemedicine in primary health care, so the argumentation of the developers goes, met with little success. The systems were expensive, complex, user unfriendly and difficult to maintain. In 2004 an Innovation Fund grant for the development of the workstation was awarded to the Medical Research Council (MRC) and the Department of Electrical and Electronic Engineering of Stellenbosch University. The department contributed most of the technological devices for the workstation. The main goal of this workstation was to provide medical infrastructure at places where is little or none. An employee of the MRC puts it this way:

> "The South African government is committed to providing basic healthcare to all South African citizens, not as a privilege, but as a fundamental right, for the many who lack the most basic services. To do this, the government identified Telemedicine as a strategic tool to improve delivery of equitable healthcare and educational services".

While following the developers of the workstation at the University of Stellenbosch and at the MRC the project became an ideal example for *the making of telemedicine* in South Africa. It is worth to have a look how the engineer sees its creation:

> "User interaction is via a touch screen and simplified keyboard. There are no physical switches or other controls on the camera, ring light and video switch as these are fully controlled via the touch screen or a remote control. A simple menu system leads the user through consultation. No additional actions are required by the workstation user to initiate up- or downloads".

These statements shows what kind of users and settings are imagined when the workstation was developed. Grabouw thereby serves as the remote setting where the device should come into action. The remote location as geographic isolation from the urban expert centres and the poor transport systems are identified as the limits of health care delivery for those living in rural areas. Remote in this way also means poorly trained staff and bad connectivity. The MRC describes the specifications in a similar way by adding another motivation. This product is "most suitable for inexperienced computer users in all developing countries". The MRC invested a lot of energy for marketing the workstation at international conferences and journals primary to find new investors and to sell their product in other African contexts.

The workstation, however, is also seen as a way to re-organize health delivery in South Africa. Through the camera and the possibility to include other devices the object is to come in action for the delivery of specialized services that normally are not offered in a

rural settings. At the same time the needed infrastructure and network to implement these technologies never existed. Consultations from Grabouw to a hospital in Cape Town stopped after no more doctors – which worked voluntary – were found to participate in the program. This can also be explained by the very few consultations that were actually conducted through the system. The managing nurse in Grabouw explained it as follows: Since the hospital has approximately 500 patients a day and can only serve around 300 of them the medical staff is forced to handle each patient in a short period of time. With the use of the PHC workstation patient with skin disorders, for example, could now be diagnosed and treated but it would require more time. Due the use of a store-and-forward system it takes about 48 hours until the diagnosis would be back at the clinic. This leads to the situation that the patient would need to come twice to the hospital just to get the diagnosis. For the medical staff this would lead to the decision to send these patients directly to the hospital in Cape Town even though this means extra travel expenses and time for the patient. There is no primary positive effect for the health staff at the hospital.

Following the development of the PHC workstation helps to see the many translations within the development process and the lack of adapting the workstation within a daily clinic routine. The expected users and settings were inscribed by the engineers, in a way that they mainly concentrated on producing a device for uneducated health staff (in the sense of inexperienced users). However, in many ways there was a clear difference between the expected uses and the ways of how it was actual uses. In the case of Grabouw it was less a problem of eLiteracy but of the integration into the daily hospital routine. The 'false implementation' of the PHC workstation can be explained through the different understandings and inscriptions of the technology by the actors involved. The different epistemic communities (engineer, MRC, medical staff) perhaps share the vision of better health care delivery through ICTs but would interpret them in different ways.

3.2 Guguletu - reconfigurations

Guguletu is situated about 20 km from Cape Town and is one of the oldest and fastest developing "black" townships in South Africa. Around 27% of the approximately 325,000 people living in Gulguletu are considered as HIV positive. The scale of the pandemic in the township is continuing to expand and as a result the number of patients who need access to treatment is increasing tremendously. One of the clinics in Guguletu that provides ARV treatment to eligible HIV positive patients is the Hannan Crusaid Treatment Centre, which is managed by the Desmond Tutu HIV Foundation in Cape Town. A main challenge for the Centre is the paper-based management system of these patients. Each patient visiting the clinic has a folder comprising personal information including name, address, and next of kin. Clinical information for example height, weight, blood group, type of disease is also recorded. At each visit, respective folders for the patients are retrieved and either the administrative clerk or the nurse makes entries in the patients' file. Since the registration, consultation and dispensing processes are carried out manually it is said that human errors such as misplacing or losing the folders are bound to occur. In addition, it is common that patients, who feel they are not benefiting from the health care and service that is being provided, will opt to go to another health centre. Several cases of patients transferring to other health centres or even patients from elsewhere coming for treatment at the Guguletu community clinic have been registered. The main drawback in such cases is that the patients' health history is unknown and this is particularly dangerous in the case of antiretroviral treatment, since the history of the

patients plays a major role in deciding on the treatment. Another concern expressed by the staff is that as Guguletu is a township, it is regarded as being a neglected and underprivileged area. Health officials and managers rarely access the township and are therefore unaware of the situation on the ground.

Since the dramatic expansion of the service (the clinic had about 120 patients when they started in 2002, while they topped 4000 during the time the fieldwork was conducted in the end of 2007) the clinic is tempted to find an "optimal model […] that a single community-based public sector ART clinic can extend care […] without compromising program performance" (Bekker et al. 2006:315). This 'scaling up' was challenged with different solution. One is the allocation of a personal therapeutic counsellor to each client on entry into the programme. Around 35 of these counsellors are working at the clinic. "These community-based counsellors, the majority of whom are living with HIV/AIDS, provide ongoing counselling support, addressing psychosocial issues and reinforcing the need for high levels of treatment adherence". They provide care for patients, both at the clinic and in their own homes. During the home visits the counsellors take note of conditions that interfere with treatment, such as the absence of food in the house. They are the first line of defence against problems with side effects and drug resistance that can evolve if treatment is not managed properly. When the clinic started this job involved writing out the cumbersome details of each home visit by hand. But as the clinic data accumulated and the number of patients on treatment grew, the system became unmanageable.

To support the counsellor programme an ICT based solution was implemented. Cell Life, a not-for-profit company initiated by academics and researchers from the University of Cape Town and the Cape Peninsula University of Technology, developed a cell phone based system to support the antiretroviral treatment. The managing nurse of the clinic, Sister Lulu Mtwisha, summarises the system as follows: I sent "a message and things are sorted out on the spot, without having to wait". The Cell Life system was initiated by using a comprehensive database that includes a patient's treatment history and lab results with a messaging service that enables counsellors, clinic staff and doctors to communicate using SMS. When visiting clients' homes, the therapeutic counsellor would scroll through a series of menus to report on side effects, monitor adherence and provide detailed social information. Once every four months, a counsellor would show up without an appointment to count the client's pills. Then she/he would submit all information to a central database, whereby the data could instantly be viewed on a computer screen. When the project started the treatment consisted of 27 pills per day. The major task for a treatment service was to discipline a patient to be adherent. Today the treatment has been reduced to a daily intake of three pills. Adherence though is still an important marker to measure the success of a treatment. The Cell Life system, however, came to a silent end. During the time of fieldwork some of the phone still existed but were not in use. This is due three major changes and problems the clinic had to cope with.

Firstly and the most prominent explanations, often stated by the counsellors are very pragmatic ones. Since a cell phone is a valuable item many counsellors were faced with armed robberies and the loss of their phones. This meant also the loss of the SIM card that stored the information to login into the database. However, this explanation only helps to some extent, since SIM cards and even phones could have easily been replaced. Secondly, the new reconfiguration that came with the Cell Life system can be understood in the way Miscione observed it in Peru (Miscione 2007: 420). Counsellors were under

new forms of surveillance through the cell phones and thereby forced to be more accountable. Thirdly, the clinic had to cope with a tremendous and fast expansion. To some extent this is where an ICT based system should have helped to scale-up. A closer look, however, shows that the technology could not fit in the vast transformations of the clinic. The delegated tasks to the cell phone where managed elsewhere, assumingly with technologies that are more flexible to fulfil the context specific needs. When children where included to the treatment program, the rigid structure of the cell phones data matrix did not allow to enter their medication plan, since syrup is measured in millilitres and cannot be counted. Adherence rates were monitored by the pharmaceutical software by simply providing the information if a patient picked up his/her medication or not. Other patient data (e.g, on nutrition, hygiene or relationships) was collected during interviews and workshops at the clinic. These examples show how a technology must have the ability for adaptation in order to work. De Laet & Mol (2000) have shown this to some extent, when arguing that a model transfer can only be successful if users are able to adapt and reconfigure to their own needs. The example of the Cell Life system in this sense did not allow these adaptations. Since the clinic, the treatment program and even the users of the cell phones underwent tremendous changes it would have been necessary to transform the technology as well. Cell Life underwent some attempts to understand these changes and to reprogram the software and to even to reshape the phones by disabling them to make phone calls to loose value for robberies. These attempts, however, could not hold the speed of the various changes the clinic experienced. It is due to the stiffness of the system and the ability to change that technology by its users that ICTs in Guguletu were abandoned and the paper bases solutions preferred.

4 Conclusion – For more adaptation and creativity

The rather questionable success of implementing standardised ICT-solutions for health care in the last decade (Wootton 2008) leads to the assumption that the majority of these devices could not be translated adequately when they were transferred. A closer look reveals that ICTs strongly depend on a complex package of other, surrounding technologies and institutions that usually remain invisible because they are taken for granted (Rottenburg 2009). This means that they are not self-contained but rely on an environment of institutionalised older technologies (for instance, files, documents, written protocols, ID cards, vaccination cards, maps, addresses, power systems, etc.). When technologies travel into different contexts and no longer function as originally expected it becomes obvious that they are not self-contained. It is a complex network of several technologies and institutions that jointly accomplish the work, whereas only one element of this network can be transferred to a new context. Within these new settings some features lose their importance while others gain new significance. In this way the production of new things can be understood as a result of translations (de Laet & Mol 2000; Pinch & Trocco 2002).

As Hörbst & Krause (2004) point out it is often neglected that these technologies must be understood in the context of global entanglements and flows of ideas and artefacts. Actors in post-colonial Africa deal with multiple challenges by mobilising and transforming institutional capacities of adaptation and creativity. The two examples from South Africa showed that the implementation of ICTs often lack adequate translations. This perhaps can be explained with two remarks. On the one hand technologies often travel from contexts, that are different to the ones they get implemented. This is also true

when they get developed in laboratories such as the Department of Mechanical Engineering at the University of Stellenbosch and then travel to places like Grabouw (Rottenburg 2009b). On the other hand, like in the case of the ARV clinic in Guguletu, new figurations emerge. Sometimes they are provoked by the technologies themselves and sometimes they are part of a bigger transformation, such as the HIV/AIDS pandemic in South Africa. These reconfigurations, however, require technologies that are flexible enough to adapt to local needs and have different distinct identities in different communities, but at the same time robust enough to maintain a common identity across different epistemic communities (see also Star & Griesemer 1989).

This is why a danger and an opportunity can be identified when talking about ICTs and development in Africa. It is dangerous because ICTs too easyily to become part of an paradigm that is blended from a revolutionary rhetoric and forgetting about all the translation work that is needed for the various African contexts. But there is also an opportunity when remembering the many ways of African adaptations of all kinds of technologies. This creativity needs to be adopted when developing and implementing information and communication technologies for African contexts. This paper hopefully helps to some extend to start such thoughts.

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