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Bridging the Digital Divide?
Self-Manage IT – A Ugandan Case Study

Abstract

It is widely thought that information and communication technology (ICT) can catalyse economic growth and that the right to information is a basic condition for human and social development. However, the difference in quantity and quality of ICT services is still wide. This so-called digital divide has to be reduced and this thesis aims to find out how on-the-ground efforts to bridge the digital divide can be carried out and to examine which factors are most important or most difficult to overcome and why this is so. The research question was "What does an on-the-ground initiative to bridge the digital divide look like in practise?" The methodology chosen is case study and the case chosen is an ICT-project (Self-Manage IT, SMIT) in Uganda. The empirical material consists of 14 interviews and the information from the informants was analysed according to two tools/theories; Dr Richard Heeks' "Information Chain Theory" and bridges.org's "Real Access / Real Impact" framework. The results show that SMIT faces some steep challenges regarding management and sustainability issues. Major access barriers are the lack of money and the absence of training of trainers.

Keywords: Digital Divide, ICT-Development Project, Information Chain, Real Access/Real Impact Framework

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Introduction

Background

At the turn of the century, UN Secretary General Kofi Annan, announced the eight Millennium Development Goals (MDGs) which is a set of human development goals and targets that should be met by 2015.[1] Information and communication technology (ICT) is not a specific MDG or target (only two of the 48 indicators consider ICT). However, it is widely thought that ICT and an information-based economy, can catalyse growth and help to pool resources and knowledge, and thereby help to reach the eight wider development goals (see Appendix 2).[2] The International Telecommunication Union (ITU) states that;

> MDGs give the world a clear focus for addressing poverty reduction. But, if we do not change the paradigms of development intervention, we will fail to meet the goals. In our experience, ICTs have proven that they can help reduce poverty when used appropriately, with the full participation of all stakeholders, especially the poor.[3]

The belief that ICT can be used in poverty alleviation and that the world can develop by improving communications was shared by more than 11 000 delegates and leaders representing 176 countries, who attended the first phase of the World Summit on the Information Society (WSIS) held in December 2003 in Geneva.[4] The summit was convened by the United Nations, and organised by ITU, in order to develop a global framework and reach international agreement on pressing issues related to ICT and to ensure that social and economic development, which is increasingly driven by ICT, *"will result in a more just, prosperous and equitable world"*[5].

Despite the fact that expectations were low and that there was significant international scepticism prior to the WSIS,[6] the delegates managed to present a hard-won consensus on the means by which ICT can be used to achieve the MDGs.[7] They agreed on a Declaration of Principles, which outlines a common vision of the values of an information society, and a Plan of Action, which outlines the steps that need to be taken (for more information on this, see Appendix 3).[8] Results from the agreement include a consensus that an essential foundation of the information society is Article 19 of the Universal Declaration of Human Rights;

> Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers.[9]

ICT has the potential to realise article 19 by connecting individuals, societies and countries in the world, making it possible for everyone to freely participate in the communication

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[1] http://millenniumindicators.un.org/ (retrieved April 2004)

[2] www.unicttaskforce.org/ (retrieved, April 04), www.itu.int/ (retrieved, February 04), Global ICT Department (2003); Warschauer (2003), Heeks et al. (2003), Kenny (2001), WSIS (2003a)

[3] www.itu.int/wsis/geneva/events/index.html/ (retrieved April 2004)

[4] www.itu.int/newsroom/wtd/2004/sg_message.html/ (retrieved May 2004)

[5] Yoshi Utsumi, Secretary-General ITU, quoted in www.itu.int/newsroom/wtd/2004/sg_message.html/ (retrieved May 04)

[6] Ferguson (2004)

[7] Hamilton (2004)

[8] WSIS (2003a), WSIS (2003b)

[9] www.un.org/Overview/rights.html/ (retrieved April 2004)

processes "*regardless of frontiers*". But, universal access to the means of communication, i.e. ICT, is not yet a reality. The availability to ICT is today unevenly distributed; between the developed and developing countries as well as within societies.[10]

A report from UNESCO states that the digital divide between developed and developing countries is immense and that "*many decades of development separate the haves from the have-nots*"[11]. Another extensive report from the World Economic Forum, "The Global Information Technology (IT) Report 2003-2004", is on the other hand optimistic and concludes that "*the use of ICT has spread rapidly amongst large segments of the world's population*"[12]. It also states that developing countries show some of the fastest rates of growth and most sizeable increases in the ICT areas. At the same time though, these countries still have the poorest ICT penetration rates while the highest penetration rates are found in advanced economies with relatively small populations. The "divide" in per-capita access to ICT has thereby narrowed, but low income countries still lag considerably, particularly in sub-Saharan Africa.[13]

The reports' analysis is based on the Networked Readiness Index (NRI), which is defined as "*the degree of preparation of a nation or community to participate in and benefit from information and communication technologies (ICT) development*"[14]. The report covers 102 countries and the United States tops the rankings for the year 2003, followed by Singapore, Finland, Sweden, and Denmark. South Africa, in top of the sub-Saharan African countries, is ranked as number 37, and Uganda is ranked as number 80.[15]

A comparison of Sweden and Uganda highlights the digital divide even more. The last two of the 48 indicators used to benchmark progress towards the MDGs are telephone lines and cellular subscribers per 100 inhabitants, and personal computers in use and Internet users per 100 inhabitants. The table below shows how Uganda and Sweden measure up against these benchmarks and gives us an idea of the magnitude of the gap.

	Indicator 47; Telephone lines and cellular subscribers per 100 population			Indicator 48; Personal computers in use per 100 population			Indicator 48; Internet users per 100 population		
	1990	**1999**	**2002**	**1990**	**1999**	**2002**	**1990**	**1999**	**2002**
Sweden	73.45	131.85	162.45	10.48	45.14	62.13	0.58	41.37	57.31
Uganda	0.17	0.51	1.81	0.00	0.25	0.33	0.00	0.11	0.40

Table 1; Access to Information and Communication Technologies, source ITU[16]

As stated above, even though there is great emphasis on the use of ICT as a tool to alleviate world poverty, there is still a wide disparity in the provision of both overt and social prerequisites for such transmission of information.[17] There are simply no financing mechanisms to eradicate the economic, social, political, technical, and infrastructural

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[10] WSIS (2003a)
[11] Sciadas (2003), 23.
[12] Dutta et al. (eds.) (2003), ix.
[13] Ibid.
[14] Ibid., 217.
[15] Ibid.
[16] www.itu.int/ (retrieved Feb 04)
[17] Heeks (1999)

constraints that hinder the world's poor to access and use ICT. However, small steps are taken and changes are taking place. In Uganda a vast number of on-the-ground efforts to bridge the digital divide exist. As stated by ITU;

> [...] there are a variety of interesting ICT-related projects taking place throughout Africa, Uganda has emerged as a test-bed for new technology implementations, specifically in the education sector [...]. Although Uganda has experienced some successes with new technology deployments, specifically in the wireless arena, many rural Ugandans remain disconnected from the global information network. However, collaborative efforts launched by domestic private actors, NGOs and a variety of international organizations promise to bring the information age to all Ugandans.[18]

Some well known efforts in Uganda are the ITU-sponsored Multipurpose Community Telecentre (MCT) project in Nakaseke, the World Banks' World Links for Development (WorLD) programme, and the new offspring of WorLD; SchoolNet Uganda (see Appendix 4 for more information on similar efforts). A new interesting on-the-ground initiative is the ICT-project Self-Manage IT (SMIT), which is a good example of an attempt to convert the principles and plans of the WSIS into concrete action in a sub-Saharan African setting.

SMIT is a project which aims to build local and regional ICT capacity for economic, social and cultural development by providing selected schools, centres, universities and institutions in Uganda with donated second-hand computers and then connect them to the Internet. The computer laboratory will also be open for the surrounding community.[19] This may seem as an easy task; to provide computers and connect them in order to bridge the digital divide. But it is not that simple; ICT requires components and factors that poor people often lack.[20] The digital divide is more than a matter of infrastructure and can not be overcome simply by a technology transfer. This is also why many ICT projects fail to deliver according to ITU;

> [The] same types of problems occur again and again in technology projects around the world, which too often focus on providing hardware and software and pay insufficient attention to the human and social systems that must also change for technology to make a difference.[21]

While identifying the difficulties to be overcome if ICT is to reduce poverty and make a real impact on socio-economic development, the literature does not suggest which factors are most important or most difficult to overcome and why this is so. More research is therefore needed before models can be asserted with any confidence.

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[18] ITU (2003)
[19] SMIT (2003a)
[20] Heeks et al. (2003)
[21] Warschauer (2002)

Purpose of Research

The overall purpose with this thesis is to contribute to the existing body of knowledge on how the digital divide can be bridged by exploring the wide area of ICT for development in the South in general and in Uganda in particular.

The specific purpose of this thesis is to investigate how on-the-ground efforts to bridge the digital divide can be carried out (what works, what fails) and to examine which factors are most important or most difficult to overcome and why this is so.

My research question is;

What does an on-the-ground initiative to bridge the digital divide look like in practise?

Definition of Key Terms

In order to fully understand the theory and discussion made it is necessary to clarify what I mean with a few of the most important concepts and terms. These will be found in Appendix 1. Acronyms and abbreviations are also included to guide while reading.

Limitations of the Thesis

There are several limitations to this thesis whereof the first and foremost are due to time restrictions. I was not able to visit all the schools and centres in the districts where SMIT operates and I was not able to interview all the persons involved in the project.

My research has been restricted to one on-the-ground initiative to bridge the digital divide only, i.e. SMIT. This thesis might have benefited of a detailed analysis of additional cases and given additional knowledge.

Another reason for the limitations to this thesis has to do with the SMIT project itself. SMIT was only in its initial stage when the generation of data was carried out (spring 2004) and had not really kicked off. This was due to a delay in the shipment of the computers. The project had thus not been in operation long enough for me to really see what SMIT had done well or to observe its impact on socio-economic development. Another consequence of this delay was that I was not able to collect data over a longer period of time which would have been preferable in order to see how the project developed.

This kind of research can be conducted in many ways. In this study I have focused on a project that delivers ICT to schools and centres in Uganda since I think that the benefits of ICT in schools and SBTs in the community is a sound and effective way to bridge the digital divide.

Structure of the Thesis

This thesis has six main chapters divided into several subsections.

1. The introduction chapter gives the background information, presents the project SMIT, and outlines the purpose of the research as well as its delimitations.
2. The methodology chapter describes the methodology (case study) and the methods chosen (literature review, interviews).
3. The theory chapter explores theoretical considerations; clarification of the term digital divide and the presentation of two access models.
4. The result chapter presents the findings of the case study.
5. The analysis chapter links the theory with the findings with the purpose of the thesis.
6. The last chapter consists of a discussion, conclusion and ideas for future research.

Methodology of the Research

Research Design

I regard reality as a social construction. A social construction is where a person interprets, understands and structures the surrounding reality in relation to prior knowledge and experience in order to give life meaning.[22] Reality is thereby personal and subjective, there is no absolute truth which can be discovered and the researcher is a part of the world he or she studies. This theoretical perspective is influenced by my epistemology (my personal view of how knowledge is created) which is affected by my ontology (my personal worldview). Looking at the reality this way means that the research itself will contribute to the shaping of my views (both my ontology and epistemology).

The general research approach has been of qualitative nature and the methodology chosen has been case study (single case design). With methodology I refer to the approach taken to address the research question and the selection of suitable methods to carry out the research. Why I chose case study will be clear in the following section. The methods chosen will also be explained.

The methodology chosen, i.e. case study, can be seen as a natural consequence of my research paradigm. Figure 1 illustrates this.

Ontology ↓ ↑	Forming my Research Paradigm	
Epistemology ↓ ↑		
Theoretical Perspective ↓ ↑		The Reality is a Social Construction
Methodology ↓ ↑	Chosen	Case Study
Methods ↓ ↑	Chosen	• Review of literature • Study of organisational documents • Semi-structured face-to-face interviews • Direct observation • Analysis of findings

Figure 1: My Research Paradigm (Figure inspired by Schueber, 2003)

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[22] Backman (1998)

Case Study

I chose to do a case study. A case study is a research strategy that *"investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used."*[23] A case study *"looks in depth at one, or a small number, of organisations generally over time"*[24].

Case study methodology is a helpful tool for examining what works best, what fails, and why it works or fails[25]. Moreover, case studies *"can draw more extensively upon local culture and problems – many of these problems being quite different from those considered significant in more highly developed countries"*[26]. Case studies are suitable to *"disseminate best practice examples of how information communication technology has been successfully used by ground level initiatives to alleviate poverty"*[27].

When conducting research by doing a case study and examining an individual organisation it is easy to be too descriptive, and ransack too much in practical realities. It might also be difficult to generalise the study.[28] To avoid these pitfalls I have used an already existing case study template developed by The International Institute for Communication and Development (IICD) and bridges.org, a non-profit international organisation based in Cape Town, South Africa. Another reason for using a template is to make this case comparable with other similar projects. The template can be used to present basic information about best practice in ICT-enabled development projects in a comparable format. The case study template has four parts:[29]

1. Overview: Provides basic information about the initiative, such as the organisation driving it, target audience, type of technology used, and key development obstacles addressed.

2. Gauging Real Impact: Considers whether and how the initiative has made / will make a real impact at the ground level by using bridges.org's "8 Habits of Highly Effective ICT-Enabled Development Initiatives" as a guideline to highlight where the initiative has succeeded.

3. Lessons Learned: Shares the views of the people driving the initiative on challenges they have faced, key constraints and dependencies that affect the initiative, opportunities for future improvement of their work, and other lessons they have learned.

4. The Story: A narrative description of the initiative that highlights why this use of ICT for development is particularly interesting.

The case study in this thesis, the project SMIT in Uganda, is presented in a slightly different format. First, the overview is presented in the result chapter, followed by lessons learned and

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[23] Yin quoted in Backman (1998), 49.
[24] Easterby-Smith et al. (2001), 49.
[25] www.bridges.org/ (retrieved February 2004)
[26] Davila quoted in Easterby-Smith et al. (2001), 70.
[27] www.bridges.org/ (retrieved February 2004)
[28] Heeks & Duncombe (2001)
[29] www.bridges.org/ (retrieved February 2004)

the story. Part two of the template (gauging real impact) is to be found in the analysis. The guideline "8 Habits of Highly Effective ICT-Enabled Development Initiatives" can either be used proscriptively for planning, or retrospectively for evaluation. I have used the guideline as the latter as a tool to analyse the results.

Review of Literature

I have selected literature that addresses themes and areas such as: the digital divide, development informatics, ICT for development, information society and the like. I have tried to choose literature that in my opinion appears to be appropriately critical and realistic. As an enormous amount of information exists on the subject I have concentrated on three main sources that constitute the basis of the theoretical discussion;

1. The first source consists of the work by Dr Richard Heeks, Senior Lecturer on Information Systems and Development at Institute for Development Policy and Management, University of Manchester (IDPM), UK. Heeks has written and edited many books and articles on ICT for Development and is often cited. I have mainly focused at his notion of "information chain" resources.

2. Heeks theory is backed by theories from the bridges.org, an organisation that promotes the effective use of ICT in the developing world. I have primarily concentrated on their theory about "Real Access / Real Impact" that can be used as a basis for the analysis as well as a framework for improving the way that ICT is used in development.

3. In addition to this, I have looked at a World Bank program that was initiated in Uganda 1996 named World Links for Development (WorLD). This pilot program has now ended but has left a vast documentation on best practices in a sub-Saharan African and Ugandan context. The program connected 32 schools to the Internet, serving over 30 000 students and is considered to be "*one of the most innovative and successful grant programs initiated by the World Bank to assist developing countries in bridging the 'digital divide'*"[30]. I have looked at the lessons drawn from the success and failures of their program.

Study of Organisational Documents

From the chairman of Self-Management (Sweden) and the project manager of SMIT, I received organisational documents, reports and working papers that have been of great support in the generation of empirical data. See references for a complete list.

Generation of Empirical Material

Relevant theories need to be complemented with empirical material. I used different methods to generate material in Uganda. The main approach was semi-structured face-to-face interviews. I chose interviews since they are useful when the courses of events, i.e. step by step logic of a situation, are not clear and the research field is unexplored.[31]

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[30] Hawkins (2002), 39.
[31] Easterby-Smith et al. (2001)

The case study template, described above, partly shaped my choice of questions. The questions were also designed to supplement and confirm and/or reject the theories ("Information Chain" and "Real Access / Real Impact"). See Appendix 5 for sample questions.

A general rule when selecting interviewees is to look for people who are as centrally positioned as possible in the course of events that you are interested in.[32]

The interviewees in this thesis fall under three categories;
1) Academic and corporate sources for general background information
2) Key persons involved in the SMIT project
3) Representatives from participating schools, institutes and universities

The interviews in the first category were arranged by me, including an interview with the Director of the ICT Directorate at Uganda's the most well known and established university – Makerere University; the Technical Chief Coordinator of Uganda's leading mobile company – MTN Uganda; and the Executive Director of SchoolNet Uganda. My supervisor in the field, Mr Samuel Nakabaale, Treasurer and Technical Coordinator for the SMIT project, arranged the interviews with key persons involved in the project (including him). Mrs Sarah Kiyingi, Project Coordinator and Administrator, partly arranged the interviews with the representatives from participating schools and centres. She tried to find representatives from a range of schools and centres including government and private run; primary and secondary; wealthy and less affluent; boarding and day schools.

I also attended a workshop conducted by the Ministry of Works, Housing and Communications, on Uganda's ICT infrastructure and e-readiness assessment.

On top of this I did some direct observation by visiting some of the participating primary and secondary schools, universities, institutes, and centres.

Analysis of the Findings

In the beginning of the analysis it is explained more in detail how I used the theories on the empirical findings according to the purpose.

Validity and Reliability

Validity is especially problematic in case study research and has been criticised because of the potential subjectivity of the investigator Yin proposed three remedies to counteract this: using multiple sources of evidence, establishing a chain of evidence, and having a draft case study report reviewed by key informants.[33]

I was automatically connected with SMIT as my supervisor in the field is working for the SMIT project. There is hence a possibility that I was given answers that the respondents thought that I, and Self Management (Sweden), wanted to hear. Not necessarily but there is a possibility.

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[32] Ibid.
[33] Yin (1994)

In this thesis multiple sources have been used in the sense that I have interviewed different stakeholders and people involved in the SMIT project as well as people within the field but not directly connected to the project. Organisational documents and observation have widened the picture. The interviews were digitally recorded and transcribed. Before finalising the thesis, the key informants reviewed the result which enabled them to chance, confirm and criticise the data.

Theory

A central enabling agent in building an inclusive information society is connectivity. Universal access to ICT infrastructure and basic communication services constitute one of the major challenges of the information society. Numerous authors and organisations have noticed that there are many difficulties as well as a number of access barriers which need to be overcome in order for the poor to access digitally stored information and to become recipients and contributors of information. Solutions that work in developed countries cannot simply be transferred to developing country environments. The needs and conditions differ and that is why many development initiatives "*have failed to provide sustainable, replicable models for community ICT use*"[34]. What have been missing are thus realistic models for delivering access and ICT-enabled development at ground level.

However, two such models that take into account the local context exist, and will presented in this chapter. As mentioned, these are; Dr Richard Heeks' "Information Chain Theory", and bridges.org's "Real Access / Real Impact" framework. After this a similar project will be presented; WorLD, which highlights access issues that might be more specific for community telecenters, electronic public places associated with existing public places, particularly those located in educational institutions, notably school-based telecenters (SBTs). This will make the link between the empirical findings and the theory clearer since this case study concerns computers in schools. First of all, however, the term digital divide needs to be clarified.

Digital Divide

The term "digital divide" is widely used, and also misused in material and papers concerning the information society and ICT for development. Its terminological exactitude is not crucial (in another world it might have been "silicon split", the "gigabyte gap" or the "Pentium partition"[35]) and definitions range from being very narrow to wide. Simply, the term could be understood as the gap between the haves and have-nots regarding access to, and use of ICT and the Internet.[36]

There are several reasons *why* the gap, and thereby the digital divide, exists. The most obvious one is the unequal distribution of economic wealth in the world. Another major related reason is that in many cases, the supporting technical infrastructure is lacking (from the basic level of not having electricity and a functioning computer, to the limitation of bandwidth), i.e. the technical condition is far from satisfactory. This is commonly explained by the normally slow diffusion of new technologies and the difficulties in "rolling out" the new technology around the world.[37] The lack of political will could also exacerbate the digital divide, supporting government policies might have failed and/or governments try to intervene too much, i.e. controlling the flow of information.[38] A linguistic and literacy problem also exists; ICT (and the Internet) is dominated by the major languages and is mainly designed for the literate; many people are therefore excluded. The gender issue is also important; women and girls are less involved in ICT due to a non-conducive environment. Even if access is available some people choose not to use it, i.e. it could be a matter of personal choice.[39] The

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[34] bridges.org (2001), 7.
[35] Fink & Kenny (2003)
[36] Sciadas (2003)
[37] briges.org (2001)
[38] Ibid.
[39] Ibid.

commoditisation of information is another reason behind the deepening gap between the haves and the have-nots.[40]

According to Fink and Kenny (economists at the World Bank) there are at least four possible explanations to the digital divide appearing in the literature:[41]

1. A gap in *access* to use of ICTs (measured by tele-density or computers connected to the Internet)
2. A gap in the *ability* to use ICTs (measured by computer literacy, the skills base and the existence of several complimentary assets)
3. A gap in *actual* use (measured by how many, for what purpose and for how long the telecommunications are used, the number of Internet hosts, and the level of e-commerce)
4. A gap in the *impact* of use (measured by financial and economic returns)

These four explanations suggest that the digital divide is a relative concept since countries and societies are dynamic and ever-evolving. In order to evaluate any progress made by developing countries it must therefore be examined against the progress made by developed countries.[42] Statistics, based on the various measurements mentioned, shows that there exists a close correlation between a country's per capita GDP (or human development index, HDI) and, for example, the percentage of the population using the Internet (or the countries e-readiness).[43]

According to bridges.org there are five basic perspectives on what the digital divide *is* and *how* to solve it.[44] The first three perspectives define the digital divide in a similar way; as the lack of computer hardware, network access and training. However, the perspectives offer different explanations on how the digital divide should be overcome;

1. Governments, NGOs and private initiatives should supply these requirements in order to bridge the digital divide
2. Laissez faire; do nothing – let the market and selective development projects solve this problem on its own by "*steadily lowering prices, fostering an IT training sector, and extending infrastructure to outlying regions*"[45]
3. New policies are needed since the digital divide is "*exacerbated by ineffective government policy – government actions (or inaction) hinder the development and use of computers and until these policies are changed, the digital divide cannot be solved*"[46]
4. The digital divide is a lost opportunity for disadvantaged groups. How technology is used is what really matters and effective use "*requires computers, connections, training, locally relevant content, and real applications of the technology to fit immediate needs*"[47]

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[40] Ferguson (2004)
[41] Fink & Kenny (2003)
[42] Sciadas (2003)
[43] Ibid.
[44] briges.org (2001)
[45] Ibid., 88.
[46] Ibid., 88.
[47] briges.org (2001), 88.

5. The digital divide is merely a reflection of the lack of basic literacy, poverty, health and other social issues that must be addressed first before the digital divide can be bridged

According to bridges.org *"people have realised that the digital divide is not a new phenomenon, but simply social and economic disparity extending to access to and use of information and communications technology"*[48]. Bernardo Sorj (professor of Sociology at the Federal University of Rio de Janeiro and author of brazil@digitaldivide.com) suggests that the digital divide *"refers to the unequal distribution of resources associated with information and communication technology between countries and within societies"*[49] where ICT *"can potentially support contradictory tendencies: towards greater freedom and social participation and to deeper social inequality and new forms of concentration of power"* [50]. The digital divide *"often follows and reinforces existing inequality and poverty patterns"*[51] and the introduction of more ICTs is simply exacerbating social and economic divides – not only between developed and developing countries, but also between socio-economic groups within countries.[52]

To conclude; the divide exist at different levels. There are differences in the technical access (the physical availability of the ICT) and in the social access (the technical skills and the professional knowledge necessary to benefit from ICT). The digital divide can be seen as a divide *between* countries (i.e. international digital divide or sometimes referred to as the global divide); generally between developed (industrialised) and developing countries. It can also be seen as a divide *within* countries (i.e. domestic digital divide or social divide); where the urban, rich, educated and young (often male) are most likely to use ICT.[53]

Devyani Mani, United Nations Centre for Regional Development (UNCRD), explains it like this;

> Within each nation, there are groups of people with limited or no access to ICTs – generally underprivileged communities, traditionally marginalized groups, minority groups, women, the aged, and those located in rural and remote areas. Projects that targeting communities in poor rural areas and urban slums struggle to bring the weakest in. Digital divides reflect socioeconomic divides.[54]

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[48] briges.org (2003), 2.
[49] Sorj (2003), 15.
[50] Ibid., 15.
[51] Pigato (2001), 7.
[52] briges.org (2001)
[53] Fink & Kenny (2003), Pigato (2001), briges.org (2001), Heeks et al. (2003), Pigato (2001)
[54] Mani (2002)

The Information Chain

According to Dr Richard Heeks, considering the digital divide as merely digital is insufficient. To fully comprehend information-related divides one has instead to consider that information is a result of the process of accessing, assessing and applying data.[55] People "*must be able to access data and assess if they are useful and applicable for their situation, before they could act upon them*".[56] Data remains data unless people have the skills and expertise to transform raw data into useful information.[57] Heeks uses a "4 As" model (Figure 2) to illustrate this staged process. This model takes understanding beyond just access issues to the whole chain of steps that turn data into people action.[58]
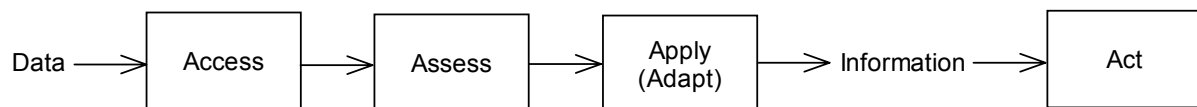
Figure 2: The '4 As' Model of the Information Chain (Heeks, 1999)

The elements in the information chain can be clarified as follows. *Data* is unprocessed, raw facts and figures which might or might not be useful.[59] When data is obtained, you *access* it. You *assess* data when you decide or estimate the value or quality of the data. You *apply* (*adapt*) data when you start using the data and make it suitable for a purpose, for particular needs or circumstances. The processed raw data then becomes *information*. Or in Checkland's and Holwell's words; "*data is transformed into information when meaning is attributed to it*"[60]. This means that one person's information can be another person's data, for whom it has no meaning. In the Information Chain Theory, the word information is used in a special sense, simply understood as "*a physical quantity which can be stored, processed and transmitted via technical means*"[61]. Finally, when you do something with the obtained information or decide something based on that information; you *act*. According to Heeks, the main indicator of the value of the information is the impact it makes on decision-making and action.[62] "*[T]he value of ICTs comes from their new abilities to handle information*"[63].

Heeks' information chain could be seen as a part of Richard Fuchs (Director, ICT for Development Program, IDRC) "value chain of information"[64] (see Figure 3). According to Fuchs; "*people want to add value to what they already know or presently do*"[65] which means that information gets "*assimilated into a coherent framework of understanding*"[66]. Fuchs states that "*more and more of what gets offered moves up the value chain towards knowledge and wisdom*"[67]. Fuchs sees ICT as "*technological tools for communication to help people move up the value chain of information*"[68].

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[55] Heeks (1999)
[56] Heeks et al. (2003)
[57] Heeks (2000)
[58] Heeks (1999), Heeks (2000)
[59] Heeks & Duncombe (2001)
[60] Checkland & Holwell (1998), 95.
[61] Dahms (1999), 3.
[62] Heeks (1999)
[63] Heeks & Duncombe (2001), 6.
[64] Fuchs (1997)
[65] Ibid.
[66] Heeks quoted in Schueber (2003)
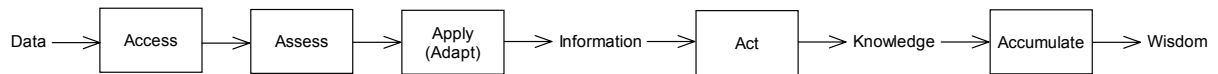[67] Fuchs (1997)
[68] Ibid.

Figure 3: The Value Chain of Information (Heeks 1999, Fuchs 1997)

According to the value chain of information, wisdom is built on accumulated knowledge. Knowledge in its turn is the result of acting on information. And information, as seen above, is the result of the process of accessing, assessing and applying data.

Surrounding Components

Information creates knowledge but the creation of information is also facilitated by existing knowledge, meaning that knowledge is needed to create information.[69] But knowledge is not all that is needed; other surrounding components must also be present. Heeks distinguishes between data, overt, social, and action resources (Figure 4). Deficits in any of these can threaten the effective functioning of the ICT information chain and become access barriers for poor people.[70]
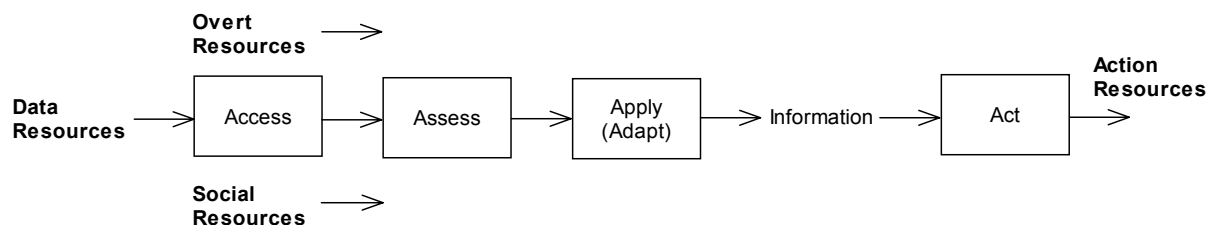
Figure 4: The '4 As' Model with Surrounding Components (Heeks, Duncombe 2001)

Heeks classification of ICT access barriers are;[71]

Data resources;
- the raw data should be relevant for the purpose of use and adapted to the local context
- data "*is often driven by the objectives of the source rather than the needs of the recipient*"[72], meaning that the needed data is not available

Overt resources (affecting ICT access when locally available);
- telecommunication infrastructure for network access
- electrical infrastructure to supply electricity
- money to buy and access the ICT
- skills infrastructure to keep the technology working
- usage skills to use the ICT
- literacy skills to make use of the written content

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[69] Heeks (1999)
[70] Ibid.
[71] Heeks (1999), Heeks (2000), Heeks & Duncombe (2001), Heeks et al. (2003)
[72] Heeks (1999)

Social resources (affecting ICT access, assessment and application)
- source proximity; "*data is created within a particular context and retains embedded characteristics of that context*"[73] and unless the recipient "*come from the same context as the sources creating information, problems of miscommunication and misunderstanding can arise*"[74]
- trust in the source and communication channel
- knowledge for accessing information; for "*assessing whether it is truth or lies, of value or not*"[75]; to adapt information in particular needs and circumstances
- confidence and security; feel motivated to "*take a certain amount of risk*"[76]

Action resources;
- affected by inequalities in overt and social resources; "*Inequality in endowment of both overt and social resources for action therefore keeps poor entrepreneurs poor regardless of whether information is supplied to them via ICTs*"[77]

For many people in developing countries (particularly in rural areas) the problem is that the resources needed for a functioning information chain are often absent; ICT requires resources that the poor people lack.[78] According to Heeks[79], too often we observe that:

- relevant data is not available (there is a lack of local content)
- data is available but people can't access it (they don't know how to get data or they can't afford it)
- data is accessed but people can't assess and apply it (they don't understand the data)
- information is created but people can't act on it (for example, they have identified new customers but can't afford to purchase materials to supply those customers)

However, Heeks insists that none of the mentioned resources are impossible barriers for ICT access. Although they need to be taken into account; "*None of these represents insuperable barriers and they should not be seen as excuses for inaction*".[80]

Real Access / Real Impact

bridges.org "Real Access / Real Impact" theory consist of two interrelated theories; the "Real Access Criteria" and "8 Habits of Highly Effective ICT-Enabled Development Initiatives".

Real Access Criteria

According to bridges.org, providing access to ICT is critical, but it must be more than just physical access and go beyond computers and connections so that ICT use makes a Real Impact on socio-economic development.[81] "*Computers and connections are insufficient if the technology is not used effectively because it is not affordable; people do not understand how*

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[73] Ibid., 8.
[74] Heeks & Wilson (2000), 416.
[75] Heeks (1999), 9.
[76] Ibid., 9.
[77] Ibid., 9.
[78] Heeks et al. (2003)
[79] Ibid.
[80] Heeks (1999), 11.
[81] bridges.org (2001), bridges.org (2004)

to put it to use, or they are discouraged from using it; or the local economy cannot sustain its use."[82] bridges.org acknowledge that there is no single answer to what will guarantee success and achieve Real Impact. However, looking at the project in terms of bridges.org key determining factors in whether or not people have "Real Access" to ICT or not might help.[83] There are twelve inter-related Real Access criteria which could be used to measure the "soft" issues surrounding ICT access and use. The questions can help outline the thinking about how to apply the criteria to ICT projects;[84]

- **Physical access to technology.** Is technology available and physically accessible? What technology is available?
- **Appropriate technology.** Desktop computers and high-bandwidth connections might be the first things that come to mind regarding ICT projects. However, they are often not the best technology choices in the context of local realities of developing countries. Is the ICT appropriate to local conditions, and how people need and want to put technology to use?
- **Affordability of technology and technology use.** Affordability is a critical problem that in the long run is a question of sustainability. Realistic choices about introducing costly ICT services in poor communities must be made. Is technology access affordable for people to own and use?
- **Human capacity and training.** People will only use ICT when it is apparent that it will have a positive impact on the daily lives. The lack of technical support could hinder technology use. Skills transfer is therefore an important element in any ICT related development project. Do people have understanding and training on how to use technology and its potential uses?
- **Locally relevant content, applications, and services.** Is there locally relevant content, especially in terms of language?
- **Integration into daily routines.** Find ways to integrate ICT use into the daily routines and work in order to achieve improvement. Is technology use an additional burden to the lives and work of people and organisations already burdened by daily tasks, or is it integrated into their daily routines?
- **Socio-cultural factors.** "[P]*eople are prevented from full participation in their societies and economies on the basis of their race, gender, class, age, physical ability, HIV status, geographical location, sexual preference, religion and other socio-cultural factors.*"[85] Are people limited in their use of technology based on gender, race, age, religion or other socio-cultural factors?
- **Trust in technology.** If users do not feel confident it can significantly limit the ICT use. Do people have confidence in and understand the implications of the technology they use, for instance in terms of privacy, security, or cybercrime?
- **Local economic environment.** Sustainability in ICT-projects in developing countries has proven challenging. Is there a local economy that can and will sustain technology use? What impact will ICT use have on the local economy?
- **Macro-economic environment.** National policies can affect the uptake of technology through; "*policies governing deregulation of key industries; foreign direct investment; banking and currency controls; trade tariffs, labour and employment standards; and*

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[82] bridges.org (2001), 45.
[83] bridges.org (2001), www.bridges.org/ (retrieved February 2004)
[84] bridges.org (2001), bridges.org (2004)
[85] bridges.org (2004), 7.

taxation."[86] Is national economic policy conducive to widespread technology use, for example, in terms of deregulation, investment, and labour issues?

- **Legal and regulatory framework.** ICT-policies from international, regional, and national institutions shape national laws and regulations. The implications of their and governments decisions therefore affect the end user. ICT-projects "*frequently encounter obstacles that directly or indirectly relate to the country's legal and regulatory framework*"[87]. How do the country's laws and regulations affect technology use and what changes are needed to create an environment that fosters its use?

- **Political will and public support.** Is there political will in government to do what is needed to enable the integration of technology throughout society? Do people support the widespread use of technology in their communities?

By paying attention to the criteria above, Real Access could be achieved. Sometimes, however, it is not enough to consider and address these issues; initiatives still fail because of poor project administration.[88] Therefore, the Real Access / Real Impact model also recommends the "8 Habits of Highly Effective ICT-Enabled Development Initiatives" in order to sustain ICT-projects.

8 Habits of Highly Effective ICT-Enabled Development Initiatives

According to bridges.org, initiatives should be built on best practice principles or what they call "8 Habits of Highly Effective ICT-for-Development Initiatives".[89] These eight guidelines aim to "*ensure the internal health of initiatives harnessing ICT for development*"[90]. They are used to measure whether and how projects are making a Real Impact on people's lives.[91]

1. **Do some homework, conduct a needs assessment.** Learn from similar initiatives; their successes and failures, i.e. learn from past experience. Try to understand what has worked and what has not. Also, do a needs assessment and look at the real needs of the community or group targeted for the project.
2. **Implement and disseminate best practice.** ICT initiatives should build on best practice in the field and adapt to their projects. Then share their experiences with others.
3. **Ensure ownership; get local buy-in, find a champion.** Someone who is part of the community where a project is being implemented also knows the local context which is important for the success of the project.
4. **Set concrete goals and take small achievable steps.** Many ICT initiatives have project plans that try to do too much in too little time and/or have unclear target, which will be of no help if the project loose the track. A structured methodology that is based on small achievable steps will keep project implementation moving forward.
5. **Critically evaluate efforts, report back, and adapt as needed.** ICT initiatives should regard the funders as investors and treat the funding more like an investment than a gift in order to show result and increase responsibility.
6. **Address key external challenges.** External challenges are beyond the direct control of those implementing the project. For example; "*each of the Real Access criteria*

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[86] Ibid., 8.
[87] Ibid., 9.
[88] Ibid.
[89] bridges.org (2001)
[90] bridges.org (2004), 11.
[91] bridges.org (2004), www.bridges.org/ (retrieved March 2004)

identified above can become an external challenge for ICT projects or policies in one way or another"[92].

7. **Make it sustainable.** ICT initiatives should include "business" plans that embrace the provisions for overall sustainability. ICT initiatives should also consider "soft" issues related to sustainability; human resources, in-house skills etc.

8. **Involve groups that are traditionally excluded on the basis of gender, race, religion or age.** *"When groups are alienated for social or cultural reasons it not only hinders ICT penetration to the detriment of those excluded, but also limits the benefits of diversity in the information society more broadly."*[93]

World Links for Development

The theories above can be applied to all type of ICT access in the South. Are there access issues that are more specific for community telecenters located in educational institutions, i.e. school-based telecenters (SBTs)? Robert Hawkins from WorLD discusses in chapter four in "The Global Information Technology Report 2001-2002" his program's experience in connecting schools to the Internet as well as training the teachers. Hawkins grouped the experiences into ten, practical lessons;

1. **Computer labs in developing countries take time and money, but they work.** The barriers are many; the lack of adequate hardware and software, unreliable Internet access, high student-teacher ratio etc. But in spite of many limitations;

   > […] schools make these labs work. Schools squeeze as much use as possible out of poor connectivity through technical solutions such as store-and-forward e-mail, caching Web pages locally, extensive use of CD-ROMs, and pulling Web pages through e-mail. Teachers have also learned to manage their classes to work with these limitations.[94]

2. **Technical support cannot be overlooked.** To set up the computer lab is relatively easy; to keep it running is a challenge. Problems include; electrical spikes, viruses, dust, heat, and normal wear-and-tear. And since *"most schools lack the funds for a fulltime computer technician, and when one is hired and trained, he is often lured away to a more lucrative job elsewhere"*[95] other solutions must be found. One solution is to give the students more responsibility for maintaining the labs. Another is additional training for technical staff and then outsource this technical support to private organisations.

3. **Noncompetitive telecommunications infrastructure, policies, and regulations impede connectivity and sustainability.** When investment in high speed Internet access is undertaken, there is, according to a survey conducted by SRI International for WorLD, an increase in satisfaction and use, as well as increased integration of ICT into the curriculum. Ministries of education could partner with the local or national telecommunications company to create a win-win situation, i.e. educational aims are furthered and the companies have a chance to *"build their future user base, potentially*

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[92] bridges.org (2004), 13.
[93] Ibid., 14.
[94] Hawkins (2002), 39.
[95] Ibid., 40.

reach parents through students, and accrue the public relations benefits of providing a social service"[96].

4. **Lose the wires.** Since the telecommunications infrastructure in many African countries is poor, fixed line dial-up or ISDN connectivity will not be a viable solution. The solutions vary; cellular telephone connection (slow data rate, 9.5 Kbps), line-of-sight spread spectrum (sender and receiver must have a clear path, i.e. limited distance of 20 km), wireless satellite or VSAT (this option is a bit more expensive and a fence to keep monkeys off jumping on the dishes or eat the cables is also required).

5. **Get the community involved.** One of the greatest challenges to connecting schools in developing countries to the Internet is the lack of finance. Part of the solution is to share facilities and costs with the surrounding community. This could be done by setting up a community education tax and/or using the computer labs as community learning centres where the clients pay a small fee. WorLD piloted this concept in Zimbabwe and the;

> […] success of these pilots suggests that developing countries should encourage schools to open up to the community as a means of bridging the digital divide between urban and rural areas of the country, between in-school and out-of school youth and, finally, between girls' and boys' access to education.[97]

6. **Private-public sector partnerships are essential.** Strategic partnerships must be formed between the Ministry of Education (government) and private companies in order to bridge the digital divide; none of the two can do it alone. In Karnataka, India, for instance, the local government worked together with a private computer training institute to equip seven hundred schools with ICT labs. The institute was obligated to equip and maintain the computer labs and provide an ICT instructor during school hours. After school hours, they were allowed to use the facilities for delivery of its own private training courses to the community.

7. **Link ICT and education efforts to broader education reforms.** According to Hawkins, "*installing the physical infrastructure is the easiest part of the battle*" but "*few* [Ministries of Education] *have developed coherent strategies to fully integrate the use of computers as pedagogical tools in the classroom*"[98]. Many Ministries see basic computer literacy skills as an independent discipline or subject. Hawkins believes that if it is integrated into the broader curriculum (i.e. if it is seen as a tool to aid in learning and teaching) real gains will be made.[99]

8. **Training, training, training.** Teachers need to know, apart from basic ICT literacy, how best to integrate technology into their teaching so that the classrooms becomes;

> dynamic, student-centred learning environments in which learners interact with peers in teams, both in their own classroom as well as with virtual classes around the world through the Internet […]. Teachers need support, examples of good practice, and leadership from their school principal to receive the necessary time for professional development, in order to truly transform teaching and learning in the classroom.[100]

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[96] Ibid., 40.
[97] Ibid., 41.
[98] Ibid., 41.
[99] Ibid.
[100] Ibid., 42.

9. **Technology empowers girls.** In the donor community and among development agencies many believe that female education is one of the critical factors in promoting social and economic development. According to Hawkins, "*once online, girls appear to do extensive research on teen-related information that is often taboo in their cultures, such as sexually transmitted diseases, teen pregnancies, and AIDS and its prevention*"[101].

10. **Technology motivates students and energises classrooms.** The students go from being passive receivers of information to being analysing and questioning. The hierarchy and the barriers between teachers and students are broken down and more interaction is taking place.

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[101] Ibid., 42.

Case Study – Self-Manage IT (SMIT), Uganda

Overview

Initiative: Self-Manage IT (SMIT) is a project with the intention to build local and regional ICT capacity for welfare development by providing selected schools, universities and institutions in particularly in Uganda, with second-hand computers, connecting them to the Internet.[102] Once connected, the participating schools and centres are supposed to open up their ICT-laboratories for the surrounding community.

Geographical area targeted: SMIT targeted area is five districts the Lake Victoria Basin in Uganda; Entebbe Municipality, Wakiso district, Kampala district, Mubende district, and Masaka district.[103]

Implemented by: SMIT was initiated by Self-Management (Sweden) with backing and leadership of Self-Management Uganda, and with assistance from ICT4Africa (Sweden) (Figure 5).
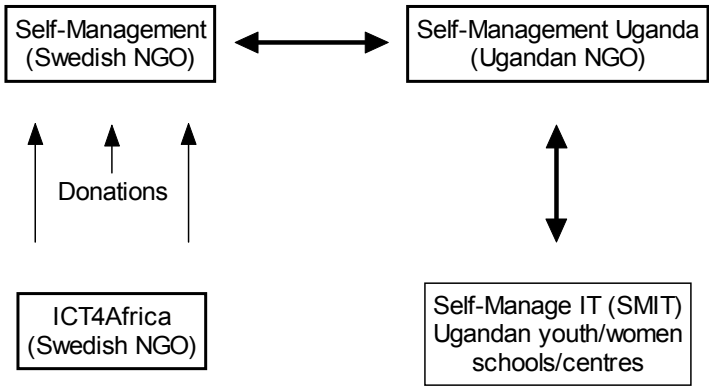
Figure 5: Project Chart (SMIT 2003d)

ICT4Africa (Sweden)
ICT4Africa (Sweden) is a non-for-profit Swedish based NGO that works with empowerment and building local capacity through strengthened institutions, enhanced ICT penetration, and skills development in developing countries. The NGO collects donated ICT-equipment from companies, organisations and individuals in Sweden and ensure that the equipment reaches schools, universities, hospitals and community centres in developing countries. Through partnerships with strong and recognised local organisations the ICT4Africa contributes to the establishment of ICT-centres, educational possibilities, and community development on the local organisations own conditions. ICT4Africa requires that every project is fully supported through aid or locally raised money. It is also required that there is a focus on educational and/or health sectors, that it is a local initiative, that a long term sustainability plan exists, and

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[102] SMIT (2003a)
[103] SMIT (2003c)

that there are embedded added values. The projects are always owned by the partnering organisation.[104]

Self-Management (Sweden)
Self-Management (Sweden) is a Swedish based NGO for new cooperatives in developing countries. It is a politically and religious independent organisation. Self-Management wishes to contribute to create functioning, self-supporting projects in developing countries that are economical, social, and ecological sustainable and where people together can organise and improve lifestyle. The NGO's activities range from information work in Sweden and partner countries, to functioning as a support organisation for a number of projects in developing countries.[105]

Self-Management Uganda
Self-Management Uganda is an umbrella community-based registered NGO. It is composed of local community leaders with support from local authorities where schools/centres are located.[106] The NGO was established for many reasons; the main rationales were to have the objectives focused (better organisation) and to give participating schools and other stakeholders the sense of ownership of the SMIT idea.[107] Also, according to Mr Samuel Nakabaale, Technical Coordinator, a registered NGO enjoy certain exemptions, like tax reductions and;

> If you are to tap assistance from anybody it looks nicer to support an organisation than a single entity, or school. So when we called for the stakeholders' workshop, the workshop resolved to have an umbrella organisation of the stakeholders that were joining the program. That gave birth to Self-Management Uganda. The name is of course derived from Self-Management Sweden, just to reflect the relationship between the two organisations.[108]

Mr Moses Ssemakula
Mr Moses Ssemakula is the driving force behind SMIT. Being the chairman of Self-Management (Sweden); the initiative taker of the whole project; project manager and international contact person – his importance can not be overlooked. Or in his own words (my translation); "*If Moses would stop preaching SMIT, what would happen? It is a big question which I am very concerned about*"[109].

Funding or financial model: SMIT is a not-for-profit initiative. It has received initial financial support from Sida (Swedish International Development Cooperation Agency) through Forum Syd (Swedish NGO working with development issues). The ICT-equipment was donated from ICT4Africa.

The participating schools and centres need to cover the ICT laboratory's initial and recurrent costs as well as contribute US$75 per computer to cover administration and freight to Kampala.[110]

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[104] http://www.ict4africa.org/ (retrieved June 04)
[105] http://www.self-management.cc/ (retrieved June 04)
[106] SMIT (2003d)
[107] Interview Kiyingi, 040505
[108] Interview Nakabaale, 040511
[109] Interview Ssemakula, 040629
[110] SMIT (2003b), Interview Ssemakula, 040629

Self-Management Uganda are looking for funding, both local and international, but has not been able to secure any funding apart from the grant by Sida.[111]

Timeframe: SMIT is scheduled to take place over a 3 years period, starting from the date the contract with ICT4Africa was signed and the presentation of the list of schools and centres requesting for computers was made.[112] The project is intended to finish in 2006 but "*that specific time is not specified*"[113], i.e. project might be prolonged if needed.

Local context: In order to identify general or context-specific factors that might facilitate (or constrain) similar initiatives in the future, the broader political, social and economic contexts within which the SMIT interventions are taking place must be understood.

Uganda, and its capital Kampala, is a landlocked country in East Africa. It is 263 000 km^2 in size with an estimated population of about 26.7 million.[114] The country became independent from the British in 1962. More than two decades of devastation, civil war and dictatorship followed, but in 1986, Yoweri Museveni, came into power and became president. The first presidential elections were held in 1996, and despite its turbulent history, Uganda has a relatively stable economy and political system.

Due to the civil war and the HIV/AIDS epidemic, Uganda has a very young population (50% are under the age of 15 years)[115]. 88% of the total population live in the rural parts of Uganda[116] and 82% of the labour force work with agriculture.[117] The GDP per capita (purchasing power parity) is US$1,400 and 35% of the total population live under the poverty line, i.e. below US$1/day.[118]

The two biggest languages are Luganda and English. The adult literacy rate (percentage of persons aged 15 and over who can read and write) is 69 (male 79 and female 59).[119] The primary school in Uganda is complimentary (free) but not compulsory. Primary school grades are from P1 to P6 (6 to 12 years) and secondary school grades are from S1 to S6 (about 13 to 19 years old). S1 to S4 classes constitute ordinary level (O-Level) and S5 to S6 classes constitute advanced level (A-Level). In order to qualify for S5, S4 students must pass the O-Level exams. S6 students do A-Level which is also the exam which qualifies students for university. O-Level and A-Level are national exams and they are highly competitive, both within the class and between schools.

The basic supporting infrastructure in Uganda still has a long way to go. According to Sida, only about 1% of the rural population today have access to electricity but the Ministry of Energy and Mineral Development plan to increase this figure from 1% to 10% by 2010.[120]

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[111] Interview Nakabaale, 040511
[112] SMIT (2003d)
[113] Interview Kiyingi, 040507
[114] UNFPA (2004)
[115] CIA (2004)
[116] UNFPA (2004)
[117] CIA (2004)
[118] Ibid.
[119] UNFPA (2004)
[120] www.sida.se, Swedish-Uganda Partnership, retrieved April 2004

One of the common problems with the power supply in Uganda is electrical spikes, power shading and power cuts. The voltage could be as low as 180 and as high as 300.[121]

Uganda's telecommunication infrastructure was prior to 1996, according to the independent ICT regulator Uganda Communications Commission (UCC); "*among the least developed, not only in Africa, but also in the whole world*"[122]. However, in 1996, the government of Uganda introduced reforms in the telecommunications sector in order to improve telecommunication services and increase penetration and service through private sector participation rather than government intervention.[123] It began with the disbanding of the former Uganda Posts and Telecommunications (UPTC) into two independent companies: Uganda Posts Limited (UPL), licensed to provide postal service in Uganda, and Uganda Telecom Limited (UTL), licensed to provide telecommunication service. Another national operator was also licensed; MTN Uganda Limited. On the mobile cellular side there are three operators, the two already mentioned and CelTel LTD.[124]

An exclusivity period was granted to the two national operators for five years, beginning 25th of July 2000. This so-called protected telephone service consists of basic telephone service, cellular telecommunications, and satellite service.[125] Since CelTel operated before the exclusivity period started they were not affected.

Following liberalisation, deregulation and the establishment of a competitive environment for telecommunications provision, the telecommunication sector has seen a ten-fold increase in the number of telephone (mainly mobile) subscribers between 1995 and 2001.[126]

Other aspects of communication have also seen changes. There is a growing awareness among key government officials, decision-makers and the private sector of the importance of ICT. In Uganda, there is a broad policy framework focusing on development called Poverty Eradication Action Plan (PEAP) in which there is an acknowledgement that ICT and economic growth are connected.[127] To encourage ICT growth, the Ugandan government scrapped value added tax and customs duties on the import of computer hardware and software. In order to make services accessible and cheaper, they also (in 2002) waived a US$500 licence fee on communication service providers like Internet cafes, fax bureaus, and phone kiosks.[128]

The Internet sector in Uganda experienced an increased competition as the UCC licensed more internet service providers (ISPs). From two ISPs in 1996, the number has today risen to 17. As a consequence, there has been a reduction of both subscription and installation fees.[129] Kampala has now roughly 150 Internet cafes (the number might be even higher), up from 24 three years ago.[130] Access charges range from Uganda Shillings 15-50 per minute (less than 5 US cents).

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[121] SMIT (2003c)
[122] UCC (2001), 2.
[123] Ibid.
[124] New Vision (2004, May 17th)
[125] Agarwal & Shankar (2003)
[126] Ibid.
[127] Workshop, 040227
[128] Agarwal & Shankar (2003)
[129] Ibid.
[130] Ibid.

The cost for Internet access per month depends on the quality and speed of connectivity. Roughly, a school or organisation using dial-up connectivity pay US$ 200-300 per month in telephone costs. ISDN costs approximately US$200 a month. ADSL is not an option due to the obstacle of limited international bandwidth capacity (see below). VSATs are more expensive; excluding computers and local LAN, the initial VSAT site equipment cost is about US$6,700, and another US$4,000 for installation and site service. One month's access costs US$400.[131]

The major constraint in Uganda concerning network access is the local and international bandwidth which is expensive and dependant on satellites.[132] Mr Francis Kazinduki, Technical Chief Coordinator, MTN Uganda, explains;

> Uganda is unfortunate, we are unfortunate. Uganda is landlocked so we don't have access to undersea optical fibre systems. We have to depend on expensive satellites to get along here. And the price is also high because we must to buy license to operate international gateways, we MTN and UTL. However, we have a big project under way; Uganda, we are building fibre optic to Kenya. Kenya is going to connect through Mombasa, then Mombasa… it is going to be an undersea cable. […] MTN is involved in this project called EASSy; East Africa Submarine System.[133]

The EASSy project will be commissioned by end of 2006 and according to MTN it will help Uganda by significantly reducing the price of bandwidth and consequently the price for Internet access.

Despite deregulations, reforms and supporting policies, the "E-Readiness Assessment Report" presented by the Ministry of Works, Housing and Communications, concludes that the digital divide is a fact in Uganda;

> Our surveys showed repeatedly that the digital divide is very real in Uganda, not just among the haves and have-nots among the population, but also within cities, organisations and the government itself. Ministries and departments with wellfunded projects have world-class facilities, while those without access to donor funds languish without even a PABX system [private automatic branch exchange; an automatic telephone switching system] or the means to pay for an entire month's phone bills.[134]

The development problem/obstacle addressed:
Africa's (and Uganda's) educational system is in deep crises. According to a report from Economic Commission for Africa;

> School are overcrowded, understaffed and riddled with inadequate resources to equip themselves with teaching and learning materials, etc. Information and communication technologies offer opportunities for new forms of learning and teaching in an emerging knowledge economy, posing urgent imperatives for transforming teaching and learning.[135]

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[131] Ibid.
[132] Ibid.
[133] Interview Kazinduki, 040514
[134] Agarwal & Shankar (2003), 13.
[135] ECA (2001)

Mr Samuel Nakaabale gives us another example;

> In a rural school here, when a teacher is teaching, he is all they got. They may have a textbook produced in the 60s or 70s or so. A textbook and a teacher, in front of them, that's all they got. The same lesson can take place in a developed country, and in addition to the teacher, or the textbook, the students has this wealth of information that can support the lecture or the lessons he have learnt today. That alone opens up his mind, and probably he or she understands that very lesson. If this teacher of mine, in the rural school in Uganda, is not good… I mean… I will only be as good as he.[136]

These two quotes indicate that there is a belief that ICT can revolutionise the Ugandan (old fashion) way of conducting teaching by offering better educational tools and courseware to the students. ICT could also help to relieve the pressure on the teacher. Ugandan schools have an average student to teacher ratio as high as 53:1 in primary schools and 18:1 in secondary.[137]

According to a report from University of Sussex in Brighton, UK[138]; almost all secondary school leavers in Uganda denoted that they did not receive adequate training in ICT while they were at school. However, this is not so strange considering that in Uganda, there are few computers to access and owning one is principally out of the question.[139] Only 5% of Ugandan primary and secondary schools have computers. The majority of these are secondary schools located in Kampala.[140]

This means that the vast majority of Ugandan schools do not currently own or use ICT. The reasons may vary; lack of money; lack of skills or knowledge; lack of technological infrastructure; lack of other information chain resources mentioned in theoretical chapter.

However, there is a need and a demand for ICT. Mr Pedison Bbaale, Deputy Head Teacher, Entebbe Secondary School (SSS) said; *"You know, this is the age of the computers. Typewriters are getting out of use. You need computers"*[141]. Sr Angelina, Headmistress, St Agnes Primary School Mission, Entebbe; *"Being that we are now in the computer era, everybody wants at least the students to know how to use the computers and what… It is easier and they can communicate friends"*[142].

It is not only the Ugandan schools that lack computers. The digital divide in Uganda, as seen above, is a fact.

> In Uganda, a typical African setting, you have maybe one computer between thousands people and therefore the rate at which you do benefit from the wealth of information, on the web for example, is very limited. The whole idea, or objective of SMIT, is to reduce the digital divide.[143]

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[136] Interview Nakabaale, 040511
[137] Agarwal & Shankar (2003)
[138] Al-Samarrai & Bennell (2003)
[139] SMIT (2004f)
[140] Agarwal & Shankar (2003)
[141] Interview Bbaale, 040310
[142] Interview Sr Angelina, 040310
[143] Interview Nakaabale, 040511

Implementation of the project:

Self-Management (Sweden) realised that some action is needed to halt the current trend of unfair distribution of ICT in the world.[144] This realisation together with recognition of Article 19 of the Universal Declaration of Human Rights laid the foundation to the idea of SMIT. Self-Management (Sweden) also realised that this could not be done without partners. Collaboration with ICT4Africa started and in order to ensure local partnership capacity, a number of potential local strategic partners representing the various recruitment areas were identified.[145] A feasibility study was carried out to provide a thorough background for the project.

> A feasibility study was needed with an aim of examining the preparations on the ground for the implementation process and to consolidate on the established relations with the partners locally.[146]

The feasibility study resulted in a two day workshop where the strategic partners, consisting of community based organisations as well as local community leaders, together established Self-Management Uganda.[147] This community-based organisation handles the affairs of SMIT and thereby owns the project on behalf of all the stakeholders.[148] Indirectly, all the members of Self-Management Uganda own the project;

> If you give ownership to just a few people the others will not feel responsible whatever they are doing. The success of the projects depends on each and every member. So they have to be committed and responsible for what they are doing.[149]

SMIT's overall goal is to contribute to the narrowing of the digital divide and the purpose is to improve ICT literacy in the target group areas.[150] In order to achieve this, a range of activities had to be carried out.

Schools and centres had to be identified and recruited. This was done by members of Self-Management Uganda in their respective district.[151] The schools had to fulfil some criteria in order to be selected and obtain the computers. These criteria was; appropriateness of space and security, electricity and telecommunication facilities.[152]

A secured environment and a suitable room for the computers is a must. This includes iron bars for the windows, a proper door and that the computers are secured and guarded during off-hours (see Appendix 6). The participating schools must also have electricity but since the electric power supply in Uganda is not too reliable, a power stabiliser is needed as well as an Uninterrupted Power Supply (UPS). On top of this, there is often a need to rewire the building and install extra sockets and a proper earthing to be able to install the computers. Finally, in order to make the project idea executable, the schools and centres had to have a telephone line. A telephone line is connectivity in two ways.[153] First, the existence of a telephone line gives an indication of that an ISP can reach the school (dial-up, 56 Kbps). Second, an ordinary

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[144] SMIT (2003d)
[145] SMIT (2003a)
[146] SMIT (2003d)
[147] Interview Ssemakula, 040629
[148] Interview Nakabaale, 040511
[149] Interview Kiyingi, 040505
[150] SMIT (2003d)
[151] SMIT (2003c)
[152] SMIT (2003e)
[153] Interview Nakabaale, 040511

telephone copper wire could easily be converted to a leased line (ISDN); a dedicated 24 hour available link allowing digital transmission at the speed of 128 Kbps.

The participating schools and centres were also obligated to;[154]

- Provide US$75 per computer set as payment for administration and freight to Kampala[155]
- Provide and finance recurrent costs (electricity, connectivity, maintenance)
- Underwriting the computer laboratory's initial costs (furniture, security, burglar-proofed room)
- Not sell, dispose of, gift, loan, exchange, or part with the equipment for five years without written permission
- Provide instruction in computers for teachers and youth
- Use the donated computers to give free Internet access to the youths

Every school and centre was required to sign an agreement to open up the computer laboratory for the community, i.e. establish a SBT.[156] If needed, the schools can charge a small fee for people above the age of 18 to cover the costs; "*For reasons of sustainability, it is anticipated that the fees charged will enable the school/centre to pay for the running costs, technical support and procurement of hardware in the future to replace existing ones or expand facilities.*"[157]

The basic pipeline of activities required to source and use second-hand computers in Ugandan schools and centres started once ICT4Africa received the payment for the computers from the participating schools (the US$75 per computer set). ICT4Africa arranged the donations, procurement, and refurbishment of the computers and also the shipment from Sweden to Uganda. Once the computers reached Uganda, Self-Management Uganda took over.

The SMIT projects' major activities in order to reach the results are:

> Firstly, the launching of the technology by delivering and installation of the donated equipments from Sweden to the schools/Centres in Uganda. Secondly, the basic user knowledge training of trainers.[158]

When the container arrived to Uganda, technicians tested that the computers were in good working condition and repaired those affected by shipping. The computers where then distributed to the schools and centres where technicians installed the computers and helped to set up the computer laboratory.

Giving access to ICT is a staged process where connectivity comes second. SMIT's estimated minimum costs for one dial-up Internet connection (including electricity, ISP, peripherals, support, maintenance and software) for on year is US$3750. This cost caters for one or two computers.[159] However, in this initial phase of the project, there has not been a focus on connectivity. This will come later.

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[154] SMIT (2003b), Interview Ssemakula, 040629
[155] Interview Nakabaale, 040511
[156] Interview Kiyingi, 040505
[157] SMIT (2003d)
[158] SMIT (2004g)
[159] SMIT (2003d)

The training of trainers is planned to be done under a six months period, using the International Computer Driving Licence (ICDL) model. ICDL helps to provide proof of computer skills and competence. The training covers seven modules; basic concepts, using the computer and managing files, word processing, spreadsheets, databases, presentation tools, and finally, information and communication. The schools were required to identify two teachers who will receive a minimum of six months ICDL training and later on, be in charge of training at the respective centres.

The deliverables will be in the form of reports; what has been done and what has been the result.[160] Self-Management Uganda conducts the internal evaluation, i.e. visits to the schools and centres and has meetings with the stakeholders at regular intervals. Due to accountability issues, the external evaluation reports, i.e. what SMIT targeted for and how it has turned out, will be conducted by a certified auditing firm.[161] The donor community (Sida and ICT4Africa) are informed about progress being made through Self-Management (Sweden). Periodical reports are and will be presented after the completion of each major activity.[162]

According to SMIT, the benefits for the schools and centres are many; increased amounts of available information will build the students' knowledge base; teachers can get access to education sites from across the world which they can use to improve their teaching of various subjects such as geographic and mathematics; and teachers and students can use and produce information that is relevant to their local conditions and requirements. In other words; ICT add value to learning and teaching and thereby strengthens the education system.

SMIT's principle objective for establishing a school-based telecenter (SBT) is to lower the schools ICT cost and maximise the resource use in after-school hours and on holidays.[163]

> If they want to have a valuable and sustainable centre they have to get customers for some services. We are not going to subsidise or give them some money that run the café […]. They have to generate some income to maintain the hardware and the machinery and the software they have. And in that way; opening the centres for outsiders is contributing to that advantage.[164]

SBTs are, according to Mr Moses Ssemakula, educational, social and communal and will generate greater community-school linkages. Furthermore, if the facilities are shared, more people benefit. Not only is the digital divide reduced in Ugandan schools, it even reduces the national digital divide and thereby the international one. *"That is the vision, the reality has to wait."*[165]

Next steps: It is expected that the SMIT initiative will evolve into an *"incubator for ICT inspired small businesses in the region"*[166]. Mr Samuel Nakabaale explains;

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[160] Interview Ssemakula, 040629
[161] SMIT (2004g), Interview Ssemakula, 040629
[162] Ibid.
[163] Interview Ssemakula, 040629
[164] Interview Nakabaale, 040511
[165] Interview Ssemakula, 040629
[166] SMIT (2004g)

> You start something almost on a voluntary basis but you are not only creating jobs, you are providing a market for the IT industry. […] And that is why they are called incubator; ICT-incubator projects. When you do these little interventions, after you have created a job, you've also created a bigger market for investors to come and sell more computers because people have seen value in it.[167]

Concerning Self-Management Uganda, the hope is that *"the organisation will evolve into a new-cooperative business entity capable of sustaining the projected ICT development aspirations catering for ICT inspired small-enterprise incubation in the region"*.[168]

Lessons Learned

This section invites the people driving the initiative to share their views on challenges they have faced, key constraints and dependencies that affect the initiative, opportunities for future improvement of what they do, and other lessons they have learned.

According to Mr Moses Ssemakula, the main challenges have been financial and organisational. The original idea was to ship 895 computers in two containers, cater for 64 schools and centres, and thereby have an estimated direct target group of about 35000 students. Mr Moses Ssemakula said that;

> In the initial phase we have been forced to change a lot of things. In fact the project idea from the beginning was meant to cover so many schools and even support those ones who don't have the possibility in mobilising their own funds.[169]

And;

> In the beginning, after the feasibility study, we looked at this project as an implement able project. […] We was sure that given the resources, funds we wanted, and the resources we could gather around us, we could do some development work as a project which could be renewed after three years…[170]

However, due to reduced Sida support, SMIT's plan had to change. The first container had approximately 400 computers for 20 schools and centres with a primary target group of 8500 (students and active parents).[171] The project has now been given the status pilot project; *"pilot in the sense that we don't have to work on a larger scale than what we have now, until we are sure of the results, and until we are sure of how we can run this, and until also the organisation has matured"*. SMIT will be considered as a pilot for half a year and then continue as planned from the beginning for the next three years, starting in the beginning 2005. Mr Moses Ssemakula concludes that, maybe, SMIT tried to cover too many schools, i.e. they started too big.

Mrs Sarah Kiyingi, Project Coordinator and Administrator, said that so far, the real challenge of the project has been to collect the money from the schools. It has been difficult because of priorities; money aimed for the computers has been put away but because of the delay, the school has spent the money on other things. And it has been difficult in another sense too; *"there are many conmen around spreading rumours like this project will only steal your*

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[167] Interview Nakabaale, 040511
[168] SMIT (2003d), p.5
[169] Interview Ssemakula, 040629
[170] Ibid.
[171] SMIT (2004g)

money or the computers will not work."[172] Mr Samuel Nakabaale agrees; *"there are so many conmen in Kampala so people are suspicious whenever they see somebody trying to look for contributions to any project so the genuine people like us actually suffer a lot*"[173].

The participating schools and centres also mentioned that the main challenge they had encountered so far was financing the project. For some schools it was hard enough to contribute with US$75 for a computer.[174] Mr Pedison Bbaale, Entebbe Secondary School (SSS), said that *"so far, the setback, our major problem, is the finance."* Mr Toni Katagira, Deputy Headmaster, Mary Reparatrix Secondary School in Entebbe stated the same;

> The major problem is shortage of funds, because the computer soft- and hardware is expensive. Then they need to be serviced most of the time. So, shortage of funds, being a private school, we have very many things to spend on so you will find that the computer project has limited funds. So if we have to buy computers from the open market, you may find that in a term we can buy one computer, with the funds we have.[175]

Mr Dickson Baguma, Head Computer Unit, Nkumba University also identified finance as major challenge;

> If we had the money we wanted, because depending on only school fees, to pay for all lectures salaries, or support staff salaries, the food, accommodation and all that stuff, just depending on fees alone isn't easy. […] That puts us on a very difficult situation, saying we can just buy a few computers at a go, not many. In fact it is the major challenge; funds. If I got all the funds I wanted, phew, tomorrow I would modernise this place.[176]

According to Mr Samuel Nakabaale, connectivity will be a challenge. Internet access might not be the most viable solution for some of these schools and centres and being online is very expensive;

> My feeling is that to even get to the stage of connecting a school to the Internet will be a big, big step given the constraints, the financial constraints the schools find themselves in. They expecting us to do everything, and that's not sustainable. My feeling is that we will concentrate on getting the basic IT-skills going; we will then go to a step further. If people have several computers you can even build a network and share resources and so forth, first locally, then secondly once you got enough funding to connect them to the internet, then suddenly they can see all the others, the other schools, and they can communicate.[177]

Since SMIT is so financially constrained *"we'll have to think of best ways to utilising this information."*[178] However, according to Mr Samuel Nakabaale, there are workarounds; a single centre that is connected to the Internet could download relevant educational content, burn it on a CD and distribute it to the schools. The school can put it on a server and deal with it on their local area network. Another technical challenge is the technical sustainability, Mr Samuel Nakabaale says;

> I'm aware, sustainability at looking at technical aspects have limitations here in this kind of old computers exchange program. I'm also aware that you can use thin client to have a 486 surf. So there are workarounds to sustain even a Pentium II for some time to allow us bring up these

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[172] Interview Kiyingi, 040505
[173] Interview Nakabaale, 040511
[174] Ibid.
[175] Interview Katagira, 040310
[176] Interview Baguma, 040401
[177] Interview Nakabaale, 040511
[178] Ibid.

disadvantage communities to a certain level. And we must encourage our donors not to bring, I mean to donate, computers that will not make… sense, that are not useful, so we are not in fact dumping rather than helping.[179]

According to Mrs Sarah Kiyingi there are not any specific lessons they have learned during the initial phase of the project except;

…except that there is a time lag. Because of the distance the communication becomes… you know, by the time Ssemakula sends message then we send this message to the schools and then we get feedback, there is sometimes time lag and sometimes Ssemakula needs this information very urgently, especially from Sida. You know, we are requesting for some help and so. Sometimes Sida asks for certain information, by the time maybe we send it, it will be a little bit late.[180]

Mr Dickson Baguma, Nkumba University, who have had some experience with technicians, said that;

They are many in Kampala. They are expensive and they are slow. They are paid per hour. They don't know business; they don't have good business ethics you know. Let's say it is a cable which have jumped of the hard disk, if he looks at it he say; 'Oh oh, this is a very hard problem, I need to take it to my laboratory' so that he can overcharge, instead of saying; 'Oh, it was a cable, I'll fix it back' and it works! And he charges just a little money instead of saying; 'No no, it's a lot of work' because he wants to make sure that he can cover up even the other days when he might be [out of work]. Which is a little bit funny.[181]

Since the project just had started when this thesis was carried out (spring 2004), it was a bit early to mention the successes of the project.

The Story

This section presents a narrative description of the initiative that highlights why this use of ICT for development is particularly interesting.

Education, both in traditional and in new settings, is the key to creating an inclusive information society and an equitable knowledge societies. Access to ICT and the acquisition of knowledge and skills are means to do this and to bridge the digital divide.

In this case, there are two different types of linkages between ICT and education. The first is the use of education and training to create computer literate students, i.e. ICT is used as a subject. This will enable the students to use ICT with confidence, in school, in their private time, as well as in their future work. The second type of linkage is the use of education and training systems (the Internet and CDs) to achieve learning goals that do not necessarily have anything to do with ICT themselves. The subject determines the use of ICT and it could thereby be seen as ICT is used as a tool. Both types contribute to the narrowing of the digital divide.

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[179] Ibid.
[180] Interview Kiyingi, 040505
[181] Interview Baguma, 040401

Many of my informants believed that the education system will get better with computers. Mr Dickson Baguma, Nkumba University, said that *"You know these things can force you to think harder and to make life easier even"*[182].

This project will also make the schools more attractive. Mr Pedison Bbaale, Entebbe Secondary School (SSS) in Entebbe says that;

> Fortunate our school, around this area, is an old school, it has been performing well so we definitely get many students as a result, probably a combination of many things; being an old school; being a performing school; and also because of computers. But true, generally, schools that have computers attract more. And even those private schools that don't have computers, in fact they may even go to some areas to take photos or get video coverage of some computers and then include in their advert to attract more students. So true, computers do attract students.[183]

An identified user benefit is that ICT-literate youth will benefit more from their higher education studies and have a better start position for their future development and employment.[184] Mr Toni Katagira, Mary Reparatrix Secondary School in Entebbe, agrees;

> The most important thing is the skills which are very, very high demanded in the job market today. They want people who are computer literate. So if they learn these skills when they are still in school then that one also relieves them the burden of spending more after school to go for computer course, which they already have acquired here.[185]

There is extremely limited African web content available.[186] This must raise the questions about ICT and Internets' relevance for teaching African students. However, it must start somewhere. Material exists and an Internet connection would mean a lot. Mr Toni Katagira, Mary Reparatrix Secondary School in Entebbe has ideas;

> We have a lot of information that we want to produce and publish. Some teachers have publications, booklets… Then we also have a writers club, the students write. Bulletines and a like… But we have a problem of… I say a shortcoming, that when they write their information they can not print it.

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[182] Ibid.
[183] Interview Mbaale, 040310
[184] SMIT (2003c)
[185] Interview Katagira, 040310
[186] Interview Nakabaale, 040511

Analysis

As a basis for the analysis I will use two theories/tools. Firstly, I have used Heeks' Information Chain Theory to identify what access barriers exist in the SMIT project. Is SMIT's approach to ICT holistic, i.e. taking the whole information chain into account?[187] Secondly, I have used bridges.org Real Access / Real Impact framework that is comprised of two tools; the "Real Access Criteria", used to outline the issues surrounding ICT access and use, and "8 Habits of Highly Effective ICT-Enabled Development Initiatives", which look at the application of best practice in ICT project management. This framework will in other words be used to gauge whether and how SMIT will/is making a Real Impact on people's lives.

The two theories/tools will be backed by the general conception of the digital divide and the specific notion about school-based telecenters (SBTs).

Information Chain Theory

According to Heeks, deficits in any of the surrounding resources can threaten the effective functioning of the ICT information chain and become access barriers for poor people.[188] The problem is that the resources needed for a functioning information chain often are absent. If a resource is not available, an access barrier occurs. An essential question for SMIT is therefore if there exists any shortage of these resources.

Data resources

Agarwal and Shankar state that "*since English is the official language of the country there is no shortage of content*"[189]. This may be true in one sense since there is a huge amount of external and global content that the participating schools and centres can draw on. However, how much of this is locally produced? And how much of this is relevant? The answers to these questions depend on the needs of the recipient. Relevant educational content surely exists in some subjects, maybe not in other. However, ideas like Mr Toni Katagira's, i.e. to publish the works from the writers club on the web, will eventually erase the problem.

The government also has a responsibility. National policies are needed as well as to create more local content. For example, Uganda Statistics Bureau possesses a homepage but there are no statistical services or data available.

Overt resources

Even the telecommunication infrastructure for network access is mainly a question of national ICT policy. The Ugandan government is struggling with this issue and has done a lot but not enough. The telecommunication infrastructure is still a huge access barrier in Uganda due to poor or non-existing analogue copper wires. However, there is an increase in the number of wireless technologies available that improve access. By really utilising these new technologies (like VSATs and mobile phones), rolling out of the infrastructures becomes quicker and more cost effective (for the government). WorLD's experience was similar; dial-up is not viable solution – lose the wires! In the long run this will, according to WorLD, be more cost effective. Also, when the EASSy project is finished, the prices will drop.

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[187] Heeks & Duncombe (2001)
[188] Heeks (1999)
[189] Agarwal & Shankar (2003), 71.

The electrical infrastructure to supply electricity is a major obstacle in Uganda. Electricity is not only expensive for a school with a very limited budget. Power shading and electrical spikes, which could easily destroy a motherboard, are also a problem. Since the power is not clean, the ultimate would be (as SMIT has observed) to install a power stabiliser on the main electricity switch so that whenever the voltage goes above a certain level the power simply switches off. That, together with an Uninterrupted Power Supply (UPS) unit, ensures that computers could be shut down properly even if the power went off.

Money to buy the ICT is, as we have seen, in many cases a major obstacle. The statement made by Mr Samuel Nakabaale; that some schools had problems to contribute just that US$75 for a computer, illustrates this clearly. People in Uganda are poor, Ugandan schools are poor. Since the schools now have used a big part of their budget on purchasing the computers, few schools can afford to pay for the Internet access.

The skills infrastructure to keep the technology working is not present at the moment. Installing and operating the computers requires high-tech skills and knowledge that are of short supply in Uganda. The technicians available are expensive and, according to Mr Dickson Baguma, have bad business ethics. However, SMIT is addressing this problem and plans are under way to come with a solution.

The usage skills to use ICT will come with time. However, SMIT's plan to give a six months training to two teachers at every school and centre at six months will be of great need.

The literacy skills to make use of the written content are not a problem in the Ugandan schools and the lessons are taught in English. The literacy rate in Uganda is relatively high.

Social resources
As stated by Heeks; "*Information creates knowledge, but knowledge is also needed to create information*"[190]. The ICT knowledge is something that will grow. In the beginning there is a possibility that the source will be trusted too much or that there will be an information overload; i.e. they might not be able to handle increased amounts and complexity of information.

Content and means of transmission must be accurate and trusted by the poor before content may be communicated successfully. This means that the communication channel needs to be secured and understood. The problem with source proximity must also be taken into account. Content is specific to the social context and since most of the available content is produced in the North it might not be properly understood in the Ugandan social context. Pornography is an example; people in the South might believe that this is the norm in the North since there is so much of it available on the Internet.

The only way to learn how to use the information effectively and to ensure the data reliability is through training. The importance of training the trainers can not be stressed enough. Trainers are needed so that they could help the new users in assessing whether the information is true or not, as well as adapt the information to a particular need. The confidence and security will grow but help is needed in the beginning.

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[190] Heeks (1999), 8.

If SMIT is to succeed with their SBT approach and if, for some reason, direct use and access is not possible (perhaps because of illiteracy) a trusted social network becomes necessary to overcome inability for direct use. This means that the person working in the SBT must be neutral and respected.

The participating schools and centres (teachers, students) are highly motivated to the whole thing. The sense of being left out of the modern world and the belief that you must be ICT-literate to get a good job further increases the motivation.

Action resources
If the information supplied through ICT should generate an impact it will require action. Action requires other resources and as we have seen and there are many shortages concerning these.

	Access Barrier	Access Barrier for SMIT?
Data Resources	Relevant data	Might be
	Available data	No
Overt Resources	Telecommunication infrastructure	Yes
	Electrical infrastructure	Yes, in terms of money
	Money	Yes
	Skills infrastructure	At the moment
	Usage skills	At the moment
	Literacy skills	No
Social Resources	Source proximity	Might be
	Trust in source and channel	No
	Knowledge for accessing, assessing, adapt	At the moment
	Confidence and security; feel motivated	No
Action Resources	Overt and social resources	Probably

Table 2; Access Barriers and SMIT

To conclude; overt resources are lacking and constitute a major access barrier. The training of trainers and the deliverance of the computers should have been in line. When the training of trainers is in place, many of the access barriers will disappear. The ICT approach should be more integrated, i.e. starting with the overall goals; seeing how information meets those goals; then seeing how ICT might help. SMIT's approach to ICT is not holistic; the whole information chain is not taken into account. This might lead to that the information chain will not work. Remember though, that even if access barriers exist, it should not be seen as excuses for no action.

Real Access Criteria

Physical access to technology
In the first container there were approximately 400 computers for 20 schools and centres with an estimated primary target group of 8500 students and active parents. That makes it 21 users on every computer. When the schools and centres open up their facilities after school hours, on weekends and on holidays that number will increase.

Every school will receive 20 computers on average. Twenty computers sharing one dial-up connection? The hardware is available but far from ideal. The internet service, if existing, will be very poor.

Appropriate technology
Considering the financial constraints, donated desktop computers is a solution since they are provided to the schools and centres for almost free. However, there are a number of questions that immediately arise considering refurbished computer programmes like SMIT; Are developing countries becoming the dumping ground for the electronic garbage of "developed" nations? Is the price for a refurbished computer low enough to call it a cheap solution? If ICT4Africa and SMIT were not working on voluntary basis, the cost per computer would be very high. Also, when taking the expected lifetime for the donated computer plus the technical support into account the total cost could in the end be much higher. However, the fact remains that many of the participating schools can not pay more than US$75 per computer. They have no saving or bank accounts available. If they want computers, this is the only way they can get it. So, the question whether or not use second hand and refurbished computers as part of educational technology solutions in Ugandan schools does not have a clear answer.

Connection will be a challenge for the schools. WorLD's experience was that dial-up connectivity is an unviable option because of; high recurrent telephone costs, poor line quality, low bandwidth and absence of connectivity in rural areas. VSAT with a monthly access cost of US$400 is not a solution either. This is too expensive for most of the Ugandan schools. The best solution might be the workaround Mr Samuel Nakabaale talked about; CDs (to save bandwidth). It could be a viable option to start with at least.

Affordability of technology and technology use
As seen above, the actual purchase price of a computer is only the small part of what can be considered the total cost of ownership, which includes the price of software, maintenance, peripherals, and, in this case, training, planning, and administration. SMIT's estimated minimum costs for one dial-up Internet connection for on year was US$3750. This is more than a Ugandan teacher make in one year. Is it right (what is right, what is not) to spend so much on computers and connections? This is up to the participating schools and centres to answer.

Human capacity and training
Training the trainers has been identified as one of SMIT's major activities. However, it seems like it is not one of SMIT's major priorities. When the resources were reduced the training plans vanished. The plan was to train the trainers in the seven modules of The International Computer Driving Licence (ICDL) which focus on basic ICT literacy. However, training should, according to WorLD and Hawkins, consist of more than just basic ICT literacy. In order to truly use the computers as tools, the technology must integrate into the teaching, becoming a tool. SMIT's development goal must be the starting point of the training. Then the trainees must understand how ICT and information can help to meet that development goal. The training programme should be, for example, "better education" not "using the Internet"[191]

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[191] Heeks & Duncombe (2001), 7.

It is very important that the staff together with students can handle any technical fault (hardware, software and network etc) with minimal assistance from outside the school. This will contribute to keep the maintenance budget small. Technical support is a major obstacle since the existing technicians are few, needed, and expensive. SMIT must therefore also train the trainer's basic hardware knowledge. An alternative identified is to have a support run by technician working for SMIT.

Locally relevant content, applications, and services
There is very little locally relevant content existing. So far there is hardly any educational material with local relevance or digitally stored information in Luganda available. Locally relevant applications and services are few. There is no plan on how to create or improve locally relevant information. See data resources above for more.

Integration into daily routines
At first, the computers will be used as a subject. When the ICT-literacy improves it can also help learning, i.e. become a tool. This is thereby a question of training.

Socio-cultural factors
SMIT is trying its best not to exclude or limited peoples' use of technology because of their gender, race, age, religion or other socio-cultural factors.

Trust in technology
With more hands on and training, this problem will be overcome.

Local economic environment
The local economic environment is poor. According to bridges.org, creating sustainability in an ICT-project in developing country is a challenge.[192] This study has strengthens that statement. This early impact assessments/thesis about SMIT indicates steep challenges in management and sustainability issues. The long term economic sustainability is probably the most critical issue facing ICT-laboratories in the participating schools.

SMIT is not promoting the school-based telecentre hard enough. By not doing this, the schools lose an opportunity to improve their economy.

There are a number of problems/concerns that (while not very exciting) are nonetheless critical to ICT success and sustainability. One relates to the long-term consideration or lack thereof (i.e. funding and expertise) for equipment maintenance, parts replacement and operating supplies. Replacement parts must be available otherwise the equipment will die a too early death. Some equipment may be functioning but is unused because the recipient school or centre can not afford the expensive, or hard to find, ink cartridges.

Another problem relates to the risks that the schools take when they connect to the Internet and are exposed to viruses, worms, etc. Projects like this when computers are provided and connected to the Internet, help and an understanding must be given how to protect themselves, and how to keep that protection current.

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[192] bridges.org (2004)

Macro-economic environment

The Ugandan government encourage the use and import of computers by having free custom and no value added tax on the import of computer hardware and software. Communication service providers like Internet cafes and SBTs do not need to pay for the licence.

Legal and regulatory framework

There are no known policies or laws hindering the SMIT project since they are only using regular desk-top computers. The government in Uganda is development friendly and support ICT-initiatives.

Political will and public support

There are ongoing reforms in the telecommunications sector and a growing awareness among key government officials and the private sector of the importance of ICT. This awareness has resulted in a coherent, integrated ICT policy to counter disparate, uncoordinated efforts. There is also a strong government encouragement of donor investment.

Real Access Criteria	SMIT
Physical Access	Access to computers YES, to the Internet NO
Appropriate Technology	Refurbished computers YES, dial-up Internet NO
Affordability	Cheaper than buying new computers but funding is still a problem. But is it cost-effective?
Capacity	More is needed. Training of trainers and maintenance have low priorities
Relevant Content	No plan on how to generate locally generated content
Integration	Comes with the training
Socio-Cultural Factors	Addresses the problem
Trust	Comes with training
Local Economic Environment	Bad
Macro-economic environment	OK, and getting better
Legal and Regulatory Framework	Nothing that hinders SMIT
Political Will	Yes

Table 3; Real Access and SMIT

To conclude; Real Access will not be achieved as long as there is no training of trainers. Another major Real Access obstacle is connectivity. The local economic environment is bad and SMIT still have a weak plan on how to succeed in delivering ICT access to the people living in the community. It seems like SMIT have not learnt WorLD's lessons (seen in theory) since it repeats WorLD's key failure, that the "*schools were provided with expensive equipment but with little or no support for teachers' professional development, national ICT-in-education policies, or community involvement*"[193].

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[193] Hawkins (2002), 39.

8 Habits of Highly Effective ICT-Enabled Development Initiatives

1. Do some homework, conduct a needs assessment.
The homework has not been done to the extent that would have been preferable. Self-Management Uganda has not learned from other similar initiatives. However, Self Management Uganda has identified the needs of the community and conducted a needs assessment.

2. Implement and disseminate best practice.
SMIT has adopted a model from the organisation Computers For India for the ICT laboratory set-up. Otherwise, the project idea somehow follows a "learning by doing" principle. It shares best practices through workshops and meetings but the external input is limited.

3. Ensure ownership; get local buy-in, find a champion.
Self-Management (Sweden), through Mr Moses Ssemakula, has made sure that the SMIT project has a strong support among the participants. The ones running the initiative know the local context and the needs of the surrounding community since they themselves are part of it. This has contributed to that the participants feel a "sense of ownership" over the project which is especially crucial to the sustainability of development activities like SMIT. The involvement of community leaders during the consultation and mobilisation process also helped to bring the SMIT concept closer to the community than it probably would have been if a "foreigner" promoted it.

4. Set concrete goals and take small achievable steps.
SMIT has been following a detailed first year project implementation time line, starting July 2003. However, due to a range of delays in the various activities, the whole time line has been displaced. SMIT started too big and lost track.

Is SMIT's objective to bring as many computers as possible or to make a real impact?

It was good that the project downsized. 400 computers are more than enough for the first load and to get experienced. However, 400 computers are far from enough to bridge the digital divide in Uganda.

5. Critically evaluate efforts, report back, and adapt as needed.
Reports are written and handed over to the different stakeholders. The reporting mechanism in the SMIT project seems to work fine. Mrs Sarah Kiyingi has noticed that the communication process sometimes is delayed for various reasons. It seems like everything and all the information goes through Mr Moses Ssemakula which makes the reporting mechanism a bit vulnerable. This means that the existing organisation (Self-Management Uganda) not yet has the needed capacity to handle things on its own.

6. Address key external challenges.
The key external challenges are mainly telecommunication and electrical infrastructure. SMIT is not addressing any external challenges since they don not have the capacity to do so.

7. Make it sustainable.
Sustainability is a very, if not the most, critical factor in a project. It is something that must permeate the whole project idea. At the moment, in this initial phase, the project depends on external support; both in terms of money and people offering their time. This support is time limited, even the amount is limited. SMIT has mainly focused on the economical

sustainability. The initial investment for the schools and centres are very much subsidised by Sida and ICT4Africa. But is it sustainable in terms of recurrent costs and maintenance? SMIT relies very much on the SBT concept but the knowledge about this concept among most of the participants is limited. The sustainability in the long term is therefore threatened.

However, sustainability also considers other issues like technical and interest sustainability. The training of trainers is also a part of the sustainability issue since it ensures human capital sustainability.

Something that could really affect the project in a negative sense, in regards to the survival and sustainability of the project, is the importance of Mr Moses Ssemakula. He is way too important for the projects' good. There is no backup if he for some reason fails to deliver (which the project literally experienced when Mr Moses Ssemakula's mobile phone and lap-top was stolen).

8. Involve groups that are traditionally excluded on the basis of gender, race, religion or age.
Self-Management Uganda is very well aware of the importance of an inclusive information society. The gender digital divide is something that SMIT addresses and there is a want to involve other excluded and disadvantaged groups in the project.

	8 Habits	SMIT
1.	Has the homework been done and did the initiative start by looking at the concrete needs of the people and community that it serves?	No homework, yes needs identified
2.	Does the initiative draw on best practice in the field?	No
3.	Do local participants feel a sense of ownership?	Yes
4.	Does the initiative set concrete and realistic goals for ICT use?	No
5.	Does the initiative evaluate its efforts and report back to the stakeholders?	Yes
6.	Does the ICT initiative take practical, proactive steps to overcome the obstacles?	No
7.	Does the initiative work to make its efforts economically and socially sustainable, over the short and long term?	Short term yes, long term no
8.	Does the initiative involve groups that are traditionally excluded because of social or cultural reasons?	Yes

Table 4; 8 Habits and SMIT

To conclude; to deliver and install the computers is the easy part, it is basically about logistics. To maintain and run the project is harder. SMIT should have looked at best practice before implementing the project. SMIT goal and targets should have been clearer and a sustainability plan should have been produced. Maybe the downscaling of the project has meant more than Self-Management Uganda admits. It could have affected the training of trainers' program for example. The organization behind SMIT, Self-Management Uganda, must mature and develop in order to sustain the project in the long term.

Discussion

Bridging the digital divide is more than enhanced ICT penetration and access issues; it is about social and economic development. However, in on-the-ground efforts to bridge the digital divide, like the case of SMIT, focus is on ICT and access and it is hard not to focus on it. Other issues disappear and the main rationale of the whole idea, i.e. to create *"a more just, prosperous and equitable world"*[194], is easily lost along the way.

The answer to this thesis research question, "what does an on-the-ground initiative to bridge the digital divide look like in practise", is found in the result chapter. The reality differs a lot from the theory and material found on the topic and there are aspects and situations that are hard to foresee and address in advance. The SMIT project is a good example of how it can look like in practise. As stated above, the main issues to consider before the ICT-equipment is delivered to the schools and centres and connected to the Internet are; finding a partner who can channel ICT donations; finding financial support, establishing a locally based organisation (or 'establishing the organisation' depending on where you are); recruiting schools and centres; and training the trainers. Once the computers are delivered the school must open up the ICT-laboratory for the community. Those activities are surrounded with other, minor issues but still of great importance; electricity, connectivity, technicians, local content development etc. All this together constitutes the practical reality behind bridging the digital divide.

As mentioned in the introduction, the literature does not suggest which access barriers factors are most important or most difficult to overcome and why this is so. Despite the fact that this is a single case study and it is not possible to generalise from one case only, conclusions can be made.

Some access barriers are more frequent and affect other barriers too. The lack of economic resources, i.e. money, is *the* major access barrier. Money is needed to buy and maintain the ICT-equipment. Money is needed to access Internet and sustain the ICT-laboratory. Money is needed to train the trainers. There is a constant need for more money; money which is not around. To simply depend on donors and external financial support is not a sustainable option. Mr Moses Ssemakula (Self-Management, Sweden) had to struggle hard to raise money needed to make the project happen. The schools and centres had to struggle hard to raise the US$75 for the computers. The projects' long term economic sustainability is not yet guaranteed and is probably the most critical issue that the project faces. SMIT must find ways to make it economic sustainable in the long term. The idea of SBTs and electronic public places associated with existing public places is a good idea. It brings in money and it is in line with the purpose, i.e. making ICT available for the people. How to make the SBTs profitable and how to best serve the community are issues that must be solved.

Mr Samuel Nakabaale mentioned that there are workarounds. Cheap distributed CDs could in some cases replace expensive connectivity, i.e. Internet might not be the only and the best solution. The results show that a major Real Access obstacle is connectivity. Prices in Uganda will hopefully drop but for the participating schools and centres this will always be a cost that must be covered for.

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[194] Yoshi Utsumi, Secretary-General ITU, quoted in www.itu.int/newsroom/wtd/2004/sg_message.html/ (retrieved May 04)

Other cost factors that are a risk for schools and centres is the high cost of initial investment seen in money, time, and skills. At the same time though, the establishment of ICT-laboratories with facilities give plus points to schools. Considering the high competition schools face in the Ugandan education system, those extra points (read school fees) are very much needed.

Another major access barrier at the moment is the lack of training of trainers. The training of trainers is very important since it is a prerequisite to best adopt the technology; to develop relevant data and local content; and to improve the usage skills and technical knowledge. Some type of access might be achieved even without training but Real Access will not be achieved as long as there is no training.

Although not an access barrier, management and how SMIT is run is still important for the success of the project. Mr Moses Ssemakula's importance for the project is a critical issue, even more so by the fact that Self-Management Uganda is a new organisation that has not yet matured. People involved in the project are experienced but it is the first time for many of them to conduct an ICT-project like this. The result showed that SMIT has ensured local ownership which is very crucial for the project's sustainability. A development initiative like SMIT will not be sustained without local owners who continue to be responsible for it after external financial support and assistance ends. However, a key issue is who the owners are and their credibility in the community they represent. This is something I have not addressed in this study.

Another thing concerning management, which is a problem not only for SMIT but also for many other NGO efforts, is that the actions carried out are local and improvised. In this case, bringing previous generations of ICT, i.e. donated computers, to a developing country and poor communities can improve the situation and make an impact on people's lives. However, SMIT will not make a large-scale societal impact. This is due to the fact that SMIT is not replicable. SMIT should therefore focus more on policy advocacy. My observation is that they spend too much of their time and money (in terms of high overheads) intervening with individual schools and centres instead of pressing for better policy-level interventions. This would be more convenient, efficient, smother, and cheaper. Duplication of work will also be avoided. In practise this could mean publishing an easy to use handbook (set-up, troubleshooting, giving examples etc) for the schools and centres including contact possibilities to a SMIT helpdesk.

SMIT should with other words move from micro-level intervention (supporting individual schools) to macro-level intervention (policy advocacy). Interventions on a meso-level (supporting development of other institutions and receiving help) is also needed. SMIT should work more with other organisations, private initiatives, with the government and with policymakers in order to make a difference. Once this is realised ICT can truly fulfill its potential and contribute to and support the eight wider development goals.

To conclude; it is mentioned in the theory chapter and the case study has showed the same – ICT requires resources that the poor people often lack. The lack of money is a huge problem but there are ways to decrease the costs and make it economic sustainable in the long term. These solutions and workarounds are something that SMIT must work harder on. In order to get the information chain to function properly, achieve Real Access and make a Real Impact on peoples lives, SMIT must pay more attention to the surrounding components. SMIT is, at the moment, not delivering an "information chain package" or "Real Access". This is so

because SMIT has focused a bit too much on the deliverance of the computers, forgetting that ICT should be seen as a mean to an end, not as an end in itself. I truly believe that on-the-ground initiatives to bridge the digital divide need to reach beyond treatment of the symptoms, i.e. not only insuring access. ICT has to be seen in the context of the overall development of society and the measure of success is the progress towards reaching the MDGs and international development targets, rather than the spread of ICT or bridging the digital divide per se.

Further Research

Due to my choice of methodology, a single case study, some of the research findings are naturally specific to SMIT and Self-Management Uganda. However, some findings identified through the study of SMIT, in combination with the analysis of literature, seem of quite a frequent nature and are probably relevant for other similar projects too.

Since I've studied the initial phase of one on the ground effort to bridge the digital divide, what is needed is an impact study. Impact studies are often based on a simplistic comparison between the initial situation, which in this case is before the interventions of SMIT, and the situation at any given point in time "after" its real implementation. This will truly answer the question if a Real Impact has been made or not.

The difficulties that should be overcome for poor to access and use ICT must be further researched. The research found is still limited and mostly based on case studies like this that are hard to generalise. More research, like impact studies, is needed before models can be asserted with any confidence.

This thesis touches some areas whereof some need to be further investigated; SBTs role in the community, refurbished computers versus new computers in regard to the total cost of ownership, the dumping of computers in the South, ICTs role in education in schools located in the South…

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Appendix 1; Acronyms, Abbreviations and Glossary

List of Acronyms and Abbreviations
ADSL = Asymmetric Digital Subscriber Line
Bps = Bits per second
DFID = Department for International Development (UK)
ICT = Information and Communication Technology
IDRC = International Development Research Centre (Canada)
ISDN = Integrated Services Digital Network
ISP = Internet Service Provider
IT = Information Technology
ITU = International Telecommunication Union
MCT = Multipurpose Community Telecentre
MDGs = Millennium Development Goals
NGO = Non Governmental Organisation
SBT = School-based Telecentre
Sida = Swedish International Development Cooperation Agency
SMIT = Self-Manage IT
UCC = Uganda Communications Commission
UNCRD = United Nations Centre for Regional Development
UPL = Uganda Posts Limited
UTL = Uganda Telecom Limited
VSAT = Very Small Aperture Terminal
WorLD = World Links for Development
WSIS = World Summit on the Information Society

Glossary
Bandwidth: How much data a phone line or computer network can carry; measured in bits per second (bps).
Community: A group of persons grouped by interpersonal bonds (not necessarily biological) who share the same common values, interests and goals, i.e. a common way of life.
Data: Raw pieces of information.
Development: "Good change" or cultural change. Often used interchangeably with economic growth.
Developed countries: *"Those countries, sometimes referred to as the first world or industrialised countries, which due to their strong economy, are in a more powerful position in relation to those who have not achieved the same level of economic growth."*[195]
Developing countries: *"Those countries from the South, previously described as the Third World, which have not been able to develop economically to a standard that makes them equal to developed countries."*[196]
Dial-up: For Internet connection where ISPs use household telephone lines to transmit data from the Internet. A modem converts the data and a computer displays the information. Drawbacks are usually limited speed, old phone cables, and it tends to be less reliable.
Digital divide: The perceived divisions between ICT "haves" and "haves-not"; the lack of ICT-infrastructure.

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[195] Schueber (2003), ix.
[196] Ibid., ix.

e-readiness: Describes the ability of a country to absorb the new trends in ICT for enhancing the living standards of its people.

Human Development Index: UN standard measuring development; both economic and social indicators are covered (poverty, literacy, education, life expectancy etc).

Information: Here often used in the sense that it is "*a physical quantity which can be stored, processed and transmitted via technical means*"[197].

Information and communication technology: "*Electronic means of capturing, processing, storing, and communication information.*"[198]

Information society: A term for a society in which the creation, contribution, and distribution of information has become the most significant economic and cultural activity. A society where everyone can create, access, utilise and share information and knowledge, and where the right to information has become a basic condition for economic, social and educational development.

Internet service provider: A company that provides Internet access.

Multipurpose community telecentre: See telecentre.

Millennium Development Goals: The eight UN goals in short; eradicate extreme poverty and hunger; achieve universal primary education; promote gender equality and empower women; reduce child mortality; improve maternal health; combat HIV/AIDS, malaria and other diseases; ensure environmental sustainability; and develop a global partnership for development.

Non governmental organisation: An organisation often involved in development cooperation (does not necessarily have to be involved in development work), and not working for the government. This thesis includes NGOs from developed and developing countries.

Telecentre: Community-based facility which caters to the information and communication needs of the people (using different intermediaries and assists learning) for economic, social and cultural development. It is more than an Internet café in that the "*services and content of applications of the telecenter is more localized and is operated based on the community's information needs.*"[199]

Teledensity: Number of subscriber lines per population expressed as a percentage.

The North: "*A term used to refer to developed countries, especially in development studies literature.*"[200] Includes; Europe, US, Australia, New Zeeland.

The South: "*A term used in international development to replace the less preferred term Third World, but still referring to developing countries.*"[201]

Universal access: Refers to providing all citizens with access to basic communication services that are of an acceptable quality at affordable prices and at reasonable distances. "*The challenge has been to reach rural, remote, or disadvantaged communities.*"[202]

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[197] Dahms (1999), 3.
[198] Heeks (1999), 5.
[199] Heeks (2003), 49.
[200] Schueber (2003), ix.
[201] Ibid., ix.
[202] Waldick (2003)

Appendix 2; MDGs and the Role of ICT

GOALS	TARGETS	Role of ICT (examples)
1. Eradicate extreme poverty and hunger	1. Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day 2. Halve, between 1990 and 2015, the proportion of people who suffer from hunger	• Increase access to market information and lower transaction costs for poor farmers and traders • Increase efficiency, competitive-ness and market access of developing country firms • Enhance ability of developing countries to participate in global economy and to exploit comparative advantage in factor costs (particularly skilled labour)
2. Achieve universal primary education	3. Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling	• Increase supply of trained teachers through ICT-enhanced and distance training of teachers, in-service support for teachers, and networks that link teachers to their colleagues both in-country and internationally
3. Promote gender equality and empower women	4. Eliminate gender disparity in primary and secondary education preferably by 2005 and to all levels of education no later than 2015	• Improve the efficiency and effectiveness of Education Ministries and related bodies through strategic application of technologies and ICT-enabled skill development and in-service support • Broaden availability of quality educational materials/resources • Deliver educational and literacy programmes specifically targeted to poor girls & women using appropriate technologies • Influence public opinion on gender equality through information/ communication programmes using a range of ICTs
4. Reduce child mortality	5. Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate	• Enhance delivery of basic and in-service training for health workers • Increase monitoring and information-sharing on disease and famine • Increase access of rural care-givers to specialist support and remote diagnosis • Increase access to reproductive health information, including information on AIDS prevention, through locally-appropriate content in local languages
5. Improve maternal health	6. Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio	
6. Combat HIV/AIDS, malaria and other diseases	7. Have halted by 2015, and begun to reverse, the spread of HIV/AIDS 8. Have halted by 2015, and begun to reverse, the incidence of malaria and other major diseases	
7. Ensure environmental sustainability	9. Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources 10. Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation 11. By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers	• Remote sensing technologies and communications networks permit more effective monitoring, resource management, mitigation of environmental risks • Increase access to/awareness of sustainable development strategies, in areas such as agriculture, sanitation and water management, mining, etc. • Greater transparency and monitoring of environmental abuses/enforcement of environmental regulations • Facilitate knowledge exchange and networking among policy makers, practitioners and advocacy groups
8. Develop a Global Partnership for Development	12. Develop further an open, rule-based, predictable, non-discriminatory trading and financial system 13. Address the special needs of the least developed countries 14. Address the special needs of landlocked countries and small island developing states 15. Deal comprehensively with the debt problems of developing countries through national and international measures in	

	order to make debt sustainable in the long term 16. In cooperation with developing countries, develop and implement strategies for decent and productive work for youth 17. In cooperation with pharmaceutical companies, provide access to affordable, essential drugs in developing countries 18. In cooperation with the private sector, make available the benefits of new technologies, especially information and communications	56

Source: http://millenniumindicators.un.org/ (retrieved April 04), Marker et. al (2002)

Appendix 3; Declaration of Principles and Plan of Action

The common vision and guiding principles of the Declaration are translated in this Plan of Action into concrete action lines to advance the achievement of the internationally-agreed development goals, including those in the Millennium Declaration, the Monterrey Consensus and the Johannesburg Declaration and Plan of Implementation, by promoting the use of ICT-based products, networks, services and applications, and to help countries overcome the digital divide.[203]

…all stakeholders should work together to: improve access to information and communication infrastructure and technologies as well as to information and knowledge; build capacity; increase confidence and security in the use of ICTs; create an enabling environment at all levels; develop and widen ICT applications; foster and respect cultural diversity; recognize the role of the media; address the ethical dimensions of the Information Society; and encourage international and regional cooperation.[204]

An Information Society for All: Key Principles and Steps that Must Be Taken;

Key Principles	Action Lines
1) The role of governments and all stakeholders in the promotion of ICTs for development Governments, private sector, civil society, and United Nations and other international organizations have an important role and responsibility in the development of the Information Society and in the decision-making processes	Develop national e-strategies and when implementing; take into consideration local, regional and national needs and concerns Countries should establish at least one functioning Public/Private Partnership (PPP) or Multi-Sector Partnership (MSP) International organisations should publish reliable information submitted by relevant stakeholders on successful experiences of mainstreaming ICTs
2) Information and communication infrastructure: an essential foundation for an inclusive information society Connectivity and access; universal, ubiquitous, equitable and affordable; adapted to regional, national and local conditions, making greater use innovative technologies where possible Establish ICT public access points in disadvantaged areas for ensuring universal access; in places such as post offices, schools, libraries and archives	Governments should support an enabling and competitive environment for the necessary investment in ICT In the context of national e-strategies; support technical, regulatory and operational studies by the International Telecommunication Union (ITU) and other relevant international organisations; address the special requirements of disadvantaged and vulnerable groups Design and produce ICT so that everyone has easy and affordable access Encourage the use of unused wireless capacity and the creation and development of regional ICT backbones and Internet exchange points
3) Access to information and knowledge Universal Declaration of Human Rights, Article 19 Removing barriers to equitable access to information for economic, social, political, health, cultural, educational, and scientific activities Preservation of documentary records Affordable access to software	Development and promotion of public domain information Promote research and development to facilitate accessibility of ICTs for all Governments, and other stakeholders should establish sustainable multi-purpose community public access points, providing affordable or free-of-charge access Promote awareness among all stakeholders of the possibilities offered by different software models, and the means of their creation, including proprietary, open-source and free software, in order to increase competition, freedom of choice and affordability, Governments should actively promote the use of ICTs as a

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[203] WSIS (2003b), 1.
[204] WSIS (2003a), 3.

	fundamental working tool
	Fostering worldwide cooperation between libraries
4) Capacity building Literacy and universal primary education so that each person have the opportunity to acquire the necessary skills and knowledge in order to understand, participate actively in, benefit fully and see the new opportunities offered by ICTs Major factors in determining development and competitiveness, i.e. positive integration into the knowledge economy, depends largely on increased increased capacity building in the areas of education, technology know-how and access to information	Develop domestic policies to integrate ICTs in education and training at all levels Designing and offering courses for public administration, taking advantage of existing facilities such as libraries, multipurpose community centres, public access points Develop pilot projects to demonstrate the impact of ICT-based alternative educational delivery systems Promoting equal training opportunities in ICT-related fields for women and girls Training of teachers should focus on the technical aspects of ICTs, on development of content, and on the potential possibilities and challenges of ICTs. Activate volunteer programmes to provide capacity building on ICT for development
5) Building confidence and security in the use of ICTs Strengthen the trust framework, prevent the use of information resources and technologies for criminal and terrorist purposes, while respecting human rights	Promote cooperation among the governments at the United Nations and with all stakeholders to; prevent, detect and respond to cyber-crime; promote user education and awareness
6) Enabling environment ICTs should be used as an important tool for good governance Existence of a policy and regulatory framework Improving global affordable connectivity, intellectual property issues, and knowledge sharing Development and adoption of international standards (like radio frequency spectrum) Secure, safe and healthy working environment Management of the Internet encompasses both technical and public policy issues	Governments should foster a supportive, transparent, pro-competitive and predictable policy, legal and regulatory framework, which provides the appropriate incentives to investment and community development Secretary General of the United Nations to set up a working group on Internet governance Create opportunities for exchange of experience ITU and other regional organisations to ensure rational, efficient and economical use of, and equitable access to, the radio-frequency spectrum by all countries, based on relevant international agreements
7) ICT applications: benefits in all aspects of life ICTs should create benefits and sustainable production and consumption patterns	Promote the use, existence, and benefits of e-government, e-business, e-learning, e-health, e-employment, e-environment, e-agriculture, and e-science
8) Cultural diversity and identity, linguistic diversity and local content Promotion, affirmation and preservation of diverse cultural identities and languages as reflected in relevant agreed United Nations documents including UNESCO's Universal Declaration on Cultural Diversity Creation, dissemination and preservation of content in diverse languages and formats, including people living in rural, remote and marginal areas	Develop local cultural industries suited to the linguistic and cultural context of the users Support local content development, translation and adaptation, digital archives, and diverse forms of digital and traditional media by local authorities
9) Media Freedom of the press and freedom of information	Encourage the media—print and broadcast as well as new media—to continue to play an important role in the Information Society Encourage traditional media to bridge the knowledge divide

	and to facilitate the flow of cultural content
10) Ethical dimensions of the Information Society Use of ICTs and content creation should respect human rights	Promote the common good, protect privacy and personal data and take appropriate actions and preventive measures, as determined by law, against abusive uses of ICTs such as illegal and other acts
11) International and regional cooperation The worldwide agreed objective is to contribute to bridge the digital divide, promote access to ICTs, create digital opportunities, and benefit from the potential offered by ICTs for development. Core competences of the International Telecommunication Union (ITU) are of crucial importance	International cooperation among all stakeholders is vital in implementation of this plan of action and needs to be strengthened with a view to promoting universal access and bridging the digital divide, *inter alia*, by provision of means of implementation.

Source: WSIS (2003a), WSIS (2003b)

Appendix 4; Initiatives and organisations

The following is a selection of on-the-ground level initiatives and relevant organisations.

WorLD
The World Bank (EDI); World Links for Development (WorLD) initially connected three schools to the Internet in July 1996 in Uganda. The program then expanded to 32 schools, serving over 30 000 students. This pilot program has now ended but was instrumental in helping to establish SchoolNet Uganda.
www.world-links.org

SchoolNet Uganda
SchoolNet Uganda is the new offspring of WorLD. The NGOs vision is to transform the Uganda educational system from an Industrial model (learning by assimilation) to a knowledge-based model to prepare the youth of Uganda to effectively enter a global economy based on knowledge, information and technology. Its mission is to make graduates of Uganda's education system more globally competitive.
www.schoolnetuganda.sc.ug/homepage.php

SchoolNet Africa
SchoolNet Africa is the mother organisation of SchoolNet Uganda. They are campaigning for its project One Million PCs for African Schools. This includes an intensive capacity building programme involving technical coordinators and managers in order to establish PC refurbishment centres in a number of African countries. SchoolNet Africa is targeting the establishment of SchoolNets in more than half of all African countries by 2005 and its vision is to connect all schools in Africa by 2020.
www.schoolnetafrica.net

Connect-ED
Connect-ED was a program under the Education for Development and Democracy Initiative (EDDI). It was launched by former US President Bill Clinton in 1998 and it ended in 2003. Connect-ED aim was to improve the quality of primary education by providing ICT training to teachers and enhancing the quality of teacher education through Internet connectivity.
www.connected.ac.ug

World Computer Exchange
World Computer Exchange is an international educational non-profit focused on helping the world's poorest youth to bridge the global divides in information, technology and understanding. The equipment donated is by individuals and companies to connect poor youth to the Internet.
www.worldcomputerexchange.org

UCONNECT
Uganda Connect Project's (UCONNECT) object is the advancement of public education in Uganda, using ICT for education, to improve the quality and efficiency of communications through the provision of necessary hardware, software and training of teachers and managers in the use of communications software, especially electronic mail (e-mail), and the World Wide Web, for education, health, agriculture and other sectors.
www.uconnect.org

ACACIA (part of IDRC)
IDRC has also launched the Acacia Initiative that is intended to demonstrate that ICTs in the hands of poor communities in Africa can enable them to take more effective control over their own development. Uganda has been identified as one of the priority countries (together with South Africa, Mozambique and Senegal) and a number of major projects have been launched.
http://network.idrc.ca/ev.php

bridges.org
bridges.org is an non-profit international organisation based in Cape Town, South Africa. Promotes the effective use of ICT in the developing world. bridges.org defines the digital divide as the difference between those with "Real Access" and capacity for effective use and those who do not. Their core work deals with ICT project evaluations, ICT policy work, and technology research on an international, regional, national, and local level. It's a civil society organisation, committed to work with businesses and governments. Their homepage is a must for all interested in the field, for example, look at their guide to free resources available to NGOs and businesses to use computers and the Internet.
www.bridges.org

IICD
International Institute for Communication and Development (IICD) is an independent non-profit foundation, established by the Netherlands Ministry for Development Cooperation in 1997. Their mission is to assist developing countries to realise locally owned sustainable development by harnessing the potential of ICTs. The Uganda country programme began in 1999 and now has ten projects in the education, livelihoods and governance sectors. Among them is the Global Teenager project which is particularly active in the education sector. It is connecting 200 school classes worldwide (in Uganda too), applying ICTs to support education and inter-cultural understanding. Its core funders include the Dutch Directorate-General for Development Cooperation (DGIS), the UK Department for International Development (DFID) and the Swiss Agency for Development and Cooperation (SDC).
www.iicd.org

i-Network
The Information Network (i-Network) Uganda is a national network consisting of individuals and organisations from the private sector, government and civil society. It provides a platform for sharing knowledge and forming partnerships around the use of ICT to address development challenges and to extend equitable national development. i-Network Uganda was initiated by IICD and started in June 2002.
www.i-network.or.ug/

Appendix 5; Sample Questions

The interviewees fall under three categories;
1) Academic and corporate sources for general background information
2) Key persons in Self-Management (Sweden) and Self-Management Uganda
3) Representatives from participating schools, institutes and universities

The following are sample questions that I used for guidance.

Sample questions specifically for category 1;
- How can ICT help to alleviate poverty in Uganda?
- When it comes to ICT and Uganda, what are the main opportunities and the main constraints?
- Do you think that the digital divide can/will be bridged?
- Who has the power over the telecommunications development in Uganda?
- Do you think that Uganda have handled the telecommunication reform well?
- Some fear that liberalisation in the long run obstruct the technological roll-out in areas considered un-profitable, i.e. rural areas. Do you think this is/will be the case in Uganda?
- Were there any obligations for the companies when they signed the licence with the Government?
- How will the marine optical fibre cable outside the East African coast affect Uganda and why was it not there in the first place?

Sample questions specifically for category 2;
- What are the objectives with this project?
- From where does the initiative come, who started the whole thing?
- Why was Self-Management Uganda established?
- Was it hard to establish the NGO in the first place?
- Who is funding the project?
- Who is the owner the SMIT project? Who is responsible for the project?
- How are/were the schools selected?
- Do you have any approach for generating relevant local content?
- How will the schools connect to the internet?
- How will the project ensure sustainability? (Financial, technical, interest)
- If you could start it all over again, is there anything you would like to change in this initial phase, are there some other lessons you have learned?

**Sample questions specifically for category 3;**
- How did you first get in contact with Self-Management IT?
- What role will ICT play in your education?
- Should ICT be taken as a tool to aid learning and teaching or should ICT be an independent discipline or subject? (ICT as a tool Vs ICT as a subject)
- What are your expectations with this project?
- What are the major problems/constraints as you see it?
- Do you have plans to connect with other schools in Uganda?
- Will the school fees still be the same even though there are computers?
- Will this project make the school more attractive?
- How big part of the total budget is spent on this ICT-laboratory?
- Which are the main opportunities with ICT as you see it?

Appendix 6; Pictures

Mary Reparatrix Secondary School in Entebbe is the proud owner of a total of 10 computers and have requested for another 10. They hope that once connected they can make good use of the computers in other subjects like geography as well as publish the works from the student's writers club.

Computer literacy among Ugandan students is low. SMIT intends to change this.
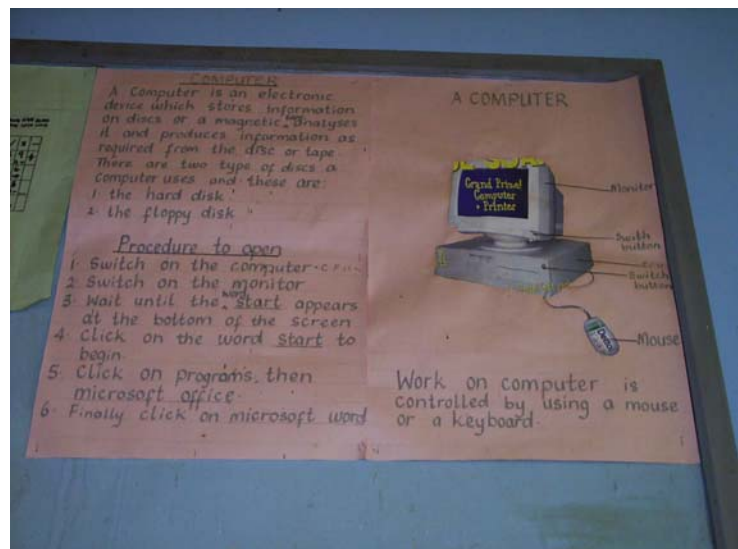
St Agnes Primary School Mission, Entebbe. Burglar proofed windows and door locks; a new ceiling; furniture; a dust-free and cool environment; rewire the building for electricity; extra sockets and earthing… Just to prepare the computer room is costly and a big challenge for many schools.