

Masterarbeit

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unter der Anleitung von:

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durch

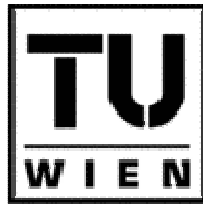
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Information and Communication Technology for Persons with Visual Impairments in Tanzania

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Dedication

I dedicate this work to my beloved sons Lionel and Marwin who are the main source for my ambitions and give me the strength to continue studying while also working and taking care of the family.

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My special acknowledgments go to:

- Prof. Fleissner for accepting supervising my thesis and showing true interest in the topic. He has been of great support and has helped me enormously to successfully structure and finish this study.
- The *Vienna University of Technology* (TU-Wien):
 - For Financial Support, which permitted me not to limit myself to a literature research but to go on field research to South Africa and Tanzania
- The *South African National Council for the Blind* (SANCB):
 - For the free training programme on the Dolphin Mercury Pen and Mapping.
 - For their assistance in providing me with information on the situation of persons with visual impairments in Africa by enabling me to use their library and their internet connection.
- The *Information Centre on Disability* (ICD): Thank you for your assistance in providing me with contacts of associations for blind persons and with statistics about the number of persons with visual impairments in Africa and in Tanzania.
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- My thanks go particularly to Lazaro, Baraka, Edgar, Godwin, Joy, Kaganzi, James and many others.
- Special thanks also to my wife Katharina Noussi, for her assistance, as the coordinator of the project Inclusive Tanzania, she provided me with all the required information
- Another special thanks to my mother Mme. Maptué Marie-Claire for everything she has done and is still doing for me.

Abstract

This Master Thesis is based on my field research in Tanzania and South Africa in July 2007 and on the intensive screening of one case study, the project “Inclusive Tanzania”. While Information and Communication Technology (ICT) has become an essential element of our global information society, and consequently of our way of living and working, persons in developing countries have hardly access to ICT. However, also in the poor communities of the world, the development of the ICT sector is rapidly gaining grounds while leaving out persons with disabilities.

Persons with visual impairments belong to the poorest of the poor, largely excluded from everyday life in their societies. Therefore, one might argue that they would need access to ICT most in order to empower themselves and participate in society. This thesis aims at contributing to raise awareness on the potentials and rights of persons with disabilities to fully participate in the information society. They can do so if they are facilitated with assistive devices and training. I hope that this thesis can contribute to the inclusion of persons with disabilities in mainstream ICT policies, programmes and projects on the one hand and to the development of special policies, programmes and projects aimed at supplying persons with visual impairments in developing countries, and in Tanzania in particular, with ICT.

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Chapter 1

Introduction

This chapter first describes my motivations for conducting this study. Then I will give a short overview of the research content and the main findings. Finally, I will describe the research methodologies used.

My **motivation** for choosing this topic was first of all to study issues concerning ICT in Africa. What is the situation like? How are projects organised? What are governments trying to do? What is the situation in schools like? After discussions with my supervisor, I realised that this topic has already been widely studied. On the other hand, a new issue was slowly surfacing on the debating circles: As with March 2007, the new *Convention on the Rights of Persons with Disabilities* was opened for signatures, which is a large opportunity for persons with disabilities to gain access to their rights. Inspired by my wife and my supervisor, I immediately got interested in the special issue of ICT for persons with disabilities in Africa. I quickly realised that this was a very new topic, which was not receiving the attention it deserved and therefore I decided to choose it as my topic.

Thanks to the *Technical University of Vienna* I got the opportunity to go on field research to South Africa and Tanzania. When getting to the point of having to choose a case study I chose Tanzania for several reasons. First of all it belongs to the so called group of *Least Developed Countries*¹, ranking 162 out of 177 countries on the Human Development Index.² Around 36% of the population lives below the national poverty line and 90% of the population lives of less than USD 2 per day.³ While Tanzania is a very poor country it is also stable in political terms and has some of the best governance data rankings on governance among African countries.⁴ The government of Tanzania has also signed a number of international documents on the rights of persons with disabilities and has signed the new

¹ UN List of Least Developed Countries: <http://www.un.org/special-rep/ohrls/ldc/list.htm> (2.10.07)

² UNDP, 2006: 283-286

³ UNDP, 2006: 294

⁴ Referring to the World Bank Institute (WBI) Governance Indicators, in DPG, 2006: 16 and at <http://info.worldbank.org/governance/wgi2007/>

Convention on the Rights of Persons with Disabilities on the first day it was opened for signatures (31.3.2007). Furthermore, *Light for the World* (LFW) is implementing a project to supply organizations of and for the blind in Tanzania with basic ICT.

Later the South African National Council for the Blind (SANCB) in Pretoria, South Africa, invited me to participate in a training on the use of the *Sightsavers Dolphin Pens*. I very gratefully accepted the invitation and used the opportunity to learn about the situation of persons with visual impairments in South Africa in particular and in Africa in general.

The thesis is structured in the following way: Chapter two will first explain what is visual impairment and will then outline the situation of visually impaired persons living in Africa, and in particular in Tanzania. Visual impairment is a huge problem in developing countries, as poverty and disability are closely related and re-enforce each other. Poverty and the lack of health facilities, eye health personnel and awareness raising initiatives are the major causes of blindness in developing countries. On the other hand, persons living with visual impairments belong to the poorest of the poor. They are excluded from participation in society and are denied their basic human rights.

Then we go on to chapter three where we define the term Information and Communication Technology (ICT) and what type of ICT we are interested in within this master thesis. We will present the main assistive devices available for persons living with low vision as well as for blind persons. In particular, we will present the *Supernova Screen Reader and Magnifier*, as this is one of the most used products and also of importance within our case study. At the end of this chapter, we will present the situation of ICT for persons with visual impairments in Tanzania. This will open the way for chapter four.

In chapter four we will present our main case study, the advocacy project “Inclusive Tanzania”. This project is owned and implemented by a coalition of ten disability organisations in Tanzania and has a large advocacy and capacity-building component. During the project implementation it became evident that persons with visual impairments were deprived of having access to all written and electronic materials although this was one of the main project principles. The reason was that Braille printing was expensive in Tanzania as there were only very few institutions offering such a service. Consequently, *Light for the World* as project coordinator and funding agency decided to address the urgent problem. One Braille embosser as well as ten *Sightsavers Dolphin Pens* were purchased and sent to Tanzania. Furthermore a training for 20 participants in basic computer literacy skills and the use of the pens was organised between September and December 2007.

In chapter five we will then go on to analyse the project example, do a cost-benefits analysis and give some lessons learnt. Basically, it can be concluded that the project was a huge success as it attracted a lot of interest by the media and public officials. For the first time persons with visual impairments had been trained to use the computer in Tanzania. This was a great eye opener for the public who realised that persons with visual impairments can participate fully in society if the access barriers are removed. Finally we will also reflect on possibilities to extend the project to the whole country and to provide ICT to a larger number of persons with visual impairments.

Chapter six will summarise the thesis and give conclusions, while chapter seven lists up the bibliography used. Finally, in the annexes we will provide the questionnaires used, a list of variety of ICT for persons with visual impairments available and three project documents.

The following research **methodology** was applied:

1) Structured Interviews as well as open discussions with:

- James Shimwenye, Inclusive Tanzania Consortium (ITC) steering committee member, Director of Tanzania *National Institute for the Blind* (TNIB), Dar es Salaam
- Grayson Lazaro, ITC steering committee member, member of the *Tanzanian League of the Blind* (TLB), teacher
- Rutachwamagyo Kaganzi, Director of the *Information Centre on Disability* (ICD)
- Henry Wimile, ICD Board member, coordinator of the *Early Childhood Development-Network* (ECD-N)
- Fred Mkatambe, ICD Board member, advocate with the *Legal and Human Rights Centre*
- Edgar Telesphory, IT technician and trainer with the *National Institute of Transport*
- Katharina Noussi, Junior Advocacy Officer, *Light for the World*, Vienna
- Godwin Sanava, “Inclusive Tanzania” project coordinator, ICD, Dar es Salaam

The main question during my interviews and open discussions was “how do you think that access to ICT will be of benefit to you, to your organisation, to the project and to society in general?” Other questions I have asked concerned the situation of persons with disabilities in Tanzania and how they perceived the project “Inclusive Tanzania” (see annex 1).

2) Participative field research

This was my favourite method of research. I spent ten days in Tanzania with the disability organisations. By spending time with them in their organisations, assisting them in their daily activities, having lunch and dinner with a large number of employees of ICD and TNIB mainly, I got to know their way of thinking and their opinion of the project. I was very impressed by the abilities of the blind individuals and their way of coping under such harsh conditions such as societal stigma and low economic resources.

I participated in a Steering Committee meeting of the Inclusive Tanzania project and witnessed their participatory way of discussing and making decisions. I also installed the Braille embosser at the ICD office, trained one staff on how to use it and established a network for their operating systems.

By participating at the Dolphin Mercury Pen Training in Pretoria, I got the opportunity to study the device myself, to have a first contact with persons with visual impairments and to learn about the situation of persons with visual impairments in South Africa.

- 3) **Screening of primary documents** such as project reports, project accounts, press clippings, government policies etc.
- 4) **Study of secondary literature**, found on the net and in the library of the SANCB in Pretoria as well as at the TU library.

Chapter 2

Situation of persons with visual impairments in Africa and in Tanzania particularly

In this chapter, we are first going to give an overview of visual impairments, after that we are going to generally present the situation of persons with visual impairments in Africa, and finally we will take a closer look at the situation of visually impaired persons in Tanzania.

2.1. What is visual impairment?

According to *Bailey and Hal (1990)*, the term *visual impairment (VI)* technically encompasses all forms of vision loss, including **low vision** and **total blindness** that affect a person's ability to perform the usual task of daily life. For a better understanding of visual impairment, we will briefly look at the eye's optical system as well as the sight's mechanism and measurement, before giving a definition. Causes of visual impairments are multiple and diverse and depend to a great extent on which part of the eye is affected. *Figure 1 (a)* shows the essential elements of the eyes' optical system. Damage to any of these can result in various degrees of impaired vision.

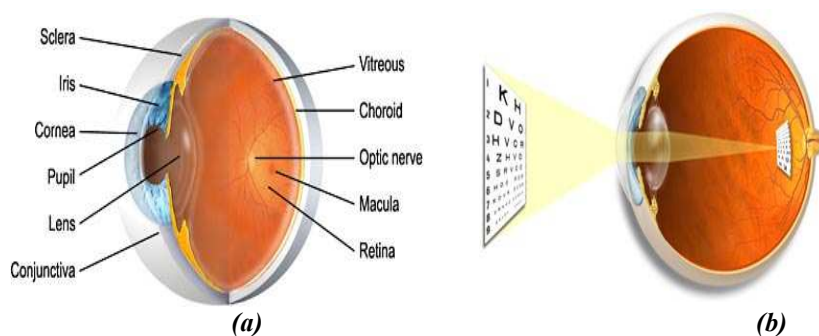


Figure 1: *The eye's optical system*

Source: The eye anatomy: A guide to the many parts of the human eye and how they function⁵

⁵ <http://www.stlukeseye.com/Anatomy.asp> (14.1.08)

The best way to understand, how the sight mechanism functions and how an image is formed by our eye, is to assimilate the eye to a camera. Like a camera the eye needs a lens (**cornea, crystalline lens, vitreous**) to refract the light and a film (**retina**) on which to focus the rays. The retina captures image and sends it to the brain to be developed. Another important element of the optical system is the **macula**, which is the highly sensitive area of the retina. The macula is the area which allows us to see fine details. It is particularly important for reading. The process followed by the eye to form an image is as follows:

- *When we look at an object, light rays are reflected from the object to the **cornea**, which is where the miracle begins.*
- *The light rays are bent, refracted and focused by the cornea, **lens** and **vitreous**.*
- *The lens makes sure the rays come to a sharp focus on the **retina**. The resulting image on the retina is upside-down (Figure 1 (b)).*
- *At the retina, the light rays are converted to electrical impulses which are then transmitted through the **optic nerve** to the brain, where the image is translated and perceived in an upright position!⁶*

As we have already mentioned before, the causes of visual impairment can be multiple and diverse and depend to a great extent on which part of the eye is affected. When any component of the eye's optical system is not functioning correctly a poor picture or no picture at all is formed by the eye. Talking about visual impairment implies an understanding on how the sight is measured. The most common clinical measurement of sight is the **visual acuity** (VA).

The Dictionary of Visual Science 4th ed. (1997) defines visual acuity as the acuteness or clearness of vision, especially to form vision, which is dependent on the sharpness of the retinal focus within the eye, the sensitivity of the nervous elements, and the interpretative faculty of the brain. VA is measured with the aid of an eye chart (Figure 2). The chart usually consists of letters, numbers or pictures printed in a line of decreasing size, which a patient is asked to read or identify at a fixed distance. Measurement results are usually recorded as a fractional number which represent the VA of the patient. A person is said to have a normal sight, if his VA is 20/20, where the first number (the numerator) represents the distance to the eye's chart, and the second number (the denominator) represents the distance from which a

⁶ <http://www.stlukeseye.com/Anatomy.asp> (14.1.08)

normal eye sees letters clearly on the eye's chart. For example, a person with a VA of 20/100 sees only letters at 20 feet (around 6 meters) that a normal eye identifies at 100 feet (around 30 meters). The higher the denominator of the VA, the worse the vision will be.

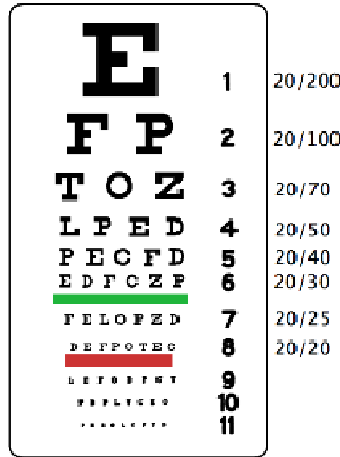


Figure 2: *Traditional eye chart*
 Source: [Wikipedia-Snellen Chart](http://en.wikipedia.org/wiki/Snellen_chart)⁷

After this brief tour around the eye, let us look at another definition of visual impairment as stated by the *International statistical Classification of Diseases and related Health Problems (ICD-10)*, which is a coding of diseases and signs, symptoms, abnormal findings, complaints, social circumstances and external causes of injury or diseases, as classified by the *World Health Organisation (WHO)*.

As mentioned in the beginning of this section, the term Visual Impairment encompasses the two terms **low vision** and **blindness**, the 10th revision of the **WHO-ICD-10**, defines the terms low vision and blindness as follows:

- **Low Vision** is defined as visual acuity of less than 6/18, but equal to or better than 3/60, or corresponding visual field loss to less than 20 degrees, in the better eye with best possible correction.
- **Blindness** is defined as visual acuity of less than 3/60, or corresponding visual field loss to less than 10 degrees, in the better eye with best possible correction.

The two following tables (*Table 1 und Table 2*) present the categories of severities of visual impairment (*Table 1*), and the classification of visual impairment in a person (*Table 2*), according to the WHO-ICD-10.

⁷ http://en.wikipedia.org/wiki/Snellen_chart (14.1.08)

Category of visual impairment	Presenting visual acuity		Or central visual field*	Classified as
	Maximum less than	Minimum equal to or better than		
1	6/12 0.50 20/40	6/18 0.33 20/60		Mild visual impairment
2	6/18 0.33 20/60	6/60 0.10 20/200		Moderate visual impairment
3	6/60 0.10 20/200	3/60 0.05 20/400	20° or less but more than 10°	Blindness
4	3/60 0.05 20/400	1/60 (finger counting at 1 metre) 0.02 5/300 (20/1200)	10° or less but more than 5°	Severe blindness
5	1/60 (finger counting at 1 metre) 0.02 5/300	Light perception	5° or less	Very severe blindness
6	No light perception			Total blindness
9	Unspecified			Unspecified

*Visual field restriction criteria applicable even if VA is better than for that category of VI

Table 1: Classification of severity of VI according to the WHO-ICD-10
Source: Dandona (2006)

ICD code	Level of visual impairment in a person
H54.0	Blindness in a person Visual impairment category 3, 4, 5 or 6 in the better eye. Following are subsets of blindness in a person: ○ Severe blindness – visual impairment category 4 in the better eye. ○ Very severe blindness – visual impairment category 5 in the better eye. ○ Total blindness – visual impairment category 6 in both eyes.
H54.1	Moderate visual impairment in a person Visual impairment category 2 in the better eye.
H54.2	Mild visual impairment in a person Visual impairment category 1 in the better eye.
H54.3	Unspecified visual impairment in a person Visual impairment category 9 in both eyes.
H54.4	Blindness in one eye of a person Visual impairment category 3, 4, 5 or 6 in one eye and no visual impairment in the other eye. Following are subsets of blindness in one eye of a person: ○ Severe blindness – visual impairment category 4 in one eye and no visual impairment in the other eye. ○ Very severe blindness – visual impairment category 5 in one eye and no visual impairment in the other eye. ○ Total blindness – visual impairment category 6 in one eye and no visual impairment in the other eye.
H54.5	Moderate visual impairment in one eye of a person Visual impairment category 2 in one eye and no visual impairment in the other eye.
H54.6	Mild visual impairment in one eye of a person Visual impairment category 1 in one eye and no visual impairment in the other eye.
H54.7	Unspecified visual impairment in one eye of a person Visual impairment category 9 in one eye and no visual impairment in the other eye.

Table 2: Classification of VI in a person according to the WHO- ICD-10
Source: Dandona (2006)

Due to the fact that the existing definition of VI by the ICD-10 are still based on recommendations made over 30 years ago, *Dandona et al (2006)* have published an interesting article. It provides suggestions for a revision of the definition of visual impairments and their classifications, which could be more appropriate for estimating and tracking visual impairments in the poor countries and regions of the world than the existing classification in the ICD-10. These suggestions propose a revision of the definitions of visual impairment in the International Statistical Classification of Diseases that address the three following issues:

- *First, the existing definitions are based on best-corrected visual acuity, which exclude uncorrected refractive error as a cause of visual impairment, leading to substantial underestimation of the total visual impairment burden to the extent of about 38%.*
- *Second, the cut-off level of visual impairment to define blindness in the International Statistical Classification of Diseases is visual acuity less than 3/60 in the better eye, whereas with increasing human development the visual acuity requirements are also increasing, suggesting that visual acuity level less than 6/60 be used to define blindness.*
- *Third, the International Statistical Classification of Diseases uses the term low vision for visual impairment level less than blindness, which causes confusion with the common use of the term low vision for uncorrectable vision requiring aids or rehabilitation, suggesting that alternate terms such as moderate and mild visual impairment would be more appropriate for visual impairment less severe than blindness.*

2.2. Persons with visual impairments in Africa

The WHO estimates that one person out of ten is disabled by physical, mental or sensory impairment. At least 350 million disabled persons are living in areas where they do not receive the services needed to enable them to overcome their limitations. Persons with disabilities in the developing world often face more acute barriers than those in developed countries. Up to 80% of disabled persons live in isolated rural areas in the developing world. In some countries, 20% of the population is disabled. Thus, it can be estimated that, when disabled people's relatives are included, 50% of the population is affected by disability. In addition, disabled people are the poorest of the poor. They often do not have access to adequate medical services. As a result, disabilities are often not detected in time to minimize

disability effects. By the time they receive medical attention, if at all, impairment may have become irreversible. In addition, the number of elderly people is rising around the world. Thus, disabling conditions, that are not common to younger people, such as deteriorating vision or hearing, are becoming more prevalent.

According to the WHO, the number of persons with visual impairments in 2002 was estimated to be 161.2 million worldwide, of whom 124.3 million were having *low vision* and nearly 37 million were *blind* (see *Table 3* and *Figure 3*). This estimation, which is still in use as reference, reveals that there are around 6.8 million persons who are totally blind and 20 million persons with low vision in Africa. Consequently, there are around 26.8 million persons with visual impairments in Africa. Our calculation (*Table 3, row 6 and 7*) shows that, the prevalence rate for blindness in Africa is around 1%, which is the highest rate worldwide. In comparison, the average prevalence rate of blindness worldwide is only 0.59%. Adding persons with low vision, we get a prevalence rate for persons with visual impairments in Africa of about 4%. Thus nearly every fourth person out of 100 in Africa is severely visually impaired.

	African Region	Region of the Americas	Eastern Mediterranean Region	European Region	South-East Asia Region	Western Pacific Region	Total
1 Population	672.2	852.6	502.8	877.9	1,590.80	1,717.50	6,213.90
2 Number of blind people	6.8	2.4	4	2.7	11.6	9.3	36.9
3 Percentage of total blind (%)	18%	7%	11%	7%	32%	25%	100%
4 Number of people with low vision	20.0	13.1	12.4	12.8	33.5	32.5	124.3
5 Number of people with visual impairment	26.8	15.5	16.5	15.5	45.1	41.8	161.2
6 Prevalence rate of blindness (%)	1.01	0.28	0.80	0.31	0.73	0.54	0.59
7 Prevalence rate of visual impairment (%)	3.99	1.82	3.28	1.77	2.84	2.43	2.59

Table 3: Global estimate of visual impairments, by WHO. Region/millions, 2002, *Source: WHO Fact Sheet N°282, November 2004*⁸

⁸ <http://www.who.int/mediacentre/factsheets/fs282/en/> (14.1.08)

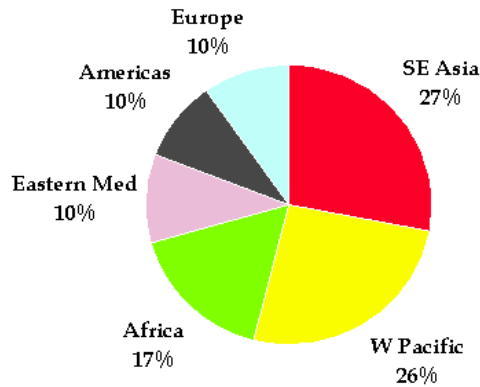


Figure 3: Global estimate of visual impairment by WHO region
 Source: WHO Fact Sheet N°282, November 2004⁹

According to my interviews with *Light for the World* and the personal observations made during my research visit to South Africa and Tanzania, there is a tight relationship between visual impairment and poverty. The following reasons can be identified as the root causes of visual impairment:

- *Lack of clean water and safe sanitation (f.ex. causing Trachoma)*
- *Lack of good nutrition and proper health education (f.ex. causing Child blindness related to Vitamin-A-deficiency)*
- *Lack of effective disease control programmes and access to health facilities*
- *Lack of enough trained eye health professionals and poorly equipped clinics (80% of all blindness could be prevented or treated)*

With the ***Vision 2020: The Right to Sight***¹⁰, which is a global joint initiative of the WHO and the *International Agency for the Prevention of Blindness* (IAPB), with an international coalition of Non-Governmental Organizations (NGOs), professional associations, eye care institutions and corporations; there are great chances to break the vicious circle, in which ***poverty causes visual impairment and visual impairment feeds poverty***. The objective of this global campaign is to eliminate all avoidable blindness by the year 2020. Fifty percent of blindness in developing countries is caused by cataract. It only needs a simple operation of around 15 minutes to restore sight to a person suffering of cataract. Compared to other health

⁹ <http://www.who.int/mediacentre/factsheets/fs282/en/> (14.1.08)

¹⁰ <http://www.v2020.org/> (14.1.08)

issues for example HIV/AIDS, malaria etc. the prevention and treatment of diseases causing blindness is very cost efficient.

2.3. Visual impairment: situation analysis of Tanzania

In this particular section, we are going to look at the situation of visually impaired persons in Tanzania. The objectives of this section are, first, to present some statistics about the number of persons with visual impairment in Tanzania, and secondly to present some associations of and for visually impaired persons in Tanzania.

During my research work in Tanzania, I conducted interviews and many open discussions with associations of and for visually impaired persons, particularly the *Information Centre on Disability (ICD)*, the *Tanzanian National Institute for the Blind (TNIB)* and the *Tanzanian League of the Blind (TLB)*. Although these organisations are collecting sample data to determine the number of persons with visual impairments, there are actually no official statistics about the number of persons with VI in Tanzania.

According to the WHO estimation on disability in 2002, *the United Republic of Tanzania* with a population (in 2002) of 34,569,232 was estimated to have 3,456,900 persons with disabilities (PWDs). The number of visually impaired people in 2002 was estimated to be 933,363. (see Table 4)

Type of disability	Number	Percentage (%)
Physically handicapped	967,932	28%
Visually impaired	933,363	27%
Deaf	691,380	20%
Mentally handicapped	276,552	8%
Multiple handicap	138,276	4%
Other disabilities	449,397	13%
Total	3,456,900	100%

Table 4: PWDs in Tanzania in 2002, according to the WHO
Source: Ministry of Labour, Youth Development and Sports, July 2004. National Disability Policy¹¹.

A research carried out by *EyeSearch*¹² also reveals that the prevalence of blindness and low vision amongst the general population of Tanzania has been found to be at least 1.26%.

¹¹ <http://www.tanzania.go.tz/pdf/NATIONAL%20POLICY%20ON%20DISABILITY.pdf> (14.1.08)

¹² <http://www.onanetwork.org/eyesearch/tanzania.htm> (14.1.08)

This is due to the fact that to date comprehensive eye care service coverage has not yet reached the whole Tanzanian population and that the housing census did not use accurate research methods concerning disability issues.

Like many African countries, indebtedness, the Structural Adjustment Programmes dictated by the *World Bank* and the *International Monetary Fund* (IMF) in the 1990s and the new world economic order have greatly impacted the economical and social life of the majority of the population in Tanzania. Many services such as health and education were drastically affected by the introduction of privatisation and cost sharing modes, and visually impaired people and more generally persons with disabilities are the most affected. Despite efforts made by the government of the *United Republic of Tanzania* to provide services to persons with disabilities, there is still a long way to go in order to reach equal social, economic, cultural, civil and political rights of disabled persons as stated in the new *Convention on the Rights of Persons with Disabilities*¹³.

As a signatory to various disability specific international instruments which include among others the *Declaration on the Rights of People with Disabilities* (1975), the *Convention on the Rights of the Child* (1989), the *Standard Rules on the Equalization of Opportunities for Persons with Disabilities* (1993), and the new *Convention on the Rights of Persons with Disabilities* (signed by the *United Republic of Tanzania* among the first signatories on 30th March 2007), the government of Tanzania is bound by international law to address disability issues. To make sure that those issues are indeed implemented, the participation of disability associations play an important role.

It is above the scope of this master thesis to present all associations of and for visually impaired persons in Tanzania, but let us briefly present some main associations. In Tanzania there are four main associations dealing with visual impairment issues:

- ***The Tanzanian National Institute for the Blind (TNIB)***: Founded in 1998 the TNIB has programmes in 15 local districts in Tanzania mainland with the objective to create awareness in rural areas, provide training in the villages, organise public discussions, organise screenings of persons with visual problems, give awareness training to councillors, and to provide vocational training for blind persons.

¹³ <http://www.un.org/disabilities/default.asp?navid=12&pid=150> (14.1.08)

- ***Tanzanian League of the Blind (TLB)***: Founded in 1964, it was the first disability organisation to be founded in Tanzania. TLB is the official representative organisation of all blind persons in Tanzania, having branches in all regions over the country. Since 1972 TLB changed from a welfare approach to advocacy for the rights of persons with visual impairments in the country, and aims at making sure that blind people are included in society.
- ***Tanzanian Society for the Blind (TSB)***: TSB was established in 1959, formerly known as *Tanganyika Society for the Blind*, affiliated to the *Royal Commonwealth Society for the Blind*. It changed its name in 1992, and is now engaged in promoting education for persons with visual impairments, providing eye care services and rehabilitation services for the blind.
- ***TAS: Tanzania Albino Society (TAS)***: TAS is involved in parents' mobilization and dissemination of information and the causes and effects of Albinism and tries to fight the stigma against persons living with Albinism.
- ***Information Centre on Disability (ICD)***: ICD was founded in 1998 by five blind persons as an awareness raising and advocacy organisation. Its main objective is to disseminate information on the situation of persons with all kinds of disabilities and to influence national decision making.

Chapter 3

Information and Communication

Technology (ICT) for persons with visual impairments

After having presented and defined the different types of visual impairment and the situation of persons with visual impairments in Africa and in Tanzania in particular, this section will present some types of technologies that assist persons with visual impairments. We will present both hard- and software currently on the market. This section will also discuss how persons with visual impairments are taught computer literacy. Furthermore, the focus will be on tools and devices related to our case study, namely visually impaired people in Tanzania.

3.1. Introduction

According to *Howell und Lundall* (2000), Information and Communication technology (ICT) is a term which broadly refers to:

All forms of technology used to create, store, process and use information in its various forms (data, voice, image, multi-media presentations and other forms including those not yet conceived) and which enable, facilitate and support communication. More specifically, ICTs refer to the convergence of micro-electronics, computers and telecommunications which make it possible for data, including text, video and video signals, to be transmitted anywhere in the world where digital signals can be received. They include networks such as fixed, wireless and satellite

telecommunications, broadcasting networks and applications such as the Internet, database management systems and multi-media tools.

While ICT clearly encompasses a wide range of technologies, for the purposes of this study, the term ICT will be used specifically to refer to technologies which are related to the use of computers, email, and Internet.

One thing we can be sure about ICT, namely, that the rapid spread of ICT since the end of the 20th century has considerably changed the way of living and working around the world. One can discuss whether these changes are good or bad or in what sense they have contributed to a better living or have created new problems. There are several questions that may arise when talking about ICT. We can ask ourselves this simple question: is ICT an instrument for empowerment or for oppression? Is the answer to this question as simple as it sounds? As far as I am concerned, I do not think so. Just try to take a look at the way in which companies and organizations use information to gain competitive advantages and shape this information to their advantages. Also look at the ways in which criminals are deploying lots of efforts at capturing personal information and use it nefariously. It is above the scope of this study to discuss issues around ICT and society (impact, benefits, etc.) which have been and are still the subject of a wide range of literature and research work.

We can however be sure that ICT does not only have disadvantages, in contrary there are lot of advantages and benefits which are coupled with ICT. Moreover, it is a fact that those advantages and benefits have spread unequally (between rich and poor, between developed and non-developed countries, etc.), especially between persons with and without disabilities. In the next section, we are going to look at some assistive technologies which can help visually impaired persons to be computer literate.

3.2. ICT supporting persons with visual impairments

ICT is offering new opportunities to persons with visual impairments and facilitates their social, vocational and cultural inclusion into society. The processing of information, which is presented only on paper, represented in former times a main obstacle for the social integration of persons with visual impairments. Today ICT makes it possible that all information, which can be converted as text, is also made accessible for persons with visual

impairments. By the employment of special aids such as *magnifiers*, *screen readers*, *speech-outputs* or *Braille-displays* persons with visual impairments are today able to use modern computer systems. This enables them to get an entrance to current information, for example over the Internet or a CD-ROM, and it also enables them to participate in modern work and communication processes.

While the term ICT clearly encompasses a wide range of technologies, interviews with persons with visual impairments in Tanzania reveal that their interests in ICT is on being able to use a computer in order to access information, to send email and to surf on the web. For this reason and as mentioned in the introduction of this chapter, the term ICT will be used specifically to the use of computer, email and Internet.

In former times, the Braille system was the only reliable method of literacy for persons with visual impairments. What is Braille? The Braille system is a code, which enables persons with visual impairments to read and write. Braille was invented by a blind Frenchman, Louis Braille, in 1829. Each Braille character or cell is made up of six dot positions, arranged in a rectangle containing two columns of three dots each. Braille is embossed by hand or with a machine onto thick paper, and read with the fingers moving across on top of the dots. Combination of Braille dots within a cell represent contraction of two or more print letters and Braille characters take up three times as much space as print.¹⁴

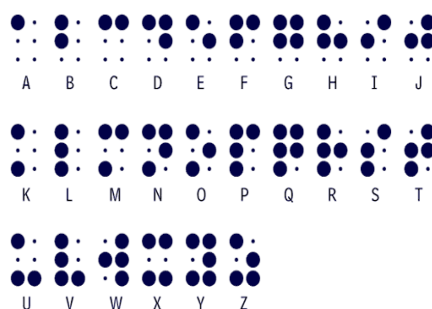


Figure 4: *Braille Alphabet*

Source: <http://www.flong.com/storage/experience/dakadaka/braille.html>

There is a whole range of assistive technologies and different ways in which ICT can enable persons with visual impairments to use modern computer systems and to enable them to participate in the modern work and communication processes. Although there are lots of technologies that currently exist for persons with visual impairments, it is regrettable to discover that persons with visual impairments, especially in developing countries, are mostly

¹⁴ <http://www.braille.org/> (14.1.08)

not even aware of their existence and on how they can retrieve some benefits of those technologies. Thanks to the efforts of some NGOs, some persons with visual impairments in developing countries are now able to have access to those assistive technologies (f.ex. see chapter 4). Still, to really have access and to enable persons with visual impairments to be computer literate in developing countries, a lot of work still has to be done. The small scale projects by some NGOs will not solve the problem.

Before looking at how persons with visual impairments are taught computer literacy (how a computer can be used by persons with visual impairments), let us briefly look at how ICT may enable the communication between visually impaired and sighted persons.

- **Braille translation and output:** For learners inputting in Braille, *Braille translation software* can produce a text version of the learner's work for their teacher to read. It can be very beneficial for some students to print out in Braille or Softbraille using an embosser. Written text can be converted to Braille using a scanner and a Braille printer. Braille keyboard computers are available with synthesized speech or moving Braille output. The printing out of text in Braille is done with a Braille embosser. Before embossing, however, the text saved on the computer must be translated into Braille. This is done with a product called Braille translation software. This process involves more than substituting the Braille for text but involves the translation of the format, such as indents, tables and other special formatting. In addition, Braille code takes more space than text on a page so the physical layout, such as pagination needs to be determined. Some software work better than others with heavily formatted texts, some even as well as certain word processing applications. So this may be a consideration when choosing a particular product. Another consideration may be the product's ability to work with different Braille codes, since the translation of Braille codes into other Braille codes, and the translation of Braille into text, known as "back" translation, is performed by this product.¹⁵
- **Speech input/output:** Increasingly, software has speech output capability, which enables digital speech to be built into programmes such as on-screen grids and word processors. Blind users will use screen readers, which provide sophisticated tools to aid navigation of the screen document. Speech recognition systems may benefit pupils

¹⁵<http://www.becta.org.uk/> (14.1.08)
http://schools.becta.org.uk/index.php?section=tl&catcode=ss_tl_cm_cs_03&rid=9815 (14.1.08)

who can speak to their computer and produce correctly spelt documents. Speech input/output software brings their contribution on breaking the barriers faced by visually impaired persons to use a computer, emails and the internet. Multilingual speech synthesizers are now available. Calculators, thermometers and electronic dictionaries, all with in-built speech, may also be useful.

As mentioned in chapter 1, the term Visual Impairment will be used to encompass the two terms, low vision and blindness. In the following section we will briefly look at how a computer can be used by either low vision or blind persons.

3.2.1 Using a computer with Low-Vision

To use a computer without the availability of special aids, some helpful changes can be made at the computer screen level to meet individual needs of a person with low vision, e.g. colour, contrast and brightness can be changed. However, these changes are in most cases not enough to meet the individual needs of a person with low vision; for example, the mouse pointer can sometimes be difficult to see for someone with sight problems. Most operating systems actually presented on the market, offer some optimisation possibilities to persons with low vision to customize their computer to meet their personal sight condition. This is possible by a customisation of the operating system attributes; for example within the control panel of the Windows operating system, there are utilities available which can customize the mouse pointer to the users' preference pointers, those options may include:

- larger pointers and colour
- interesting shapes or animated pointers
- mouse trails which leave multiple images on the screen to highlight the movement of the mouse
- a locator which gives a visual indicator of the position of the mouse
- features which can automatically move the mouse pointer on the screen to a default button

For computer users with low vision, the above-mentioned general accessibility options included in computer operating systems will not be suitable in most cases, and they will need the support of *screen magnification software*. This enables users to magnify the screen (usually only part of it) by up to 16 or even 32 times and select text and background colours to suit their individual needs. With an appropriate optimisation of the operating system and/or a good assistive software package, a person with low vision can comfortably use the computer

to surf on the web and do all other things such as a sighted person. Furthermore and nevertheless, a good customisation of the computer combined with a screen magnifier can really help to stabilize the visual accuracy.

On the web site of the *Royal National Institute for the Blind* (RNIB),¹⁶ which is a leading charity working for blind and partially sighted people throughout the United Kingdom (UK), there are lots of useful information sheets on screen magnification and the different methods used to magnify all or parts of a computer screen. It also includes information on large monitors, lighting and standard enhancements to the computer screen. A brief description of some well-known software packages can be taken from Annex 2.

3.2.2 Using a computer without vision

Persons with very poor vision or no vision at all, will need special equipment in order to be able to use a computer. For example for blind persons to be able to use *Graphical User Interfaces* (GUI) such as MS-Windows GUI, they will need special software, so called **screen readers** which enable the computer to talk. The screen reader will speak the text in its focus and the user navigates through menus, dialog boxes, edit fields and so on. The computer is controlled by a standard keyboard using key combinations called *keyboard shortcuts*, instead of a mouse. Some people also use a *Braille display*, which provides information on the screen on a *tactile display*, which sits underneath the keyboard. Typically, a screen reader, sometimes called a **speech output system**, for use with a computer will consist of two components:

- **A speech synthesizer** “speaks” the text sent to it from the screen-reading programme installed on the computer. The speech synthesizer is usually a software programme that works with a sound card.
- **A screen-reading programme** sends text displayed on the screen to be spoken by a speech synthesizer. Common features include the ability to speak:
 - the full screen
 - a user defined area of the screen
 - a line, word, individual letters or the phonetic equivalent of a letter
 - capital letters, punctuation, symbols
 - system messages.

¹⁶ <http://www.rnib.org/xpedio/groups/public/documents/code/InternetHome.hcsp> (14.1.08)

For more information, the RNIB web site provides an interesting information sheet, which highlights products that enable blind persons to use a computer by hearing in electronic speech what is displayed on the screen or read it as Braille on a Braille display. It also presents some common features of screen reading systems.¹⁷ A description of some well-known screen reading systems and other assistive technologies for blind persons can be taken from Annex 2.

The following section (3.2.3) will briefly describe *Supernova™ ScreenReader and Magnifier* and will also show how persons with visual impairments can use it to access their windows programmes, the Internet or to communicate via emails. It is important for me to mention here, that the presentation of the *Supernova™ ScreenReader and Magnifier* is just for demonstration purpose in order to present how a person with visual impairment can use a computer, and not for advertising purposes. Another motivation for the choice of *Supernova* for the demonstration purpose is that it is relevant for our case study, namely persons with visual impairments in Tanzania. Finally, chapter 4 “*Project example: “Inclusive Tanzania – access to ICT for persons with visual impairments”*” is based on the donation of 10 **Dolphin Mercury Pens** (a simplified version of *Supernova* pre-installed on the Sightsavers Dolphin Pen). As an alternative to *Supernova*, which is a commercial tool, other interesting tools such as *Oralux*, *ZommText*, or *JAWS* to assist persons with visual impairments will be briefly presented in Annex 2.

3.2.3 Supernova™ ScreenReader and Magnifier

As mentioned in the previous section, the choice of *Supernova™ ScreenReader and Magnifier* is just for demonstration and not for advertising purposes. The aim of this section is to give an overview of *Supernova* and to present how it can be used by persons with visual impairments to use their windows application, the Internet or their email easily. We will first look at what is *Supernova*, before presenting some of its keys features and how it can be installed and used from a **Dolphin Pen**.

1) *Supernova™*

Produced in the UK by *Dolphin Computer Access*, *Supernova* is a Screen Reader and Screen Magnifier package. It includes a full screen magnifier with features such as variable magnification, multiple screen management styles and a variety of colour replacement options

¹⁷ <http://www.rnib.org/xpedio/groups/public/documents/code/InternetHome.hcsp> (14.1.08)

to overcome partial sight impairment. Furthermore it also includes a full featured powerful screen reader for people who are blind. One of the main advantages of *Supernova* is that it is an all encompassing screen access solution for visually impaired computer users. This advantage of having a single combined package avoids compatibility and stability issues as the speech output, Braille output and screen magnification components of the software are all contained in one executable programme. *Supernova* works with most popular applications, and non standard applications which do not work perfectly, can however usually be “*mapped*” (configured) easily to do so. Map files are continually being created and updated by those who know the mapping language and those are posted to the *Dolphin* website for free download.

A recent unique development by *Dolphin Computer Access Ltd.* (2005) is the introduction of what they call a “*Dolphin Pen*”, which is essentially a small USB memory stick. With it *Supernova* and other Dolphin Access Software (*Lunar, Lunar Plus, Hal* and *Easy Tutor*) can now be accessed on a USB drive. Unlike other screen reading programmes the software is run from the *Dolphin Pen* and not installed on to the



PC. As it measures only 7cm x 2cm the *Dolphin Pen* can be carried in a handbag or pocket. Consequently it can be run instantly on any “*Dolphin Pen friendly*” PC; as if it were the users own work or school system. The individual user's settings, which are saved on to the Pen, are automatically applied to the system. As soon as the *Dolphin Pen* is removed, the software stops running, and the PC is ready for another user. With screen reading software now running from a pen, schools, Universities, Internet cafés, offices and libraries will be less reluctant to permit persons with visual impairments to use their PCs.

To make a PC “*Dolphin Pen Friendly*”, all that is required is to install the *Dolphin Interceptor*, which includes the Microsoft *Display Chain Manager* (DCM). If a PC is not yet “*Dolphin Pen Friendly*”, the first time the *Dolphin Pen* is inserted into a PC the user needs to load the *Dolphin Interceptor* from the Pen. Although this is accomplished in seconds, it requires some sighted assistance and administrator rights. Once this has been done the next time that a Pen is inserted, the Dolphin software will run automatically without the need for sighted assistance. Its installation has no adverse effect on the general operation of the workstation therefore an organization wishing to permit *Dolphin Pen* use can incorporate the *interceptor* into its standard workstation at no risk.¹⁸

¹⁸ <http://www.yourdolphin.co.uk/> (14.1.08)

2) *Installing Supernova & Getting Started with Supernova*

Whether it is the CD-Version of *Supernova* or the Dolphin Pen Version of *Supernova*, installing *Supernova* just requires a few simple steps to be followed. In this section we will not cover the installation of the CD-Version of *Supernova*. The manual version of *Supernova* provides the readers with a detailed description on how to install Supernova.¹⁹ Let us look at the Dolphin Pen version of *Supernova*. As already mentioned before, *Supernova* will run from the Dolphin Pen and will not be installed on to the PC; all what is needed is a Dolphin Pen friendly PC.

Supernova is started by just simply inserting the Pen drive into a free USB port. When the Dolphin Pen is inserted into a Dolphin Pen friendly PC, an ascending chime sound will be heard to signal that the Dolphin Pen has been detected, and then Supernova will start automatically. When Supernova is started, screen magnification and speech will be switched on by default, and the Supernova Control Panel which provides all Supernova' settings will also be opened. The Supernova Control Panel contains a *menu bar* and a *number of property sheets*. The menu bar contains access to all the settings available in Supernova while the property sheets provides a quick and easy method to access the more commonly used setting. In the following figure (figure 5) shows the *visual property sheet*, which has the same layout like other property sheets. In the main area of the property sheet you will find easy access to the most common settings while on the right hand side there is a series of buttons that open further dialogues with some more advanced settings.

¹⁹ <http://www.yourdolphin.co.uk/> (14.1.08)

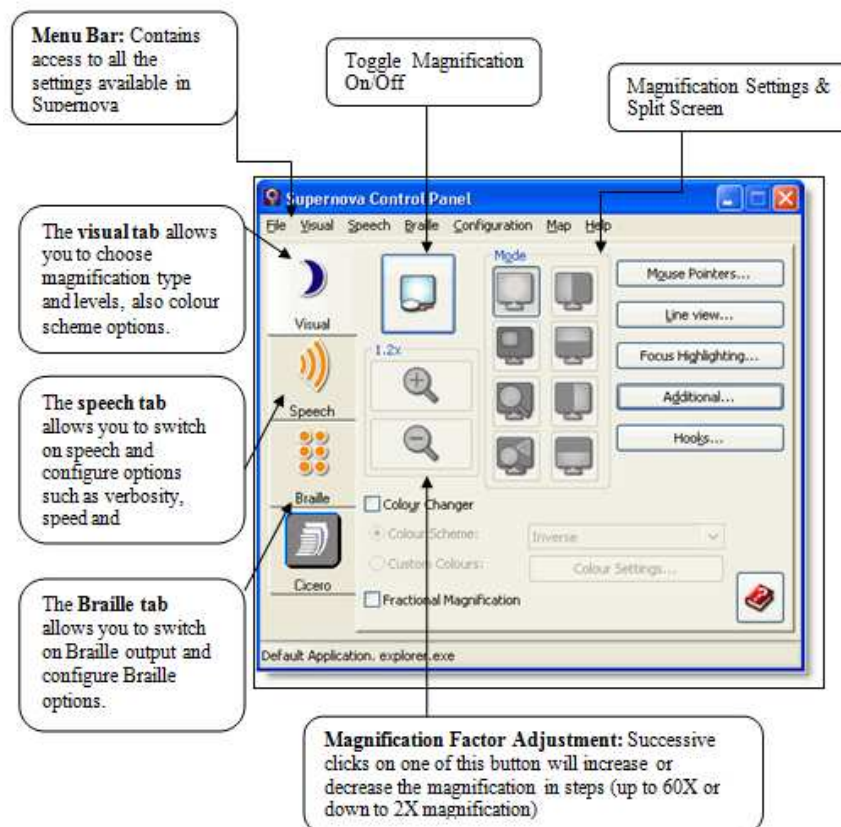


Figure 5: *The Visual Property sheet*
Source: *Supernova Quick Reference Guide*²⁰

Supernova incorporates a full range of keyboard *shortcuts* or *hot keys*, which is a set of keys or key combinations on the keyboard used to control Supernova; *hotkeys* are very useful for people who are totally blind. For example, the menu bar of the control panel of the preceding visual property sheet can be accessed by pressing the *ALT* key; this will place the focus on the first menu bar item. To then move between the menu bar items press *CURSOR LEFT* and *CURSOR RIGHT*. To open a selected menu item press *ENTER* or *CURSOR DOWN*. As said before, hotkeys are very important for blind people, because they enable them to work efficiently with Supernova. Supernova contains a variety of *hotkey* sets. The following tables provide a brief overview of the most popular hotkeys for Dolphin's screen reading and magnification software. For a full list of hotkeys, please consult the manual or the online help system.

²⁰ <http://www.yourdolphin.com/productdetail.asp?id=1&z=6> (14.1.08)

Magnification Hot-Keys		Speech Hot-Keys	
Toggle magnification on/off	Ctrl + NUM PAD ENTER	Toggle speech on/off	Ctrl + 0
Increase magnification	Ctrl + NUM PAD +	Mute	Ctrl
Decrease magnification	Ctrl + NUM PAD –	Volume Increase	Ctrl + =
Toggle magnification type	Ctrl + NUM PAD 7	Volume Decrease	Ctrl + –
Toggle split screen orientation	Ctrl + NUM PAD 1	Speed Increase	Ctrl Shift + =
Overview mode	Ctrl + BACKSLASH	Speed Decrease	Ctrl Shift + –
Colour changer	Ctrl + NUM PAD 0	Document Read	NUM PAD +
Speak Hot- Keys			
Read Character	NUM PAD 4	- Move to Previous	CAPS LOCK + ,
Read Word	NUM PAD 5	Paragraph	CAPS LOCK + NUM PAD 5
Read Line	NUM PAD 6	- Move to Next	CAPS LOCK +]
Read Focus	NUM PAD 0	- Move to Next	CAPS LOCK +
Sentence	CAPS LOCK + NUM PAD 4	Read to Cursor	Shift + NUM PAD 1
- Move to Next	CAPS LOCK + .	Read from Cursor	Shift + NUM PAD 2
Virtual Focus. Not just for the Internet! Virtual Focus provides keyboard alternatives to mouse functions and keyboard access to applications which normally require a mouse.			
Switch to Virtual Focus (current position)	NUM PAD *	Jump to previous link	L.Ctrl+L.Shift +Cursor Up
Move Virtual Focus to Mouse	Middle mouse button	Jump to first edit area (Interactive Mode)	L.Ctrl+L.Shift +Home
Move by character	Cursor left/right	Jump to next control (button or edit area)	Left Ctrl +Page Down
Move by word	Left Ctrl + cursor left/right	Jump to previous control (button or edit area)	Left Ctrl +Page Up
Move by line	Cursor up/down	Jump to Quick Launch Toolbar	Left Shift + NUM PAD *
Move to next/previous object	Tab/Left Shift Tab	Jump to Toolbar	Left Shift + NUM PAD -
Start of line	Home	Move mouse pointer to Virtual Focus	Right Ctrl +Delete
End of line	End	Select/press	Enter
Jump to next text (skip links)	L.Ctrl+ L.Shift +Cursor Right	Left mouse click	Insert
Jump to previous text	L.Ctrl +L.Shift +Cursor Left	Double click	Insert (x2)
Jump to next link	L.Ctrl+L.Shift +Cursor Down	Right mouse click	Delete

Table 5: Supernova-Hotkeys
Source: Supernova- Tips and Tutorials²¹

²¹ http://www.yourdolphin.com/online_tutorials.asp?act=next (14.1.08)

3) *Using Supernova to navigate the World Wide Web*

The World Wide Web provides opportunities in communication, learning and in the management of day-to-day living. Supernova provides a wealth of features that help you navigate through the rich content that is found on the web pages. The first step in understanding web navigation is to understand the role of the virtual focus.

The *Virtual Focus* is a simulated cursor which can be used to review the contents of the screen in situations where using a live cursor is not practical. An application's focus, such as a flashing beam cursor in an edit area, a highlight in a menu or a dotted box in a dialog box, are all intelligently and automatically tracked by Dolphin's software. This is referred to as tracking the live focus. On the other hand, the virtual focus mode allows you to navigate windows or parts of the screen where an application's focus cannot go. This is a special sort of focus created and controlled by the screen reader, so it does not really exist as far as an application is concerned. This is why it is referred to as virtual! If we want to interact with a document or application, such as typing in text on web pages, we need to switch from *Virtual Focus* to *Live Focus*. *NUMPAD Minus (-)* will Toggle virtual focus mode on / off, and *Left Control + 4* will Toggle automatic virtual focus on / off.

The most practical example of using virtual focus mode is in the navigating and reviewing of HTML content. Such windows do not contain a cursor, meaning it is not possible to simply move line by line through the information displayed. At least not in live mode! But, using virtual focus mode it is possible to move through the page logically and at your leisure. Just like in a word processor, you can read each line, use your screen reader's speak keys and, going further, you can jump through to various objects and even perform searches. The virtual focus mode is powerful and one of the best ways to navigate web pages. The following table (table 6) presents all the necessary hotkeys to be efficient in just not surfing the web but also to efficiently work with the *Supernova ScreenReader and Magnifier*.

Action	Key Press	Action	Key Press
Activation Hot Keys			
Click on a link in virtual focus	Insert	Click on a button in virtual focus	Spacebar
Virtual Focus Hot Keys			
Toggle Auto VF Mode	Left Control + 4	End of line	End
Left a character	Cursor Left	Skip back	Left Control + Cursor Up
Right a character	Cursor Right	Skip ahead	Left Control + Cursor Down
Left a word	Left Control + Cursor Left	Go to top of page	Left Control + Home
Right a word	Left Control + Cursor Right	Go to end of page	Left Control + End
Previous line	Cursor Up	Next object (e.g. link)	Tab
Next line	Cursor Down	Previous object (e.g. link)	Left Shift + Tab
Start of line	Home		
Heading Navigation Hot Keys			
Previous heading	Previous heading	Next heading	Next heading
Find, Routing and Table Navigation Hot Keys			
Find in virtual focus	F3	Previous table	Dolphin Key + Home
Find previous	F2	Next table (e.g. link)	Dolphin Key + End
Find next	F4	Table row navigation	Cursor Up / Down
Route virtual focus to mouse	Middle Mouse Click	Table column navigation	Dolphin Key + Cursor Up / Down
Toggle Verbosity Schemes			
Toggle speech verbosity	Dolphin Key + Equals	Toggle Braille verbosity	Left Shift + Dolphin Key + Equals
Text Selection			
Mark starting character (drag)	Right Control + Home	Mark end character (drop)	Right Control + End
Forms And Labels Hot Keys			
Toggle forms mode	Dolphin Key + Enter	Exit interactive mode and go to next control	Tab
Select check box or radio button in virtual focus	Spacebar	Speak label left	Dolphin Key + NumPad 7
Enter interactive mode	Enter	Speak label above	Dolphin Key + NumPad 8
Exit interactive mode	NumPad Minus		
Custom Virtual Focus Hot Keys			
Jump to first edit area	Left Control + Left Shift + Home	Move to previous link	Left Control + Left Shift + Cursor Up
Move to previous control	Left Control + Page Up	Move to next link	Left Control + Left Shift + Cursor Down
Move to next control	Left Control + Page Down	Move to previous frame	Left Control + Left Shift + Page Up
Move to previous text (skip links)	Left Control + Left Shift + Cursor Left	Move to next frame	Left Control + Left Shift + Page Down
Move to next text (skip links)	Left Control + Left Shift + Cursor Right		
Dolphin List Utility Hot Keys			
List of links	Dolphin Key + 1	List of frames	Dolphin Key + 3
List of headings	Dolphin Key + 2	List of tables	Left Shift + Dolphin Key + 1
Internet Explorer Hot Keys			
Go to previous page	Alt + Cursor Left	Stop page downloading	Escape
Go to next page	Alt + Cursor Right	Go to a new location	Control + O
Refresh the current page	F5	Go to your home page	Alt + Home

Table 6: Supernova Hotkeys -Getting Started on the Internet
Source: Supernova- Tips and Tutorials²²

²² http://www.yourdolphin.com/online_tutorials.asp?act=next (14.1.08)

3.3. ICT for persons with visual impairments in Tanzania

Before looking at what ICT currently exists for visually impaired persons in Tanzania, let us briefly take a look at the general ICT environment in Tanzania. Due to the fact that I have just spent some few days in Tanzania, which was not enough to fully investigate the status of ICT there, I will rely in this section on the *National ICT Policy* (2003) of the *United Republic of Tanzania* and on my personal observations.

Due to significant efforts by Tanzania's government reforms, the liberalization of the telecommunication sector, the emerging private sector and entrepreneurship, and official development assistance, the ICT environment is slowly but surely taking a serious fly. We can summarize the overall situation of ICT in Tanzania as follows:

➤ **Infrastructure:**

- Public Switched Telephone Network (PSTN) is using fibre optic, microwave and satellite-based link.
- Radio and television are a liberalized broadcasting sector.
- Low teledensity (population coverage): An estimation made by the Tanzania Communication Regulatory Authority (TCRA), shows that, in terms of population coverage, about 17 out of 100 Tanzanians own a voice telephone line. The data further shows that majority of Tanzanians (83%) have no telephone lines.

➤ **Internet availability:**

- There are more than 23 Internet Service Providers (ISPs)
- Lack of affordable tariffs

➤ **Hardware and Software:**

- No local manufacturer of ICT equipment
- Very limited in-house software development
- There is a real need of open source initiatives

- Small emerging skilled capacity to support the ICT industry in terms of developing, selling or supporting hard- and software
- **Educational access to ICT**
 - Few educational institutions are equipped with computer laboratories and other multimedia facilities, and fewer of these are linked to the internet.
 - Few available computers at Universities and other institutions of higher learning
- **ICT in everyday life and at the workplace**
 - Many computer users access the internet through Internet Cafés.
 - There is sufficient evidence that several large organizations and companies make extensive use of networked computers, some with internet access.

The National ICT Policy of the United Republic of Tanzania (2003²⁴) is a good starting point to get an overview of what is the stand of ICT in Tanzania. Another very good starting point to get more information on ICT not only in Tanzania but more generally on the African continent is the web site of the *Association for Progressive Communications (APC Internet and ICTs for Social Justice and Development*²⁵), which has as its primary goal to enable African civil society organizations to engage in ICT policy development to promote an information society based on social justice and human rights.

What about ICT for persons with visual impairments in Tanzania? While a large enthusiasm can now be observed in Tanzania to facilitate the deployment, utilization and exploitation of ICT in all sectors of life, I was really surprised that ICT is currently not a hot theme for associations of and for visually impaired persons in Tanzania. That really sounds for me like a paradox. In my discussions members of associations dealing with persons with visual impairments *Advocacy, Lobbying, Access to information* where words which often came up in the conversations, they did not seem to consider their right to ICT. It was for me very difficult to dissociate

²⁴ <http://www.tanzania.go.tz/pdf/ictpolicy.pdf> (14.1.08)

²⁵ <http://www.apc.org/> (14.1.08)

access to information, advocacy and lobbying from ICT. Talking about ICT for persons with visual impairments in Tanzania we can say that, apart of:

- some computers that are in possession by some associations of and for blind persons (and uniquely used by sighted persons);
- the recently donated 10 Dolphin Pens and 1 Braille embosser by *Light for the World*
- very few individuals who are in possession of some private assistive tools;

the status of ICT for persons with visual impairments in Tanzania is not even at a beginning phase. In fact there is a large gap between sighted persons and persons with visual impairments concerning ICT in Tanzania. Furthermore, it is also a fact that despite the claimed efforts done by Tanzania's government to facilitate the utilization and exploitation of ICT in all sectors of life, the general public (persons with and without sight) is still not aware of the role and potential of ICT. Therefore, it is very important that any initiative to promote the development of the ICT sector in Tanzania should already take into consideration persons with visual impairments. We will argue in this thesis, that ICT can particularly play an important role for associations dealing with persons with visual impairments to reach their intended objectives. As ICT has the potential to facilitate access to information, and because information is power, the logic deduction is that ICT will therefore help persons with visual impairment in Tanzania to empower themselves.

Chapter 4

Project example: “Inclusive Tanzania

– access to ICT for persons with visual impairments”

The aim of this chapter is first to generally present the project “Inclusive Tanzania”. After that, we will then analyse how the project has made information technology available to persons with visual impairments. What technology has been chosen and why? How was the training organized and received?

4.1. “Inclusive Tanzania” - Project Description²⁶

The project “Inclusive Tanzania – inclusive education and political participation of persons with disabilities through empowerment and capacity building” is a joint project by *Light for the World – Christoffel Development Cooperation*²⁷ and the *Information Centre on Disability (ICD)*. *Light for the World* is an Austrian non-governmental development organization (NGDO), founded in 1988 and active in the area of prevention of blindness, rehabilitation of persons with disabilities and advocacy for the rights of persons with disabilities. In 2007, *Light for the World* supported 91 projects worldwide. The *Information Centre on Disability (ICD)* is a Tanzanian NGDO, founded in 1998 working on inclusion of disability issues in the Tanzanian public. In 2007 ICD implemented five advocacy and

²⁶ The information on the project description is taken from personal interviews with the project coordinators of the *Information Center on Disability* and *Light for the World* as well as the project website www.inclusive-tanzania.org (14.1.08) and the official project description (see Annex 3)

²⁷ www.light-for-the-world.org (14.1.08)

awareness raising projects in several regions of Tanzania. ICD is one of the few Tanzanian NGOs for persons with disabilities, represented in policymaking structures in Tanzania. ICD has the overall local coordination responsibility of the project; a full time project coordinator is located at their office.

The project “Inclusive Tanzania” has a time frame of four years (November 2005 up to December 2009) and is implemented in two regions of Tanzania (three districts in Dar es Salaam and one district – Mwanza - in the Kilimanjaro Region) as well as on the national policy level. The overall objective of the project is to realize an inclusive and barrier free society in Tanzania where persons with disabilities can participate equally and fully. Two socio-political areas have been selected as priority areas for the realisation of an inclusive development in Tanzania: inclusive primary education of children with disabilities and equal political participation of persons with disabilities.

According to the project description, the project methodology is based on a human rights based approach to development. Within that approach persons with disabilities are not asking for charity but they are considered as right holders with entitlements. Equally the government, the international community and the village community are identified as duty-bearers with obligations to realize human rights as set out upon the norms and values in international law. The *Office of the United Nations High Commissioner for Human Rights* (OHCHR, 2006) defines poverty as disempowerment or exclusion and development as access to all fundamental human rights and freedoms, including social, economic, cultural, civil and political rights. Therefore, a human rights based approach to development aims at the promotion and protection of human rights. It seeks to analyse inequalities and to redress discriminatory practices and unjust distributions of power. Within the framework of the project “Inclusive Tanzania” this means that persons with disabilities and their representative organizations have to empower themselves to claim their rights. On the other hand the government, the international community, the village community etc. must eliminate all physical, social, legal barriers that hinder the full and equal participation of persons with disabilities in society.

This advocacy project is planned, implemented and evaluated through a participatory process by the prime target group itself, persons with disabilities and their representative organizations. The project structure is composed of the *Inclusive Tanzania Consortium (ITC)*, an advocacy alliance of 10 disability organizations

founded at the project’s Kick-off-Workshop in March 2006, a steering committee, several work groups and the project coordinators. The project also uses the synergies between advocacy at local, national as well as international levels. Therefore, the close cooperation between the project coordinators of *Light for the World* and the *Information Centre on Disability* is very important. Furthermore the project is accompanied by an expert institution in human rights, the Austrian *Ludwig Boltzmann Institute of Human Rights* (BIM)²⁸. Its task is to publish a “Manual for Inclusion” after the completion of the project so that the lessons learnt and good practice examples are made available for other development organizations.

Project structure:

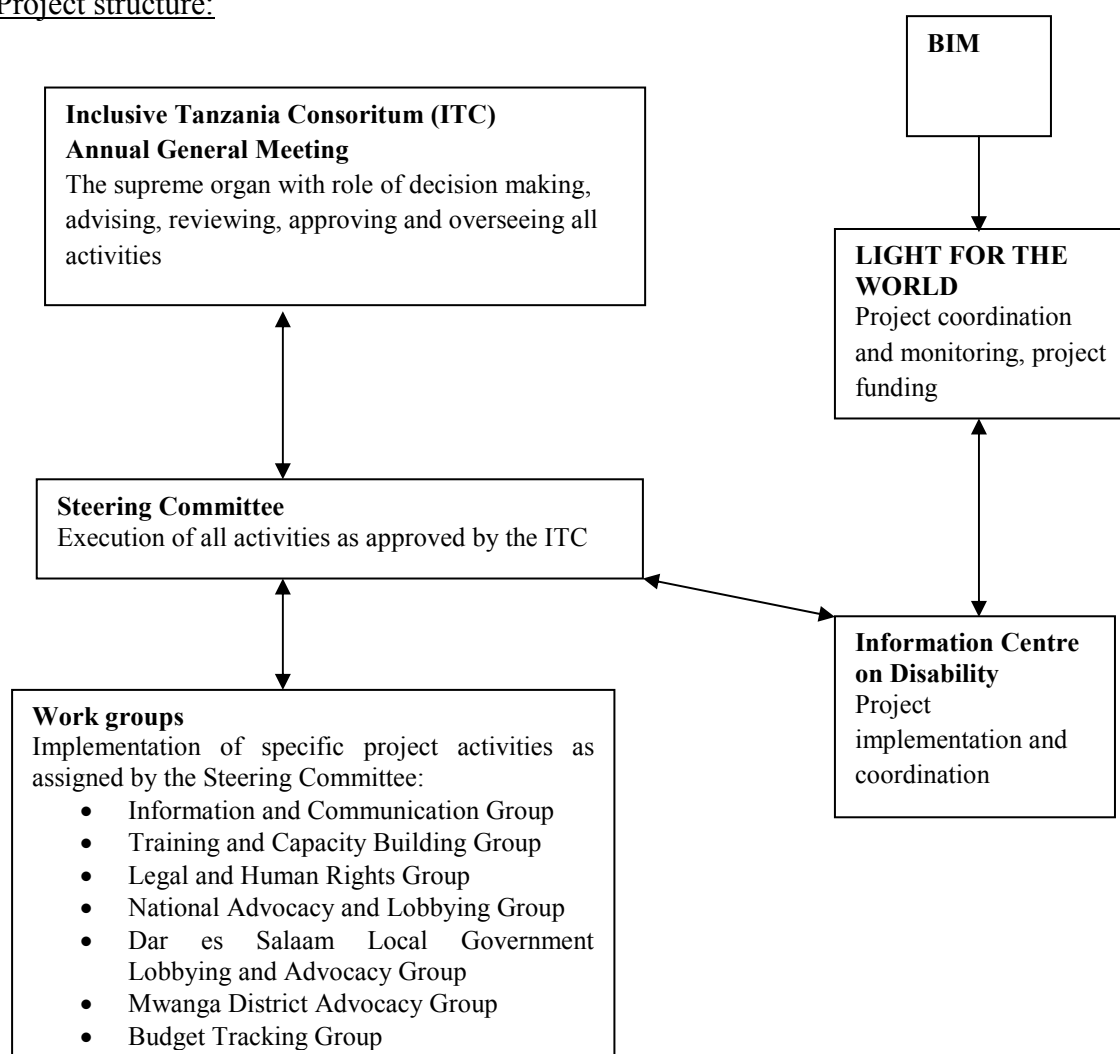


Figure 6: Project Structure “Inclusive Tanzania”,
Source: www.inclusive-tanzania.org²⁹ (14.1.08)

²⁸ <http://www.univie.ac.at/bim/> (06.2.08)

²⁹ www.inclusive-tanzania.org (14.1.08)

As of December 2007 the following organizations were participating in the ITC:

1. *Information Centre on Disability* (ICD), Coordinator, member without vote
2. *Tanzania League of the Blind* (TLB)
3. *Tanzania National Institute for the Blind* (TNIB)
4. *Tanzania Society for the Blind* (TSB)
5. *Tanzania Albino Society* (TAS)
6. *Tanzania Association of the Deafblind* (TASODEB)
7. *Tanzania Association of the Deaf* (CHAVITA)
8. *Tanzania Society for the Deaf* (TSD)
9. *Tanzania Association of the Mentally Handicapped* (TAMH)
10. *Mwanga Union of Persons with Disabilities* (MUPWD)

The main project activities as identified by the project coordinators and as outlined in the project description are:

1. **Capacity building** through the organization of tailor-made trainings, equipment with necessary infrastructure, development of a common identity and common advocacy concepts, strategies and contents, development of project ownership by the primary target group, development of partnerships and alliances
2. **Advocacy and Lobbying** through development of relations with important decision makers at the national, regional and district level, the demand of and contribution to the development of new laws, policies and programmes, the review of public expenditures and demand for appropriate state budgets for disability issues, as well as advocacy for the rights of individual children with disabilities to be included in their local schools
3. **Awareness Raising** of the public through the radio, TV and print media, publication of a newsletter, organisation of public discussions, visit of schools and families, and cooperation with various opinion leaders

To summarise, the main components of the **project concept** are:

- the development of a social movement rather than a service delivery organisation,
- project implementation through an alliance rather than through a single organisation,

- investment in time consuming processes for the development of local ownership, with the objective of assuring project sustainability
- concrete project objectives such as inclusive education and political participation instead of capacity building as objective per se
- the use of synergies between local and global advocacy
- the exchange of experiences between the rural and the urban project regions
- close support by *Light for the World* as well as flexibility in the project implementation
- mobilisation of the grassroots and securing an impact for the prime target group
- “learning by doing” as a method of empowerment

According to my interviews with the two project coordinators and the project activity reports, the following activities have been carried out in the last two years:

1. Alliance Building and Capacity Building

The main focus of the project activities so far was on building a functioning advocacy alliance. Before the start of the project, the various disability organisations used to work independently, each competing for resources and influence. However, through the project they have agreed to come together and speak with one voice, so that they can have influence on national policy making. The list of trainings organised by and for the ITC during the first two years reflects this focus of alliance building:

- Organisational development and conflict resolution (June 2006)
- Advocacy and Lobbying Skills (July 2006)
- Development of Advocacy Strategies and Materials (Oct. 2006)
- The concept of Inclusive Education (Feb. 2007)
- Work Group Organization (Feb. 2007)
- How to build a strong disability movement (Aug. 2007)
- Legal and Human Rights (Sept. 2007)
- Inclusive Education in Practice (Dec. 2007)

Furthermore, in order to develop a common vision the steering committee spent considerable time with the member organisations as well as potential partner organisations to discuss their fears and objections with them.

Concerning the provision of necessary infrastructure, the project coordinator in Tanzania was provided with a PC, digital camera and a digital recorder. Three ITC member

organisations also received a PC and all organisations that were not already connected, were paid the registration fee for the internet connection and the internet fees for the first three months. One major challenge was the provision of all project information to persons with visual impairments; this issue will be discussed in detail in chapter 4.2.

2. Mwanga District:

In Mwanga District, there was no active disability organisation at project start. Due to the efforts by some very motivated individuals, it was possible to quickly form the *Mwanga Union of Persons with Disabilities* (MUPWD) and to develop good relationships with the district authorities and schools. Only in a few months time after founding the MUPWD in August 2006 they had succeeded in building one school class for children with mental disabilities and to get two special needs teachers from the government deployed to that school by early 2007. Although this kind of special education is not fully in line with the concept of inclusive education, it was a good start for the project and proofed that it is possible to have success through lobbying. In December 2007, another training on Inclusive Education was organised. Now the MUPWD, the teachers, parents' representatives and district representatives of Mwanga understand that children with disabilities have the right to be fully included in their families, communities and the schools and must not be separated. They have developed a new plan how to realise inclusive education in 5 schools in the district.

3. Advocacy and Lobbying:

In the four project districts in Dar es Salaam the ITC established links with the district education officers, enquired about the situation of children with disabilities and facilitated an exchange between the different districts. On the national level, the government is currently developing a new Education policy, Education Act and Disability Act. The ITC has already been invited three times by the government in the framework of civil society consultation workshops to give their opinion on the Education policy and Act, which will be finalised in 2008. Furthermore the ITC has successfully initiated a *Public Expenditure Review* (PER) on Vulnerable Groups in September 2007. PERs are part of the formal structure within the national budget process, facilitating coordination between the government, the international donor community and non-state actors in Tanzania. With the establishment of the PER on Vulnerable Groups, the ITC will be able to enquire about budget spending on Inclusive Education, conduct specific research and feed in their experiences from the local level. Consequently, the ITC is no longer constrained to lobbying ministries but can voice their

interests and demand transparent budget expenditures through a formal process. This will very much facilitate their advocacy work.

4. Awareness Raising

ITC has established good relationships with the *Media Network on Disability* (MNOD) and gets substantive media attention when organising public manifestations such as the *International Day of Persons with Disabilities* or the *International Day of the Child*. The project has produced a newsletter and has aired a large number of programmes on national and local TV and radio stations.

4.2. “Inclusive Tanzania” and ICT for persons with visual impairments

4.2.1 Background

The project description of the project “Inclusive Tanzania” clearly states that one main principle of the project is to provide access to information to all persons with disabilities, that means to provide sign language and tactile sign language interpreters during workshops and meetings and to print all materials in large print for persons living with low vision as well as in Braille for blind persons. However, as the project developed it became evident that blind persons were often deprived of their right to information as not all materials were printed in Braille. The two blind persons in the steering committee, Grayson Lazaro of the *Tanzanian League of the Blind* (TLB) and James Shimwenye of the *Tanzanian National Institute for the Blind* (TNIB) started to seriously voice their complaints during the Internal Evaluation Workshop and Annual General Meeting of the ITC in December 2006, where *Light for the world* was also present. It was agreed that the ITC should submit a project proposal to *Light for the World* as soon as possible.

4.2.2 Needs identification³⁰

In February 2007 a project proposal entitled “Inclusive Tanzania Project: Access to Information for Visually Impaired Persons” (Annex 4) was submitted to *Light for the World*. In its chapter “6; Problem Justification” it reads,

³⁰ see also Annex 4

“Up to now the Inclusive Tanzania Project has accomplished significant achievements in the realization of its goals. Distribution of information materials to stakeholders and a wider public has been carried out successfully. However, ... due to the lack of appropriate infrastructure, visually impaired persons are yet to be addressed in an appropriate way. In Tanzania, Braille printing services are scarce; ...”

According to this project proposal and my own enquiries during my research visit, the only Braille printers available were the following:

➤ **Tanzania Braille Printing Press:**

This press is owned by the Ministry of Education and Culture and therefore produces mainly school books in Braille for primary and secondary schools. Although the Braille Press acquired a new Braille embosser (PED 30) in 2006, it is still waiting for the installation of the necessary software. Therefore it is still embossing all school books manually by more than 10 employees. In my interviews I was told the rumours that the problem was not the unavailability of the missing CD for the installation of the powerful PED 30 but the unwillingness to install it as this would mean that less personnel would be needed.

The Press does not identify itself as a service provider to non-State actors and therefore charges high sums when printing for private institutions. When the ITC produced 100 Braille copies of the project newsletter the charged costs were 1,171,000 TSh/664,58 EUR (11,710 TSh./copy or 6,65 EUR/copy)³¹. Another disadvantage of printing materials at the Braille Press is that the customers have to accept the press' schedule so that calculating the required time is difficult. The biggest problem by far is that the Press does not even offer service for a fixed price and moreover refuses to give out receipts. Furthermore the Press only agrees to print publications or large reports and refuses to print short protocols or letters.

➤ **Braille Embosser of the Dar es Salaam University Special Education Unit:**

This embosser was purchased specifically for use by visually impaired students. None of the services provided by this unit (including embosser, Perkins Brailler, Thermoform) are available for private customers or NGOs. When one ITC member went there to make copies of a workshop handout, service was only offered as a favour, not in terms of business.

³¹ 1 EUR = 1.762,02 TSh (Tanzania Shilling) as of July 2007

The following **manual techniques** for printing Braille are used by visually impaired members of the Inclusive Tanzania project:

➤ **the Perkins Braille:**

Perkins Braille are widely available in Tanzania, there is even one in the ICD office. This device is used similarly to a typewriter, but only types Braille. A brailist can transcribe one print page into Braille in about 15 minutes. One print page equals to about three brailled pages as Braille takes a lot more space than printed language. After brailing, the papers are taken to a Thermoform for copying.

➤ **the Thermoform:**

This electric machine produces copies of brailled papers through using heat. To make a copy, a piece of braille paper (plastic paper) is put inside the Thermoform, heated and put on top of the brailled page. That way, one copy can be produced in about 30 seconds. Such Thermoforms can be found at the *University of Dar es Salaam Special Education Unit*, the *University College of Education* and at the *Tanzania Society for the Blind*. Braille papers are available in different shops in Dar es Salaam and one role of 200 sheets of papers costs about 15,000 TSh/8,51 EUR³².

➤ **the Slate:**

The slate, another manual device for brailing, is usually only used for notes taking and not for typing project reports etc. because it is too time consuming.

Besides of being deprived their right to access printed materials, visually impaired persons were also excluded from **access to electronic information** like Internet, emails and electronic documents because of the lack of translation equipment (f.ex. Dolphin Pens). Although the ITC member organisations had all been connected to the internet, visually impaired persons so far did not have the possibility to access the electronic information by themselves and always needed an assistant to read and write on their behalf. Hence, there was a strong need to equip them with the required devices for their efficient and effective participation in the project. According to my research, so far in Tanzania only three blind persons are using the PC independently. Those are: 1) Mr. Frederic Mkatambe, advocate, employee at the *Legal*

³² 1 EUR = 1.762,02 TSh as of July 2007

and Human Rights Centre and Board Member of ICD, 2) Mr. Emanuel Simpungwe, Director of the *Tanzanian League of the Blind*, and 3) Mr. Peter Mlahaladala, PhD student.

The concept note concludes, that according to the needs identified, the objective of the project must be to purchase

- one Braille embosser for the project
- and ICT (Dolphin Pens) for use by visually impaired members of the project.

The Braille embosser will quicken production of project reports and other relevant materials for the visually impaired. The Dolphin Pens, on the other hand, would enable visually impaired persons to access the latest information from any electronic source independently. The concept paper also included a list of required activities for the implementation of this sub-project as well as a cost-benefits analysis, which we will discuss in detail in chapter 5.

4.2.3 Braille embosser

1. Purchase of a Braille embosser³³:

After studying the project proposal, *Light for the World* agreed to purchase one Braille embosser for the ITC. Therefore, the first task for the project coordinators was to enquire about the type of embosser needed. *Light for the World* consulted its visually impaired members as well as specialised institutions, such as the *Austrian National Institute for the Blind* and the *World Blind Union* branch for East Africa in Nairobi. It asked for offers from various producers such as *Index Braille* Sweden, *Enabling Technologies* USA and *Braillo* Norway. Finally, the following criteria for selecting a suitable Braille embosser for the Inclusive Tanzania project were identified:

- What Braille paper is available in Tanzania?
- Tractor feeding of paper is not necessary, as there is manual help available if paper should get stuck.
- Double-sided printing is important in order to save paper costs.
- Embosser must support rough environment, dust, power cuts.
- Embosser should be easy to handle.

³³ Information provided by *Light for the world*

- Embosser should have a high speed of embossing (signs per second).
- Embosser should support translation software in Swahili language.
- Service must be available.
- Embosser should work with the regular computer and software (Windows 2000) available.
- and last but not least the price;

After thorough screening of all products available, the *Index Everest* by *Index Braille* Sweden was selected as the most suitable product. It is a small embosser mainly used for office purposes. It has a very good printing quality, high printing speed and easy handling. Most importantly, it uses single cut sheet papers that can also be purchased locally in Tanzania. These cut sheet papers can be locally produced paper of suitable card quality, and therefore helps to reduce paper costs compared to imported specially produced tractor fed Braille paper, which many other embossers use. Indeed, most other embossers use tractor-fed paper that must be imported in large paper rolls, while the *Index Everest* only uses single sheets of paper that can be special Braille paper to print in high quality or even normal cardboard paper. The sheet feeder may be loaded with seventy sheets of normal card stock type and it can easily be adapted to the used paper size.

With a production of 300 pages per day, the producer predicts service needed after 2-3 years. Although *Index* has no active distributor in Tanzania, there are distributors in Africa with service knowledge. Furthermore the *Index Everest* comes with the *Win Braille editor* which also translates Swahili language and can be installed on Windows operating systems such as *Windows 1998*, *Windows 2000* and *Windows XP*. Furthermore, the *Index Everest* was the cheapest double-sided printer available. The *Index Everest* is the most used embosser for cut sheet paper on the global market.



Figure 7: *Index Everest Braille Embosser*
 Source: <http://www.indexbraille.com/> (14.1.08)

Light for the World then compared the prices for the *Index Everest* by the producer as well as different distributors and got a very good offer by the Austrian company, *TSB Transdanubia Technik für Sehbehinderte und Blinde*³⁴. TSB offered to sell a new *Index Everest* including software at cost price and advised *Light for the world* to purchase special Braille paper for high quality productions with the *Tiroler Blindenverband*, who also offered to sell the paper at cost price to *Light for the world*. Furthermore the shipping costs were sponsored by the transport company *Cargo Partners* at cost price too. The Braille embosser, the software and the paper were sent to Tanzania in July 2007 when I was conducting my field research. Therefore I was present when the embosser arrived and was asked to install it in the ICD office. The installation went on without complications and I trained the ICD Information Officer, Mr. Mohamed Kajembe how to use it.

2. Terms of Reference for using the embosser³⁵:

The steering committee during its quarterly meeting of 3rd and 4th of July 2007 agreed that the following ITC member organisations should be given first priority for printing with the embosser: ICD, TLB, TNIB, TSB, MUPWD. However, the other ITC member organisations are also allowed to use the embosser, if they need to print Braille materials. They further agreed on the following terms on how to use the Braille embosser:

- The embosser should be placed in the ICD office.
- It should be used for printing ITC materials and not to make business.
- Any printing should be authorised by the project coordinator or his assistant if the project coordinator is on leave.
- The project coordinator is allowed to authorise up to 30 pages of normal print and not more than 5 copies.
- More than 30 pages of normal print and more than 5 copies in Braille should get authority from the committee of Braille embosser. This committee is composed of the project coordinator (ICD), Grayson Lazaro (TLB), James Shimwenye (TNIB) and Roy Maeda (TSB).
- All the printings should be done by the Information Officer of ICD under the direction of the ITC project coordinator.
- All prints for the ITC project should be done free of charge.

³⁴ www.transdanubia.at (14.1.08)

³⁵ Source: Protocol of the Steering Committee meetings of July and October 2007

- Printings of use by the member organisations should be done by small cost sharing of 200 TSh per page, which will assist in purchasing Braille papers and cover service requirements.

3. Challenges encountered:

Unfortunately, I was informed that the Braille embosser did not work for some months before one technician managed to re-install it in January 2008. Currently it is working but the largest challenge remains the lack of technicians with adequate know-how to do repairs in case of break-down. Furthermore, the normal office staff fear that they could do something wrong and therefore refuse to involve themselves in reading the manual. Generally, I encountered a huge resistance by ICD staff to read through the manual, as they considered themselves not computer literate enough. I tried to convince them that the manual is written in very simple language so that everybody can understand it and that all steps are described in detail. Still, my experience was that most employees do not want to engage themselves with the handling of the embosser and prefer to leave it to specialists.

4.2.4 Dolphin Pens and Computer Literacy Training

1. The Sightsavers Dolphin Mercury Pen:

During *Light for the World's* enquiries about adequate electronic devices for the Inclusive Tanzania project, it heard about the *Sightsavers Dolphin Pen* project. *Sightsavers International*³⁶ is an international NGDO with headquarters in the UK and more than fifty years of experience. It works in the area of prevention of blindness, restoring sight through specialist treatment and eye care and support to persons who are irreversibly blind by providing education, counselling and training. *Dolphin Computer Access Ltd*³⁷ is a British accessibility software developer. *Dolphin* has developed one of the first commercial screen readers and later innovations like:

- Supernova, a combined magnification, speech and Braille software (see chapter 3.2.3.)

³⁶ www.sightsavers.org (14.1.08)

³⁷ www.yourdolphin.com (14.1.08)

- The *Dolphin Pen*, a portable screen access device that enables the visually impaired person to use any computer just the same way that any other person does. The Dolphin Pen can be put into any PC running Windows XP or Windows 2000 with a USB port. On the flash drive is Supernova software. The pen has four facilities, or consoles, covering magnification, speech, voice input and Braille. Using Supernova, the keyboard can be configured as Braille and can print from ordinary text to Braille when used with a Braille printer. (see chapter 3.2.2.)
- *Pocket Hal*, an access software that works on a Personal Digital Assistant (PDA).

In May 2007 *Sightsavers International* and *Dolphin* launched the *Sightsavers Dolphin Pen*, a simplified version of Supernova pre-installed on the Sightsavers Dolphin Pen. This partnership ensures the *Sightsavers Dolphin Pen* is available at very low price to development partners and projects in developing countries. The *Sightsavers Dolphin Pen* is a variant of the *Dolphin SuperNova*. It offers a low cost combined screen reader and screen magnifier on a USB pen drive enabling users to have complete portability of their access software.



Figure 8: *Sightsavers Dolphin Mercury Pen* (see also chapter 3.2.3.)
 Source: <http://www.yourdolphin.com/productdetail.asp?id=27> (14.108)

Light for the World and the *Information Centre on Disability* (ICD) agreed to purchase ten *Dolphin Mercury Pens* for the “Inclusive Tanzania” project. As this was the first time that ICT for visually impaired persons was purchased to be used in Tanzania, there were no trainers available in Tanzania. The project coordinators therefore had to decide whether they should employ an external trainer to teach a group of blind persons on how to use the pen or to invest in training a local trainer who will remain in the country and become a resource person.

2. Training of trainers:

Sightsaves International and *Dolphin Computer Access Ltd.* organised a training workshop to train trainers of the *Dolphin Mercury Pen* at the *South African National Council for the Blind*, in Pretoria, South Africa between the 2nd and the 5th of July 2007. The project coordinators consequently decided, that it would be the best solution to also send one computer technician from Tanzania to the training in Pretoria. ICD contacted several computer training institutes and finally agreed to cooperate with the *Tanzanian National Institute of Transport*³⁸ (NIT), which is situated just next to the ICD office and has well equipped training facilities. Mr. Edgar Telesphory was selected to become the Dolphin Trainer and was sent to the training in Pretoria. The training in Pretoria was conducted by Mr. Spencer Ellis, Adaptive Technician from Dolphin and Mr. Robin Spinks, Assistive Technology and Disability Adviser from Sightsavers International. It included a two days training on the use of the Dolphin Mercury Pen and a two days training on Map File writing.

I also participated at the very same training and experienced it as very interesting. The participants were mainly blind people from South Africa but there were also participants from other African countries (Kenya, Tanzania, Uganda, Cameroon etc.). The workshop was conducted in a good atmosphere and in a comprehensive manner. I would now be able to teach any person how to use the Dolphin pen, on its advantages and how to take care of pen safety, i.e. anti-virus programmes etc. After the training in Pretoria I travelled to Tanzania where I participated in a meeting between the Steering Committee and Mr. Telesphory, where they decided on the concrete terms of reference for the computer literacy training to the ITC project members.

3. Terms of reference for the distribution and use of the pens:

As already mentioned, *Light for the World* and ICD agreed to purchase ten *Sightsavers Dolphin Pens* which were sent to Dar es Salaam in August 2007. The Steering Committee decided on the following terms for the distribution and use of the pens during their meeting in July 2007³⁹:

- The Dolphin Pens will not be individually owned but will belong to the following organisations:
 - *Inclusive Tanzania Consortium* Steering Committee (ITC): 2 pens

³⁸ www.nit.ac.tz (14.01.08)

³⁹ Information taken from the protocol of the Steering Committee meeting from July 2007

- *Tanzania National Institute for the Blind (TNIB)*: 2 pens
 - *Tanzania League of the Blind (TLB)*: 3 pens
 - *Information Centre on Disability (ICD)* : 1 pen
 - *Tanzania Society for the Blind (TSB)*: 1 pen
 - *Mwanga Union for Persons with Disabilities (MUPWD)*: 1 pen
 - Total: 10 pens
- As soon as the Dolphin Mercury Pens will arrive a training on how to use the pens will be organised.
 - The training will be composed of 20 participants, of which at least 10 will be women.
 - The trainees have to serve as trainers in their respective organisations.
 - Some sighted persons who are computer literate from ITC member organisations will also participate so that they can assist the visually impaired users and in the training within their organisations.
 - As all visually impaired persons are computer illiterate the training needs to start by basic introduction to computer literacy.
 - The following training schedule was agreed:
 - Basic computer literacy: two weeks and one week practice
 - Microsoft Word 2003: two weeks and one week practice
 - Microsoft Excel 2000: two weeks and one week practice
 - Internet surfing and emails: two weeks and one week practice.
 - Two more weeks practice and then final exam.
 - The courses will take part in the evenings, five days a week for three hours each. The training will be concluded with an exam. The diploma certificates will be handed out within the framework of an official graduation ceremony.
 - The Pens and the Training will be publicised through the mass media.

4. Implementation of the training:⁴⁰

The training attracted a lot of interest by persons with visual impairments in Tanzania. Lots of people wanted to participate in the training, so that the ITC is already thinking on how to offer another training in 2008. After the ten pens were received by the ITC they also borrowed eight more pens which were distributed by *Sightsavers Tanzania* to the *Zanzibar*

⁴⁰ Information taken from interviews, quarterly reports and the final report (Annex 4)

National Association of the Blind (ZANAB), so that they had eighteen pens for the training of twenty participants. The training course was conducted between September 17th and December 21st, 2007. Although 20 participants were registered for the training, only 18 managed to attend the class regularly and 16 successfully completed the training by passing the final exam. The trainees came from the following institutions:

- *Tanzania League of the Blind (TLB)*: 6 trainees
- *Tanzania National Institute for the Blind (TNIB)*. 6 trainees
- *Mwanga Union of Persons with Disabilities (MUPWD)*: 2 trainees
- *Inclusive Tanzania Steering Committee (ITC)*: 2 trainees
- *Tanzania Braille Printing Press*: 3 trainees
- *Information Centre on Disability (ICD)*: 1 trainee

The project organised an official inauguration ceremony during the Annual General Meeting of the ITC at the end of December 2007 where it attracted a lot of media interest, there was even a documentary shown on National Television. However, already before the inauguration ceremony, the training had attracted the interest of the media as well as of public officials. One article in the national Newspaper shows Mr. Grayson Lazaro, member of TLB and of the ITC Steering Committee demonstrating how blind persons use the computer in front of the Vice Minister of Health of Zanzibar and the Vice Minister of Health of Tanzania Mainland during the Celebrations of the White Cane Day on October 15th.



Figure 9: Grayson Lazaro, demonstrating how a blind person can use a computer to the Vice Minister of Health of Zanzibar and the Vice Minister of Health of Tanzania Mainland during the White cane day.
 Source: ICD quarterly project report July-September 2007.

This shows that there is indeed great amazement about the abilities of blind persons to use the computer (see also chapter 3.3.). As we have said above, this is the first time that persons with visual impairments are supplied with assistive devices and are trained on how to use a computer independently on Tanzania mainland.

4.2.5 Audio Tapes⁴¹

The *Austrian Association of the Blind*⁴² (ÖBV) through Mr. Erico Zeyen, Board Member of *Light for the world*, donated 7600 pieces of audio tapes, which were sent at cost price by the transport company *Cargo Partners* to Tanzania in April 2007. The ÖBV has a hearing library, where thousands of books are available in audio format. Formerly the books used to be recorded on audio tapes, now they have all been transformed on Audio CDs. Therefore, the ÖBV liquidated their old tapes and donated them to several organisations, among them *Light for the World*.

The 7600 audio tapes were shared among the following organisations:

S/N	ORGANISATION	NUMBER OF CASSETTES
1	TLB	2500
2	TSB	1000
3	TNIB	2000
4	ICD	1000
5	MUPWD	1000
6	Uhuru Mchanganyiko Primary School	100
TOTAL number of audio cassettes		7600

Table 7: Distribution of Audio Tapes, Organisations and numbers received.
 Source: ICD quarterly project report July-September 2007.

The tapes were distributed to schools and individuals with visual impairments and will be used for the development of an audio library at the ICD office.

4.2.6 Accessible website

The “Inclusive Tanzania” project has its own website, www.inclusive-tanzania.org, which was developed by a local web designer under directions of the project coordinator. However, *Light for the World* criticized that the website was not accessible to persons with visual

⁴¹ Information provided by *Light for the World*

⁴² Österreichischer Blinden- und Sehbehindertenverband ÖBV www.oebv.at (14.01.08)

impairments. As the local website programmer did not have experience in programming accessible websites he was provided with manuals and directions for revising the site.

For example, the World Wide Web Consortia based on recommendations from the *Web Access Initiative*⁴³ have issued guidelines for web content developers. However, web technology is constantly changing and such guidance is in need of on-going revision. The RNIB has started a Digital Campaign⁴⁴ which provides advice and information on developments such as on-line services and seeks to encourage good practice in this area. Currently, the project website is under construction and should be online with a new accessible version soon.

⁴³ <http://www.w3.org/WAI/> (14.01.08)

⁴⁴ <http://www.rnib.org.uk/digital/> (14.01.08)

Chapter 5

”ICT for persons with visual impairments in Tanzania” – Cost-Benefit Analysis and Lessons Learnt

The chapter will first define how to conduct a Cost-Benefit Analysis and its role within project management. I will analyse the costs and consequently the benefits of the project. Then I will critically analyse the project implementation and give recommendations and lessons learnt. Finally, I will reflect how a large scale project which provides ICT to persons with visual impairments all over Tanzania could be developed.

5.1. Definition of a Cost-Benefit Analysis

The Cost-Benefit Analysis (CBA) is an economic tool to aid social decision-making, and is typically used by governments to evaluate the desirability of a given intervention in markets. The process involves monetary value of initial and ongoing expenses versus expected return. Constructing plausible measures of the costs and benefits of specific actions is often very difficult. Many components of benefits and costs fail to suggest methods of measurement. In the framework of a CBA all components must have a common unit of measurement, most commonly money. This means that all benefits and costs of a project should be measured in terms of their equivalent money value. CBA is mainly used to assess the value for money of very large private and public sector projects such as the construction of infrastructure. However, especially in these projects the costs and benefits are often difficult to express in financial or monetary terms (e.g. environmental damage). The method

then tries to put a financial value on intangible costs and benefits (e.g. environmental damage), which of course can be highly subjective.⁴⁵ The European Commission (EC, 2004:135) defines a Cost-Benefit Analysis as follows:

“Cost-benefit analysis involves the valuation of the flow of the project’s costs and benefits over time to determine the project’s return on investment. A comparison is made between the situation ‘with’ and ‘without’ the project to determine the net benefit of the project.”

The CBA can therefore be part of a project evaluation after completion of a project. It can however be also part of a feasibility study to decide on whether the project is worthwhile initiating. Within the framework of development projects, the benefits of the project are very often difficult to measure in financial terms. As in our project example “Inclusive Tanzania” the project concept is based on a human rights based approach and therefore the realisation of human rights is the overall objective, which cannot easily be valued in money. Still, CBA can be part of the study of efficiency of a project. However, CBA on its own will not be enough to analyse the success of a development project, there are more criteria that need to be taken into account. In order to understand how development projects are designed, implemented and evaluated, we will now look at the project cycle management, and then we will study the logical framework analysis which will lead us to the logical framework matrix. Finally, we will conclude which criteria are necessary for the evaluation of a development project, and how a CBA fits into these criteria.

The project cycle usually includes five different phases, namely programming, project identification, project formulation, project implementation and evaluation and audit. During the programming phase the general policies and programmes of an institution are developed. During the identification phase, possible projects and partners are identified and studied within the framework of feasibility studies. The formulation phase already includes the design of activities, budgets, stakeholders etc. During the implementation phase, the project is carried out according to the plan and is constantly monitored. During mid-point or after completion of the project, it might be evaluated (internally or externally) and an audit (financial and or qualitative) will be conducted (*Figure 10*).

⁴⁵ http://en.wikipedia.org/wiki/Cost-benefit_analysis (14.01.08)
<http://www.sjsu.edu/faculty/watkins/cba.htm> (14.01.08)
http://www.mindtools.com/pages/article/newTED_08.htm (14.01.08)
<http://management.about.com/cs/money/a/CostBenefit.htm> (14.01.08)

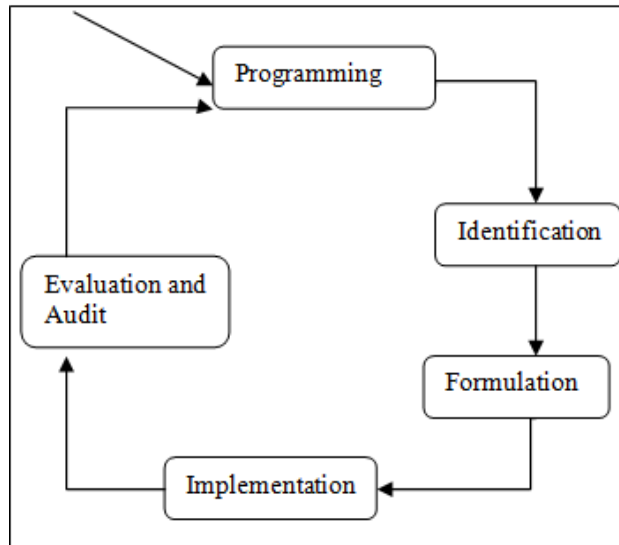


Figure 10: *The Project Cycle (EC, 2004: 16)*

According to the European Commission (2004:17) Project Cycle Management (PCM) helps to ensure that project are:

- *“supportive of overarching policy objectives... ;*
- *relevant to an agreed strategy and to the real problems of target groups/beneficiaries;*
- *feasible, meaning that objectives can be realistically achieved within the constraints of the operating environment and capabilities of the implementing agencies;*
- *and that benefits generated by projects are likely to be sustainable.”*

PCM requires the active participation of key stakeholders and uses the *Logical Framework Approach (LFA)* as an analytical tool to analyse and organise information in a structured way. The LFA therefore is an analytical process for assessing the project. The LFA is now applied by most multi-lateral and bi-lateral aid agencies, international NGOs and by many governments. It was developed in the late 1960’s to assist the US Agency of International Development (USAID) to improve its project planning and evaluation system. It comprises tools such as the stakeholder analysis, the problem analysis, the objective setting and the strategy selection. One important part of the LFA is the development of a Logical Framework Matrix (LFM or Logframe).

The Logframe is a management tool, which summarises the key elements of a project plan, namely, the project’s hierarchy of objectives, the key external factors critical to the project’s success and how the project’s achievements will be monitored and evaluated. Furthermore, it also provides the basis on which the resource requirements (inputs) and the costs (budget) are determined. The Logframe therefore serves as the documented product of the analytical process within the LFA. It is now widely used in development cooperation and all official development projects are now analysed and documented within the framework of a Logframe. The following table (*table 8*) shows the typical structure and information contained in a Logframe Matrix.

Project Description	Indicators	Source of Verification	Assumptions
<p>Overall objective: The broad development impact to which the project contributes – at a national or sectoral level (provides the link to the policy and/or sector programme context)</p>	Measures the extent to which a contribution to the overall objective has been made. Used during evaluation. However, it is often not appropriate for the project itself to try and collect this information.	Sources of information and methods used to collect and report it (including who and when/how frequently).	
<p>Purpose: The development outcome at the end of the project – more specifically the expected benefits to the target group(s)</p>	Helps answer the question ‘How will we know if the purpose has been achieved’? Should include appropriate details of quantity, quality and time.	Sources of information and methods used to collect and report it (including who and when/how frequently)	Assumptions (factors outside project management’s control) that may impact on the purpose-objective linkage
<p>Results: The direct/tangible results (good and services) that the project delivers, and which are largely under project management’s control</p>	Helps answer the question ‘How will we know if the results have been delivered’? Should include appropriate details of quantity, quality and time.	Sources of information and methods used to collect and report it (including who and when/how frequently)	Assumptions (factors outside project management’s control) that may impact on the result-purpose linkage
<p>Activities: The tasks (work programme) that need to be carried out to deliver the planned results (optional within the matrix itself)</p>	(sometimes a summary of resources/means is provided in this box)	(sometimes a summary of costs/budget is provided in this box)	Assumptions (factors outside project management’s control) that may impact on the activity-result linkage

Table 8: Typical structure and information contained in a Logframe Matrix, (EC, 2004:73)

The planning of a project therefore needs a deep analysis of the objectives, how they can be achieved and of possible risks. In a second step, an activity schedule as well as the budget need to be developed. Both the activity schedule and the budget need to be drafted during the feasibility study of the project at the planning stage. One important part of the feasibility study is the cost-benefits analysis, to be conducted on the basis of the Logframe, the first draft activity schedule and the first draft budget. The activity schedule as well as the budget should be clearly linked to the project results (as specified in the Logframe). The level of detail required will largely depend on the nature and scale of the project, on the potential funding partners and the expected implementation modalities.

To conclude this part, we can summarise that the CBA is an important tool during the planning phase of a project within the project management cycle. CBA is part of the feasibility study of a project, which is carried out on the basis of the Logframe, activity schedules and the budget of a project. The feasibility study serves to assist decision-making on whether the project should be realised or not.

Secondly, the CBA also serves as an analytical tool during the project evaluation phase. Here again CBA has to be understood within the larger structure of the Logframe. The Logframe is also an essential tool to support the design and establishment of effective monitoring, review and reporting systems because it clearly specifies what was to be achieved (namely results and purpose), how these achievements were to be verified (Indicators and Means of Verification) and what the key assumptions were.

There are several tools for assessing a project, of which the main are monitoring, conducting an evaluation or an impact assessment. While monitoring is a constant process and asks “what” is happening, evaluation builds on monitoring and analyses “why” things are happening. According to the *Development Assistance Committee* (DAC) of the OECD (in Weiner:4)

“evaluation is the systematic and objective assessment of an ongoing or completed project, programme or policy, its design, implementation and results.”

On the other hand, an **impact assessment**

“is the systematic analysis of the lasting or significant changes – positive or negative intended or not – in people’s lives brought about a given action or a series of actions”
(Roche, 1999 in Weiner:36)

Therefore, a project evaluation assesses the inputs, activities, results, use of output and direct effects while an impact assessment also analyses the possible indirect effects of the intervention as well as the overall development effects in the country (see also GTZ Impact Modell in Weiner:37). According to the European Commission (2004), the main criteria for assessing a project are the following:

Relevance	The appropriateness of project objectives to the problems that it was supposed to address, and to the physical and policy environment within which it operated. It should include and including an assessment of the quality of project preparation and design – <i>i.e.</i> the logic and completeness of the project planning process, and the internal logic and coherence of the project design.
Efficiency	The fact that the project results have been achieved at reasonable cost, <i>i.e.</i> how well inputs/means have been converted into Activities, in terms of quality, quantity and time, and the quality of the results achieved. This generally requires comparing alternative approaches to achieving the same results, to see whether the most efficient process has been adopted.
Effectiveness	An assessment of the contribution made by results to achievement of the Project Purpose, and how Assumptions have affected project achievements. This should include specific assessment of the benefits accruing to target groups, including women and men and identified vulnerable groups such as children, the elderly and disabled.
Impact	The effect of the project on its wider environment, and its contribution to the wider policy or sector objectives (as summarised in the project’s Overall Objective).
Sustainability	An assessment of the likelihood of benefits produced by the project to continue to flow after external funding has ended, and with particular reference to factors of ownership by beneficiaries, policy support, economic and financial factors, socio-cultural aspects, gender equality, appropriate technology, environmental aspects, and institutional and management capacity.

Table 9: Evaluation Criteria used by the European Commission, (EC, 2004:49)

As we can see in Table 9, a development project needs to be assessed in terms of its relevance, efficiency, effectiveness, impact and sustainability. The CBA mainly helps us to examine the efficiency of a project. The efficiency criterion studies how well the various activities transformed the available resources into the intended outputs (results), in terms of quantity, quality and timeliness. According to the EC (2004:49) the assessment of Efficiency focuses on such issues such as the quality of day-to-day-management, for example in management of the budget, of personnel, information, property, management of risk etc. It also analyses contributions from local institutions, project participants or local governments. Another question to be studied in the area of efficiency could concern how well the project helped to develop local capacities. Most importantly, this part of the evaluation must contain a

Costs and value-for-money study (CBA) that analyses how far the costs of the project were justified by the benefits. This can be expressed in monetary terms or in comparison with similar projects or known alternative approaches, while taking account of contextual differences. (EC, 2004:131)

To summarise, the CBA is an important management tool, which is widely used by public institutions in order to assess the feasibility of a project during the planning phase as well as during the evaluation phase of a project. Within the framework of development projects, other factors apart from cost efficiency become equally important when assessing a project. To recall, important questions other than efficiency for the assessment of a development project are:

1. Is this project relevant to the overall development goals? (Relevance)
2. Is the project effective in delivering the necessary results? (Effectiveness)
3. What are the negative and positive effects of the project on the primary target group as well as the larger project environment? (Impact)
4. Will the project results be sustainable? (Sustainability)

In the next section of our study, we will now analyse the project “ICT for Persons with Visual Impairments” in Tanzania, with the help of the tool CBA, while also taking into account the other four criteria for assessing development projects.

5.2. Costs

As we have said in chapter 4.1., the project “ICT for Persons with Visual Impairments” is just a sub-project, i.e. one additional activity of the larger pilot project “Inclusive Tanzania – inclusive education and political participation of persons with disabilities through empowerment and capacity building”. Therefore, certain costs, that would normally be necessary for the implementation of a project like conducting a situation analysis, forming a project implementation structure, costs for project coordination and monitoring etc. cannot be easily calculated and included in our costs analysis, as these budget positions were part of the larger project, which contains a wider overall objective, a larger advocacy strategy and much more activities. Furthermore, all the participating disability organisations in Dar es Salaam had already been provided with a computer and internet connection prior to the initiation of the sub-project “ICT for Persons with Visual Impairments” which will also not be included in this costs analysis. Therefore, we have to bear in mind, that this costs analysis only considers

direct project costs relevant to the sub-project “ICT for Persons with Visual Impairments”, which has been carried out within an existing project structure.

The following costs have been identified by *Light for the World*:

SN	Activity	Total Tsh to be paid by Light for the world	Total costs for Light for the world in EUR
1	Meetings to prepare needs identification, feasibility study and concept for the ICT access to persons with visual impairments project	320.000,00	181,61
2	1 Braille embosser incl. software	-	2.833,00 ¹
3	5000 pages of Quality Braille Paper	-	180,00 ²
4	Transport of Braille embosser and paper	-	108,39 ³
5	10 Dolphin Pens	-	2.144,36 ⁴
6	Training of 1 IT Technician at SANCB, South Africa, including local transport in Dar, local transport in South Africa, return flight ticket, Visa, Accommodation, Breakfast, Dinner and Essentials	1.565.518,00 ⁵	888,48
7	Training of 20 persons in the use of the Dolphin Mercury Pen and Computer Literacy. Costs include training costs, local transport for Dar based participants, transport and Daily subsistence allowance for up-country participants.	6.800.000,00 ⁶	3.859,21
9	Additional contract for preparation of accessible website	1.610.070,00	913,76
10	Installation of the Braille embosser, training of local personnel ⁷	0,00	0,00
11	Service for the embosser, re-installation etc. ⁸	?	?
Total Costs			11.108,81

Note: 1 EUR = 1.762,02 TSh (July 2007)

Table 10: *Costs of the project “ICT for Persons with Visual Impairments in Tanzania”*

Source: *Light for the world*

To conclude, EUR 11.108,81 were provided by *Light for the World* to implement the project “ICT for Persons with Visual Impairments”. Contributions were made by the NIT in providing the training room as well as two additional weeks for training free of charge. The participants contributed by paying for their local travelling costs and the three participants from outside of Dar es Salaam had to subsidize their living costs in Dar es Salaam during the three months of the training. Furthermore, the Braille embosser, the Braille paper and the transport could be purchased at cost prices, which were special offers by the *TSB Transdanubia*, *Tiroler Blindenverband* as well as *Cargo Partners*. Finally, the *Sightsavers*

Dolphin Pens are a special development cooperation between *Sightsavers International* (SSI) and *Dolphin Computer Access* and therefore much cheaper as the usual market price.

5.3. Benefits

Recalling the European Commission's Definition of a CBA in chapter 5.1. we need to compare the situation "with" and "without" the project to determine the net benefits of the project. We will do this by looking at quantitative as well as qualitative indicators, at various levels (the individual, the organisation, the project, the society).

5.3.1 Quantitative Indicators

1. Ten *Dolphin Mercury Pens* have been distributed to and are owned by six disability organisations in Tanzania.
2. Sixteen visually impaired persons have successfully completed the training. They are now able to use the computer independently and will become trainers within their organisations.
3. One Braille Embosser and 5000 pages of Braille paper have been purchased and installed at the ICD office to be used by all member organisations of the Inclusive Tanzania Consortium.
4. Savings because of the purchase of the Embosser: The project proposal by the ITC includes a table with a list of project materials which were printed during the first two quarters of 2006 and an estimated calculation of the price in Braille, if printed at the *National Braille Printing Press*. As we can see on *table 11*, the total cost for these two quarters would have been more than 30 million TSh (17.026,00 EUR).

	Document	Word pages	Braille pages	No. of Braille copies needed	Total No. of Braille pages	Price per 1 copy	Total price per Braille document
1	Newsletter	10	50	100	5,000	11,171	1,171,000
2	Workplan	11	55	20	1,100	64,405	1,288,100
3	Conflict & Resolution report	20	100	50	5,000	46,840	2,342,000
4	Mwanga report	8	40	50	2,000	18,736	936,800
5	Training on Lobbying Manual	40	200	20	4,000	234,200	4,684,000
6	Developing Advocacy material report	30	150	20	3,000	175,650	3,513,000
7	Situation analysis	83	415	20	8,300	485,965	9,719,300
8	July training report	32	160	20	3,200	187,360	3,747,200
9	Kick-off workshop report	24	120	20	2,400	140,520	2,810,400
10	Total	248	1,290	320	412,800	94,411,875	30,211,800

Table 11: List of materials printed as part of the Inclusive Tanzania project between January and June 2006 and numbers of Braille pages that would have been necessary to print.

Source: Project proposal, Annex3

5.3.2 Qualitative Indicators

a) Benefits to the individual:

The individual trainee has acquired the know-how to operate independently a computer, particularly Word, Excel and the Internet. He or she will now have access to a lot of electronic information and will therefore largely increase his/her horizon and potentials. The individual person with a visual impairment will no doubt be proud of having acquired this knowledge, he/she will feel empowered, gain self confidence as he/she belongs to the first persons in Tanzania to be able to use electronic devices. His or her status in society will probably be raised and he/she will become a role model for other visually impaired persons. This will have an overall positive effect on the life of the individual, in the private as well as professional area.

Due to the purchase of the Braille embosser, the individual blind person will now also be able to read all workshop reports, meeting protocols and letters that will be printed in Braille. This will allow the person to participate fully in discussions, and participate more efficiently in project activities.

b) Benefits to the disability organisations:

The member organisations of the Inclusive Tanzania project are now able to print all materials in Braille. Therefore they will be able to save costs and time compared to other printing options. They will be encouraged to print more materials in Braille. Particularly the organisations with blind members will benefit a lot from the Braille embosser. They will now be able to share information more widely and timely among their members and improve their management and controlling systems.

The ITC member organisations that have received Dolphin Mercury Pens are those with blind members. Those blind members are now able to access electronic information by themselves without the need of an assistant. This will save time and costs to the organisation and will help to increase their efficiency. Having access to the web means having access to unlimited information, for example to information on project activities by other organisations of the blind worldwide, on techniques and methods of how to apply for project funding and on possible donor organisations. They will also be able to improve their advocacy work as they will now be able to read information on government policies, programmes and budgets online.

c) Benefits to the project:

The first principle when advocating for an inclusive society is to advocate for the awareness that one must not create new barriers. By printing the project reports only in normal print, the project created barriers to the participation of blind and visually impaired persons. Furthermore, for a successful project implementation it is necessary that it is owned and implemented by the local disability organisations themselves. Therefore it is vital that the ITC member organisations have all the necessary equipment to fully participate in the project. Furthermore the project is not credible when demanding accessibility of government structures and processes while it is creating barriers itself. Therefore the provision of the Dolphin Pens, the training and the embosser are not only a means to increase the project efficiency but are also part of the awareness raising activities.

As we have presented above, the Dolphin training got substantial media attention as this was the first project of this kind in Tanzania. This project was often referred to as an “eye opener” to Tanzanian society, as it was the first time that persons with visual impairments received computer training and the public was not aware that persons with visual impairments could be able to work on a computer independently. This media attention can now be used for

future advocacy issues of the Inclusive Tanzania Consortium (ITC). The media will be able to refer to the ITC as the organisation that has provided computer training to blind persons when then also making a connection to new issues, such as demanding the ratification of the *Convention on the Rights of Persons with Disabilities*.

d) Benefits to society

The project raised awareness in the public about the abilities of persons with visual impairments. The message sent out was that, persons with disabilities are not unable, they are just made unable to participate by the many barriers they are facing. While blind persons used to be looked at with pity as persons that can purely depend on charity, the perception might have changed now. Some employees will have realised that it is also possible to employ persons with visual impairments and that they can be equally productive as sighted persons.

As we have said above, in order to create an inclusive society in Tanzania, it is on the one hand necessary that the persons with disabilities and their representative organisations empower themselves to claim their rights. On the other hand, it is also necessary that the society removes the social, environmental and legal barriers that disable.

Critics might say that this project only trained 16 individuals and therefore can be compared to a drop on a hot stone. However, I think its main value was to create awareness on the potential of persons with disabilities and in that sense contributed to the removal of social barriers that are excluding persons with disabilities from obtaining their rights.

5.4. Summary and Conclusions of the Cost-Benefit Analysis

In the chapters 5.2. and 5.3. we have tried to list the project costs as well as the project benefits. In studying the project efficiency, we can conclude, that the project “ICT for Persons with Visual Impairments in Tanzania” operated very cost efficiently mainly because it succeeded in obtaining cost reductions and local contributions. The benefits of the project are manifold, in quantitative as well as qualitative terms, to the individual, the organisation, the project as well as society at whole. Looking at other factors than project efficiency, we can conclude the following:

- The project is directly *relevant* to the implementation of the project objectives of the “Inclusive Tanzania” project and part of the overall development goals that it pursues.

- The project *effectiveness* can also be positively assessed. The main reason contributing to the effective delivery of the project results can be attributed to the local ownership of the project and the participation of the primary target group in its planning and implementation.
- The long term effects of the project, i.e. the project *impact*, was also analysed as having served as an eye-opener to the general public about the potentials of persons with disabilities.
- Finally, the *sustainability* of the project is assured because it had used a local trainer who will be able to train other persons as well. Furthermore, the training of the 16 visually impaired persons also included a train-the-trainer component and the ITC having developed this pilot project will also be in a good position to develop a larger project of this kind, which can be sent to potential donors for funding or can be used for lobbying the government.

The main challenges encountered by the project were:

- few Dolphin pens for a large number of participants;
- late start of the project;
- lack of experience of the trainer so that the training manual and techniques had to be adapted during the training;
- lack of competent technician to re-install the embosser when it stopped working, so that it was out of function for some months;

To summarise, taking the total of the quantitative and qualitative benefits and comparing them with the total costs, we have to conclude that the benefits outweigh the costs and that the project was successful in achieving the set objectives.

5.5. Lessons Learnt

The project “ICT for persons with Visual Impairments in Tanzania” provides a number of important **lessons learnt**:

- There is a huge need for ICT for persons with visual impairments in developing countries.

- Partnerships like the one between *Sightsavers International* and *Dolphin Computer Access* are very good examples of how commercial products can be sold at low cost to projects in developing countries.
- When conducting a development project, it is vital to develop local ownership so that the real needs of the constituency are identified and can be addressed adequately.
- By supplying the organisations of and for the blind in Tanzania with Dolphin Pens and a Braille embosser, they are now able to do their work more effectively.
- The recognition by the media and public officials and the large interest by persons with visual impairments to be trained shows that ICT can serve as an eye-opener and as a means of awareness raising about the potentials as well as the rights of persons with disabilities.
- The choice of the *Index Everest* as Braille embosser was the right one because it uses locally available cut sheet paper and does not need to import expensive Braille paper rolls.
- There is a great need of trainings: training of trainers, training of technicians, training of persons with visual impairments as users.
- The development of ICT projects for persons with visual impairments in developing countries is still a new phenomena. There is little expertise in this field as ICT experts often lack the special know-how on assistive technologies. On the other hand, experts in matters concerning persons with visual impairments often lack the ICT knowledge.

To conclude, the pilot project by *Light for the World* and the *Information Centre on Disability* was an important starting point for the emancipation of persons with visual impairments, and persons with disabilities in general, in Tanzania. However, in order to really make a difference for the estimated 933, 363 persons with visual impairments in Tanzania, a lot more needs to be done. There is a great need of blindness prevention and restoration of eye sight, and of inclusion of irreversibly blind persons into society. Their exclusion is not only a large economic loss for the country but also a deprivation of their basic human rights. In the next chapter we will develop a tentative project concept for an extension of the pilot project “ICT for persons with Visual Impairments in Tanzania” to the national level.

5.6. Reflections on developing a large-scale project

The pilot project “ICT for persons with Visual Impairments in Tanzania” was part of a larger project, “Inclusive Tanzania – inclusive education and political participation of persons with disabilities through empowerment and capacity building”. It addressed a need, which was identified during the project implementation. As we have said above, the project was conducted successfully, there is now one functioning Braille embosser available to the disability organisations in Tanzania, 10 Dolphin Pens have been distributed to organisations for and of the Blind and 16 individuals with visual impairments have successfully completed basic computer training. However, as we have also said above, this must only be the start within the general ICT development of Tanzania. There are many more persons with visual impairments in Tanzania that still lack access to electronic information. Within the framework of a feasibility study of a nation-wide project, the following questions have to be answered:

- What are the overall and specific project objectives?
- What is the purpose of the project, what needs does it address?
- What should be the project results?
- Who should implement the project?
- Which other stakeholders are active in this area? Where could synergies be developed?
- Who could be a potential donor to the project?

Further criteria that need to be assessed:

- How does this project fit into the overall development goals of the country?
- How do you assure project sustainability?
- How can the project assure participation by the primary target group?
- How will the project build on local capacities and further support them?
- How can the project be delivered efficiently? Are there local resources available for supporting the project?
- Will the costs outweigh the benefits?
- How does the project address the needs of the most marginalized persons of society?
- How will an equal access to women as well as men to the project be assured?
- Will the project support environmentally friendly activities?
- How can an effective project monitoring be assured?

We will now try to develop a draft concept for such a large-scale development project to address the need for ICT for persons with Visual Impairments on a national level in Tanzania. To implement a large-scale project means that one needs an effective implementing structure and monitoring system. This must be assured by an institution in Tanzania with a lot of development experience and contacts in the country. The project could be implemented by the government itself, or by other stakeholders that cooperate with the government. Those could be a large donor like the European Commission, a UN agency or an international NGO in cooperation with an experienced partner organisation in the country. As this project should address the situation at national level, it is evident that a cooperation with the government is necessary. The project should have a timeframe of five years, to be extended later, and should be conducted in all capital cities of the 26 regions of Tanzania.

In a first step, we will now develop a Logframe Matrix, and analyse the objectives hierarchy and the results that we want to achieve.

Intervention logic	Objectively verifiable indicators of achievement	Sources and means of Verification	Assumptions
Overall objective: Poverty in Tanzania is reduced, particularly poverty by persons with visual impairments and their families.	Mortality rate of persons with VI and their dependants, unemployment rate of persons with VI, etc.	National statistics on persons with disabilities, unemployment etc. Self-evaluation of the situation by disability specific organisations etc.	
Specific objective: Existing barriers to persons with visual impairments to participate in the information society in all regions of Tanzania are eliminated.	Number of persons with visual impairments employed increased by 10% after 5 years, activities of organisations of persons with disabilities and their effectiveness increased significantly, the stigma against persons with visual impairments has reduced.	National statistics on employment, annual reports by the disability organisations, public opinion surveys, number of press clippings, TV and radio spots etc, way of reporting by the media on persons with disabilities, etc.	Positive economic development in Tanzania, political stability, etc.
Expected Results			
Result 1: Persons with visual impairments having basic computer literacy skills increased.	20% of adults with VI having finished secondary education also have basic computer literacy skills.	School data, data provided by training centres and NGOs.	The development of the ICT sector in Tanzania continues to flourish and extend to rural areas.

Result 2: Training centres offering courses on computer literacy for persons with VI increased.	In all large cities of Tanzania there is at least one training centre that also offers courses to persons with VI.	Project reports etc.	The ICT sector in Tanzania continues to flourish and the training centres are interested in a cooperation.
Result 3: Projects and businesses supplying ICT for persons with VI increased.	Number of businesses and projects acquiring the know-how and the contacts for importing ICT for persons with VI has increased.	Project reports, information by the tax office etc.	ICT for persons with disabilities can be imported duty free.
Result 4: Secondary and higher learning institutes offer computer courses and ICT for persons with VI.	All universities and higher learning institutions (app.10), 5 % of secondary schools and 20 IT training centres offer computer courses to persons with VI.	Project reports, education data etc.	Universities and secondary schools do offer computer courses.
Result 5: Number of persons with VI employed by public institutions increased.	Number of persons with VI employed by public institutions increased by 5%.	Government employment records.	The government will be hiring new staff.

Table 12: Logframe for a large scale project “ICT for Persons with Visual Impairments in Tanzania”,
Source: own creation

In this *Logframe* we have developed the objectives of the project as well as the results we want to achieve. We have further developed indicators for the assessment of the project results and thought about sources where the fulfilment of the set indicators can be verified. Finally, we have also taken into consideration possible factors that are outside of the project’s control but might inhibit the project’s successful implementation (assumptions).

To recall, in our project, the overall objective is to reduce poverty in Tanzania, particularly poverty by persons with visual impairments and their families, while the specific project objective is to reduce all barriers so that persons with visual impairments can participate fully and equally in the information society in all 26 regions of Tanzania. Our project expects five results within a timeframe of five years, those are:

1. The number of persons with visual impairments having basic computer literacy skills has increased.
2. The number of training centres offering courses on computer literacy for persons with visual impairments has increased.

3. The number of projects and businesses supplying ICT for persons with visual impairments has increased.
4. Secondary and higher learning institutes offer computer courses and ICT for persons with visual impairments.
5. The number of persons with VI employed by public institutions has increased.

In a second step, we will now develop an activity schedule for our project. Below we have listed 13 major activities that need to be conducted in order to reach the project results. The required activities are:

1. Conduct a Situation Analysis: The purpose of this activity is to find out the actual need and possibilities, potential partners, and challenges that we will encounter.
2. Develop project concept, timeframe, implementing body, assure project office: During this phase we want to make use of the Situation Analysis and concretise the project concept. Particularly we need to decide the implementing body.
3. Develop cooperation with government and local authorities: in order to deliver the project results it is necessary that the project is carried out by the government or in a close cooperation with the government.
4. Develop cooperation with existing projects in the area of ICT and/or disability: We need to look for potential partners, that can assist in the project implementation and with whom we can develop partnerships and synergies.
5. Organise stakeholders workshop and form project committee: In order to assure the relevance of the project to the prime target group (i.e. persons with visual impairments and their representative organisations) it is necessary to involve them in all phases of the project, that is project development, implementation and evaluation. At the same time it is also necessary to involve IT training institutes, secondary schools, higher learning institutions and IT businesses in the planning and implementation of the project.
6. Organise and conduct train-the-trainers courses for 150 IT technicians: The 150 IT technicians will then conduct the training courses at the 50 selected training institutes, some will be employed by the higher learning institutions and some will conduct courses at the selected secondary schools.
7. Provide infrastructure for persons with VI: Braille embossers as well as software for persons with VI need to be purchased and installed at the training centres, higher learning institutions and secondary schools. At the same time, we also need to

organise a training course for 3 IT technicians that will be able to do repairs and maintenance in the country.

8. Conduct trainings to persons with VI: Each training institute should offer two training courses per year. This will make up to 100 training courses offered per year in the IT training institutions. Each course will teach 10 participants, so a total of 1000 persons can be taught annually in the training institutes. In addition, also 2 courses are offered to students of each higher learning institution (Universities etc.) annually and 2 courses are offered annually to teachers and pupils at selected secondary schools.
9. Conduct public awareness raising programmes: There shall be regular TV and radio programmes and newspaper clippings publicising the trainings as well as raising awareness on the rights of persons with disabilities. In addition, public debating fora shall be organised and a dialogue with major opinion leaders shall be sought.
10. Assist import businesses and projects to provide ICT for persons with VI: Businesses and NGOs shall be informed about the market structure of ICT for persons with VI and shall be assisted in importing assistive devices. There shall be no import tax for assistive devices and ICT.
11. Change public employment policy: Persons with visual impairments shall be encouraged to apply for jobs within the public service. Senior public servants shall be informed about the potentials of persons with visual impairments and financial assistance shall be provided for employing persons with VI.
12. Monitoring: Constant project coordination and monitoring must be assured by an experienced organisation in Tanzania. In addition the formed project committee will also be responsible for project monitoring.
13. Evaluation: After two year and at the end of the project, external evaluations shall be organised to assess the project.

The implementation of the activities will overlap at times, for an illustration of the timeframe of each activity we have developed a timesheet (see Table 13 below).

Activities	Jan-Mar 2009	Apr-Jun '09	July-Sept '09	Oct-Dec '09	Jan-Mar 2010	Apr-June '10	July-Sept '10	Oct-Dec '10	Jan-Mar 2011	Apr-Jun '11	July-Sept '11	Oct-Dec '11	Jan-Mar 2012	Apr-June '12	July-Sept '12	Oct-Dec '12	Jan-Mar 2013	Apr-June '13	July-Sept '13	Oct-Dec '13
1. Conduct Situation Analysis																				
2. Develop project concept, timeframe, implementing body, assure project office, coordinator																				
3. Develop Cooperation with government or local authorities																				
4. Develop cooperation with existing projects in the area of ICT and/or disability																				
5. Organise stakeholders workshop to form project committee, involving DPOs, ICT institutions, schools etc., meet semi-annually to coordinate and evaluate the project																				
6. Organise and conduct train-the-trainers courses for 150 IT technicians to teach ICT to persons with VI																				
7. Provide infrastructure for persons with VI at 50 selected IT training centres, all selected secondary schools and all higher learning institutions																				
8. Conduct 2 trainings/year to persons w. VI in 50 selected training institutes, and at least two trainings/year to secondary schools and all higher learning institutions																				

Activities	Jan-Mar 2009	Apr-June '09	July-Sept '09	Oct-Dec '09	Jan-Mar 2010	April-June '10	July-Sept '10	Oct-Dec '10	Jan-Mar 2011	Apr-Jun '11	July-Sept '11	Oct-Dec '11	Jan-Mar 2012	April-June '12	July-Sept '12	Oct-Dec '12	Jan-Mar 2013	Apr-June '13	July-Sept '13	Oct-Dec '13
9. Public awareness raising programmes																				
10. Assist import of ICT for persons with VI																				
11. Change public employment policy, employ persons withVI																				
12. Monitoring																				
13. Evaluation																				

Table 13: Activity schedule for a large scale project “ICT for Persons with Visual Impairments in Tanzania”, Source: own creation

Sub-Activities per Activity, ex. “1. Situation Analysis”	Jan. 2009	Feb. '09	March '09	April '09	May '09	June '09	July '09
1.1. Develop Terms of Reference							
1.2. Invite for offers							
1.3. Screen offers, conduct interviews, select an institution							
1.4. Discuss details of the research, budget							
1.5. Research is conducted, assure timely deposit of the research, ask for clarifications							
1.6. Analyse research results and develop project concept							

Table 14: Activity schedule for Activity 1 “Conduct a situation analysis”, Source: own creation

As we have seen in table 13, the first activity will be the conduct of a situation analysis. Now we have to break down this activity into sub-activities. In table 14 we have exemplarily developed such a schedule for activity 1 “Conduct of a Situation Analysis”. The sub-activities to be implemented are:

1. Development of Terms of Reference (ToR) for the Situation Analysis, including information on the requirements of the research institution or consultant, the kind of information that needs to be researched as well as the methodologies that should be used and the nature of the end product that needs to be delivered.
2. Invite for offers in local and international newspapers, internet platforms, networks etc.
3. Screen all offers, conduct interviews, select an institution/experts
4. Discuss the details of the research to be conducted and the budget
5. Research is conducted. We need to assure timely deposit of the research report. Screen the research report and ask for clarifications.
6. Finally, we will need to analyse the research results and develop the project concept.

As the first activity, “Conduct of a situation analysis” is a rather short and clear one, it only requires 6 sub-activities. Other activities will however require much more sub-activities. At the end, we will get a complex activities schedule.

Finally, we will need to develop a budget for the project. In order to develop the project budget, we will have to allocate the resources and means required to each sub-activity. There needs to be an assessment of local resources and means available that can be used (for example infrastructure for the project coordination). The budget will include costs for personnel for the project formulation, implementation and monitoring. There will be material costs for the purchase of Dolphin Pens, embossers, training manuals etc. There will be costs for the organisation of workshops and trainings, awareness raising campaigns, costs for evaluation and auditing etc.

So far we have demonstrated the required process on how to develop our nation-wide project. We have developed a Logframe Matrix, an activity schedule and sub-activities as well as a budget. Now we are going to critically reflect whether the development of a nation-wide project is really feasible.

The initial situation analysis must have as objective to assess whether our concept is realistic and how it fits into the local situation and needs. Crucial questions that must be answered by the situation analysis are:

- Are the project objectives meeting the needs of the most marginalized? Is the project really going to fight poverty?
- Are the project objectives realistic?
- Who could be potential partners for the implementation? Is it possible to assure project coordination in all 26 regions? Let us not forget that Tanzania is a very large country⁴⁶ with an area of nearly 1,000,000 km². Many regions are hardly accessible by car as there are no ceiled roads. They can only be reached on mud roads, by ship or plane. In many areas there is no electricity, no running water and certainly no internet outside of the city centre. Would it not be better to start the project in only some regions?
- What is the situation of persons with visual impairments and their dependants like? How many persons with VI have completed secondary school? How many are employed?
- What is the ICT sector in Tanzania like? How many training centres are there in the regions? What are the training costs?
- What is the ICT infrastructure in secondary schools like? Tanzania is one of the poorest countries in the world. Over the last years it has made remarkable success in the provision of primary education. The *UNESCO Education for All Global Monitoring Report 2008* (pages 231, 291) states that Tanzania has increased its primary net enrolment rate (NER) from 48% in 1999 to 98% in 2005 due to the abolition of school fees in 2003. However, one of the biggest challenges in the country is that there are not enough secondary schools to cater for all primary school leavers. And certainly, the existing secondary schools are not equipped with ICT. Consequently, only very few, mostly private secondary schools, will be equipped with computers and internet connections. Will visually impaired students afford to go to these secondary schools?
- How will the project assure sustainability in terms of retaining the trained IT trainers? Will they want to work for low-paid public salaries if they can maybe use their newly acquired knowledge to get a better paid job in an international organisation in Tanzania or will they want to go abroad? How is the project going to assure that these trainers will stay in the newly equipped training centres in each regional capital city? How will the cooperation between these

⁴⁶ Area of Tanzania is 945.087 km² (Fischer, 2008)

private institutions and the project/government be organised? There must be large subsidies provided in order for persons with visual impairments with low incomes to be able to access the trainings.

These questions already demonstrate that it is essential to develop the project concept in close cooperation with local stakeholders, particularly the government, but also NGOs active in the area of education, ICT, disability etc. The project must fit into national policies and plans (in the education sector, the ICT sector and disability sector) and must be realistic and feasible. Maybe it would be better to start in fewer regions, or by training less trainers but assuring a close follow-up. Another important issue could be to offer the training on ICT for persons with disabilities as part of the regular curriculum for teacher trainings on ICT.

To summarise, the WHO estimates that there are more than 900.000 persons with visual impairments in Tanzania (compare with table 4). However, we do not have exact figures, nor do we have the number of persons with visual impairments who have finished secondary school, as the national census of Tanzania in 2002 did not collect accurate disability aggregate data. However, government estimates indicate that less than 1% of persons with disabilities have access to primary education. Moreover, even less will successfully complete secondary education. We assume that computer literacy skills will particularly be interesting for pupils as well as for adults with an adequate education level (completion of secondary education). Consequently, the large majority of persons with visual impairments will not be addressed by this project.

One needs to assess the benefit of this project to the society and compare it with other possible interventions that address the poverty of persons with disabilities and their dependants. Traditionally vocational training courses for persons with visual impairments offered courses on pottery, weaving, cloth dyeing, etc. But how far are these skills still needed in the modern economy? Will a blind person with a training in word processing find employment more easily or will he/she be better off with skills in traditional vocations? These questions have to be addressed within the initial situation analysis. Another concern could be the low literacy rate of persons with visual impairments. Maybe the situation analysis will conclude that it is more important to first focus on offering primary education to persons with visual impairments before developing a large scale project on ICT training.

Besides all these doubts, we have seen in chapter 3.3. that the development of the ICT sector is currently taking off in Tanzania. Furthermore, we have also learnt that persons with visual impairments can equally access ICT if provided with the necessary training and technology. The most important claim by the global disability movement is that no new

barriers must be created by society. Therefore, the development of the ICT sector in Tanzania should include and address the special needs of persons with disabilities from the beginning. One could also compare the costs for including persons with disabilities in computer courses and providing them with computer literacy courses with the costs of leaving them out. Persons with visual impairments would probably have greater difficulties in finding employment, gaining their living, taking care of their dependants, and would need assistance from their families or state support, if the project does not take place.

To conclude, the development of a large-scale project with the objective of providing access to ICT to persons with visual impairments all over Tanzania is not an easy task. It needs to be carefully studied and a detailed activity plan and budget need to be developed. Considerations like the literacy rate of persons with visual impairments and the availability of ICT to persons without disabilities in the rural regions of Tanzania need to be studied. Do secondary schools offer computer courses? How is the situation of ICT development outside of Dar es Salaam? What are the employment opportunities for persons with visual impairments in Tanzania? Would the government be open to developing a cooperation on national as well as local level? Which organisation could take responsibility for the effective and efficient implementation of such a large scale project in the country? How can the project be funded? After having answered these questions the project concept could be developed in detail.

Chapter 6

Summary and Conclusion

This chapter summarizes and concludes the master thesis.

This Master Thesis has analysed the situation of persons with visual impairments in Tanzania and has analysed how they could get access to ICT. Persons with visual impairments face multiple discriminations and are deprived of their social, economic, cultural, political and civil rights although the United Republic of Tanzania has signed a number of international legal instruments guaranteeing the rights of persons with disabilities. The organisations of and for persons with disabilities in Tanzania do not want to accept their exclusion and advocate for their inclusion in society. Concerning the socio-economic sector of Information and Communication Technology (ICT), Tanzania is only in a starting phase. Being one of the least developed countries in the world, it still has to go a long way to participate fully in the global information society. However, comparing the ICT available for sighted and for persons with visual impairments, the discrepancy becomes even more shocking. Persons with visual impairments, no matter whether they live in rural or urban areas in Tanzania are deprived of any right to information. They do not have access to Braille materials, and are not facilitated access to electronic information.

The project “Inclusive Tanzania” for the first time addressed this issue and supplied the disability organisations with one Braille embosser and ten Sightsaver Dolphin Pens. Although this might be considered as only a very small contribution to changing the situation of persons with disabilities in Tanzania, it has already attracted a lot of media attention and therefore already served as an eye-opener. The public in Tanzania is slowly realising that not the individual person with a disability is the problem, but the barriers, be it physical, social or legal, that hinder their participation in society. The project has been able to raise awareness, increase the efficiency of the organisations of the blind in Tanzania and raise the self confidence of the blind computer graduates.

Finally, we have analysed how the project could be extended to reach out to all regions of Tanzania and to provide ICT and access to information to a large number of persons with visual impairments. We have concluded, that the development of such a large scale project needs to consider a number of important factors. In order to analyse the feasibility of such a large-scale project we would first have to do a comprehensive situation analysis. We want to conclude this thesis by joining the global disability movement in their call, that no new barriers must be created to the inclusion of persons with disabilities. Consequently, we hope to have contributed to the debate, to have given some ideas for the development of ICT projects including addressing the special needs of persons with disabilities and to have raised awareness so that regular ICT projects will in the future include persons with visual impairments and not create additional barriers by excluding them.

Chapter 7

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Abbreviations

APC: Association for Progressive Communications

AT: Assistive Technology

CBA: Cost-Benefits Analysis

DCM: Display Chain Manager

EC: European Commission

ECD-N: Early Childhood Development-Network

EUR: Euro

GTZ: Gesellschaft für Technische Zusammenarbeit (German Development Cooperation)

IAPB: International Agency for the Prevention of the Blindness

ICD: Information Centre on Disability

ICD-10: International statistical Classification of Diseases

ICPs: Internet Service Providers

ICTs: Information and Communication Technologies

ITC: Inclusive Tanzania Consortium

LFA: Logical Framework Analysis

LFM: Logical Framework Matrix

LFW: Light for the World

MUPWD: Mwanga Union of Persons with Disabilities

MDGs: Millennium Development Goals

MNOD: Media Network on Disability

NGDO: Non-Governmental Development Organisation

NGOs: Non Governmental Organizations

NIT: National Institute for Transport

PCM: Project Cycle Management

PWDs: Persons with Disabilities

RNIB: Royal National Institute of Blind People

SANCB: South African National Council for the Blind

TAS: Tanzania Albino Society

TNIB: Tanzania National Institute for the Blind

TLB: Tanzanian League of the Blind

TSB: Tanzanian Society for the Blind

TSh: Tanzanian Shillings

UK: United Kingdom

UN: United Nations

VA: Visual Acuity

VI: Visual impairment

WHO: World Health Organization

WWW: World Wide Web

Annex_1 – Guiding questions for the interviews

- Name:
- Sex:
- Age:
- Disability:
- Profession:
- Organization you work for:
- Responsibilities within this organization:
- Relationship to the Inclusive Tanzania Project:
- Are you participating in the project “ICT for persons with visual impairments in Tanzania?”
- If yes, why and what is your role? If no, why not? Would you like to participate? How?
- What do you expect from the computer literacy training?
- How will the training be of benefit to you personally, to your organization, to the project “Inclusive Tanzania” and to society in general?
- What challenges will the participants face?
- How would you describe the benefits of having a Braille embosser for the project?
- How would you describe the potentials as well as obstacles to the sustainability of the project?
- What is the general situation of persons with visual impairments like in Tanzania?
- What barriers are you facing for participating fully and equally in society?
- What improvements, if any, of the situation of persons with visual impairments have you observed in the last years?
- What ideas do you have for a possible extension of the project?
- Any other comments:

Thank you very much for your kind help and openness.

Annex_2 - ICT for persons with visual impairments

This Appendix briefly presents some technologies (Soft- and Hardware) currently existing to assist persons with VI. The term ICT was used in this work to refer to the use of computers, email, and Internet, for this reason only such tools will be listed. The first listing briefly presents some well known *magnification software* and *screen reader programmes*, while the second listing presents other assistive technologies existing to support visually impaired people.

Please note that this is not an exhaustive listing as it contains only some of the hard- and software available. Before purchasing any tool (hard- or software), it is important to analyse the individual requirements of a pupil by doing a needs assessment.

Magnification Software

A Screen magnifiers are software principally developed for people with low vision and can magnify the contents of the logical computer screen from 2 until unlimited times. Most magnification programs offer a maximum magnification to 16 times. On the physical computer screen, you get a portion of the normal screen. You can view the whole screen by scrolling over the screen using the mouse or the keyboard. While moving the mouse the information on the screen changes.

ZoomText: is a magnification software which enlarges and enhances everything on your computer screen, making all of your applications easy to see and use. NOT FREE, demo version available, more information at

- NOT FREE; for Windows OS, Demo Version Available;
- More information at <http://www.aisquared.com/index.cfm>



MAGic®: MAGic® combines great magnification features with true low vision screen reading when purchased with the speech option. It gives you the ability to choose the information you want read from the screen as you navigate your applications. MAGic is easy to use with its talking large print installation, color-coded user interface, and hot keys that avoid conflicts with Windows® and popular software applications.



- NOT FREE; for Windows OS, Demo Version Available;
- More information at: http://www.freedomscientific.com/fs_downloads/magic.asp

Lunar: For partially sighted computer users who find themselves straining to read the screen, whether it is text, graphics, toolbars, icons or emails, Lunar can offer the ideal magnification solution. **Lunar plus** is offering all the benefits of a screen magnifier, and also offers added speech output to provide extra support for partially sighted computer users.



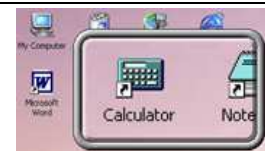
- NOT FREE; for Windows OS, Demo Version Available;
- More information at: <http://www.yourdolphin.co.uk/products.asp>

BigShot: This low-cost, easy-to-use magnification program allows you to fine tune the screen for more comfortable viewing. With 20 levels of magnification from 100 to 200 percent, BigShot allows you to focus on your work without straining to see the screen. BigShot is ideal for home and professional use and works great on laptops and desktops. It's the easy-to-use solution to everyday computer eyestrain.



- NOT FREE; for Windows OS, Demo Version Available;
- More information at <http://www.aisquared.com/Account/BSTrialChoice.cfm>

Virtual Magnifying Glass: Virtual Magnifying Glass is an open source, screen magnification tool for Windows and Linux. It is simple, customizable, and easy-to-use.



- NOT FREE; for Windows OS, Demo Version Available;
- More information and download at <http://magnifier.sourceforge.net/>

iZoom web: iZoom Web is a Web-based screen magnifier with *speech support*. The Intuitive interface makes it simple to use, 1.5X to 16X magnification on supported sites, and up to 3X on unsupported sites, 6 Zooming modes, including Full Screen and Magnifying Lens, adjustable zoom lens size, high grade image smoothing, user configurable color settings, cursor enhancements and option to launch the program automatically at startup.



- NOT FREE; for Windows OS, Demo Version Available;
- More information and download at <http://www.issist.com/index.asp?page=downloads>

ScreenReader Software

A screen reader is a piece of software that allows the user to hear via a speech synthesizer or touch via a Braille display the information on the screen. The screen reader will follow along and say exactly what I am doing.

JAWS: ScreenReader software program for visually impaired users produced by the Blind and Low Vision Group at Freedom Scientific, it provides the user with access to the information displayed on the screen via text-to-speech or by means of a Braille Display and allows for more comprehensive keyboard interaction with the computer. It also allows users to create custom scripts, which can alter the amount and type of information, which is presented by different applications, and ultimately makes programs that were not designed for accessibility (such as programs that do not use standard Windows controls) usable through JAWS.



- NOT FREE; for Windows OS, Demo Version Available;
- More information at <http://www.aissquared.com/index.cfm>

Oralux: Oralux is an audio Linux distribution for visually impaired computer users. It uses various free software speech synthesis packages such as Emacspeak, Yasr and Speakup or for braille such as BRLTTY. It is available as a LiveDistro, which means that it can be run from a CD-ROM, without having to install anything on a computer's hard disk or make any changes to the installed operating system. For example, it can be used on a Microsoft Windows computer without any adverse consequences.



- FREE; available for download;
- More information at: <http://www.oralux.org/>

Window-Eyes: Window-Eyes provide blind users' access to Windows based computers by speaking the contents of the computer's screen. All applications, word processors, Internet, email are available to the blind user. Window Eyes integration into Windows is seamless, providing you with instant access to the operating system without having to learn a complicated set of keystrokes. Applications that utilize standard Microsoft controls are spoken automatically with little to no configuration necessary. Other applications may require simple modifications to Window Eyes whose options are easily accessible via a well organized, speech control panel



- NOT FREE; for Windows OS, Demo Version Available;
- More information at: <http://www.gwmicro.com/Window-Eyes/>



Dolphin HAL: Developed for blind computer users, Hal is a software screen reader that works by reading the screen


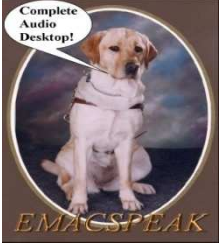








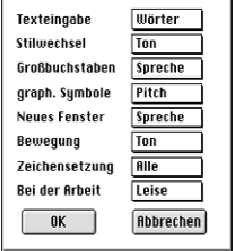
interactively and communicating through a speech synthesiser or a refreshable Braille display. not just on a desktop PC, it can be transported on a USB stick to use at any university, internet café, library or work place in the world.

- NOT FREE; for Windows OS, Demo Version Available;
- More information at <http://www.yourdolphin.com>

Other assistive technologies for persons with visual impairment

Preview/Logo	Product name	Description
	<p><u>Blindows</u> (Software)</p> <p><u>Area of disability:</u> Reduced vision, Blindness</p>	<p>This combination of <i>magnification system and screen reader</i> makes a large number of common Windows programs and the internet accessible to sight-impaired users.</p>
	<p><u>Bookworm</u> (Hardware)</p> <p><u>Area of disability:</u> Blindness</p>	<p>This portable <i>Braille reading device</i> in Walkman size offers straightforward access to literature on-line. The texts are saved and are then readable with eight Braille cells. Several books can be stored at the same time. The texts can be loaded into the Bookworm via the PC's serial interface.</p>

	<p><u>Braille display</u> (Hardware)</p> <p><u>Area of disability:</u> Blindness</p>	<p>A <i>Braille display</i> is a computer output device with a single-line display on which the dots of the Braille script can be sensed.</p> <p>Example are: <i>Braille - Voyager 70, Braille Lite Millennium, Braille Star 40, Braille Star 80, Braille Wave, BRAILLEX EL 2D-80</i> etc.</p>
	<p><u>EMACSPEAK</u> (Software)</p> <p><u>Area of disability:</u> Reduced vision, Blindness</p>	<p>EMACSPEAK is an <i>audio browser for web access</i>, based on the Open Source principle. The tool offers full support for the CSS standards for speech output, alongside many other features such as multimedia output. The browser comes with speech servers for IBM Via Voice TTS (text to speech) and with synthesizers of the Dectalk family, and supports a wide range of natural languages. EMACSPEAK runs under the Linux und Solaris operating systems.</p>
	<p><u>Galatee Organizer</u> (Hardware)</p> <p><u>Area of disability:</u> Blindness</p>	<p>This battery-powered organizer with 8-cell Braille keyboard, speech output and many other functions is a stand-alone device which can also be used as a fully-featured PC keyboard (in parallel with the standard keyboard).</p> <p>Each device has speech output capability in up to four foreign languages.</p> <p>The device saves data on a SMART Media Card (up to 128 MB). File transfer between organizer and PC is via serial interface.</p>
	<p><u>Grafic Window</u> <u>Professional</u> (Hardware)</p> <p><u>Area of disability:</u> Blindness</p>	<p>This device makes it possible for blind people to sense graphic displays on a PC screen under Windows. The graphics are converted into tactile images consisting of 24 x 16 cells. The graphical display is processed by the built-in software and reduced to the most important information.</p> <p>The tactile graphic changes dynamically in real time with each change in the screen display.</p>

	<p><u>Dolphin HAL</u> <u>ScreenReader</u> (Software)</p> <p><u>Area of disability:</u> Reduced vision, Blindness</p>	<p>Hal is a Screen Reader that provides the screen access for visually impaired computer users through speech and Braille. With Hal, reading a web page can be as simple as reading a word processor document. Dolphin's Virtual Focus allows you to browse the Internet without a mouse.</p>
	<p><u>Handy Braille</u> <u>Keyboard</u> (Hardware)</p>	<p><u>Braille keyboards</u> make it easier for blind people to input data when a mechanical Braille embosser can be operated, or where there is no previous experience in using a standard keyboard. It can be used single-handedly, and separate function keys make it possible to access special functions directly. Control keys such as ENTER and DELETE are also available.</p>
	<p><u>Braille embossers</u> (Hardware)</p> <p><u>Area of disability:</u> Blindness</p>	<p>A Braille embosser is a printer, necessarily an impact printer that renders text as Braille. Utilizing special translation software, a print document can be embossed with relative ease, making Braille production much more efficient and cost-effective.</p>
	<p><u>Lynx</u> (Software)</p> <p><u>Area of disability:</u> Reduced vision, Blindness, Restricted mobility</p>	<p>This freely available browser displays web pages as standard text and requires no mouse control. It is controlled entirely from the keyboard. It ignores JavaScript and does not show graphics, but only the text content of the internet pages. The browser always shows content in the same window. It can run under different operating systems (UNIX, MS-DOS and Microsoft Windows) and can also be used on an older PC, e.g. with MS-DOS.</p>
	<p><u>SaltoVocale</u> (Software)</p> <p><u>Area of disability:</u> Blindness, Reduced vision</p>	<p>This is a screen reader for blind and severely visually impaired people. With it, the severely visually impaired computer user can be helped to find their way around and work with the user interface of the Macintosh operating system.</p>

References of this listing about ICT for visually impaired people are the two following links that I will advise to visit to get more information about visual Impairment and assistive technologies.

- **VI Guide** – This site is a guide to Internet resources about visual impairments for parents and teachers. It has pointers to other Web sites concerned with Access Technology, services, organizations, research, education and leisure.

www.viguide.com

- **Barrierefrei kommunizieren: Online database!** This online database contains a collection of disability-compensating techniques and technologies intended to open up the world of computers and the internet to people with disabilities. The database is offered to those with disabilities, their relatives and careers, as a guide and companion for finding their way round the available products.

www.barrierefrei-kommunizieren.de/datenbank

Annex_3 – Project Description

“Inclusive Tanzania”



Inclusive Tanzania

Inclusive Education and Political Participation of People with Disabilities through Empowerment and Capacity building

Geographical area Three districts in Dar Es Salaam (Ilala, Kinondoni and Temeke) and Mwanza District in Kilimanjaro Region

Time Frame: 1.11.05 – 31.12.2009 (50 months)

1. Summary and project objectives

The overall objective of the project is to realise an inclusive society in Tanzania where persons with disabilities have equal opportunities to participate in society. The project methodology is based on the global claim of disabled people’s organisations, “*nothing about us, without us*”. Following this motto, the methodology of the project is a participatory process where organisations OF people with disabilities together with organisations FOR people with disabilities define the priorities the strategies and carry out the activities of the project.

The project is based on a human rights approach to poverty reduction and the fact that development goals cannot be realised without the inclusion of persons with disabilities. Two socio-political areas have been selected as priority areas for the realisation of an inclusive development in Tanzania: inclusive primary education of children with disability and equal political participation of persons with disabilities. The project focuses on empowerment and capacity building in order to achieve sustainable and effective results. A well focused and needs driven training programme for the key players and multipliers constitutes and networking constitute next to advocacy the main components of the project.

2. Country information

Area:	945.087 km ²
Population:	37.6 Mio.
Capital:	Dodoma
Government type:	Republic with 26 regions
Ruling Party:	Chama Cha Mapinduzi/CCM
GDP per capita:	674 (PPP USD)
Human Development Index:	Rank 162 of 177
Population below nat. poverty line:	36 %
Life expectancy:	45.9 years
Adult illiteracy rate:	69,4%
Primary education/net enrolment ratio:	86%



Since independence in 1961, poverty eradication has been the main priority of the government. Still, Tanzania remains one of the poorest countries in the World (rank 162 out of 177 countries on the UN Human Development Index) with 90% of the population living on less than \$2 a day.⁴⁷ Accurate official statistics of the numbers of persons with disabilities in Tanzania are not available, but according to the World Health Organisation (WHO) approximately 10% of the population are persons with disabilities. Therefore, it is estimated that there are 3,8 million persons with disabilities, of which 1.7 million children with disabilities, in Tanzania.

3. Project rationale

The concept of Inclusive Development is based on a human rights approach to poverty reduction and the fact that development goals cannot be realised without the inclusion of persons with disabilities. Development processes have to be designed in a way that no groups or persons are excluded. In order to reach this objective a strong disability movement advocating for the rights and needs of people with disabilities is an essential precondition. The slogan of the international disability movement, "Nothing about us, without us" demonstrates this need for people with disabilities themselves having to speak out for their rights.

Disability is both a cause and a consequence of poverty. Poor persons with disabilities are caught in a vicious cycle of poverty and disability. Disability limits access to education and employment and leads to economic and social exclusion. The international model used for tackling disability is the Twin-Track-Approach. This approach stipulates a general inclusion of disabled people in the development process as well as specific policies and programmes for a sustainable improvement of the living conditions of persons with disabilities. In order to aim at a sustainable inclusion of the rights and needs of persons with disabilities it is imperative to focus on the strengthened capacities and the role of local disability organisations.

Primary education of children with disabilities

The right to education is universal and must extend also to children, youth and adults with disabilities. In Tanzania, the development of national education policies which adopt an inclusive approach is increasingly discussed by the government and the international donor community. One example is the NSGRP/Mkukuta: one of its operational targets in the field of education is an increased primary school enrolment for children with disabilities. The proportion of children with disabilities enrolled and those who attend and complete schools should increase from 0.1% in 2000 to 20% in 2010.⁴⁸ However, without respective legal commitments, this goal is unlikely to be achieved.

Equal political participation

Effective participation of persons with disabilities in decision and policy making processes is another central area for aiming at a sustainable inclusion of persons with disabilities. According to the Constitution of Tanzania, all citizens are fully entitled to political participation, actively as well as passively. However, the involvement of persons with disabilities in political processes and decision making is rather poor and in rural areas almost inexistent. This emanates from the fact that the Constitution does not give specific provisions addressing the special needs of different categories of people with disabilities that are necessary for the

⁴⁷ UN Human Development Report 2005, <http://hdr.undp.org>

⁴⁸ United Republic of Tanzania, Vice President's office: National Strategy for Growth and Reduction of Poverty (NSGRP), final draft, January 2005.

enhancement of their equal participation, for example sign language for the deaf, Braille for the blind, affirmative seats in parliament etc.

4. Target group(s)

Persons with disabilities and their interest groups are the prime target group of the project and will be trained in advocating for the rights and needs of persons with disabilities. Consequently, persons with disabilities are the main beneficiaries of the project but also the project implementers.

The second target group are political stakeholders (at central and local level) in Tanzania as well as international donors and institutions. They shall benefit from the expertise of the prime target group and the tools developed for aiming at inclusive education and political participation of persons with disabilities.

5. Methodology

The project methodology is based on the global claim of disabled people's organisations, "*nothing about us, without us*". Following this motto, the methodology of the project is a participatory process where organisations OF people with disabilities together with organisations FOR people with disabilities define the priorities the strategies and carry out the activities of the project.

In summary, the methodology of the project is based on the following principles:

- a) Participation and Empowerment: the prime target group will have the overall responsibility for the implementation of the advocacy activities while LIGHT FOR THE WORLD and external experts only act as resource providers
- b) Policy as well as and needs oriented: The project focus is on policy level, the method is however practice and needs oriented in the design of the capacity building activities and advocacy activities.
- c) "Learning by doing" is the underlying principle for the empowerment of the prime target group.
- d) Regionalisation: The Project addresses the national and community level in Tanzania. For the implementation on local level we have chosen three urban and one rural district.
- e) From grass roots to the international level: Using the interdependence of local, national and international advocacy work, this project not only addresses decision-makers on community and national levels in Tanzania but also on the international level.
- f) Reciprocity: The results and lessons learnt of this pilot project will be documented and published as a "Manual for Inclusion".

6. Project Activities

Due to the participatory approach of the project, the listed activities indicate the strategy of the project but do not cover the complete range of project activities. For example, the advocacy activities of the project are decided by the target group and are accompanied by a comprehensive and needs oriented training and capacity building programme. The target group is responsible for the implementation of advocacy activities, while LIGHT FOR THE WORLD and ICD act as coordinators and supervisors.

Activity 1: Situation Analysis I and II

An initial situation analysis is carried out in order to get a comparative base for evaluating the project's results. Consequently, a second situation analysis will take place at the end of the project.

Activity 2: Advocacy, lobbying and awareness raising

The advocacy strategy will embrace inclusive primary education and political participation. During the first two years the focus will be on inclusive primary education, and in the last two project years, political participation will be addressed. At the Kick-off workshop the project and the situation analysis will be presented to the prime target group, which will develop the project implementation structure.

Activity 3: Trainings and Capacity Building

At least 2 training blocks per year will be organised. Their content solely depends on the defined needs of the steering group. Priority will be given to local trainers, but experts from the region and the international level will also be invited.

Activity 4: Communication and Networking

The implementation of the project is accompanied by transparent and accessible communication for the participating stakeholders and the public in general. All communication tools, like the web page of the project, as well as relevant materials have to be accessible to all (Braille, large print, sign language interpreters etc.).

Activity 5: Monitoring and Evaluation

Monitoring and evaluation is an integral part of the project. The ongoing monitoring is carried out by LIGHT FOR THE WORLD. An overall interim evaluation will take place after 2 years and a final evaluation at the end of the project.

Activity 6: Collection of good practice examples

“Good practice examples” will be developed to serve as arguments for the international advocacy work and to supply policy makers and project planners with a resource tool for the development of inclusive development projects and policies.

Other activity: International advocacy work

Complementary to the advocacy activities in Tanzania international stakeholders, such as the EU, the Austrian Development Cooperation, UN, World Bank etc. are addressed for including disability in their policies and programmes. These activities are not included in the project budget but are carried out within the ongoing general advocacy work of LIGHT FOR THE WORLD.

For more information contact:

Information Center on Disability (ICD) Godwin Sanava Project Coordinator Mabibo Road Mabibo Office Complex P.O. Box 10269 Dar es Salaam Tel: 00255-22-24 00 227 e-mail: infocenter1998@yahoo.com www.inclusive-tanzania.org	LIGHT FOR THE WORLD – Christoffel Development Cooperation Katharina Noussi Project Coordinator Niederhofstraße 26 1120 Vienna Austria Tel: 0043 – 1 -810 13 00-17 e-mail: k.noussi@light-for-the-world.org http://www.light-for-the-world.org
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Annex_4 – Project Proposal on ICT for Persons with Visual impairments in Tanzania

CONCEPT PAPER

*Inclusive Tanzania Project: Access to Information for
Visually Impaired Persons*

*Submitted to:
Light for the World Austria*

**By
Inclusive Tanzania Consortium with Information
Centre on Disability
P.O. Box 10269, Dar es Salaam**

**February
2007**

1.0. Project title:

Access to information for persons with visual impairments in the context of the Inclusive Tanzania Project

2.0. Implementing agency:

Inclusive Tanzania Consortium

2.1. Funding Agency:

Light for the World Austria

3.0. Time frame:

The three remaining years of the project, i.e. 2007-2009

4.0. Project scope:

Four areas, namely Ilala, Kinondoni and Temeke in Dar es Salaam; Mwanga in Kilimanjaro region

5.0. Background:

The Inclusive Tanzania project aims at building an Inclusive Tanzanian society in order to insure that the rights and needs of persons with disabilities are fully and equally recognized. The project focuses on two areas: the first area is inclusive education (first two years of the project) and the second area is political participation of persons with disabilities in Tanzania (remaining two years).

During the Kick-off workshop in March 2006 the participating DPOs and PDOs formed the Inclusive Tanzania Consortium (ITC) which now functions as owner of the project. Its main responsibilities are to make sure that lobbying for inclusive education and political participation takes place and that information about the project activities is distributed to all project members and stakeholders.

Through advocacy activities, capacity building and networking the project tries to mainstream disability matters into all areas of Tanzanian society.

6.0. Problem justification:

Up to now the Inclusive Tanzania Project has accomplished significant achievements in the realization of its goals. Distribution of information materials to stakeholders and a wider public has been carried out successfully.

However, for various reasons one specific group has yet to gain access to important information: Due to the lack of appropriate infrastructure, visually impaired persons are yet to be addressed in an appropriate way. In Tanzania, Braille printing services are scarce; the only Braille printers available are the following:

1. Tanzania Braille Printing Press:

This press is owned by the Ministry of Education and Culture and therefore produces mainly Braille materials for primary and secondary schools. Its capacity is limited and unfortunately it is lacking well-trained personnel with up-to-date skills of access technology devices. Although they acquired a new Braille embosser (PED30) in 2006, they are still waiting for installation of the necessary software. By the time the PO of IT project investigated on the progress in early February 2007, the new equipment was still not working.

Moreover, if the Tanzania Braille Printing Press provides services to non-governmental organizations and institutions, the charged costs are high – when ITC produced 100

Braille copies of the project newsletter the charged costs were 1,171,000 Tsh. (11,710 Tsh./copy) - and these customers have to accept the press' schedule so that calculating the required time is difficult. The biggest problem by far is that they do not offer service for a fixed price and moreover refuse to give out receipts.

2. Dar es Salaam University Special Education Unit Braille Embosser:

This embosser was purchased specifically for visually impaired students. Unfortunately, by mid-2006 the embosser broke down and is out of work since then. What is more, none of the services provided by this unit (including embosser, Perkins Brailier, Thermoform) are available for private customers or NGOs. When one IT project member went there to make copies of a workshop handout, service was only offered as a favour, not in terms of business.

3. Arusha Braille Printing Press:

The Braille Press in Arusha belongs to the Pentecostal Church of Arusha. It is only a small enterprise but is equipped with a new embosser and computer software. During a visit of the Inclusive Tanzania project officer at the end of January 2007, the director was very cooperative and helpful, so we sent some information brochures there for printing Braille copies. He promised to send them to Dar together with information about printing costs as soon as possible. Unfortunately (and in spite of many investigating phone calls from the PO) up to now he did not provide the information and apparently the embosser broke down so they are waiting for spares from abroad.

Manual techniques which are used by the visually impaired members of the Inclusive Tanzania project include the following:

- the Perkins Brailier:

One Perkins Brailier is available at the ICD office. This device is used similar to a typewriter to write Braille. A braillist can transcribe one print page to Braille in about 15 minutes. One print page equals to about 3 brailled pages. After brailing, the papers are taken to a Thermoform for copying.

- the Thermoform:

This electric machine produces copies of brailled papers through using heat. To make a copy, a piece of brailon paper (plastic paper) is put inside the Thermoform, heated and put on top of the brailled page. That way, one copy can be produced in about 30 seconds. Such Thermoforms can be found at the University of Dar es Salaam Special Education Unit, the University College of Education and at Tanzania Society for the Blind. Brailon papers are available in different shops in town and one role of 200 papers costs about 15,000 Tsh.

- the slate:

The slate, another manual device for brailing, is usually only used for short notes and not for project reports etc. because it is too time consuming.

The scarcity of service devices renders it difficult for the project to produce adequate information material for visually impaired persons, although **its policy clearly expresses the obligatory inclusion of all project members and stakeholders.**

Another reason for the insufficient inclusion of visually impaired persons in the project is that visually impaired persons face difficulties in **gaining access to technology and information devices like internet and electronic documents** because there is a lack of translation equipment (for instance Dolphin Pens). Although participating organizations of/for visually impaired persons have already been connected to the internet by the Inclusive Tanzania Project, visually impaired persons so far do not have the possibility to access it. The Braille embosser will quicken production of project reports and other relevant materials for the visually impaired. The Dolphin pen, on the other hand, will enable VI persons to access latest information from any internet electronic source independently.

Hence, there is a strong need to equip them with the required devices for their efficient and effective participation in the project.

7.0. The goal of the project:

The main goal of this project is to facilitate the visually impaired participants of the project with appropriate equipment in order to make sure that each and every participant is addressed in an adequate way.

8.0. Objectives and planned activities:

- To purchase one Braille embosser for the IT project which will be set in the ICD office
- To purchase 3 Dolphin Pens

The Dolphin Pen is a small portable screen access device that enables the visually impaired to use any computer just the same way that any other person does. The Dolphin Pen can be put into any PC running Windows XP or Windows 2000 and with a USB port. On the flash drive is Supernova software supplied by Dolphin Computer Access. There are four facilities, or consoles, covering magnification, speech, voice input, and Braille. Using Supernova, the keyboard can be configured as Braille and can print from ordinary text to Braille when used with a Braille printer.

Two of the purchased Dolphin Pens will be given to the visually impaired members of the steering committee and one to MUPWD. These Dolphin Pens will enable the blind or VI members of the steering committee to obtain up-to-date information from various electronic sources for participating fully in the project and to be able to prepare sufficiently for the project meetings.

- To conduct two-week training for 5 ICD staff members in order to instruct them in the use of the Braille embosser and Dolphin Pens and to become trainers to VI on how to use a computer.
- To conduct a training to the VI on how to use a computer (basic knowledge about how to switch it on/off, use of Windows, Word, internet, e-mail, Dolphin Pen)
- To produce project reports, information materials, newsletters etc. for visually impaired stakeholders, project participants and other visually impaired persons

- To make visually impaired persons participate fully and without barriers in the work of the project and to give them information in accessible format
- To distribute Braille materials to a wider public
- To achieve higher participation of visually impaired persons in general

9.0. Budget:

Serial No.	Item	Number of units	Estimated cost
1	Braille embosser inclusive transport, software ⁴⁹	1	Tsh. 2,600,000-5,200,000
2	Dolphin pens á Tsh. 200,000	3	Tsh. 600,000
3	1-week training on use of Braille embosser + Dolphin pens for 5 sighted ICD employees	1	instructor's payment???
4	1-week training for 15 VI members of the consortium to use computers (basic information on the functioning of a PC, word processing, internet and on how to use the dolphin pen)	1	Tsh. 3,750,000 ⁵⁰
	Total		?

10.0. Cost-benefit analysis:

The following table lists the project materials, which were printed during the 1st two quarters of the 1st year of the project. If they had also been printed in Braille, the sum would have been more than 30 million Tanzanian Shillings as one Braille printed page costs about 1,100 Shillings.

⁴⁹ information and prices from: Enabling Technologies: www.brailler.com

⁵⁰ this number only includes costs for transport, food and drinks for 15 VI plus their assistants (total of 30 persons) and does not consider payment for the instructor

	Document	Word pages	Braille pages	No. of Braille units needed	Total No. of Braille pages	Price per 1 copy	Total price per Braille document
1	Newsletter	10	50	100	5,000	11,171	1,171,000
2	Workplan	11	55	20	1,100	64,405	1,288,100
3	Conflict & Resolution report	20	100	50	5,000	46,840	2,342,000
4	Mwanga report	8	40	50	2,000	18,736	936,800
5	Training on Lobbying Manual	40	200	20	4,000	234,200	4,684,000
6	Developing Advocacy material report	30	150	20	3,000	175,650	3,513,000
7	Situational analysis	83	415	20	8,300	485,965	9,719,300
8	July training report	32	160	20	3,200	187,360	3,747,200
9	Kick-off workshop	24	120	20	2,400	140,520	2,810,400
10	Total	248	1,290	320	412,800	94,411,875	30,211,800

Annex_5 – Final Report on the Project “ICT for Persons with Visual impairments in Tanzania”

**INCLUSIVE TANZANIA CONSORTIUM –ITC
Visually Impaired Computer Training Final Report**

SPECIAL COMPUTER TRAINING FOR BLIND AND VISUALLY
IMPAIRED PERSONS REPORT,

ORGANISERS: INCLUSIVE TANZANIA CONSORTIUM PROJECT

FUNDED BY: THE LIGHT FOR THE WORLD FROM AUSTRIA.

TRAINING INSTITUTION: THE NATIONAL INSTITUTE OF
TRANSPORT (NIT).

DURATION OF TRAINING: TWELVE WEEKS FROM 17TH
SEPTEMBER TO 21ST DECEMBER 2007.

Prepared by ITC Computer Training Coordinating Committee

December 2007

1.0 INTRODUCTION AND BACKGROUND TO THE TRAINING.

Special computer training program was designed by ITC project as a way of empowering persons with visual impairment to participate and include them accordingly in the whole process of implementing the project in its four districts of operation. Prior to this training, ITC was highly challenged by impossibility of blind community in Tanzania not accessing information easily and instantly like others despite the advances in science and technology particularly in the field of information and communication technology.

To overcome the pressing need for instant, adequate and cheap means of accessing information, ITC project under the sponsorship of the Light for the World agreed in principal to organize and run special computer training program to cater for special needs to the visually impaired with a focus of empowering their respective organizations/institutions.

1.1. GOAL AND OBJECTIVES OF THE TRAINING

The main goal for organizing special computer training was to provide an opportunity for organizations of and for the blind to acquire basic computer literacy skills as a way of building capacity for both organizational effectiveness/efficiency and for the betterment of the ITC project.

1.2. SPECIFIC OBJECTIVES OF THE TRAINING

Specifically the training sought to:

Enable 20 participants from organizations of and for the blind acquire basic computer literacy skills;

Expose and train participants to use Dolphin pen program adequately and correctly;

Reduce dependence among leaders and practitioners with visual impairment with a view of maximizing their capacities and increase independence at work;

Strengthen information sharing between ITC member organizations.

2.0. TARGET ORGANISATIONS/INSTITUTIONS FOR THE TRAINING

Computer training was mainly designed for organizations that directly works with or for persons with visual impairment. Below is a list of such organizations:

5. Tanzania League of the Blind (TLB);
6. Tanzania National institute for the Blind (TNIB);
7. Tanzania Society for the Blind (TSB);
8. Information Centre on Disability (ICD); and
9. The Union of Persons with Disabilities of Mwanga (UPWD).

3.0. PROCEDURES FOR SELECTION AND RECRUITMENT OF TRAINEES

The ITC was responsible for organizing and coordinating the training and signing the contract with the NIT who offered the trainer, venue and the relevant infrastructure for

the training. Each organization was required to appoint participants whom appeared useful to the same. However, there was a special emphasis that gender equality was a compulsory criterion to all. In addition, sighted computer literate persons were to be appointed to join the class in order to assist trainees with visual impairment to learn more easily.

Failure of some organizations to observe gender in their selection of trainees and tight schedules of some participants necessitated the recruitment of three women trainees from the Tanzania Braille Press.

4.0. FUNDING AND FACILITATION OF THE TRAINING

The ITC under the funding of the Light For the world financed and facilitated the following:

1. Training of the trainer from NIT who attended a one week training workshop on Dolphin pen program organized by the South Africa National Council for the Blind in July 2007 in South Africa.
2. Purchasing 10 Dolphin pen programs.
3. Paying fees for 20 participants and living costs for three upcountry participants and one personal assistant.
4. Production of Braille computer materials particularly those recommended as most important by the trainer.
5. Organizations/participants paid for local traveling costs and the three upcountry participants had to subsidize the living costs in Dar es Salaam.
6. NIT offered two extra weeks for the training as its contribution to the ITC project.

5.0. MANAGEMENT AND COORDINATION OF THE TRAINING PROGRAM

Computer training was managed and administered on two folds. Firstly, the NIT was responsible in managing the classroom in terms of delivering classroom instructions, ensuring the availability of facilities plus repair, enforcement of timetable and the like. And second; the program was coordinated by a small Computer training Committee which worked very closely with the classroom leadership that was democratically elected by trainees. Through these structures different concerns and needs of trainees were dealt upon accordingly.

PROCEEDINGS OF THE TRAINING

6.1. PRELIMINARY INFORMATION

The training officially commenced on 17th September and ended on 21st December 2007. Although 20 trainees were registered for the training, 18 managed to attend the class (with varying degrees of attendance) and only 16 successfully graduated the training. (See the attached list of participants)

6.2. COMPUTER PROGRAMS TAUGHT/LEARNT

The training was designed to offer the following computer programs:

1. Introduction to Computer;
2. Microsoft Word 2003;
3. Microsoft Excel 2000;
4. Introduction to Internet and networking; and
5. Mercury Dolphin Pen program and other screen readers (narrates and Supernova)

7.0. ACHIEVEMENTS AND CHALLENGES OF THE TRAINING

7.1. ACHIEVEMENT

Computer training for the blind and visually impaired persons registered the following achievements in the course of its implementations:

1. For the first time in Tanzania mainland 16 VIP where specially trained and qualified in Basic Computer literacy Skills. This was indeed a vital and tremendous land mark in the development of persons with visual impairment and their organizations in facing ever-changing socioeconomic and political and technological developments specifically in the field of information, communication technology. Thus, the blind community in Tanzania has currently started to benefit and enjoy the advances and marvels of computer technology.
2. Associations/organizations of and for the blind including TLB, TSB, ICD, TNIB and ITC obtained Dolphin pen programs specially made available to assist the blind to work independently with the computer likewise, the Tanzania Braille press benefited from the training for its three staff though could not be given the dolphin pens. Both the special programs and computer literacy grandaunts are expected to contribute greatly in increasing organizational efficiency that in turn would promote and improve delivery of services to the constituency of disability particularly the blind.
3. The NIT successfully managed to organize and execute special computers training for the first time in the country. Consequently, other learning institutions might learn from the NIT in planning and implementing such training programs for the visually impaired persons who seem thirsty and ready to learn such unavoidable skills required for quick development of the country and their organizations as well.
4. Presence of specially trained trainer in Dolphin pen program for the blind. This has set a basis for expansion and improvement in providing special computer training for the blind community in the country.
5. The ITC project attained the necessary experiences and capacity in organizing and coordinating computer training for the blind.

7.2. CHALLENGES

Since computer training for the blind was really a new experience to both the ITC and the NIT, the program encountered a number of challenges as listed below:

1. Some registered trainees particularly the executive officials of DPOs totally failed to accommodate the training schedule in daily programs of their organizations. As a result, those who were initially targeted missed the opportunity and four registered trainees could not continue with the training for similar explanation.

2. Computer training modules in Braille were not produced on time due to ITC Braille printer failing to function because of lacking the required technical know how. Lack of materials in Braille challenged trainees not to learn adequately, freely and at one's speed. It is important to mention that efforts were made by the project to reduce the intensity of this problem which was mainly caused by lack of budget in the first concept note that was submitted to the Light for the World which funded the training.
3. The trainer was challenged with a large number of trainees in a single classroom. It was extremely very difficult to handle such a big number of trainees who needed intensive and extensive support from the trainer.
4. A small number of Dolphin pens in relation to the number of trainees.
5. Most of trainees lacked opportunity to do practical in their own organizations due to inadequate number of computers. This limited them from mastering the computer as timely as expected

8.0. LESSONS LEARNT:

1. Computer training for the blind requires enough time and resources (both financial and human) for planning, production of relevant materials and execution of the same;
2. ITC member organizations dealing with persons who are visually impaired can establish and run computer training centers in order to meet the alarming demand for compute training programs for their stakeholders;
3. Media programs are unavoidable if the disability constituency is to acquire its special needs and attention such as access to information technology.
4. The public was very amazed by the program produced and aired by National Television of Tanzania (TVT) which demonstrated persons with VI working with computer in a classroom at NIT.

9.0. Recommendations

The following are recommendations for sustainability and improvement of training programs for the blind as pointed by both the grandaunts and the computer training coordinating committee,

1. ITC project in collaboration with organizations of and for the blind should formulate sustainable plans to enable large numbers of blind persons in schools, colleges and those at work who to make them compete fairly in the labor market
2. Colleges and other learning institutions have to learn from the NIT on how to prepare and implement computer training programs for the blind. This will result into increased opportunities for the blind to acquire computer literacy skills for their betterment and that of the country at large.
3. The government of Tanzania, non government organizations and development partners should recognize the great demand for computer training by persons with visual impairment. Consequently, development plans should include computer training programs for the blind. Indeed, this is the area and concern that requires a due support by responsible stakeholders for it is not yet worked upon accordingly.

4. ITC project, ICD and Light For the World should see the possibility of providing respective DPOs with reasonable number of dolphin pens and computers. This will save the outgoing training from being useless and unfruitful.

10.0. CONCLUDING REMARKS

Generally, the organizations working with and for the visually impaired persons, trainees, the trainer, the college management, coordinating committee and the ITC were satisfied with the way the training program was organized, coordinated and implemented in spite of some limitations as pointed earlier on.

The graduates particularly extended their appreciations and uttered a vote of thanks to the following:

1. The Inclusive Tanzania Consortium project for organizing and coordinating the special computer training;
2. The Light For the World for financing the computer training project in different dimensions including sponsoring the trainer to study dolphin pen program in South Africa; paying the college fees for all participants; production of computer Braille materials; and other related costs.
3. Information Centre on Disability for hosting and coordinating efficiently the ITC project as well as the computer training;
4. Sight Savers International Tanzania for providing the training with eight dolphin Pens to smoothen the execution of the training these were pens to be returned since they belonged to Zanzibar National Association of the Blind. (ZANAB)
5. The National Institute of Transport for implementing the training program as contracted.

NATIONAL INSTITUTE OF TRANSPORT
SPECIAL COMPUTER TRAINING PROGRAMME FOR
VISUALLY IMPAIRED PEOPLE

Final Report

Dates: 17th October 2007 – 21st December 2007

Course Modules

- Introduction to Computers, Windows XP, Dolphin Mercury Pen
- Internet
- Microsoft Word 2003
- Microsoft Excel 2003

Tutor: Edgar Telesphory - National Institute of Transport

Programme coordinator: Godwin Sanava - Information Center on Disability

Venue: NIT computer laboratory 2

Course Details

Participants exposed into various screen readers that may assist in working with computer, these includes Narrator, Supernova, Jaws and Dolphin Mercury Pen.

They learn about Introduction to Computers, hardware and software before embarking into evolution of Windows Operating system, They learn and practice using Windows XP operating system as well as security and healthy hazards of using Computers.

With internet they covered Email, Surfing, Searching, Security, Chatting, and Downloading

They learn basic word processing using Microsoft Word 2003 and basic spreadsheet using Microsoft Excel 2003

Participants

1. Frola Duma - Tanzania League of Blind - Dar Es Salaam
2. Frida Haule - Union People with Disability - Mwanga Kilimanjaro
3. Zitta Batamanagwa - Tanzania League of Blind - Dar Es Salaam
4. Richard Fungambili - Union People with Disability - Mwanga Kilimanjaro
5. Sekunda C. Assenga - Tanzania League of Blind - Dar Es Salaam
6. Boniface Kiyenze - Tanzania National Institute for the Blind TNIB
7. Ezekiel A. William - Tanzania National Institute of Blinds
8. Bahati Tuarira - Tanzania League of Blind - Dar Es Salaam
9. Greyson Lazaro Mlangi - Inclusive Tanzania Consortium - Dodoma
10. Hadija M. Salum - Tanzania Braille Press- Dar es Salaam

11. James Shimwenye – Inclusive Tanzania Consortium Dar es salaams
12. Juma Bakari Mwishaha - Tanzania National Institute of Blinds
13. Margareth M. Kishiwa –Tanznia Braille Press
14. Maria Onesmo - Tanzania National Institute of Blinds
15. Mary Msengezi - Tanzania League of Blind - Dar Es Salaam
16. Raphael Noah - Tanzania League of Blind - Dar Es Salaam

Participants who did not perform Examination

14. Stella Jails –Tanzania Braille Press.
15. Felician Mkude TLB

Absconded with Apologies

16. Hendry Wimile. ICD
17. Sadic Halid TSB
18. Seif Hamis TLB

Total number of participants 20, 10 males and 10 females

Participants who finished successfully

9 Females. 7 Males

SPECIAL COMPUTER TRAINING PROGRAMME FOR VISUALLY IMPAIRED PEOPLE

Examination Results

Names	Marks/100%	Gender	Remarks
1. Raphael Noah	56	Male	Pass
2. Mary Msengezi	50	Female	Pass
3. Maria Onesmo	54	Female	Pass
4. Margareth M. Kishiwa	45	Female	Pass
5. Juma Bakari Mwishaha	46	Male	Pass
6. James Shimwenye	52	Male	Pass
7. Hadija M. Salum	43	Female	Pass
8. Greyson Lazaro Mlanga	73	Male	Pass
9. Bahati Tuarira	52	Female	Pass
10. Ezekiel A. William	45	Male	Pass
11. Boniface Kiyenze	51	Male	Pass
12. Frola Duma	51	Femal	Pass
13. Frida Haule	50	Female	Pass
14. Zitta Batamanagwa	44	Female	Pass
15. Richard Fungambili	44	Male	Pass
16. Sekunda C. Assenga	45	Female	Pass

Note: Best Male student (VI)- Grayson Lazarus Mlanga, Best Female student (VI)- Bahati Tuarira