Managing risks in implementation of information communication technology in developing countries.



Colophon

Document:	Master thesis (final)
NIII-thesis number:	09 IK
Student number:	0041386
Date:	Tuesday 16 November 2004
Author:	Maarten Hendriks (mhendriks@student.ru.nl)
Telephone:	+31-243296878 / +31-648261400
Address:	Lange hezelstraat 10, 6511 CJ, Nijmegen, the Netherlands
Education:	Radboud university, sub-faculty of Informatics
Study:	Information Science
Department:	Information retrieval and information systems (IRIS)
Supervisor:	Prof. Dr. E. Proper (erik@acm.org)
Associate supervisor:	Dr. E. Simons (e.simons@icarin.fiuc.org)



nijmeegs instituut voor informatica en informatiekunde

1 Maarten Hendriks 16/11/04

Abstract

ICT implementation in developing countries is normally done by external sponsors with different interests and budgets then regular ICT projects. It is envisioned by many developing organisations that ICT can play an essential role in development and should therefore be encouraged. However complexity and uncertainty in these ICT projects are extremely high. Often business stakes are not understood. Cultural and political influences play a large role in the way an ICT project is executed, causing risks for both the service and target domain. Managing the risks in these projects is therefore a necessity.

Managing risks in implementation of information communication technology in developing countries does not unnecessarily has to be done differently then in Western countries. However, extra precaution should be taken by taking actions and making decisions. The ISPL methodology proves to be useful in risk mitigation, but the decision making process should be adapted to the way decisions are made in developing countries. This can only be done by persons with the right authority, interests and knowledge about interfaces with other services. Also strategy planning as proposed by ISPL should be done carefully. The participatory descriptive approach is almost always the best option since relations between business actors are different.

Preface

This thesis is the result of a very turbulent period. I choose to travel to Tanzania for a couple of months with the intention to finish my studies in Information science. Without knowledge about the things to expect in this beautiful country I figured that at least a lot could be done over there. The decision to go to Tanzania was partly based on the possibility to accompany my girlfriend who was going to work in the designated district hospital in Sumve. This hospital interested me as well since I've tried to focus on medical information science during my studies. Therefore I got in touch with the Sumve foundation which initiated the Sumve library project, meanwhile I got informed about the 'Electronic Supply of Academic Publications' (eSAP) project and finally decided to work on both projects. Although this decision made it possible to compare very different situations with each other, this also meant that I had to integrate with their environment as well.

When time is at once not objective any more and cultural bridges do have to be overcome, things get difficult. Before one could even start working with the methods one has learned in all those years at the university, firstly frustration did stop me from expecting anything to stand up out of the dust. However after a while you adopt the pace of life in the east African countries and you start to see and feel what life is about in such an environment. Although the idea to implement ICT in a developing country is supported by many, a long way has to be overcome. By this time I can look back on what long ways really are and how fortunate we are with our means of communication. On the other hand, stress did not occur in my vocabulary while I was working in Tanzania, while time seems to manipulate me again, being back in the Western society.

Yes, it is true that I was fortunate to visit Tanzania and was able to work on two projects which were of high importance for this thesis. I suffered by using local transport and low budget hostels, but still I didn't manage to accept the things as they are, like the Tanzanians do. Sometimes I didn't know what I was doing there and I was angry many times on situations which were as pointless as being mad about it. Work on this thesis did not only give me more insight in issues related to ICT and developing countries but also to the many colourful aspects of live. My thanks go out to many people for very diverging reasons.

- Dr. Robert Mhamba, for a smooth introduction to Africa.
- Dr. Vero, for the possibility to work in Sumve.
- The Sumve Foundation, for their visit in Sumve and especially the 100 Euro I needed to survive another month.
- Prof. Dr. Erik Proper, being my long distance supervisor.
- Joost Dam and Via@frica for their help in the Sumve project.
- My friends in Morogoro.
- Denis Verhoef for his introduction and advices about ISPL.
- Fr. Walters who always welcomed me warmly at the st. Augustine university.
- Dr. Ed Simons, for his fast replies and ideas for the eSAP project.
- All the sponsors of the marathon I ran for the project in Sumve.
- My family and many friends, for supporting me by sending email from time to time.
- Rutger Rozendal for his advice about development issues.
- My girlfriend for patiently listening to my complains.

Maarten Hendriks 16 November 2004

Table of contents

	Abstract Preface	2 3
	List of tables	. 6
	List of illustrations	6
	List of abbreviations	. 7
1.	Introduction	8
	1.1. Background	. 9
	1.1.1. ICT in developing countries	. 9
	1.1.2. ICT in Tanzania	10
	1.1.3. ICT in healthcare	11
	1.1.4. ICT in business.	11
	1.1.5. ICT IN Education	12
	1.1.0. RISKS III ICT	13
	1.3 Theoretical framework	13
	1.4. Problem definition	14
	1.5. Methodology	15
~		
۷.	The esap project	1/
	2.1. Background	17
	2.2. Evaluation methodology	18
	2.3. Target domain	20
	2.3.1. Complexity factors	20
	2.3.1.1. Business system	20
	2.3.1.2. Process.	21
	2.3.1.3. IIIUIIIIduuli	23
	2 3 1 5 Technology	25
	2.3.2. Uncertainty Factors	27
	2.3.2.1. Business System	27
	2.3.2.2. Process	29
	2.3.2.3. Information	30
	2.3.2.4. Actors	30
	2.3.2.5. Technology	31
	2.4. Service domain	32
	2.4.1. Complexity factors	32
	2.4.1.1. Process.	32 22
	2.4.1.2. IIII0IIIIdu0II	22
	2.4.1.3. Actors	33
	2.4.2. Uncertainty factors	35
	2.4.2.1. Process	35
	2.4.2.2. Information	36
	2.4.2.3. Actors	36
	2.4.2.4. Technology	36
	2.5. Risk Analysis	37
	2.5.1. Risks associated to the target domain	38
	2.5.2. Risks associated to the service domain	40
	2.5.3. Risk probability and impact	41
	2.5.4. KISK MITIGATION	43
	2.5.4.1. ISPL FISK MILIGATION	43
	2.5.4.2. KISK MILLYALION IN THE ESAF PROJECT	.40 ⊿Ω
	2.0. Questioning inclusions	+0 ⊿0
		77

3.	The Sumve project	50
	 3.1. Introduction	50 52 53 54 55 57 57 58 59 59 59 61
4.	Analysis	.63
	 4.1. Development approach. 4.1.1. Introduction. 4.1.2. Multiple approaches. 4.1.3. The ISPL approach. 4.2. Political influences. 4.3. Cultural influences. 4.3.1. The aspect of time. 4.3.2. Authority. 4.3.3. Influences on the decision making process. 4.4. Technical influences. 4.5. Main differences. 	65 66 68 70 72 72 73 73 74 75 76
5.	Conclusion	.77
6.	Evaluation	82
Re	eferences	83
Aŗ	opendices	.86
	 A. List of eSAP Universities B. Profiles of institutes C. Questionnaire D. Telecentre Components E. Internet solutions 	86 87 90 93 95

List of tables

Table 1 ISPL Dimensions	. 19
Table 2 Risks associated to the Complexity factors in the target domain	39
Table 3 Risks associated to the uncertainty factors in the target domain	. 40
Table 4 Risks associated to the Complexity factors in the service domain	. 41
Table 5 Risks associated to the uncertainty factors in the service domain	. 41
Table 6 Risks sorted on probability	. 42
Table 7 Risks sorted on impact	. 43
Table 8 Main institutes of Sumve	. 54
Table 9 Risks that may be increased by strategy options	. 62
Table 10 Risks in different cases	. 77
Table 11 Internet Connection Prices Radio Node	. 96

List of illustrations

lustration 1 ISPL Risk management	13
lustration 2 The action research Cycle	16
lustration 3 ISPL risk management, Complexity uncertainty and actions to mitigate risks	19
lustration 4 eSAP Project Management	33
Justration 5 eSAP publication hierarchy	46
lustration 6 ISPL risk management, Actions to reduce risk probability	51
lustration 7 The action research Cycle	51
lustration 8 Sumve designated district hospital	52
lustration 9 Sumve multi-purpose community telecentre	57
lustration 10 ISPL Risk management, Causality	63
lustration 11 Project influences.	64
lustration 12 ISPL decision point planning	65
lustration 13 Action Research in Risk management	77
lustration 14 Development approach	78
lustration 15 Kwimba district.	96
lustration 16 SAUT network	96

List of abbreviations

COSTECH	Tanzania Commission for Science and Technology
DRP	Directorate of Research and Publications
eSAP	Electronic Supply of Academic Publications
FIO	Field Information Officer
ICT	Information and Communication Technology
ISPL	Information Services Procurement Library
NMTC	Sumve Nursing and Midwifery Training Centre
MCC	Medical Computer Centre
MCT	Multi-purpose Community Telecentre
PMP	Point to Multipoint radio
PoPs	Points-of-Presence
RU	Responsible units
SAUT	St. Augustine University of Tanzania
SDDH	Sumve Designated District Hospital
SSA	Sub Saharan Africa
STOA	Scientific and Technological Options Assessment
SUA	Sokoine University of Agriculture
TCC	Tanzania Communications Commission
UCC	University Computing Centre
UDSM	University of Dar-es-Salaam
UNESCO	United Nations Educational, Scientific and Cultural organisation
VLO	Virtual Library Officer
VSAT	Very Small Aperture Terminal
WLL	Wireless Local Loop
WSIS	World Summit of the Information Society

1. Introduction

This thesis is part of the study of Information science at the university of Nijmegen. The thesis is done under supervision of the Institute of Information Retrieval and Information Systems, Nijmegen Institute for Informatics and Information science (NIII), sub-faculty of Informatics. According to the vision on Information science [KAMP]

"Information science focusses on forming theory and communication of information and the role played by information technology. Information processes at individuals and organisations are not only seen from a technical, but also a cognitive, social and business perspective"

The four pillars which are used as viewpoints on problems in information science are: Organisation, information, technology and the human being. When these viewpoints are used in a developing country, it seems that there is a lack of Information and Technology while the Organisation and the human being is very complex for researchers from an other culture. According to Baskerville [BASK] the human being can only be understood as whole entity by action researchers. From his point of view:

"Factoring of a social setting, like an organisation and its information technology, into variables or components, will not lead to useful knowledge about the whole organisation"

Therefore the whole organisation should be under investigation, especially when one wants to analyse the risks that threaten that specific organisation. In the view of an action researcher, complex social processes can be studied best by introducing changes and observing the effects of these changes. When a risk analysis has to be done in order to mitigate these risks in a project in a developing country, the researcher will have to participate in the project to make his observations.

One of the methods that can be used to manage and mitigate risks is the ISPL methodology: Information service procurement Library. Although this library knows several plug ins for example for large-scale migrations, a plug in for developing countries does not exist. During this process of risk mitigation, changes are made to the processes. The research problem of this thesis looks into this risk analysis methodology by performing action research.

Reasons for doing research in a developing country are numerous, there are many problems that can be overcome by use of ICT, while there are also many problems that will have to be overcome when ICT has to be implemented. In § 1.1. of this chapter many of these ICT related issues are introduced. These issues

1.1. Background

1.1.1. ICT in developing countries

The problem of the implementation of ICT in developing countries has been under research by several development organisations. These organisations all have their own goals and approaches to the problems that occur during planning and implementation. Several approaches seem to work, while others seem to fail. Although these organisations learn form mistakes and best practices, there is no framework for the estimation and mitigation of risks that occur during implementation of ICT in developing countries. Such a framework could be helpful in achieving the goals of these development organisations.

The main theme of the United Nations Educational, Scientific and Cultural organisation (UNESCO) is:

"contributing to peace and human development in an era of globalisation through education, the sciences, culture and communication".

This main theme is split in several thematic areas and some cross-cutting strategies. In the Medium-Term Strategy 2002-2007 [UNES] these strategies are described. One of them is ICT related, namely:

"The contribution of information and communication technologies to the development of education, science and culture and the construction of a knowledge society".

It is obvious that ICT could contribute to development of several other areas like education and health care. According to UNESCO: "*ICTs open up new horizons for progress and the exchange of knowledge, education and training, and for the promotion of creativity and inter cultural dialogue*".

Many organisations share the idea that ICT should be brought to developing countries in these different areas. The Scientific and Technological Options Assessment (STOA) work group of the European Parliament (EU) [PEDR] reports about the so called digital divide.

"The unequal provision of opportunities to access and contribute to information, knowledge and networks and to benefit from the development- enhancing capabilities of Information and Communication Technology (ICT)"

This work group assents to the opinion of UNESCO. ICT can strongly contribute to the economic growth of the country, ICT can make it easier for the poor to access business, education and medical care, ICT can improve the environment and reduce the vulnerability of the poor.

One of the problems in actions taken to decrease the digital divide is that many developing countries do not ask for ICT. "*Probably many African policy-makers are not yet aware of the possible use of ICT, and prefer to deal with other more familiar fields"*. An ICT project could never be effective, when there is no awareness among the users. At the World Summit of the Information Society (WSIS) the challenge was posted:

"to harness the potential of information and communication technology to promote the development goals of the Millennium Declaration".

According to the report of the Geneva phase [WSIS], continuous and adult education, retraining, life-long learning, distance-learning and other special services, such as telemedicine, can make an essential contribution to employability and help people benefit from the new opportunities offered by ICTs for traditional jobs, self-employment and new professions.

In chapter 1, Plan of action, B. Objectives, goals and targets (page 12) indicative targets are mentioned, which serve as global references for improving connectivity and access in the use of ICTs, promoting the objectives of the Plan of Action, to be achieved by 2015. For the selection of the cases used in this thesis and the construction of a framework that can be related to the most important issues in ICT implementation in developing countries, a look was taken into these targets.

- a) To connect villages with ICTs and establish community access points; With this purpose in mind, a look can be taken at the construction of Multi-purpose community telecentres (MCT)
- b) To connect universities, colleges, secondary schools and primary schools with ICTs; The MCT is also used to connect secondary schools to ICTs and work done by organisations like Vi@frica can be related to this issue. Also the eSAP project is related to the connection of universities to ICTs
- c) To connect scientific and research centres with ICTs; Promotion of scientific research is one of the main aims of the eSAP project.
- d) To connect public libraries, cultural centres, museums, post offices and archives with ICTs; The library of the hospital in Sumve should be extended with access to ICT, this goal is also found in the Sumve project at the Sumve designated district hospital (SDDH)
- e) To connect health centres and hospitals with ICTs; The main purpose of the Sumve project
- f) To connect all local and central government departments and establish websites and email addresses; This target was not under research in this project.
- g) To adapt all primary and secondary school curricula to meet the challenges of the Information Society, taking into account national circumstances;
- h) To ensure that all of the world's population have access to television and radio services;
- To encourage the development of content and to put in place technical conditions in order to facilitate the presence and use of all world languages on the Internet; This is also one of the functions of the eSAP project.
- j) To ensure that more than half the world's inhabitants have access to ICTs within their reach;

These global targets can not be achieved at once in one global project. Smaller projects can contribute to achieve these targets and therefore it is of high importance that these projects are run well and lessons are learned from these projects. Organisations should work together and use the outcomes of their projects to serve this higher goal. In this thesis, problems related to individual projects but also problems caused by the initiation of several projects at an individual site are discussed.

1.1.2. ICT in Tanzania

According to the ministry of communications and transport [MCTT], Tanzania has made remarkable progress in deploying ICT. The telephone network is over 95% digital, however coverage is limited to urban areas. telecommunications and other infrastructures in the rural areas remains a basic impediment to the provision of new ICT services. The Tanzania Communications Commission (TCC) has licensed nine companies to provide public data communication services including Internet bandwidth.

These data operators have isolated initiatives of connecting their Points-of-Presence (PoPs) to the global Internet backbone. As a result, Tanzania lacks cheaper and high capacity connections to the global Internet. All connections, regardless of the data service provider, are small capacity international links that connect to the global Internet backbone in different countries. Therefore, the limited international Internet bandwidth is scarce and extremely expensive.

1.1.3. ICT in healthcare

Main arguments to construct a medical computer centre can be found in Pedrelli et al. [PEDR, page 27]:

"ICT can make important improvements in the delivery of services such as health care, including through the application of telemedicine, particularly in those areas currently not covered or badly covered."

According to Pedrelli Tele-medicine can help to cope with large-scale endemic and epidemics diseases by improving the organisation and management of health care. Data bases can be introduced to monitor the development of diseases, provide access to medical expertise and even make remote medical assistance available.

Tele-medicine can provide health services and diagnosis to the rural under-serviced; enhance the quality of health care; provide for training of health workers; facilitate the exchange of records and collection of medical information and data; provide access to medical literature; and allow for expert consultation. In Tanzania, the Health Care Sector Programme is aimed to improve access to effective and cost-efficient district health services. Therefore a national health care information system will be introduced for efficient planning, implementation and monitoring of the activities within the public health care sector. Also the eThinkTank [THINK, §5.4], a group of ICT related Tanzanians, report about the Networked World and benefits to Tanzania. According to them:

"Healthcare workers accessing on-line databases to research recent health advisories, or learning new surgical techniques via interactive video casts over the Internet. This might happen at teaching hospitals such as Muhimbili National Hospital, thus improving Tanzania's health care."

1.1.4. ICT in business

Again in Pedrelli et al. [PEDR, § B.1.3.], the opportunities of development offered by ICT in developing countries and the specific needs of these countries, above all in relation to poverty reduction are discussed. According to them ICT can provide easier access to business and education for the poor. Examples mentioned are craftsmen that cannot dace the concurrency of industrial products imported from abroad. Government should provide easier access to business. People should have access to information about agricultural price fluctuations or natural disasters.

Although arguments can be found that market globalisation is dangerous for poor people, because it can reduce some local market advantages, like higher prices thanks to market isolation. An open market can bring to the poor much larger advantages if they have access to it, and this can be possible using ICT to break down the remaining infrastructure barriers.

1.1.5. ICT in education

Another intervention to fight against poverty is to provide easier access to education for the poor. In developing countries more than 50% of people are under 25, school frequentation index is only 57% [PEDR]. "*Obviously ICT has a tremendous potential for improving education, particularly in those areas currently not at all or badly covered".* Better education increases the peoples well-being and also creates the conditions for future increases in income and the exit from poverty.

The main problem of provision of education is that it is not always accessible, because teachers are not there, don't have enough skills and the school sometimes works only a few days a year. It seems that conventional teaching methods and arrangements are increasingly unable to respond to the rising demand for learning, resulting in increasing illiteracy in many poor regions, a decrease of qualified teachers and reduced public funding of the education sector. Technologies for education and training, in particular distant education and multimedia, and new learning methods represent an opportunity to meet the needs of countries that have to accommodate, train and economically integrate large numbers of workers in widely dispersed and under-equipped inhabited areas.

[WSIS]:

"ICTs can contribute to achieving universal education worldwide, through delivery of education and training of teachers, and offering improved conditions for lifelong learning, encompassing people that are outside the formal education process, and improving professional skills".

Even long-distance education could become a complement to conventional schooling and training, especially in isolated regions, which often are the poorest. There is an official Secondary School Computer Studies Syllabus for Forms I – IV developed in 1996 and issued in 1997. this book can even been found in Sumve, although only few teachers has goner through this book. Thereby, it is out of date since the early 90's. The ministry of transport and communication identified the lack of a programme for training teachers on computers and other multi-media utilization as a major reason for slow take up of computer studies in primary and secondary schools. Generally, the use of ICT enhances effective delivery of education. Currently, this benefit is only evident in some schools and colleges in urban areas, however, only a few students have taken courses so far.

In general, there is a shortage of well-qualified professionals of ICT in Tanzania. There is also no well-established ICT professional profiles, and a standardised process of evaluation or certification of the different courses offered by various training centres is lacking. Access to On-line and distance learning for ICT is also still limited. Furthermore, opportunities for training are mostly limited to few urban centres.

1.1.6. Risks in ICT

All of these issues give reasons to implement ICT in developing countries. However implementing ICT in highly uncertain situations does have many risks. Therefore there should be a sustainable way to mitigate these risks, preferably before the start of a project. Therefore the goal of these thesis is to find out if an existing risk mitigation methodology can be used in this uncertain situation.

1.2. Goal

The main goal of this thesis can best be described with an illustration, taken over from Managing risks and planning deliveries [ISPL-MR]. This illustration [1] shows that risks can be managed through risk mitigation and strategy options. The situational factors determine the complexity and uncertainty, together causing risks for the service.

Risks for the service domain in Western countries are familiar, complexity and uncertainty can be determined from the situational factors. However less certainty can be found in projects in developing countries, since the situational factors are different and often not well understood. Therefore, it is interesting to take a look at those special situational factors, find out what risks they cause and finally if the proposed actions that are supposed to mitigate these risks are appropriate in this setting.

The goal of this thesis is to describe the risks that can be found in several situations in a developing country. A framework will be developed for the mitigation of risks in ICT projects in developing countries.



1.3. Theoretical framework

Illustration 1 ISPL Risk management

The theoretical framework used in this thesis exists of the main concepts used in risk management. A brief explanation of some concepts is provided below, the specific parts of the framework are discussed in more detail in each chapter. Complexity and Uncertainty and actions to mitigate risks are the main focus in the eSAP project, described in chapter 2. Actions to change situational factors and Actions to reduce risk probably are the main focus of in the Sumve project, described in chapter 3. Risk mitigation strategy options and Risks are discussed in the analysis, chapter 4.

Situational factors

"This are factors related to the complexity and uncertainty associated with the business and the service organisation. Their value can be expressed in a level of complexity or uncertainty."

Risk mitigation strategy options

"The strategy for a specific service guides the design of plans and the selection of methods used for that service."

Risk mitigation

The mitigation of risks is planning decision points in order to mitigate the risks that are caused by uncertainty and complexity of a project or service.

Decision points

Finally a strategy can be chosen with a sequence of decision points. "*The ISPL* methodology focuses on decisions and deliverables but does not directly prescribe the activities to be performed nor the techniques to be used". A proper strategy should make it possible to perform a sustainable project in developing countries as well.

1.4. Problem definition

The general problem area of this thesis is the implementation of Information communication technology in developing countries. This area is too broad for this thesis and therefore scope is narrowed to two projects, one in urban environment and one in rural environment. The project in urban environment is done at several locations, so as much situations as possible will be under research. The main question of the thesis therefore is:

"Can risks in ICT implementation in developing countries be managed in the same way as they are managed in Western countries?"

Sub questions:

- 1. "How could a western methodology be used too manage risks and plan deliveries in a developing country?"
- 2. "What typical risks play a role, when ICT is implemented in urban environment?"
- 3. "What typical risks play a role, when ICT is implemented in rural environment?"
- 4. "What are main differences between stakeholders in Western countries, rural and urban developing countries?"
- *5.* "What actions can be taken to mitigate risks in both urban and rural regions in developing countries?"

For data collection, participation in two projects was required with their own sub goals.

- 1. As part of the existing eSAP project, analysis has to be done to measure the effectiveness of previously taken efforts. The results of this analysis can be taken to a more general level by comparison with results of other projects. An advice report will be delivered as proposal for the further course of the eSAP project.
- 2. Secondly a plan will be developed for a new project, namely the introduction of a library and Multi-purpose computing centre in the village of Sumve.

1.5. Methodology

The problem area is studied by use of case studies [GRIF]. This technique was chosen because a multiple case study design offers the opportunity to generate new theories, via comparison between cases, or to refine theories. For comparison between urban and rural environments a case in urban environment, the eSAP project, was selected as well as a case in rural environment, the Sumve library project. The eSAP project itself contains ten separate cases, which all have their own characteristics, forming unique cases in the project.

Case studies involve a range of research methods. The case study of the eSAP project was used to conduct an evaluation, to gain direction for improvement of the project as it is developing and to determine the project effectiveness after the first pilot over three years. According to Frechtling et al. [FREC], formative evaluations examine the development of the project and may lead to changes in the way the project is structured and carried out. Summative evaluations (also called outcome or impact evaluations) look at what a project has actually accomplished in terms of its stated goals. This evaluation was both formative and summative. Formative since changes were proposed after evaluation and summative since a look was taken at the effectiveness of the system. There are many questions that could be addressed during evaluation of a project like eSAP, however since the period of time was to short to investigate all of this issues thoroughly, only descriptive qualitative research could be done.

According to Frechtling et al. [FREC], It is important to stress that there are many ways of performing project evaluations, and that there is no recipe or formula that is best for every case. Quantitative and qualitative methods each have advantages and drawbacks when it comes to an evaluation design, implementation, findings, conclusions, and utilization. The challenge is to find a judicious balance in any particular situation. Data collected through quantitative methods are often believed to yield more objective and accurate information because they were collected using standardized methods, can be replicated, and, unlike qualitative data, can be analysed using sophisticated statistical techniques. In line with these arguments, both methods were used during the research period.

The selection of cases was firstly done on interest. Since there are many projects in developing countries which could need in-depth study, numerous cases could be selected. However since the amount of time reserved for this thesis is small, the case studies had to be constrained to one country: Tanzania. Three locations in urban environment were selected, where in-depth study could be performed. One location was chosen for research in rural environment. Four sites were visited outside Tanzania for comparison and generalisation.

Data is collected by literature research and questioning. Since the evaluation was both formative and summative, unstructured interviews and questionnaire were used to gather both qualitative as quantitative information. Also work integration was used to gather data. Working closely with the project participants did help in forming better understanding of the situation. The role of theory was primarily to compare the cases with others and to confirm existing theories.

The type of research can also be qualified as action research, which is regarded as research that is normally carried out by practitioners (persons that stand in the field of work). It enables the researcher to investigate a specific problem that exists in practice what requires that the researcher should be involved in the actions that take place. The results obtained from the research should be relevant to the practice. In other words it should be applicable immediately. This means that the, researcher, as expert, and the person standing in the practice, jointly decide on the formulation of research procedures, allowing the problem to be solved.

According to Baskerville [BASK], the ideal domain of the action research method is characterized by a social setting where:

- The researcher is actively involved.
- The knowledge obtained can be immediately applied
- The research is a (typically cyclical) process linking theory and practice.

During the action research, five phases are iterated as illustrated below



Illustration 2 The action research Cycle

- 1. Diagnosing; identification of primary problems that are underlying causes of the organisation's desire for change.
- 2. Action planning; specification of actions that release or improve these primary problems
- 3. Action Taking; implementation of the planned actions.
- 4. Evaluating; determine whether the theoretical effects of the action were realized.
- 5. Specifying learning; formally undertaken last to direct the knowledge gained in the action research.

These five steps can be summarized in two main stages: the diagnostic stage and the therapeutic stage in which the changes are introduced and effects are studied. To be able to map the diagnosis, changes and actions, a conceptual framework is needed. Therefore, the ISPL methodology was used to map these actions and position the results of the therapeutic stage.

Since action research is cyclic, the starting point does not necessarily has to be diagnosing. A better starting point in the eSAP case study, was evaluation of the actions. Thereafter steps five, one and two could be executed, while step three 'action taking' will be a follow up of this research period. In the projects in Sumve several cycles where followed, increasing insight in the situation of the village and its needs for a computer centre. This project was more suitable for action research since it was a new project where actual actions were taken, starting a new cycle.

According to Baskerville [BASK] there are limitations to action research. The method is among the more qualitative approaches. There is a lack of generally agreed criteria for evaluating action research. Although this limitation is taken under consideration, it is not an option to grasp to statistical methods in this thesis. An attempt was done to gather information through a questionnaire, but results are not scientifically significant. The selection of three participants out of the total population of ten participants can not give significant quantitative data about the whole population, therefore, also the questionnaire can only be used to enrich the descriptive analysis.

2. The eSAP project

The eSAP project is a project that was initiated by Western university Professors, but implemented in 10 universities in 5 different countries. In this project each university was treated in the same way, while their needs differentiated more then expected. During the evaluation of this project it seemed that the method to manage risks and plan deliveries could be the same, but the risks and deliveries themselves do differentiate.

In § 2.1. some background about the eSAP project is provided. In § 2.2. a more in-depth look is taken into the ISPL methodology and how it could be applied to the eSAP project. In § 2.3 and § 2.4 the risks for the target domain and service domain are discussed. § 2.5 includes the risks analysis and the proposed actions to mitigate these risks. The questionnaire used to gather some quantitative data is discussed in in § 2.6. § 2.7 covers answers to the questions that were of special interest in the eSAP project, causality is discussed in chapter 4.

2.1. Background

The eSAP project was initially meant to serve two purposes [ESAP]:

- To promote the access to the international scientific journals by means of Internet for universities in developing regions.
- To supply academics in developing regions with the possibility to electronically publish their articles on the Internet.

According to Mr. Simons, general project manager, eSAP is meant as an instrument to make it technically possible to publish articles on the Internet. These articles are not categorized around a theme or subject but rather around the university and its institutes. This means that the university and institutes themselves are the responsible units (RU) for the articles and not the individual scientist who happens to have more knowledge about where and how to publish on the Internet.

Three years ago, a pilot project was started on two institutes of all participating universities (Appendix A). This pilot started with the selection of a project coordinator, a Virtual Library Officer (VLO) and a Field Information Officer (FIO) for each institute. The VLOs and FIOs were trained in the use of electronic journals, research methodologies and search tools on the Internet. The VLO was trained to be able to maintain an own version of the eSAP web pages.

After three years, the GPM expects the project to have matured in the pilot institutes and hopes to make the system ready for use in the whole university. However, before this restart of the project is made, an evaluation of the system should take place to find new requirements and problems that occurred. This evaluation was done on three of the ten participating universities resulting in advices for both the GPM as well as all participants, especially the three that were subject of the evaluation.

The university of Dar-es-Salaam (UDSM), the Sokoine University of Agriculture (SUA) and the St. Augustine University of Tanzania. (SAUT) were subjects of the case study. Furthermore, Universities in both Kenya and Uganda were visited shortly to compare their situation with the Tanzanian situation.

2.2. Evaluation methodology

The eSAP project was evaluated by use of the ISPL methodology, interviews and a questionnaire. The situation analysis was mainly done by interviews with the project participants and other stakeholders who should be involved in the project. The interviews were based on in advance prepared questions, but mainly ended in an open discussion. The Information Services Procurement Library (ISPL) methodology was used to analyse the data in more detail, this helped in analysing the complexity factors and uncertainty factors related to the project in its current form.

The ISPL method is based on best practices in procurement management. According to the authors of the book: Managing risks and planning deliveries [ISPL-MR], the method can be used for both the target domain; the part of the organisation which is affected by a service and the service domain; the service organisation that delivers the service. In this case study, the three Universities in Tanzania form the target domain, while the eSAP GPM forms the service domain.

The analysis is grouped into four classes that characterize a certain part of the situational factors. These four classes are: Process, Information, Actors and Technology. The classes are analysed in two dimensions; the domain dimension and the knowledge characteristics. The latter groups knowledge about the situational factors into complexity and uncertainty.

"Complexity can be regarded as the difficulty encountered in managing the available knowledge". [ISPL-MR]

The available knowledge is the knowledge about the target domain gathered by taking interviews and available documents about the information system that is evaluated.

"Uncertainty can be regarded as the difficulty encountered in managing the available knowledge". [ISPL-MR]

Complexity together with uncertainty can cause risks for the performance or even the success of the system. The information from the interviews is used again to evaluate the certainty of the knowledge required for proper use of eSAP.

In overview:

Risk Analysis	Target Domain	Service Domain
Complexity	Business Processes Information Actors Technology	Business Processes Information Actors Technology
Uncertainty	Processes Information Actors Technology	Processes Information Actors Technology

Table 1 ISPL Dimensions

For each of the Universities, a single advice report was written, while one report was provided to the service domain: the eSAP GPM. Preparation of the reports seemed to consume a lot of time for each individual university, while in this thesis more interest is taken into risks that can be generalized from the individual cases. Therefore one general advice report is taken over in this thesis, extended with parts of the individual reports. Also recommendations and other findings from the Kenyan and Ugandan Universities are included.

The main focus of the evaluation of the eSAP project for this thesis is to find complexity and uncertainty factors and actions proposed by the ISPL methodology to manage the risk impact.



Illustration 3 ISPL risk management, Complexity uncertainty and actions to mitigate risks

As mentioned in § 1.5. action research was used only partly in this project, while ISPL is used to map the diagnosis. Participating in the eSAP project meant that evaluation had to be done together with the project participants. Concrete questions that were needed for the evaluation included:

- To what extent are the participants moving toward the anticipated goals of the project?
- Which of the activities or strategies are aiding the participants to move toward the goals?
- What barriers were encountered? How and to what extent were they overcome?
- Was the project equally effective for all participants?
- What significant unintended impacts did the project have?
- Is the project replicable and transportable?
- What risks threaten the success of the project?
- What actions can be taken to mitigate these risks?

These questions are not all directly related to the goals of the risk analysis, but were of interest for the eSAP project. In the next two paragraphs the complexity and uncertainty factors that are appropriate to the situation of the eSAP project are discussed while finding answers to these questions.

19 Maarten Hendriks 16/11/04 2.2. Evaluation methodology

2.3. Target domain

As mentioned before, the target domain is the part of the organisation which is affected by a service and the service domain. In this case study this are the three universities in Tanzania.

2.3.1. Complexity factors

2.3.1.1. Business system

Complexity of requirements

The Complexity of the business system is described by the requirements that existed on the start of the project. In most projects these requirements are formed from the business needs, however in the eSAP project, the requirements play a different role. The system was not required by the university at first hand, but provided by the GPM. Although there were no requirements defined, the need for the system was recognized by most participating Universities. After the introduction of the system, the environmental requirements started to play a very important role in the performance of the system.

At UDSM there is no high need for the system, since there is an existing blackboard system in which articles and other course material can be published. Also the hierarchy of the university requires that the project team consists of people who can have some influence in multiple institutes of the university, which is currently not the case. Although the ICT capabilities of the university seem to match the requirements for the system, the way the project is introduced at the university does not match with the current ICT policy.

SUA does have the requirement to publish articles, whether this is electronically or on paper. However, they have their own ideas on how this should be done. The system as it was provided by eSAP does not fit in their publication policy. Although it meets the possibility to publish articles, it does not meet requirements posed by the university itself. The requirements of the university are complex, since there are requirements from several departments that play a role. Also some requirements mentioned by different stakeholders within the university are blocking the use of the system. Examples are that academics do not want to provide their articles for free. The relation between the wish to publish, the security of this publication and the recognition of the publication is highly complex and therefore these factors should be well considered.

At SAUT there is no sustainable ICT environment yet, what is needed to be run eSAP properly. Also the academic output of the university is still low, causing a lack of need for the system. The complexity of the requirements which were not specified at the start is certainly high.

Other Universities agree that no in-depth requirement analysis was done at the start of the project, causing problems with awareness and motivation of service actors. In general the complexity of the requirements can be considered High

2.3.1.2. Process

Complexity of business processes

The main process in the target domain concerns the electronic publication of articles. This process is divided in two sub processes:

- The production of an article by academic staff
- The electronic publication by uploading the article, using eSAP.

Like mentioned in § 2.1 the eSAP project is meant to support both sub processes. In our Western world, the production of an article, thesis or even a working paper, is an extremely vague process. The electronic version of publishing in itself is not extremely complex, however, in developing countries several problems occur in this process, which don't seem to be a problem in Western countries.

According to the ISPL method [ISPL-MR], factors that play a role in the complexity of the business processes, are the number of processes and the process interfaces. The system provided by eSAP, is supporting two processes: creating academic output and publication of this output. Like mentioned before, these processes are not necessarily very complex, however their interfaces are very numerous. Examples are promotion, Public relations, information exchange and several policies like the ICT policy and publication policy of the Universities.

The publication process of SUA is closely related to the process of getting promotion in the university. Externally there are relations with the journals that are recognized by the university and in which the academics want to publish their articles. These processes are complex in their relation to each other. At SAUT, the process of publication has not matured yet. There is no reliable network to support academics with sufficient resources and the university does not have a real academic atmosphere yet. Therefore, the process of electronic publication is still in its childhood at SAUT.

It is hard to use a proper scale too measure the complexity of the business processes since the business processes themselves are not necessarily complex while they seem to be very complex at some of the universities. In general low academic output is seen from the participating universities, indicating that the business process has such high complexity that it could be blocking the academics.

Complexity of quality properties of the business processes

The quality properties of the business processes relate to the quality of this process and its constraints. Usually this is expressed in efficiency, functionality, security, reliability, maintainability, portability and usability. Although each quality property can be measured on the same ordinal scale, an average measurement is taken to measure the complexity of the business processes.

Efficiency:

Since the system relies in a high amount on the availability of the Internet, the time used to download or upload an article is very high. Although the Internet connection of UDSM is reliable, the project is not introduced to the ICT department and therefore not highly efficient in use. The Internet connection of SUA however is not fast enough to wait for the download of all the articles separately. Secondly there is no integration with policies, so the system cannot be used efficiently. At SAUT the Internet is not highly reliable and there is no ICT policy for the use of electronic resources. Efficiency can hardly be reach in any off the university.

Functionality:

The system functions properly on the server in Nijmegen, however it is hard to access the system with a low bandwidth connection in Africa. The awareness about the system on most Universities is low and it is uncertain if the system can be maintained easily in the library where it is currently installed. Security:

On the moment anyone could access the system and therefore the academics are somewhat preserved about using it. The system is very open; almost any type of document could be published without review, however the university itself should form a policy for the use of eSAP. When academics will have to follow this policy, the contents of eSAP will be more reliable and represent a higher quality. At SUA, academics do not want to publish in a system what is not recognized and does not follow the copyright standards of the journals. Secondly most members of academic staff are afraid of piracy, when the articles are freely available. Many of the academics do not seem to be ready to publish electronically through eSAP. According to the project team at SUA, the GPM should spend more sensitization efforts towards academicians. At SAUT it is not possible for many members of the academic staff to access the system without interference of the VLO.

Reliability:

The system itself is reliable enough to maintain its level of performance, but the reliability of the contents is low. Since there are no quality checks or reviews for the articles yet, reliability of the system is still low. Secondly, skills of the VLO might not be sufficient to maintain the system, technical staff is needed to keep the system working within the university. Whenever the VLO has other priorities, which is mostly the case at UDSM, the system could be subject of lower performance. At SUA, the VLO who was trained for this position has been gone to Southern Africa; the person taking over his place was not trained at all in using the system. Fortunately, skills needed to be able to work with the system are low.

Maintainability:

The required knowledge to maintain the system, or better, to use the system is very low. The VLO could easily maintain the publications using an Internet browser. Only when connections are down, maintainability is low as well.

Portability:

The system has a high level of portability; it is designed to be installed on several platforms, although installation is still too complex for most of the VLOs. Portability could be higher when the whole database is distributed on CD-ROM as well. Possibilities to synchronize local versions of the system with the main server in Nijmegen were considered as well, but turned out too complex

Usability:

The effort to use the system is low, however, as long as it is not accessible over the network and there are no regulations for publication as well, usability is low.

When a look is taken at an individual case, the quality properties seems to be moderate. However, since the participating universities differentiate in their approach to eSAP and their way of working, complexity of quality properties of the business processes for the whole project are high.

2.3.1.3. Information

Complexity of business information

The information handled in the system, concerns the content of the publication as well as the representation of the university exposed to the rest of the world. Since the system provides the possibility to publish any article published by the university, it can have a large number of items, even without any relations between them, except for their relation with the university. Since many types of information can be published and it is still hard to categorize them, the complexity of the information is medium.

Complexity of quality properties of business information

Since the information in the system could be on any subject, there is no consistency in the information provided by the system. However, the way in which the information is provided is highly consistent. Quality of the information in the system falls not under the responsibility of the system developers, but should fall under the publication policies of the Universities. As long as there is no review procedure for articles in eSAP, the quality of the content can not be controlled. The maintainability of the publication, when published, is high since there are duplicates of the data and it is currently not possible to remove a publication.

2.3.1.4. Actors

The Actors of the target domain are characterized by the organisational structure of both the project and their working environment. It's obvious that the organisational structure of the Universities differentiate. During the evaluation, only a look was taken at the organisational structures of the Tanzanian Universities and their relation to the structure of the eSAP project. These structures are summarized below.

UDSM knows a top-heavy hierarchy and is therefore a rather complex organisation. It must be clear that the organisation of the university has no relation with the hierarchy and roles of the actors involved in eSAP at UDSM.

The main mandates of SUA are: teaching, research, and extension in all aspects of Agriculture, Veterinary Medicine, Forestry, and related fields. The organisational structure of the university contains several faculties and institutes with their own director and deans, however the formality within the university is not high and the actors who play a role in the project do have the mandate to make decisions about it and introduce it in other parts of the university. The project members of SUA are all related to the library. This is a central point in the university and therefore a good position to start this project.

SAUT has two campuses which are closely related. The hierarchy of the organisation is not highly complex and not strictly formal. However, the organisation of the university has no relation with the hierarchy and roles of the actors involved in eSAP at SAUT.

The organisation of the eSAP project team currently contains two members at each university:

- Virtual Library Officer. The VLO is responsible for the maintenance of the system.
 Publications should be gathered and uploaded in the system by him, in most cases this are library technicians.
- Project coordinator. The project coordinator is responsible for the project at his university. He is responsible for the implementation at his side and is the contact person for anyone in the university who is interested in electronic publications. In some cases this role is fulfilled by the chief librarian, but at other Universities a lecturer is coordinator of the project.
- In the past, a third role was part of the project, namely a Field information officer, who was associated to one unit of the university. He was responsible for awareness creation within his institute.

At each university, problems were found in the current project management. Lack of appropriate mandates causes project members not to be able to perform their roles. The following actors do have direct influences on the eSAP project and system. They should therefore be involved in the project.

- If a university computing centre (UCC) is present at the university, the directorate of this UCC should be involved in the project. At UDSM, the UCC should be involved in any ICT related project, while at SUA the UCC does not have more power then the library. At SAUT, at least one network technician should be involved in the improvement of the university network and the maintainability of eSAP, to make it accessible for all academics.
- At UDSM a project and links Officer is concerned with the procedures that should be followed when a project expands over the borders of the university. A project like eSAP should be introduced to such an officer and follow the procedures of the university. At Universities where such an officer is not present, the project coordinator needs to fin out about these university procedures and obey them.
- Most Universities have a directorate of research and Publications, which is concerned with the policy and regulations around all academic output of the university. They should be involved in the project as much as possible, to ensure that the outcomes of the eSAP project is in line with the publication policy. It is of high importance for the awareness of the academics that the system is supported by the university.
- Finally, the project team should have some authority in the university. Therefore, the Deputy Vice Chancellor should be involved. Only then, appropriate decisions can be made on the actions that will have to be taken for the continuation of eSAP

Next to the human system, described above, a computerized system can be seen as a business actor. The eSAP system has some requirements, like proper installation of Apache, MySQL, PHP and PHPdev. The VLO should be capable to maintain the system itself, however the skills of an expert could be very useful for installation and maintenance issues. At the UCC of UDSM these skills are certainly present. At most universities however, work has to be done to get the system running on the network properly. The system can be used both off line as on line, but currently there is no synchronization between the two versions. The system is still subject of changes and there is no prove of the stability.

Heterogeneity of human system actors

Although the UDSM is one organisational unit, it is subdivided in many departments and directorates that all have some freedom in their way of working and certainly have a different view on a project such as eSAP. If the system is successful in one department, it doesn't mean that it could be successful in another department as well. Secondly, the maintainability of the system is blocked from out the hierarchy of the organisation. There is no budget and time allocation for the project members unless their job descriptions allow them to spend time and effort for the eSAP project. Individuals that are involved at the moment are motivated by themselves, but they simply don't have enough authority to motivate others to use the system or provide workshops or seminars to introduce the system elsewhere.

The heterogeneity between the different business actors at SUA is low. Project members are motivated to use the system and learn about it as well as setting up training and workshops for others. However, most of the academics are not convinced about the use of electronic publishing.

At SAUT the organisational unit is not that complex, the way people work does not differentiate between institutes. The system never proved to be successful at the university, however according to several stakeholders; most members of the academic staff are going to use it in the coming academic year. The project members are not sure about their position in the project and different perceptions about the system seem to play a role in the malfunctioning of

24 Maarten Hendriks 16/11/04 2.3. Target domain

the system. In some of the Universities heterogeneity is low, but all participating universities together form a group of high heterogeneity.

Heterogeneity of computerized system actors

The eSAP system can run on multiple platforms and doesn't request much of the hardware. However, if the system is solely used over the Internet, there are severe problems with the speed and thereby the performance and usability of the system. At UDSM there might be a policy problem if the system is used in the whole university. Since only the UCC and not the library has the mandate to introduce a system in the university. Both the hardware and software should be under control of the UCC. At SUA the computerized system can run well within the library. At SAUT the system could also run on the library computer. When the network becomes more consistent and will be used by the academic staff, eSAP does have a better location on the main web server when it is configured, currently the computerized system at SAUT is not stable. Also for the computerized system, heterogeneity is high, since every participating university has a different infrastructure.

Complexity of human system business actors

Once again it has to be mentioned that the complexity of the organisation is high, the relations between the actors involved in the project are in contradiction with the hierarchy and therefore an unworkable situation is at stake. This project involves many different stakeholders in the university. Each department might have different problems with publications and use of the system. The roles within the eSAP project are clear, but more authority and skills should be added to the project teams to configure the system in such way that it can be used in the whole university. Also relations between the humans business actors should be intensified. Currently there is no contact person in the institutes, which is very important for the input, according to the director of the library at SUA. There should be a selection of contact persons who will have to be trained by the GPM.

Complexity of computerized system business actors

The computerized system is not highly complex, since it is one program running on the Apache and MySQL server, with a simple user interface. The number of copies is equivalent to the number of participating universities, so at each university there is only one installed version, running over the network. The computerized system in general has low complexity.

Number of geographical sites of the human organisation

SAUT is divided in two geographical locations; the Nyegezi campus with the academic block and administration building and the Malimbe campus which are interconnected closely. However network between the two campuses fails once in a while. The UDSM is divided in two geographical locations. The main campus contains most of the departments, only the medical faculty (Muhimbili) is separated from the rest of the university. The organisation of this faculty still falls under the general university management. SUA has several faculties; most of them are within the main faculty compounds. However, another campus exists, which is on a larger distance from the main campus. The ten participating Universities are not connected to each other and are not close to each other. For the project this means that the number of geographical sites are high

Number of geographical sites of the computerized system

The computerized system itself is located at only one point in the university, namely the server in the library. This server could be shared on the network to all the faculties, including faculties which are located far from the main campus. The system is also available on the Internet at the server in Nijmegen.

2.3.1.5. Technology

In general the technology used to create the system requires knowledge about the following subjects: Web browser, PHP, MySQL, Apache, a Scan program (e.g. Text bridge) and PDF conversion. The technology is not very complex, although some more advanced computer skills are needed for the configuration of the system. The use of the system afterwards is not complex at all. A web browser is needed, both for maintenance and browsing through the system. Back-end and front-end can be accessed using the same system.

Complexity of the methods and tools used for the business process

The methods used for the process of creating an article vary a lot. Although eSAP has provided training in search on the Internet and use of electronic data banks, not many members of the academic staff are using these methods. At SUA, academics don't see the value of electronic publication and are afraid of piracy. Only a minor part of the academic staff is aware of eSAP and the possibilities to extend their research. The same is true for academics at UDSM. At SAUT more conventional methods are used for academic research, since network reliability was low until now. The complexity of used methods and tools is high; however, the process to publish an article in eSAP afterwards is rather simple. Therefore the methods and tools needed for the business process can be averaged Medium.

Complexity of the technology

As already mentioned before, the technology used for the system is not very complex. Common technologies like Apache and MySQL were used to develop the system. Both installation and use of the system are relatively simple, although the technology is rather new for the participating universities, still its complexity can be considered low.

2.3.2. Uncertainty Factors

2.3.2.1. Business System

Availability, clarity and stability of requirements

Until now the initial requirements for eSAP, were not clear. It is obvious that the need for a system like eSAP can be recognized, but a detailed analysis of the requirements posed from the environment was never done. The clarity of the requirements is low since the requirements were not obtained in the same way as in regular projects. Normally, the target domain tries to describe its requirements together with the service domain, based on the needs of the target domain. In the eSAP project however, the technology was pushed into the target domain, assuming that the needs were there, instead of pulling a technology inside the target domain. There is still a big gap between the environmental requirements and the initial assumed requirements that has to be filled.

Especially at SAUT, efforts should be made to add sufficient skills to the project team, since the system requires at least some affinity with ICT. At SUA, more clarity about the project should be provided to the academics. actions should be taken to grow awareness and bring more sensitization among academics. Until now the availability, Clarity and stability of requirements was still low.

Quality of existing specifications

The specifications of the system are not available to the target domain and could not be evaluated. Since there was no clarity about the requirements in the past, the quality of the specifications could never be high. When the exact requirements of the target domain are rephrased properly and modifications to the eSAP system are made accordingly, proper specifications can be delivered.

Understanding of existing business system

At most of the universities, the academics are not aware of what the instrument is bringing them and most of the university departments are not even aware of the availability of the instrument. For Example at SUA, the directorate of research and postgraduate studies did not support the system and many academics think that the system is simply causing piracy for their articles, instead of seeing the real value of it.

On the other hand, the business system of the university itself was not fully understood by the developers of the system as well. Implementation of the system can only be done properly if there is a better understanding between the two parties. A major part of the academic staff does not have the knowledge to make efficient use of Internet sources. Even when the academics know about the system and are willing to use it, there still should be more training in the use of resources on the Internet for the production of academic output. In general mutual understanding of the business system is low.

Stability of business system

All of the universities as well as the eSAP system are target of development and severe changes. Although the network at UDSM is working properly, the publication policy is still in development and eSAP does not form part of it. At SUA, eSAP is part of the network, but it does not fit in the publication policy yet. At SAUT the network is still unstable and there are no guidelines for the production of publications available. The eSAP system itself as well as the local management of the system is subject to changes. Therefore the business system can not be considered stable yet.

Stability of environment

Political

Since Tanzania has a socialistic background, the hierarchies in organisations normally have a pyramid form. Politically, Tanzania went from Chiefdoms in 1962 to the elections of a one-party system. Since 1995 multi-party was introduced, but still one party gets the majority of the votes. After the collapse of the Russian system there is a democracy, but still in many organisations there is a mixture with socialistic considerations.¹ This is also the case at UDSM, where the power is in hands of the top management, major decisions about budget and time allocation will have to be made by the top management. A lecturer of a department does simply not have the mandate to introduce systems like eSAP in the university.

The situation of SUA does not seem this socialistic. Although the university is a split of UDSM, the hierarchy is not that strict. Decisions can be made by others then the top management and currently the project management is in hands of the library, where proper decision can be made. However, sensitization within the university can better be done by outside parties then by library employees. At SAUT, influence of socialism can not be felt everywhere, but when someone wants to get something done; he will have to go through several procedures. Communication within the university seems to fail sometimes causing the heterogeneity within the university.

Legal

Until now there is no regulation for electronic publication in Tanzania, but the lecturers and the management of the university are very aware of copyright issues. This means that academics are not going to use eSAP for journals and publications unless they have the right to publish the journal in a secondary source like eSAP.

The procedures that has to be followed to get a new journal legalized, could take years, therefore electronic publication could be an outcome to start new journals. However, it is not known what legal procedures will have to be followed to submit an article both to a journal and as in a secondary source like eSAP at the same time. Still many things have to be discussed about the implementation of the policies around journals and publications and the use of eSAP in these policies.

Business

The Universities are not dependent on business relations to be able to work with the system. In most Universities the Internet connection is provided from outside, causing low bandwidth and control of their Internet facilities. There where the university is providing Internet services itself, this seems to work the other way around. Services are made available to other business for commercial prices, while lower bandwidth is provided to faculties of the university itself. This also influences the use of the eSAP system.

Financial

Finances are always a problem in a developing country. Although the government run universities, like UDSM have enough funding; the main problem is to allocate it. When extra income can be generated by using facilities for business, availability of services within the university can get less attention. There is no budget allocated for eSAP until now, also because there is no indication of the budget provided by the GPM. At SUA, the academics are provided with funds for sending costs, reviews and other finances needed for their academic output. These funds could be used for eSAP when they are going to use it for their publications. SAUT is not provided with funds for the development of their infrastructure and funds needed to run eSAP. Although there is no much investment needed, when academics expect to get some financial gratification in return for there efforts to create an article, this will remain a problem.

1 S. Majenga, lecturer at st. Augustine university of Mwanza

28 Maarten Hendriks 16/11/04 2.3. Target domain

Technology

The technology needed to run the eSAP system is present in the ICT environment of UDSM. UDSM has the highest bandwidth capacity in Tanzania, namely a 2 Mbit connection, for an extremely high price: \$ 10.000,-² This bandwidth has to be used for the entire university, so the speed of the Internet connection remains a bottleneck for the use of the eSAP system. At other universities problems with capacity can only be larger. SUA has a 100 Kbit connection and not many technicians have knowledge about the tools used for eSAP. The technology standard around Mwanza is certainly lower then in Dar-es-Salaam. This also caused an unreliable Internet connection for SAUT, which is never faster then 256 Kbit. There are only few companies that can help in improving the network and neither are their many technicians available in the area with appropriate skills to maintain the network of the university.

Altogether, the stability of environment is extremely low.

2.3.2.2. Process

Adequacy of business processes

The business processes related to the eSAP project are not mature yet. The publication policies and the recognition of publications and journals are until now only available as a draft version at the UDSM. Secondly, the approach used to introduce the eSAP system was not appropriate, since the project was not rooted in the university. Although introducing a system by using a pilot can be a good method, it had no effect at UDSM. When institutes do not follow guidelines of the university, they will not be supported in their projects.

At SUA, the publication policies and the recognition of publications and journals are all regulated. The eSAP system does not meet these regulations and therefore adequacy of the business process does not stand firm. Library staff can run the project under the condition that the system is stable and meets their requirements.

When eSAP was introduced to SAUT, the university was simply not ready for the implementation yet. Training is needed for research on the Internet and adoption of the ideas behind eSAP. The adequacy of the business processes can therefore be considered low.

Formality of the business processes

The formality of the business processes is low, since rules and regulations for the use of the system are not defined. There is no conformity with the existing ICT policies of both UDSM and SUA. Neither is there conformity with the publication policy, which is totally separated from the use of eSAP. At SAUT there is no ICT policy yet.

Specificity of the business processes

A system like eSAP did not yet exist in the organisation and it is a novelty to the universities. The specificity of the process of electronic publication is high.

² Mr. Mtui, Network technician, university of Dar-es-Salaam

2.3.2.3. Information

Formality of business processes

The procedures around the project and within the university should give a more sustainable formal ground for the system; however there are no rules for the usage of eSAP yet. Also the academic output of the universities is not regulated by general procedures; each faculty does have its own procedures for their output. Only at SUA, the rules for the recognition of journals and the system what is used for promotion are very well defined.

2.3.2.4. Actors

Attitude of the business actors

The business actors of UDSM did have a different perception of the need for eSAP then was meant by the GPM. Their motivation to use the system was lower then expected. The management of the involved institutes did not appreciate the commitment of the local project team to the project. Therefore the project team was not allowed to allocate time and budget to the project.

The attitude of the members of the academic staff at SAUT is positive. Academics seem to be wiling to work with the system when it is available. Although this attitude is positive, the system was not getting a proper place in the university. Therefore it should be reintroduced when the system is stable and a training program can be provided.

On SUA the awareness of the need of the project is present, but problems with copyright issues will have to be overcome. The stakeholders and the persons who work on the project are highly motivated, but the system will only be in use by the academics when they can rely on it.

Other participating universities gave signs of discouragement as well. Academics seem to expect credentials for their work, when they provide their publication to the eSAP system.

Ability of business actors

The director of IDS at UDSM had serious doubts about the skills needed to maintain the system, more skills should be added to the project team. The Coordinator of the project should have sufficient authority and amount of allocated time to get the project from the ground. The Field information officers never had high priority for the project. In none of the Tanzanian Universities much experience is found with the systems like eSAP. However, when the system is configured properly, the business actors can easily learn about the system. The former FIOs can still play an important role in the project, when they are used as contact persons for the different institutes. With training in basic research skills, ability of the business actors will become sufficient.

Some members of the academic staff never use a computer while others use the computer, but highly inefficiently. The VLOs should focus on gathering high quality content for the system, while updates to the system are kept simple. The project coordinator should obtain enough authority to introduce the system to the rest of the university.

Importance of changes triggered by the project

At UDSM the project did not trigger changes, while the project could be important for the university. The attitude of the academics and the management should change about the way they could use the system. They will have to implement the system into their publication and journal policies, where after the benefits of the system can be shown.

The importance of the changes triggered by the eSAP project is not perceived high at SUA. There were no changes in any policy or regulation until now and academics simply ignore or are not aware of the system. When there is more work done for the promotion of the system, changes will probably occur in the amount of academic output from the university. SUA sees research as a very important output of the university, so it is very important that this project is managed well.

At SAUT there are some very important changes triggered by the system, since academic staff has to become aware of the use of electronic sources, an ICT policy should be introduced and men should work on publication and journal policies as well.

2.3.2.5. Technology

Novelty of business technology for the human system

Although publications are not new for the academics at the Tanzanian Universities, they are still not really used to the Internet and are not convinced that their articles will be safe once published electronically. Usage of the medium of Internet is still new to them, academics are not used to the fact that there is so much available on the Internet and that piracy will take place in the same way as it happens with paper publications. Thereby, if someone from Europe steels the publication and publishes it in a journal in his country, this does probably not affect the position of the African author. Academic staff will have to get used to the advantages and disadvantages of the electronic form of publication, when their perception about this process is changed, eSAP will have a more sustainable base for implementation in the Universities. In general the novelty of the system for the human system is medium.

Novelty of business technology for the computerized system

In fact the technology used for eSAP, is not state of the art and very common in use in Western countries, however, for the African universities it is still new. At the UCC of UDSM there is some experience with the technology. Also on Martyrs university, Uganda, experience can be found with the business technology. In general the novelty for the computerized system is low.

Availability of appropriate business technology for the human system

Unfortunately there is still some computer literacy at the UDSM and not all academics have a computer in their offices. To be able to use the technology, the academics will have to move out of their offices, which could hold them back from using it. Also at SUA, not all of the academics are provided with computers in their offices, but there are numerous locations to use the Internet for research. The system will be available over the network, so they will have access to it in the whole university. At SAUT there is even more computer literacy, only some members of the academic staff have a computer in their offices. The network is not reliable and power cuts happen very often.

Secondly, if the system is only available on the server in Nijmegen, the system will not be available if the Internet connection fails and even when there is a connection, this might be very slow in use. Work is done to improve availability.

Availability of appropriate business technology for the computerized system

The technology for the system is freely available.

2.4. Service domain

2.4.1. Complexity factors

The main process for the service domain is the provision of a system in which publications can be uploaded and the provision of training on academic research.

2.4.1.1. Process

Complexity of service processes

The service processes are numerous. Although the eSAP system, only is an instrument to make it technically possible to publish articles on the Internet, the main process for the eSAP management is to implement the system in several universities. The implementation is highly complex, since each university is run in its own way and is subject of different environmental factors. It is therefore hard to find a 'one size fits all' solution. It is not the aim of the project to find such a solution, only the instrument and training provided to the universities is provided in the same way. The participating universities will have to decide on what part of the university they want to use the system and what they want to publish in the system. Although the project management will thereby loose control of the overall project, it is hardly possible to manage a system from a central place in a Western country.

The process of training is complex as well, since academics from the universities will have to be instructed via the Internet, which is hardly possible with the low bandwidth, as mentioned in § 2.3. Another solution is to invite the participants in Holland for a training, which is done in the past and is very expensive. A last solution is sending a trainer who visits the universities. All of these solutions are rather complex, so in general complexity of service processes are high.

Complexity of quality properties of the service processes

The quality properties of the service process can be expressed in the following attributes:

- Efficiency: Since the system relies in a high amount on the availability of the Internet, the time used to download or upload an article is very high. Secondly there is no integration with policies, so the system cannot be used efficiently when it is only provided via the Internet. To provide training, a workable schedule should be proposed and multiple ways off providing workshops should be explored. Currently too little efforts are taken to improve efficiency of training.
- Functionality: The system functions very well, although it still lacks some features, like updating an article. The system should be stable when it is provided to the universities.
- Security: On the moment anyone could access the system and therefore the academics are somewhat preserved about using it. Copyright and security issues should be handled properly to motivate academic staff. The GPM should work on a possibility to secure publications.
- Reliability: The system is highly reliable as long as it is running on the server in Nijmegen, Holland. However, the content of the system is maintained by the VLOs. When several users can upload, update and remove publications, it will become harder to control the quality of the contents published in the system.
- Maintainability: Changes made to the system can be implemented on the server easily, however updates to local versions of the system are more complex.
- Portability: The system has a high level of portability, it is designed to install easily on several platforms, although there is no synchronization of the databases yet. CD-ROMs could be used as well to provide updates on the database.
- Usability: The effort to use the system is very low, but unfortunately motivation to use the system, is low as well

In general the complexity of the quality properties can be considered medium.

32 Maarten Hendriks 16/11/04 2.4. Service domain

2.4.1.2. Information

The delivered service comes together with a lot of documentation and meetings between the several participants in the project. Main deliverable is the supply of the system on the server in Nijmegen and off-line on CD-ROMs. Secondly there is a virtual training available, connected to the on-line system. Thirdly there have been training sessions in the past for all the VLOs and former FIOs. Meetings were organized on an irregular time base. The project coordinators are most of the time available to assist on more information needed by the participants.

Complexity of service information

The information used by the service actors is not very complex, although information is gathered from 10 different universities. The relations between the information items, for example ICT policy, publication policy and project management by the university is far more complex then assumed by the service actors. To be able to implement the project successfully this information should be gathered with high precision and should be taken under consideration when taking new steps in the project.

Complexity of quality properties of the service information

- Consistency: The information provided to the service actors is not consistent, since it has 10 different sources.
- Volatility: The information is no subject of severe changes, only when in depth interviews are taken; contradicting or different information can be found.
- Security: The security of the information is not an important issue
- Maintainability: The information should be documented properly, so requirements can be filtered out of the information over time

2.4.1.3. Actors

The main actors in the service domain are the General project Manager, trainers and developers.

Heterogeneity of service actors

The service actors work together, but from several different locations. Most of the work seems to be done by the general project manager. It might be questionable if all of the other service actors support his work, however it is assumed that there is no difficulty in co-operation

Complexity of service actors

Since the group of service actors is small, the complexity of the service actors is not high, although several different skills and interests are part of the organisation.



Illustration 4 eSAP Project Management **Size of distribution of service actors**

Again, although the group of service actors is small group, they all operate from different locations, causing more complexity in the project.

33 Maarten Hendriks 16/11/04 2.4. Service domain

2.4.1.4. Technology

Complexity of service technology

Methods, Techniques and Tools used to deliver the service, contain a wide range of different media types: E-Mail, Fax, Telephone, Meetings, Training sessions and a virtual training environment. The tools used by the service actors used for the creation of the eSAP instrument are the same as the ones used in the training: PHP, MySQL and Apache. Although the tools are numerous, for the service domain actors, these tools are off medium complexity.

2.4.2. Uncertainty factors

2.4.2.1. Process

Adequacy of schedules

It might seem strange to judge the adequacy of the schedule with normal, since no detailed schedule is available. However, the changes, updates and events regarding eSAP are normally scheduled tight. Since the project is an international cooperation of both Northern and Southern universities, a schedule is hard to maintain. Normally the general project management provides an indication about the upcoming events, like the update of parts of the system, or a meeting. There is no need for a tight schedule, but men has to be aware that project planning could help the participants to get a better grip on the project.

Adequacy of budget

The budget of the project does not seem to constrain the time path, although questions rose by some participants about the payment of the VLOs in the past. Also, the participants are unknown to the available budget for meetings and training. In the ISPL method, it is assumed that actors in the target domain are funding the project, but in a development project, this normally are actors from the service domain. This means that whenever the service actors cause a delay in the project, this will be for their own risk. The eSAP project can not be compared to regular ICT projects and therefore the adequacy of budget as seen in the ISPL method cannot be considered in the same way either.

Adequacy of service processes

The approaches, strategies, culture and maturity of the service organisation are hard to be estimated. Members of the GPM differ in their strategies and don't seem to have a common strategy. The approach used to implement the project at the universities, is a pushing technique. Decisions seem to be made by the project manager or the team, without consideration of the ideas of the main stakeholders in the target domain.

Formality of customer-supplier process

The customer-supplier process is both formal and informal. When the actors of the service domain visit the sites of the target domain, a formal meeting will be held. However, when communication between customer and supplier is considered, this process is rather informal.

Specificity / novelty of service

The novelty of the service is not high for the service domain and the used tools are common in Europe. However, the possibility to publish articles articles electronically is new to the service actors and it specificity is high.

Dependency on other services

The eSAP project is treated independent of other projects, although recently efforts have been made by the project team to create a foundation. This foundation will also develop other instruments that will be made available to the participants, like a student administration system and e-Learning system.

One of the major problems of the project is that the dependency of other services plays an important role of success at certain sites. UDSM for example does not support the system as long as it is not aligned to its other processes. At UDSM, already existing systems helps the target actors in their administrations, eSAP should be attached to this system. Policies and management of the university are of high importance for the project to be implemented properly.

2.4.2.2. Information

Formality of service information

The service information can not easily be conformed to rules and structures, since every participating university in the target domain has its own rules and structures. The structure of the university organisation should be taken under consideration as well. Since the way the system should be implemented is top down, the management of the university should first agree on it and thereafter grant the privileges to the employees who will work on the project.

2.4.2.3. Actors

Attitude of service actors

The perception of need, commitment and involvement of the service actors is different from the one of the target actors. It was assumed by the service actor that the participating universities have a need for the project. They have approached them with this assumption in mind, although with a western way of project management. It seems that not all of the universities are waiting for such a system as well as other services that will be provided by the eSAP foundation in the future. It is true that the target domain needs help in several aspects, but a better way of helping them is to see the problem from their perspective. The problem that is solved by the project might even not be a problem at all. When the project started in 2001 things might have been different, but now in 2004, most of the universities have several sources and use several computerized systems for their work. Although the eSAP system is a good instrument for the publication of articles, the need for the system is low or not seen by the target domain in the same way.

Although the commitment of the service actors is high, the participants in the target domain do not always appreciate the way they are involved in the project. It is impossible to decide about things that should be happening at a university from another country, while the universities want to decide in their own way about almost all aspects of the project. More involvement of the universities themselves should be encouraged, so they can work on the project in their own way. The service actors must be open for the culture of each university and should decide together with the university management.

Ability of service actors

The skills of the service actors are high; they can build and manage this project and system very well. However knowledge about the real requirements of the several participating universities seems to lack. The skills needed for inter cultural management are not directly apparent. A lot of integration with the target actors is needed to understand the target domain well enough to perform the tasks of the eSAP GPM.

Dependency on subcontractors / suppliers

There is no dependency of a third party; however, the project management seems to operate a little bit too much on its own. Skills that are present in the participating universities can be used to work on the project.

2.4.2.4. Technology

Novelty of service technology

The technology used by the service actors is not novel to them, however the novelty of the service for the participating universities is much higher.

Availability of appropriate service technology

The technology is everywhere available, only the access to Internet what is required can be a bottleneck for the target domain.

36 Maarten Hendriks 16/11/04 2.4. Service domain
2.5. Risk Analysis

In the book Information Services Procurement for Large-Scale Migrations [ISPL-LM], the risks for the business are those risks which have a direct impact on the business performance in terms of quality, costs, non-attainment of stakes, etc. Risks for the project are the risks which have a direct impact on the project performance in terms of quality, costs, delays, etc. Their impact on the business is only indirect through the increase of probability of some risks for the business.

In a project ran in a developing country, probably some other risks can be found, however the ISPL methodology is used in its original form to be able to test it against this environment. Some of the factors do have a totally different impact in a developing country then in developed countries, therefore caution has to be taken with the estimation of the impact. Since the methodology relies on personal experience and organisation's experience, evaluation of the risks has no standard procedures. However, the risks will have to be qualified to be able to start some actions and strategies to mitigate these risks. In this paragraph, the risks associated to both the complexity and uncertainty factors are shown with a risk probability and risk impact estimated on the experience gathered during the case study.

According to Denis Verhoef³, risk impact is estimated by by human judgements. A risk impact can be measured very high even though there could be only little indication from the ISPL methodology. In the next paragraphs the risks associated to the four dimensions are listed. Each complexity or uncertainty factor is listed with its probability. In the table associations are made with the risks they could cause. These associations are taken over from [ISPL-RM]. There where a complexity factor is high, a '+' indicates that a certain risk is at stake. If a complexity is medium, the associated risk is associated with a ' \pm '. Finally complexity factors that are considered low are associated to their risks with a '-'.

The risk probability is a kind of accumulation of the total risk probability for each risk. Therefore multiple '+' are used to indicate a high probability. Finally the risk impact is indicated in the same way as the risk probability, but these risks are estimated after the three months observation in the target domain.

³ Denis Verhoef is primary editor and member of the ISPL project team.

2.5.1. Risks associated to the target domain

	Complexity of requirements: High	Complexity of business processes: High	Complexity of quality properties of the business processes: High	Complexity of business information: Medium	Complexity of Quality properties of business information: Medium	Heterogeneity of business actors: High	Complexity of business actors: High	Size of distribution of business actors: Large	Complexity of business technology: Medium	Risk Probability	Risk Impact
Unclear service/system requirements						+				+	++
Unstable service/system requirements						+				+	++
Uncertain interfaces						+				+	++
Loss of control of service	+	+	+	±	±	+	+	+	±	+++	+
Delays in the deliveries									±	±	±
Increased costs of the service	+	+	+	±	±	+	+	+	±	+++	+
Poor quality of service/system	+	+	+	±	±	+	+	+	±	+++	++
Delay in system delivery									±	±	±
Service system not accepted by business actors			+		±					+	++
Unpredictable costs for the business							+			+	+
Non-attainment of business stakes			+		±					+	++

Table 2 Risks associated to the Complexity factors in the target domain

	Availability, Clarity and stability of requirements:	Quality of existing specifications: Low	Understanding of existing business system: Medium	Stability business system: Low	Stability of environment: Low	Adequacy business process: Low	Formality business process: Low	Specificity of the business processes: High	Formality of business information: Medium	Attitude of business actors: Neutral	Ability of business actors: Low	Importance of changes triggered by the project:	Novelty of Business technology: Medium	Availability appropriate business technology: Low	Risk Probability	Risk Impact
Unclear service/system	Ι.		<u>т</u>							-						
Instable service/system	+		T			+	+	+	T		+				++	++
requirements	+			+	+	+				±					++	++
Uncertain interfaces	+	+	±	+	+		+		±						++	+++
Lack of business actor																
participation						+				±		+			+	+++
Shortfalls in subcontracted																
tasks	+	+											±	+	+	++
Loss of control of service	+	+	±	+	+					±			±	+	++	+
Delays in the deliveries	+	+	±	+	+	+		+		±	+		±	+	+++	+
Poor quality of deliverables	+	+	±							±	+				+	++
Increased costs of the																
service	+	+	±	+	+	+		+		±	+		±	+	+++	+
Demotivation of service																
actors	+	+	±			+				±	+		±	+	++	++
Poor quality of			-							-						
Dolow in system dolivery		- T		- T	- T	- T		-			- T	Ŧ		- T	+++	++
Service/system not	-	T	-	–	Ŧ	Ŧ		–		-	Ŧ		-	Ŧ	+++	
accented by business																
actors	+		±			+				±	+	+			++	+++
Unpredictable costs for the	-					-					-	-				
business	+	+	±	+	+	+				±	+	+			+++	+
Non-attainment of																
business stakes	+		±	+	+	+				±		+			++	++

Table 3 Risks associated to the uncertainty factors in the target domain

2.5.2. Risks associated to the service domain

	Complexity of service processes: High	Complexity of quality properties of the service	Complexity of service information: Medium	Complexity of quality properties of the service	Heterogeneity of service actors: Low	Complexity of service actors: Medium	Size of distribution of service actors: Large	Complexity of service technology: Medium	Risk Probability	Risk Impact
Shortfalls in subcontracted tasks								±	±	++
Loss of control of service	+	±	±	+	-	±	+	±	++	+
Delays in the deliveries	+	±	±	+	-	±	+	±	++	+
Poor quality of the deliveries					-			±	-	++
Increased costs of the service	+	±	±	+	-	±	+	±	++	+
Discouragement of the service actors					-			±	-	+++
Poor quality of the service / system					-			±	-	+++
Delay in system delivery	+	±	±	+	-	±	+	±	++	+

Table 4 Risks associated to the Complexity factors in the service domain

	Adequacy of schedules: Normal	Adequacy of budget: -	Adequacy of service processes: Low	Formality of Customer- supplier process: Medium	Specificity / Novelty of service: High	Dependency on other services: Medium	Formality of service information: High	Attitude of service actors: Medium	Ability of service actors: Medium	Dependency on subcontractors / suppliers	Novelty of service technology: Low	Availability of appropriate service technology: High	Risk Probability	Risk Impact
Unclear service/system requirements				±	+	±							+	++
Unstable service/system requirements				±	+	±							+	+
Uncertain interfaces					+	±							+	+++
Shortfalls in subcontracted														
tasks	±	+				±				-			+	++
Loss of control of service	±		+	±	+	±	-	±	±	-	-	-	++	+
Delays in the deliveries	±	+	+	±	+	±		±	±	-	-	-	++	+
Poor quality of deliverables	±	+	+	±	+	±	-	±	±	-	-	-	++	++
Increased costs of the service	±	+	+	±	+	±		±	±	-	-	-	++	+
Discouragement of service actors	±	+	+	±	+	±		±	±	-	-	-	++	+++
Poor quality of service/system	±	+	+	±	+	±		±	±	-	-	-	++	++
Delay in system delivery	±	+	+	±	+	±		±	±	-	-	-	++	+
Service system not accepted by business actors				±		±		±					±	+++
Unpredictable costs for the business						±							±	+

Table 5 Risks associated to the uncertainty factors in the service domain

40 Maarten Hendriks 16/11/04 2.5. Risk Analysis

2.5.3. Risk probability and impact

A quick scan of the tables shows us that the risk probability in the target domain is higher then the risk probability in the service domain. This is obvious, since the risks for the service domain are simply lower, being part of a more stable environment. There is little pressure from the target domain. The ISPL methodology provides a list of actions that can be used to mitigate the risks that are found. This list is used to describe the actions that will have to be taken to mitigate the risks in the eSAP project. First the risks are categorized on probability and impact, starting with the most threatening risk. One of the problems in sorting the risk factors, is that the risk probability could be high, while the risk impact is low, therefore table 6 and 7 are sorted on probability and impact respectively. One of the most important findings is that the most probable risks that are found using the methodology are of minor impact in this type of project.

	Targe	t Dom	nain		Service Domain					
	Comp	lexity	Uncert	ainty	Comp	exity	Uncertainty			
Increased costs of the service	+++	+	+++	+	++	+	++	+		
Loss of control of service	+++	+	++	+	++	+	++	+		
Delay in system delivery	±	±	+++	+	++	+	++	+		
Delays in the deliveries	±	±	+++	+	++	+	++	+		
Poor quality of service/system	+++	++	+++	++	-	+++	++	++		
Uncertain interfaces	+	++	++	+++			+	+++		
Non-attainment of business stakes	+	++	++	++						
Unpredictable costs for the										
business	+	+	+++	+			±	+		
Unclear service/system										
requirements	+	++	++	++			+	++		
Unstable service/system										
requirements	+	++	++	++			+	+		
Demotivation of service actors			++	++	-	+++	++	+++		
Service system not accepted by										
business actors	+	++	++	+++			±	+++		
Shortfalls in subcontracted tasks			+	++	±	++	+	++		
Poor quality of deliverables			+	++	-	++	++	++		
Lack of business actor participation			+	+++						

Table 6 Risks sorted on probability

	Targe	t Dom	nain		Service Domain					
	Comp	lexity	Uncer	tainty	Comp	lexity	Uncer	tainty		
Poor quality of service/system	+++	++	+++	++	-	+++	++	++		
Service system not accepted by										
business actors	+	++	++	+++			±	+++		
Demotivation of service actors			++	++	-	+++	++	+++		
Uncertain interfaces	+	++	++	+++			+	+++		
Unclear service/system										
requirements	+	++	++	++			+	++		
Poor quality of deliverables			+	++	-	++	++	++		
Shortfalls in subcontracted tasks			+	++	±	++	+	++		
Unstable service/system										
requirements	+	++	++	++			+	+		
Loss of control of service	+++	+	++	+	++	+	++	+		
Increased costs of the service	+++	+	+++	+	++	+	++	+		
Non-attainment of business stakes	+	++	++	++						
Delay in system delivery	±	±	+++	+	++	+	++	+		
Lack of business actor participation			+	+++						
Delays in the deliveries	±	±	+++	+	++	+	++	+		
Unpredictable costs for the										
business	+	+	+++	+			±	+		

Table 7 Risks sorted on impact

2.5.4. Risk Mitigation

The ISPL methodology offers a list of actions to mitigate risks. This list is used to find actions that can be taken by the eSAP GPM and the participating universities to be able to continue the project. These risks are ordered by impact and extended with recommendations that apply to the eSAP project. The methodology also describes actions to change specific complexity and uncertainty factors, however these specific actions are already part of the actions listed below and are therefore not included in this report. Finally, some recommendations were provided independent from the risks that were found by using the ISPL methodology. These recommendations are part of the advice report that was send to the GPM and are summarized in this thesis.

2.5.4.1. ISPL risk mitigation

Poor quality of service/system

The quality of the system is poor at some locations, since it is impossible to configure the system properly. Some participants don't have a reliable network and Internet connection. For example at SAUT the system can run adequately again only when the university network becomes more reliable and a web server is configured.

The quality of the content will come together with the integration in the publication policy, while this policy differentiates between the universities and sometimes does not even exist. According to the ISPL method, the following steps actions can be taken:

To be sure that the quality of the system and its contents will be higher, it has to be verified that the quality of the articles in eSAP are as good as the quality of the articles that are provided to existing journals. One of the goals of the eSAP project is to improve the quality and the availability of the publications, while improving the skills of the academics.

Experiences should be obtained from similar situations. Each university should compare their situation with the other participants. Each university itself will have to produce requirement statements and specifications for the future service from their perspective. All relevant quality properties (performance, reliability, usability) should be specified. Formal and frequent quality control should be used to check the content of the system and the quality of the publications in it, as well as the way they are related to the entities and journals. There should be integration with reviews of articles and guidelines for publications or working papers to be published in the system.

Decision points will have to be added to the delivery plan associated with the raising of understanding of the existing service by means of descriptions of the existing service. Since in the past, exact specifications of eSAP were missing, a specification of the system should be provided to academics to give them an idea of the use of the system from their perspective.

Finally conformance to requirements should be checked regularly. The project coordinator and the GPM should describe requirements from the environment in order to improve the service in such way that it matches the current and changing needs. The service team should be trained in such way that service team members know what to do and how to do it. They should have the right skills, tools and methods.

Service system not accepted by business actors

Since the system is not in use and therefore not accepted by most of the institutes of the participating universities, it is recommended to work on motivation and awareness within the university. A positive attitude of the business actors should be created and maintained. The users, who are already motivated to use the system, can motivate others by explaining why the system is important to them. Providing workshops, seminars and training can also raise motivation. The ones who are skilled in publishing or were trained in the past by the eSAP trainers should provide these workshops.

It is of high importance to achieve user agreement on quality properties. After all, the users of the system are responsible for the quality of their publications, so they should be involved in the process. The academics can play a role in the selection of the place in the system where their publications will be found and they will have to provide the abstract, keywords, etc. There also has to be agreement with the editors and reviewers who are related to the system.

Keep business actors informed. It is of high importance that all users (or future users) are informed about what is going on with the system, what actions will be taken when an update is proposed, who the responsible contact person for them will be, who to ask for a workshop, etc.

The ISPL methodology advices to implement a user assistance function. In fact such a function is already available in the e-learning module of eSAP. Although it was only available for the VLOs and FIOs in the past, it could very well be used for the training of others. New users will have to register in the system, so they will have access to the sources of the workshops and training sessions. It is obvious that such a system should also run off-line and should be synchronized once in a while with the server in Nijmegen, or could possibly run alone.

De motivation of business actors

It is of high importance for the project to raise motivation under the users. Therefore all business actors should be trained, motivated and informed about the project. Management by blame should be avoided and realistic and feasible plans should be produced. It is recommended to train the target team that is involved in the service and checked that the team members know:

- What to do (have clear planning)
- How to do it (have the right skills, tools and methods)

The service actors could also get discouraged, since the project is not showing much result considering the span of time it is running. Therefore more concentration should be on training, motivation and informing business actors. Most importantly, the customers should be involved in the service team to facilitate mutual learning and team building.

Uncertain interfaces

Uncertainty of interfaces indicates that it is not clear how the system relates to existing processes and systems that are in use at the university. Therefore management from related processes should be involved in the service control. ESAP should comply with both the ICT policy and publication policy. When the review board for publications is aware of the system, they could encourage the use of it. Also when ICT staff is known to the system they can help in maintenance of the system and ensure availability to the academic staff.

The construction, testing and installation of interfaces with the existing publication process should be planned in co-ordination with those responsible for the external system / process of interest. When a change is made to the system what influences the technical architecture, ICT staff should be involved as well to decide on how this change should technically be implemented. When maintenance of the system is hard to be done from the library, it might be moved to the web server that still has to be configured. At SUA for example, the Directorate of Research and Publications (DRP) is invited to discuss details about how to integrate eSAP with the publication policy, it will become easier for academics to use the system while following the rules and procedures of the DRP.

Unclear/unstable service/system requirements

Since the requirements for the system where not clear from the start, the universities should appoint one person, who is responsible for the consistency and stability of requirements as part of the customer acquisition management function. This means that the coordinator of the project should gather information about new or changed requirements for the system and communicate this to GPM. This is especially of high importance when this requires a change of the system or the whole process. Both desirable and undesirable changes in the requirements should be reported.

It is recommended to create a good understanding of the existing system or service a among all stakeholders. This should be done by the contact persons of the different institutes and by the GPM. The GPM is responsible for the clearness of both the requirements as the process and project in general. The contact persons should promote the use of eSAP and use of electronic resources. Training or workshops should be provided on a regular base.

Decisions should be made early on the description of the system and decision points should be added to the delivery plan regarding requirements. For example, a meeting could be scheduled once in three months to discuss requirements and decide about their importance so they can be communicated to the general management team. Together with the GPM, these requirements can be discussed and decisions will have to be made about changes that should take place. A participatory approach is needed to clarify requirements for the business actors and the academics. They should closely be involved in the discussion about the requirements, since they are the end users.

Non-attainment of business stakes

Since the eSAP project is not mapped to the business stakes of the universities, it is important to work on a better integration of the system. Therefore acquisition management driven stakes should be implemented. The business stakes of the university should be implemented in the way the service is provided. As long as the real requirements of the university are not attached to the project, it will always miss the quality and it will not match the needs of the university.

To manage critical risks, it is important to hold records of risks and requirements. When they are managed properly, the process can be monitored continuously. These records can be used as input for meetings about the requirements and possible improvements / changes of the system.

For most of the universities, it is important to have enough authority and skills in the project team, to be able to make decisions, provide workshops and maintain the system. Probably contact persons are needed again to introduce the system in each institute.

Loss of control of service

to be able to keep control of the service, it is recommended to implement management indicators. When the management has no insight in the system at all, it is impossible to promote the use of the system or maintain it. Some statistics could be produced about the academic output of an institute or an author, in that way the management can see the productivity and handle accordingly.

The questionnaire discussed in § 2.6. could be used by the eSAP management as indicators. They could implement some of these indicators in the admin section of the eSAP system. Implementation should be done by the project team, while each university could discuss about the indicators they need.

2.5.4.2. Risk mitigation in the eSAP project

Next to the actions that are recommended by the ISPL methodology, other recommendations were formulated during the eSAP project. Although most of these recommendations are project specific, they could be used for risk mitigation in other projects as well.

Journals and university hierarchy

Currently the eSAP system knows the following hierarchy to publish articles.



Illustration 5 eSAP publication hierarchy

In this hierarchy, it is assumed that a journal is related to an entity or university, while most of the currently existing journals are not. They are either international, national or belong to a group of multiple universities together. This means that the journals could never be a part of the current entities and therefore not be implemented in the system. There are three possibilities to work around this problem.

- 1. The journal could be placed under each university, or at least each entity that is participating in the journal.
- 2. New entity levels could be introduced, like a global level and a country level.
- 3. University hierarchy could be maintained by focusing on institute or even author level.

Copyright issues

One of the major problems of the journals is the issue of copyright. Academics want to publish their articles in a recognized journal, since that specific journal has a reputation and is recognized within a known group of readers. This recognition lacks totally when an author solely publishes his article to eSAP. There is no recognition for the eSAP system as a journal and there is no relation between the editorial board of a journal and the responsible VLO of eSAP. The journal can never give the rights to the university to publish the same article freely in the eSAP system once it is published in the journal. The article will not get the same recognition in the eSAP system as long as it is not strictly related to the journal. Therefore, there should be a mechanism in which the status of the journals is preserved. The information about an article could be provided freely, while the full article should only be available to members of the journal.

Quality Control

When an article is published in a journal, the board of that specific journal will review it. This means that there is no effort that has to be taken by eSAP VLOs or coordinators. When an article is solely used for promotion (e.g. from assistant lecturer to lecturer) it does not necessarily has to be published in a journal, but it has to go through the review team of the responsible unit, which checks if the article meets their quality norms. This article could be published in eSAP under the entity header after the review team has reviewed it. eSAP could be of great help in finding a peer review, simply by providing links to reviewers who volunteers. The existing eSAP network should be used as well. A review team could be formed from members of multiple participating universities. Since they are already related to the system, they could easily have access to the system to do a review. Motivation for the review of articles will be discussed in the last paragraph.

Motivation and awareness

The subject of motivation is closely related to training. The awareness of publication can only be grown if people are trained or are invited to workshops about publishing. Although this is a main goal of the eSAP project, until now most of the universities failed in exchanging and sharing the skills that were achieved by the former FIOs and VLOs. The FIOs however could still play an important role in the training of others. They could provide workshops and hold seminars about the use of eSAP and the way information could be found in several sources on the Internet. There should be a continuous marketing mechanism, not only for the eSAP system itself, but also to provide awareness about publishing to journals and very specifically about the differences between publishing on paper or electronically.

It seems that what the academics really want, is to receive financial support for their efforts. Probably they are spoiled by the World Bank, which is paying the authors for the articles. Of course this is understandable considering the salaries in these countries. Secondly, a lecturer is commonly not obliged to produce articles. This is the case at the Martyrs university in Nkozi, Uganda and also at the st. Augustine university in Mwanza, Tanzania. It is obvious that when one has no specific reason to publish, there is no use of the eSAP system either.

It is very important that the academics become aware of the fact that the system is not forcing them to publish, but was provided to them to provide them with the possibility of electronic publishing. Using key actors to promote the system at the university is probably one of the key factors to success. If the project is supported by the deputy vice chancellor or Chief academic officer, he could give the appropriate rights to the right persons to work on promotion, workshops and training.

2.6. Questionnaire

A questionnaire was used to be able to compare the universities with each other and gather some more qualitative data about the project and the participants. This questionnaire was send to all the project members, including the VLOs, coordinators, former FIOs and other stakeholders who have influence on the project. From the 25 recipients, 8 responded. The university of Zimbabwe responded with the remark that they are not participating in the project any more. The project members at SUA did send one reply, but discussed about the answers together. The whole questionnaire can be found in Appendix C. Some of the most remarkable results are listed below. Before all it has to be noted that some of the answers were roughly estimated by the respondents, since there was no documentation available about the requested data.

Almost 60% of the participants answered that only 20-40% of the academics of their university were aware of electronic publishing in 2001, which changed to 80-100% in 2004. According to all of the respondents, the academics have a positive attitude about electronic publishing. In average awareness about electronic publishing rose from 27% to 73% which is a tremendous growth. The strange thing about these figures, is that in discussions with the project members it became clear that academics are very preserved about electronic publishing and don't seem to know what it's all about. One could get motivated about the successfulness of the project, while these figures might give a wrong insight. Although the academics seem to answer that they are aware and have a positive attitude about electronic publishing, the fact is there that there is too little academic output to be sure about their knowledge and output.

In average only 8 publications per university were provided to the VLOs and published in eSAP during the last three year. Approximately 24 publications per university were submitted to journals during this period. This extremely low number of publications does show that there is only little interest in publishing, at some of the university this was told during the case study as well. The main task of the lecturers is lecturing and therefore little time is left for research. And if there is time for research, there are not always resources available. About 70% has access to the Internet and almost 50% has the availability of a personal computer. In fact this number is incredibly high for a country like Tanzania. There were only 200.00 computers in Tanzania and 250.000 Internet users. Which is 0,57 and 0,7% respectively. ⁴. In Kenya and Uganda this is not very different. Of course it is true that universities are the first who are connected and probably have most users, but still figures are striking.

Most of the respondents indicate that the eSAP system contributes to the academic output of the university, although the system was only introduced to approximately 40% of the academics. However, the academics do expect something in return, they have to earn credits for promotion or even want to get paid for their publication. The main problem remains that there is still too little academic output to be sure about the usage of eSAP in this process, while all respondents indicate that publications are important for promotion, recognition and enrichment of lectures. The participants do indicate that when more workshops are provided, academics will certainly use the system.

In general the respondents think that the eSAP project is helpful for the university and other products created by an eSAP foundations would be approved as well. However it must be said that in discussions at UDSM the participants did not seem that convinced. For successful implementation it is the most important to provide workshops preferably be external trainers.

⁴ ITU Internet indicators: Hosts, Users and Number of PCs; http://www.itu.int/ITU-D/ict/statistics/at_glance/Internet03.pdf

2.7. Evaluation questions

In this paragraph we will look back to the questions that were posted in the first paragraph of this chapter. These questions were used to generate some notions about which risks play an important role in the project and what answers can be found by using ISPL.

• To what extent are the participants moving toward the anticipated goals of the project? It can be concluded that progress is very slow and that participants are hardly moving towards the anticipated goals. There seems to be a major problem with the motivation and commitment of the business actors.

• Which of the activities or strategies are aiding the participants to move toward the goals? Mainly provision of workshops encourages the participants to use the system and work with it.

• What barriers were encountered? How and to what extent were they overcome? Many barriers were encountered of which the main problems were de motivation, lack of authority and high uncertainty about interfaces. These barriers are still to be overcome with new strategies by the GPM. After discussion with the eSAP participants about their requirements, starting with the results of the evaluation, discussed in this report, a plan should be made to implement the proposed changed. In successive versions of the system the GPM should introduce this new features to the users. University management should introduce the system to the whole academic population.

• Was the project equally effective for all participants?

No, each participant had its own troubles with implementation and use of the system. Each participants should be approached differently, since their environment poses different threats.

• What significant unintended impacts did the project have?

The project did have some impact on the general skills of the project members who came to Holland for training. However further impact was not noticeable at the universities that were invited to join the project.

• Is the project replicable and transportable?

The project is replicable and transportable to other universities. However, a sustainable implementation plan has to be developed together with the existing participants. Secondly, a well defined plan should be developed for new participants, in such way that schedules, budget and requirements are clear

 What risks threaten the success of the project and what actions can be taken to mitigate these risks?

These risks were found using the ISPL methodology. After selection of the actions that can be used to mitigate the risks, a strategy can be formulated for the continuation of the project. Although this strategy is included in the advice report for the GPM, it is no part of this thesis. Actions that can be taken were discussed in the § 2.5.

3. The Sumve project

3.1. Introduction

The village of Sumve is located in the Lake area, Mwanza region, Tanzania. The distance to the closest city, Mwanza, is about 55 km. Mwanza is the third biggest city of Tanzania and has important facilities for most surrounding villages like a referral hospital, Internet cafés, marketplaces, banks and a bus station. The Kwimba district is situated just below the Mwanza district and lacks most of these facilities. Therefore, Sumve is an important centre in the district, with its designated district hospital. Also two secondary schools and a nursing and midwifery school can be found here, forming an important centre of education for the district and wider region. The village is currently not connected to power lines and telephone lines, therefore it lacks proper means of communication.

Different initiatives were taken to improve the roads leading from and to Sumve, projects have been done to improve the electricity network in the hospital, based on generators and other smaller projects are done to provide the hospital with sufficient facilities. Although the villagers are supported by several development organisations, still no investment was made to improve communication and access to information. Therefore it is a challenge to inquire into possibilities for sustainable ways of connecting to the global information network.

The Sumve project is in fact a combination of two different projects, which are closely related. At first, a library was to be constructed with additional computers for training and optional access to the Internet. Discussions about this project in the environment of the hospital initiated the second project: the construction of a multi-purpose community telecentre. This second project is not only meant for the hospital, but for the whole community of Sumve. Training will be provided in this centre, while the computers in the hospital will only be used for work and information search. Both the project for the Sumve Medical Computer Centre and the Sumve Multi-purpose Community Telecentre are discussed in paragraph 3.2 and 3.4. In paragraph 3.3 a more in-depth look is taken at the definition of a telecentre and finally in paragraph 3.5 and 3.6 methods used during the project and typical risks associated to this projects are discussed.

During this project, there was only little use of the ISPL methodology, however, prevention of risks was an important factor in the discussions for the establishment of the computer centres. Therefore the main focus of the Sumve project for this thesis is to find risk probabilities and reflect them to the ISPL methodology. This focus is highlighted in Illustration [6]

Action research was used more intensively. During the project a plan was to be developed for the construction of a computer centre. Constantly the situational factors were diagnosed, leading to planning of actions. The main action was the development of a sustainable plan for the construction, after finishing this plan, it was evaluated on the situated and caused a learning process for the researcher. As result of this learning process, the plan had to be rewritten with more knowledge about the situation.

Since more was learned about the situational factors, in the next sequention of the action research, actions were taken as well to change these situational factors. So after one cycle, also this part of the Framework had the focus in this case study. Since this project was a new project it was not possible to evaluate the performance of the existing service. Therefore, the evaluation questions used in Chapter 2 can not be used again. The only questions that are of interest regarding this thesis are:

- What risks threaten the success of the project?
- What actions can be taken to mitigate these risks?

The main question for this project was:

How could a sustainable community computer centre be established?

50 Maarten Hendriks 16/11/04 3.1. Introduction



Illustration 6 ISPL risk management, Actions to reduce risk probability



Illustration 7 The action research Cycle

3.2. Sumve medical computer centre



Illustration 8 Sumve designated district hospital

3.2.1. Introduction

Following the assumptions about ICT and healthcare as mentioned in paragraph 1.1.3, it is worthwhile to investigate in possibilities to introduce ICT in the Sumve designated district hospital. This hospital was started in 1934 as a Midwifery clinic by the white sisters. Nowadays it is one of the biggest district hospitals of Tanzania. The area in which they provide healthcare has the size of 200 sq. kilometres where 500.000 Sukuma people live. The hospital falls under responsibility of the archbishop of Mwanza.

Together with the Sumve foundation, a project was initiated to construct a library in the compounds of the Sumve designated district hospital. This library would contain the books that are currently present in the hospital, together with other books currently in possess of hospital employees and additional newly required books. Since the project was still to be started, the option was discussed to extend the project with the introduction of computers. The idea behind this, was that hospital employees could benefit more from access to additional sources (e.g. Medical databases) and to provide the possibility of Internet access.

Both the possibility to install computers in the hospital as well as access to the Internet were main points of discussion. The installation of computers could not be done by hospital employees, since they don't have the appropriate skills, neither are there skilled persons in the near environment. Therefore options to employ a trainer or co-operation with other institutes would be needed. Also for Internet access, the hospital would not be able to cope with the costs alone. Since Sumve is not connected to the fixed phone network, Internet solutions will have to be found by other means, for example satellite connections. However, all of the solutions together with the expensive bandwidth in Tanzania were too expensive for the hospital to pay by them selves. Therefore possibilities were to be found in sharing costs with other institutes in the near environment.

3.2.2. Discussion with other institutes

In the village, members of the main institutes table [8], were invited to attend a meeting about the construction of a shared computer centre.

- Sumve Designated District Hospital
- Sumve High school
- Sumve Girls' secondary school
- Sumve School of nursing

Table 8 Main institutes of Sumve⁵

Next to representatives of these institutes, some other village representatives were present. During this meeting, it became clear that all of the participants are interested in a shared library and computer centre. They agreed that sharing facilities would be more efficiently for all of them. I will be easier to train one librarian who is able to take care of the books efficiently, the same goes for the training of one trainer who could provide courses to members of all of the institutes. However, most of the institutes would like to have their own libraries, since the books will be under their own governance and they can more easily access them within their own institute.

All of the institutes would like to have Internet access for educational purposes as well as means of communication and information source. However, none of them can afford a high monthly fee that will have to be paid for an Internet connection, which is not using telephone lines. These costs were even too high when the institutes were going to share them, therefore conclusions were that Internet access could only be possible when external sponsors were going to pay for connection fees. It didn't seem realistic to find such a sponsor and therefore, the group focussed on the possibilities of computer training solely. An overview of Internet possibilities is included chapter 4.

The institutes are interested in usage of computers and the provision of computer training. They agreed that when there is one central computer lab, they could all use it for training as well as personal use. If this computer lab was owned by only one of the institutes, it would become hard for the others to get access to it, while it could be too expensive for the institutes itself to maintain it. Secondly, there are probably no employees within the institutes who will have the time to be trained and give computer classes after this training. Neither is there someone who can be trained for network maintenance.

A main problem with sharing of services is that none of the institutes could allow access to their compounds to others. Therefore the computer centre would have to be constructed outside all of the institutes. This required the use of a dormant building or the construction of a new building. As a start the use of a building of the Sumve parish was proposed, however the Fathers of the Parish would have to discuss the possibilities, taking a long time. Also, it would be wise to start a new company or foundation that is governed by a committee of members from the institutes. This foundation could employ two trainers and a network manager. The building could be under the same governance of this foundation. An answer to this kind of solution and building could be the development of a telecentre as it is formulated by COSTECH⁶ This Telecentre will be described in the next paragraph.

⁵ More information about these institutes can be found in Appendix B.

⁶ COSTECH: Commission of science and technology; http://www.costech.or.tz

Although the possibilities of constructing a telecentre seemed to meet the needs of the different institutes, complexity was found in the formation of a committee between the institutes and the employment of staff for the computer centre. First of all the management board of the hospital argued that the other institutes do not have sufficient funds even though they indicated this during the meeting. The participants of the meeting didn't seem to have time nor interest in the construction of a task force responsible for further plans for the telecentre.

The Girls' secondary school started working on their own computer centre within their compounds for their students only. They were provided with computers by the Archbishop and invested in this computer room themselves. This investment also caused that they were not able to spend much on a shared computer centre. Although they were looking forward to the possibilities of training, they were not willing to share their own facilities. Although they still don't have a skilled lecturer for the installation of the computers and don't have a skilled trainer they seem to make progress with the construction of their own computer room.

The other secondary school is government run. Their budget and curriculum is set by the government. This means that even when they would have enough funds to invest in computers, they could still not provide courses to their students as long as it is no part of the curriculum.

Only the nursing school and the hospital would be left to invest in the centre and therefore it became more convenient to focus solely on them again. The Sumve Foundation who finances projects for the hospital also agreed to finance the project for the hospital, since they planned on investment for the library already.

3.2.3. Construction of Sumve MCC

The fact that discussion with the main institutes of the village did not lead to a possibility to construct a shared (community) computer centre didn't mean that possibilities were still open for the hospital. A computer room at the hospital compounds could at least be open for hospital employees and students of the nursing school. The problem of Internet costs remained and therefore the decision was taken not to invest in Internet access yet. Also for the hospital a problem remained with training, since there is no staff member with sufficient skills and available time.

Even though plans were changing over time, contact was made with the organisation Vi@frica⁷. This organisation works on projects focussed on effective use of ICT in education and local organisations in Sub Saharan Africa (SSA). The management board of this organisation agreed to send computers and a trainer. Estimated capacity was to send 50 computers for this computer centre. However since the hospital does not have the space for this amount of computers, this number was reduced to 20.

The room that will be constructed for the library is about 48 square meters of which about half could be used for the computers. Computer training could be provided in this room, although difficulties with the allocation of a trainer remained. Fortunately, a new stakeholder for the construction of a computer centre showed up when the new proposal for this smaller computer centre was finished. This new stakeholder was a representative of the Sumve government. Discussions with him and other village representatives lead to a new project: The Sumve Multipurpose Community Telecentre. This project will be presented in the next paragraph.

⁷ Venture Intelligence Africa; http://www.viafrica.org

⁵⁴ Maarten Hendriks 16/11/04 3.2. Sumve medical computer centre

3.3. Telecentres

According to The Tanzania Commission for Science and Technology (COSTECH), rural areas often suffer from neglect and isolation, as they are perceived as areas of high risk to investors. COSTECH has the responsibility of co-ordinating and promoting research and technology development activities in the country. One of their initiatives is⁸: "*Community telecentre, to provide affordable computer based telecom and telecommunication services to rural communities and Village ICT projects for good governance".* According to them, the philosophy behind the rural community Telecentre concept initiatives is affordability, rural access and collaborative/participatory private/public community partnership.

This initiative is of high interest for the Sumve community. The main institutes in the village say to have interest in computer facilities like training and information search. Other facilities like a photocopier and telephone are very welcome as well. Therefore investigation was needed in the possibilities of the construction of a telecentre in Sumve. However first off all, it had to be clear, what a telecentre is. Many definitions can be found about telecentres:

Braga et al. [BRAG]:

"an MCT is a facility that provides public access to a variety of information and communication technologies and services"

Proenza et al. [PROE]:

"A telecentre may be defined as a shared site that provides public access to information and communications technologies."

Delgadillo K et al. [DELG]:

"Community telecentres are a powerful tool for supporting community development through the use of digital technologies and greater digital inclusion"

Jensen et al. [JENS, p 10]:

"MCTs are generally seen as structures that can encourage and support communities to manage their own development through access to appropriate facilities, resources, training and services."

Latchem et al. [LATC, p 19]:

"Telecentres may be defined as strategically located facilities providing public access to ICT-based services and applications. They are typically equipped with some combination of: telecommunication services, office equipment, multimedia hardware and software and meeting spaces."

Goméz et al. [GOMEZ]:

"a physical space that provides public access to ICTs for educational, personal, social, and economic development."

Short & Rice [SHORT]:

"An MCT is a technology hub that allows a community to establish many programmes and services, which provide social, economic and information technology support."

⁸ COSTECH; http://www.costech.or.tz/

Since a telecentre stands for a variety of services, definitions may differ a lot. However, in summary, almost any attempt to create a community owned place, in which information and communication services are shared and combined, can be seen as a telecentre.

Telecentres may be used to provide access to distance education, employment opportunities, training and business enterprise. Students and educators can communicate with educational institutions; access archival material and receive on-line instruction material. Specialised services can be offered to healthcare workers, enabling them to use tele diagnostics programs, order supplies, pass on public health information, and to obtain specialist advice for complex health problems. Users may include local government, church leaders, traders, teachers, schoolmasters, students, agricultural workers, hospital staff, NGOs and donor agencies.

Although it seems that defining a telecentre is very open, one should be aware that a MCT is not just computers, Internet and email, but a technology and services enabler for the community and owned by the community. According to COSTECH, telecentres often start out small and expand their services in response to demand by the people. This approach can be used in Sumve as well. Starting with computer training and possible library services, the telecentre could grow in any direction if there is demand for extra services by the Sumve community. In Appendix D. a full list of telecentre components can be found. In the situation of Sumve, the following definition may be applied the best:

"A telecentre is a shared community centre, facilitating information and communication related services."

3.4. Sumve multi-purpose community telecentre



Illustration 9 Sumve multi-purpose community telecentre

3.4.1. Introduction

The village of Sumve knows a village government, containing 20 members representing several groups of villagers. One of them is representing the secondary schools and hospital, namely Mr. Kagere. He was involved in the meetings held for the combined computer centre with the institutes and works on the construction of a computer room at the Girls' secondary school as well. Community members like him, do play an important role in creating awareness in the community and they also have access to other members who could be helpful in such a project. Since communication lines in Sumve do only exist by verbal conversation, it took a long time before other community members heard about the project and took action themselves. One of the former teachers of the secondary school, Mr. Damaso Jengo, is actively keeping contact with the community government and informed about more information about the plans.

3.4.2. Establishment of MCT task force

The plan that was proposed for the main institutes of the village, was considered again and discussed with some other members of the village government. New light was shed on the possibility of the construction of a community computer centre which lead to the following idea. Since Vi@frica proposed to send 50 computers, 20 could be used for the construction of the MCC while the other 30 could be used for the MCT. However, this meant that a new construction for finances would have to be created. Again efforts had to be taken to find a building, set up a committee and find skilled staff.

Mr. Jengo invited Mrs. Marcellina Kuginda (teacher), Mr. Charles Busengwa (Cell leader), Mr. Shaabau Malimbe (teacher), Mr. Julius Nkwabi (ward education officer) and Mr. Omari Mohammed Kombos (VET officer) to a meeting. This meeting was held on the 14th of August, in a building that is owned by another community member, which has been used in the past as a local radio station and is currently used for video presentations. This meeting initiated the establishment of a MCT-task force and a proposal was made for the use of the building.

Mr. Kombos shared his ideas about the set up of a telephone connection in this building. The MCT-task force shared the feeling that there is an opening to start an MCT with not only computers for training, but also future possibilities for Internet access, stationary, photocopy, telephone and fax services. The main difference in the set up of this MCT with the proposal for the institutes, is that this centre would be owned by the community and could be commercially exploited on a non-profit base.

This task force came together once more to discuss some details about the plan. By that time, we started using the booklets of short & rice [SHORT]: Ten Steps for establishing a sustainable Multi-purpose Community Telecentre. The steps proposed in this booklets could be used as guideline for the progress, the task force will however follow their own plan of action. Actions include some of the following points:

- Find a broader base in the community for the construction of the MCT.
- A definite agreement for the availability of the proposed building.
- Allocation of budget and search for sponsorship within the village.
- Cost estimation of Transportation of computers, Modifications of the building, Acquisition of equipment.
- Find skilled persons to be employed as trainers and technicians in the MCT.

Although the task force is very enthusiastic about the construction of the MCT, there are no sufficient funds for the construction. Also lack of experience in the task force with construction of centres like this can cause problems. Therefore active involvement of third parties is encouraged, however in the philosophy of most NGOs, work should be initiated by the task force themselves. This construction is also chosen for the MCT. The villagers will have to initiate most of the actions to ensure that they are motivated and the project will be continued after the MCT is constructed.

The books of Short And Rice [SHORT]: Ten Steps for establishing a sustainable Multi-purpose Community Telecentre, can be used by the task force as a guideline for the process of construction and management of the computer centre. These steps are worked out in more detail in § 3.5.2., a summary of the booklets was made as well to be used in the village.

3.5. MCT construction methods

For the construction of the computer centre, regular requirements engineering methods were used. By discussions and meetings with members of the hospital management board, possibilities for the computer centre were discussed. Three approaches were used, firstly the approach of COSTECH, secondly the approach off Vi@frica together with the Ten Steps approach of UNESCO.

3.5.1. COSTECH approach

After a visit at their site, plans were made to investigate in possibilities to construct a telecentre in their way. They had constructed a telecentre in Sengerema and in Mwanza already and because they are an official and local organisation they are in the right position to work on sustainable plans.

As a start, employees of COSTECH provided a draft version of the plans that were made for the construction of a telecentre in the Kilosa district. These plans were used for planning the initial construction of the MCT in Sumve as well. Discussion with Vi@frica however did not lead to a workable situation together with COSTECH. Their plans were based on large financial support from other organisations, while in the philosophy of Vi@frica only small initial finances are required for a sustainable project. After the initiation, the project should be fully self-sustainable⁹. Since the Sengerema project had a budget of \$ 150.000 and another \$ 50.000 yearly afterwards it was not realistic to resume with their approach.

Therefore the plan was rewritten and costs were estimated together with the MCT task-force and indications from Vi@frica. Also the booklets of Short and Rice [SHORT] were introduced to give a grip on the project for the members of the task force.

3.5.2. UNESCO approach

"Ten Steps for establishing a sustainable Multi-purpose Community Telecentre is intended to assist communities to walk through the basic requirements which need to be addressed when setting out to open and operate a successful MCT. It is a generic process only"¹⁰.

According to the booklets provided by UNESCO, the following steps will have to be made to be able to create a sustainable and maintainable Community Tele centre. These steps were extended with some actions that can be taken by the MCT task force as well.

Step one: getting Started

The main issues of this step are the definition of the telecentre that applies best for the community. Secondly a committee should be established which exists of various important members of the community and who can involve other community members easily. Their main task in this step is to involve the community in the establishment of the telecentre.

Step two: holding an open community meeting

This step is used to create awareness among the community member and to organize a meeting in which community members can pose ideas and ask questions about the project. In practice it proved that the planning of such a meeting is very difficult and that high attendance can not be expected. Also surveys and questionnaires do not have high responses.

⁹ Vi@frica Vision economical endurance, http://www.viafrica.org/vision/vision_sus.asp (Dutch)

¹⁰ UNESCO Ten steps, http://www.unescobkk.org/ips/ebooks/documents/tensteps/

Step three: management

In this step, the role of the steering committee is highlighted as well as the importance of creating a management committee. This management committee should obtain an official status as a foundation to be able to finance construction costs as well as receiving finances from external funders.

Step four: staff appointments

This step provides some guidelines for the preparation of a job description and interviews with solicitants. Selection of personnel should be done carefully, since they will be in a position in which they could cause severe damage to the project as well. In practice this process of personnel selection does have other complications than Rice and Short describe. Since there are so little skilled persons available, the task force should be happy with anyone who has at least appropriate technical skills. Training of personnel will have to be provided by an external expert. It is obvious that in this step help of development organisations is most welcome, Vi@frica can provide training as part of this project.

Step five: services and programmes

The task force should select both services that will be provided initially and services that can be introduced in the long term. Partners will have to be identified and the task force could set up schedules, courses and select computer purposes. The selection of partners seems a bit late in this step. In practice it is wise to search for external advisor's from the start, this is also done by COSTECH. Services that will be provided form the telecentre will have to be chosen by the community. This is also important for the installation of software in the next step.

Step six: building and equipment

In this step, a building is selected and a plan is development for renovation of the building. Also assessment of of furniture, equipment and software requirements are done in this step. After construction of the building, installation of hardware and furniture can be done. Although construction can not be done before a committee is established, it is advisable to select a building in an earlier phase. The building can have influence on the selection of services and personnel as well.

Step Seven: the planning process

A plan should be established for the future business. A mission and vision for the future should be formulated by the telecentre management team . A plan of action should be created and updated regularly.

Step eight to ten

These steps helps in planning of budget and bookkeeping, establishment of operating procedures and handling of customer services and complaints.

The ten steps of UNESCO can be seen as guidelines for the projects in Sumve. Although not all parts are specifically applicable to the situation in Sumve, these steps at least gives them a grasp to the progress of construction of a telecentre. Vi@frica will also assists in planning and implementation, but for the larger part the MCT task force will be on its own. Although this approach of self-support as encouraged by vi@frica will probably help in establishing a sustainable telecentre, this also brings extra risks and uncertainty to the project. In the next paragraph, these risks are discussed.

3.6. Risk mitigation

During this case study the ISPL methodology was not used directly. Since there are so much uncertainties and no service domain was available yet, the method could not be applied in total. Also due to time shortage, it was not possible to go through the ISPL methodology another time. This in fact already indicates a risk that is highly probable in developing countries, namely delays in the deliveries and delay in system delivery. The ISPL methodology however can also be used to manage risks before they occur.

The methodology does not specifically describe actions that can be taken to reduce the probability of risks. However a table is provided in which risks are associated to strategy options to mitigate risks. [ISPL-MR] In table [9] some strategy options are highlighted. The selected strategy options are associated to the strategies that are used in the different approaches discussed above.

Lincloar convice/cystom	Analytical description	Experimental description	Expert-driven description	Participatory description	One-shot installation	Incremental installation	Evolutionary installation	Total installation	Local installtation	Frequent project control	Formal project control	Make customer responsible for description	Make customer responsible for construction	Make customer responsible for installation
requirements	+													
Uncertain interfaces	+				+									
Unstable service/system														
requirements		+		+			+					+		
Lack of business actor														
participation	+		+		+	+		+						
Shortfalls in subcontracted tasks														
Loss of control of service		+		+			+		+			+	+	+
Delays in deliveries		+		+						+	+	+	+	
Poor quality of deliverables														
Increased costs of the service		+		+		+	+		+	+	+	+	+	+
Demotivation of service actors														
Poor quality of service/system	+		+		+	+		+				+	+	+
Delay in system delivery		+		+	+			+		+	+	+	+	+
Service/system not accepted by business actors	+		+		+	+		+						
Unpredictable costs for the														
business		+		+			+		+					
Non-attainment of business														
stakes					+									

Table 9 Risks that may be increased by strategy options

Table [9] shows that the most important risks that will have to be stressed, are:

- Loss of control of service;
- Increased costs of the service;
- Unpredictable costs for the business.
- Delays in deliveries

The estimation of costs is of course hard, since the prices of transport of computers are not known, proper weights aren't easy to estimate and especially income generation can not be ensured. However, indirectly it was possible to take actions to change the uncertainty and complexity factors by changing the plan for the construction iteratively. Answers could be found to the questions related to this chapter

The small list above gives an approximation to the question:*what risks threaten the success of the project?* However questions to the question: *What actions can be taken to mitigate these risks?* is not that easy. In Chapter 4 these actions are explored in more detail, since experiences from experts in projects in developing countries does provide better answers to these questions.

Finally the main question of this project: *How could a sustainable community computer centre be established?*

This question was answered by the exploration of several approaches. Conclusions are that a sustainable community computer centre needs commitment of the community, what can be reached through local ownership. When the community is responsible for the project they will take it and do not wait until new initiatives will bring development to them. This needs time and therefore time should be given to those with the proper authority. When the authorities provide a base for the project it will have a much higher chance of success.

4. Analysis

The main purpose of this paragraph is to compare the urban situation and rural situation with each other and point out important differences. Secondly an attempt is made to find causes for several risks that occurred in the projects. Again the ISPL risk management model can be used to focus on the situational factors, complexity and uncertainty and the risks they cause. In this part however, strategy options are discussed to mitigate the risks. The main question that has to be answered is how to mitigate risks in developing countries. Together with the observations of the case studies, the use of the ISPL methodology and literature, a general approach could be found.



Illustration 10 ISPL Risk management, Causality

For the eSAP project, the risks were worked out in far detail. This was possible since the evaluation of the existing project showed many imperfections of the project. In Sumve there was no evaluation possible since there were no ICT projects ran until now. However during the case study and set up of the projects in the village, several risks did come to the surface.

According to Rozendal [ROZE] the success of an ICT project is strongly related to the degree of acceptance of the environment. The development process should be seen as a highly complex process of interaction with this environment. This standpoint of an open system results in a perceived decline of control over the project. Using the ISPL methodology on the eSAP project also showed a high risk probability on loss of control of service. However, the impact of this risk was estimated low. It is important for the business actors to be able to work with the project themselves and therefore the GPM should loose some control of the service.



Illustration 11 Project influences

Rozendal used an Illustration, adopted from Cusworth in which two main groups of influences are shown. Namely Cultural influences and political influences. This illustration is adapted in this thesis. The eSAP project shows that not only political and cultural influences can cause severe risks for the service, but also pure technical influences can cause a project to develop totally different as well. Finally the development approach does influence the project as well.

Development approach



f importance for the project, is the development approach. that can be used for ICT projects as well as for evaluation. nce to select an appropriate approach to tackle the s to occur in an ICT project.

Political Influences [ROZE]

"Political actors are all the organisations that have the potential to influence the course of the project. From the political point of view, the art of project management lies in the capacity to create a project that arises out of the different interests of the stakeholders involved"

Cultural influences [ROZE]

"Cultural factors are all patterns of collective behaviour that influence the project but which are impossible to control through project management. From the cultural conditioning perspective, the art of management lies in the ability of the project organisation to be inventive in its adjustment to the local way of working."

Technical influences

The technical influences are a cross-dimensional point of view on the projects. This viewpoint provides an insight in the influence that technology, or better lack of technology cause to the project in the same cultural and political environment.

Along these four dimensions, the several projects can be compared and general risks can be pointed out. This will be done in the following paragraphs.

4.1. Development approach

4.1.1. Introduction

During the case study, several approaches to projects in developing countries were observed and even more approaches can be found in literature. According to Rozendal [ROZE] the design approach is too rigid to handle the dynamic environment of people-based projects. This type of study should put too much emphasis on pre-collected information. The developmental approach however should be more successful, such an approach includes experimental, pilot, demonstration and production stages. This is quit similar to the action research approach and conforms to common software engineering methodologies.

In the development approach, a pilot is started and enough room is available for new ideas from project members. Although it must be said that it is hard to get the ideas from the participants who are perceiving the project somewhat different. Inherent to this approach is that the process of decision-making on specific actions and solutions can change as part of the learning process within the project. Again this is similar to the action research approach and the decision making process of ISPL. Illustration [12] shows the whole ISPL process until the decision points planning. [ISPL-MR]



Illustration 12 ISPL decision point planning

After analysis of the situation and risks, a strategy can be formed where after decision points can be planned. For each action that has to be taken to mitigate the risks that threat the project and the related system, such a decision point can be scheduled in a meeting. It is of high importance that the participants of these meetings should be able to make the decisions about the scheduled decision points.

The service delivery strategy design in ISPL knows several approaches, these approaches should be aligned with approaches that are used by development organisations who have experience with projects in developing countries. Some of these approaches are described below where after the ISPL approach is discussed.

4.1.2. Multiple approaches

IICD approach

According to IICD¹¹, [BALL], investments in communication, information and knowledge to help reduce poverty need approaches that help to empower poor people.

"To foster a sense of ownership, Information and Communication Technology projects, programmes, etc. should be designed to be 'ownership-friendly'. This means listening to the demands of all stakeholders from the start"

Decisions should be made by the local authorities from the start, so the initiative is in hands of the local party and not in hands of the development organisation. Putting the power in hands of the people however has some negative consequences for the project. Loss of control will become a problem, costs will become unpredictable and delays in system delivery will occur. However, more important in projects in developing countries are user attainability and motivation of the business actors

UNESCO approach

The approach used in the Sumve project for the construction of the community telecentre can be found in the ten steps of short [SHORT]. Crucial factor for the successful implementation of a community telecentre project is the involvement and cooperation of a wide range of local organisations, both in setting up the facilities and in contributing to the production of "content" and applications. The private sector can also intervene in the work of the MCT, in several ways, ranging from supply of equipment and services to operational responsibility under franchise, and in general supporting development-oriented community activities.

Vi@frica approach

Vi@frica¹²:

"We think that real development can only be achieved when processes take place without too much external interference. Our aim is to start projects which will be a starting point for new initiatives. VI@frica will mainly play a role in the preparatory stage. The projects will have to be able to function independently finally."

In the view of Vi@frica, an ICT project will not only be sustainable when the local party has ownership, but also is independent of external suppliers. Set up costs could be funded by donors, but running costs should be funded by themselves. This will give the project participants more responsibility and devotion to the project.

Secondly, co-operation should be encouraged. Projects of this organisation focus on middle class. A healthy middle-class could lead to new initiatives, services and more employment. Co-operation could also be found in working together with other local initiatives. The project is not the goal itself, but could be carrier for the whole community.

¹¹ IICD International Institute for communication and development, http://www.iicd.org

¹² Venture Intelligence Africa, http://www.via@frica.org

Common approaches

Many development organisations choose to use a participatory development approach. The local parties will be owner of the problem / system, making them aware off the benefits and back falls of the project. By gaining knowledge and actively working in the project, the local parties seem to achieve the most and the project has a good chance of success.

eSAP approach

The approach of eSAP to tighten the digital divide, is to enable the academic community with tools to improve their skills and therewith improve the development of the country. [ESAP-MAK]

"The presence of a sufficiently sizeable and well-formed academic community is a key prerequisite for any country or society to overcome its problems in a sustainable way, to ban conflicts rooted in ignorance and to build a stable future based on human reason"

The lack of access and means for publishing for academics in developing regions could be resolved by the provision of a model and instrument. Their vision to improve knowledge and skills accompanied with a tool complies with the vision of IICD. However the approach to improve the knowledge and skills is questionable. Outcomes that were found are that the service is not accepted fully by the target domain and that there is no attainment with the business stakes and especially uncertainty of interfaces are a key problem of the project. Use of the ISPL methodology however can help to mitigate these risks.

4.1.3. The ISPL approach

According to [ISPL-MR] the development approach has two types

- Cognitive approach: the way in which information is processed to make decisions about the project. Initially an experimental approach was used by the GPM by introducing a pilot on two institutes. A more analytical approach was used to abstract from the information generated by this experiment. This experimental and analytical approach can be used interchangeably to reduce both uncertainties as complexity of the project.
- Social approach: In the past the GPM of eSAP worked from an expert-driven point of view. It pointed out that this approach was not very successful. A participatory approach was used once in a while, however not much of the input of the participants was really used. Now again an expert-driven approach could be used, however the team should contain experts from the university. The way in which service actors work together should be changed to a format in which the universities can play a more active roll in the decision process.

The methodology recommends the use of prototypes to find information about the use and complexity of the system. After the pilot, conclusions can be drawn, like done in the advice report for this project. Since the time needed for an experimental approach with pilots, is very time consuming, it will be hard to get enough cooperation of the participants in the service domain. It is therefore recommended to continue with an analytical approach. The information gained by abstracting the available information from the pilots can be used to reach a better understanding by both the GPM and the participants.

The situation of most of the participating universities is uncertain and interfaces with other business processes are rather complex. ISPL advices to use an analytical and participatory description approach, in which the situation is analysed and afterwards discussed with the involved participants. When the project is discussed with other stakeholders like the ones involved in the publication policy and ICT policy, complexity can be reduced through integration with these other processes.

Construction approach

The approach needed for construction of new systems and updates was changed over time. In the past a One-shot construction was chosen, the whole system was constructed in one version. This one-shot construction changed in an evolutionary construction. In this evolutionary approach, each change in requirements leads to a successive version of the system. Versions of the system will be constructed and installed in a sequence of steps. Since the schedules for the project are uncertain until now, a detailed schedule should be formed, after discussion between the GPM and the participating universities. Most important about this approach is that changes of descriptions are possible after gaining information from usage. The information gained from the pilots and this evaluation also encourages the possibility of changing descriptions of the system. When updates of the eSAP database are made, once monthly, an update could be send to the participants, so also successive versions of the database are used.

Installation approach

- System coverage: The way the system is installed can be parted in smaller pieces. In the past the system was installed as one-shot. This one-shot installation however needed some improvements, so now the evolutionary installation is used to install successive versions of the system, making use of information gained from former use of the system.
- Geographical coverage: In the past the system was only installed locally in a smaller part of the university. The system had a limited geographical coverage, namely two departments. The purpose of this pilot was to fine-tune the system and improve the installation process before the whole domain was influenced. This approach seemed to work on some locations, but failed at others. The coverage in two separate institutes did not contribute to awareness within the universities. For the continuation of the project, a global installation should be considered, since the project will become less complex to control and uncertainty about the system will decrease. The library as a central point in the project is good to start with, only for workshops the GPM should visit the university regularly.

Decision points planning

To be able to mitigate the risks that were found in the eSAP project, recommended actions should be planned by use of decision points. When a proper time schedule exists, decisions can be planned about each change and upgrade to the system. The GPM and the project team of eSAP should schedule decision points for each meeting. The participants of these meetings should be able to make the decisions about the scheduled decision points. Each decision point should contain the general purpose, purpose for the target domain and service domain. The roles involved in the decision and the deliverables. Finally the organisation, time schedule and costs should be described for the decision.

In practice planning meetings for each decision is not a commodity in Tanzania. Making decisions needs the presence of the persons who have the appropriate authority. Planning of these meeting therefore has three major shortcomings:

- 1. Almost all decisions are made by top management, while they might not have enough expertise to make proper decisions about the project
- 2. Planning of a meeting based on sequential time does fail many times, since in this culture time is not sequential. This aspect is explained in § 4.1
- 3. Decisions are assumed to be made before a meeting takes place, the reason for this is also explained in § 4.2.

This case study pointed out that it is very important to involve persons with sufficient authority, from the start of the project and continue using a participatory approach to leave the ownership in the hands of the participants. Both the chosen path of the ISPL methodology and other developing organisations, point to a participatory approach with local ownership as a sustainable development approach.

4.2. Political influences

According to Rozendal [ROZE-IF] the local ownership gives room for the influence of the local politic forcefield. Actors do have different interest in a project. Involved participants can have business interests to make profit out of the project. It is also common that they have political interests, they want to use the project to show their power. Also emotional and loyalty interests can play a role.

What is certain about all stakeholders is that they will always have multiple interests in a project. They can be forced to enrol in a project by their superiors, they can get involved in a project because of emotional interest, but also because he sees an opportunity to enrich himself. This is not only the case in projects in developing countries, however the balance is different. The projects are mostly funded by external parties and not the organisation itself. This causes a shift in balance of the risks. The financial risks are always for the service domain, while in normal projects, the financial risks are also part of the target domain.

For a project member in a project that is financed by an external funder there is little pressure from authority. Especially in developing countries, his primary interest will be the possibility to earn some money to make a living, or at least gain knowledge that can be used to achieve this in the near future.

In the eSAP case study, it was observed several times that a lecturer chooses to go to a meeting because he will be paid for attendance of that meeting. This could be over \$ 100 a day, which is comparable with his monthly income. Also in the starting phase of the eSAP project, he VLOs received a salary for their work in the project. Academics complained about the fact that the VLO was receiving money, while they did not get any credits for their work. Also in Sumve, the participants of the first meetings about the telecentre were joined by people who also had commercial interest in this computer centre.

"Although there is a collective 'matter' or 'mission' this does not mean that the project in question has the same meaning for every actor"

Every actor in a project has his own interests and view on the project. These stakeholders should be analysed thoroughly, especially their personal interests in the project. Political skills like communication, negotiation and change management will have to be used by project management to direct the process of decision-making.

According to Hagen from IICD, local ownership is the key to the sustainability of activities geared towards ICT development at a project level. [HAGEN]

"A project can have an impact only if it has a broader ownership base within the organisation in question."

IICD found this challenge when project partners had reached one or two years of operations, and wanted to expand and integrate their activities into the wider organisation. A project remains a project until it has been integrated into a more stable base and becomes an organisational priority. The move to more broad-based ownership, however, can be very political and difficult.

"Intense ownership is felt by initiators and implementers who have built up long-term stakes in 'their' project, while other members of the same organisation have often not had an opportunity to develop an affiliation with it."

Wider organisational change processes, supported by decision-makers, need to be initiated at the same time as ICT-related activities are introduced. This was not envisaged at the start of IICD activities and engendered a process of strategic reflection. IICD concluded that their approach should be changed. This approach should also be applied to the eSAP project and finds its reflections in many other ICTR projects that started with a pilot.

- Ensure that there is more broad-based organisational participation at the start of a process;
- Raise ICT skills among a larger number of an organisation's staff, thus beyond the limits of the project team;
- Train project initiators and other project team members in wider operational capabilities, such as project management and marketing;
- Advise project partners on more strategic issues, such as long-term planning and integrating project activities into organisational strategy;

4.3. Cultural influences

4.3.1. The aspect of time

A very important factor in the projects in developing countries, is that cultural differences can often not be understood easily. An important cultural difference, is perception of time. A good Illustration can be found in the book: Ebbenhout from Ryszard Kapuscinski [KAPU] According to Kapuscinski, in the European perception of time, time stands apart from the human being. It is objective, measurable, linear. The European is dependent on time, he is a slave of time and has to obey its iron laws and fixed principles and rules.

Africans do have a different assumption of time. For them it is open, flexible, subjective. A human being does have influence on the shape of time, on its course and rhythm. The existence of time does only occur in events. When two armies do not fight, there is no battle and time won't exists wither, since nothing happened. Time is a passive entity and is before all, dependent on the human being. It does appear as result of our actions, but disappears when we leave off an action.

Applied to practice, this means that when someone goes to a village where a meeting will take place in the afternoon and no-one is present, the question 'when' is pointless. Since the answer is known before: when the people are there. When an African steps into a bus, he never asks when the bus leaves. He simply steps in, sits down on a free seat and sinks in a state in which he spends a large part of his live: The state of deathly waiting.

During the case study, this event of waiting was observed several times and also gave some insight in the reason why delays occur in projects that were not expected in Western project development.

According to Rozendal [ROZE], Time is just a concept which can be distinguished in a sequential versus a synchronous notion. The sequential version is a sequence of seconds, minutes, etc. Time does not wait for man and once it is gone it is gone forever. Synchronous time however is circular, time is given to events and opportunities that repeat themselves. Someone can not waste time, but can wait for the event on which he is going to spend time.

This flexible attitude in synchronous cultures has the effect that a working day becomes an accumulation of more or less accidental meetings. This has the advantage that it leaves enough space to anticipate unforeseen problems. A main problem of this synchronous planning, is that meetings with more then two people happen a lot less likely.

In Sumve this was very obvious when an attempt was made to request a building for the computer centre. The father who was responsible for this building had to discuss some issues with the other fathers of the Sumve parish. This parish knows three priests in total, however they never seem to be in the parish at the same moment. During six weeks, no accidental meeting happened, so no discussion took place either. Putting pressure on planning the discussion, did not have any outcomes either. In contrary, the father couldn't understand why so many reminders were given to him, while he was simply waiting for the event to happen as well. On another occasion the priests accidentally met the same day causing discussion and decision to take place the same day.

Another aspect of time is related to the political influences. This was found primarily in the eSAP project. According to Rozendal, the synchronous time is misused to elevate the status of the superior in that culture. You are expected to give people time in a way that prominent people expect to be waited upon. In all of the universities visited during the case study, most people with a high authority have at least one small waiting room in front of their office.
"The decision-making process is influenced by this authority. Meetings have more of a function of ritual sessions that enable the leader to consolidate the authority. Decisions are assumed to have taken place before the meeting took place."

In the eSAP project, this aspect probably blocked the progress as well. When the participants came together for a meeting about the project, the decision points that did have to be discussed were assumed to be decided by the GPM already. Only in informal conversations after the meeting, the participants expressed their feelings about the decisions.

4.3.2. Authority

In developing countries organisations have a more particularistic culture according to Rozendal. There are no clearly defined procedures to handle customers. The person who is involved with the project is always qualified on his personality and not on his specific role. Business actors tend to use the offered help in favour of certain groups, while the donor wants to serve certain categories. In the eSAP project for example, the GPM wants to help the academics of the universities in publishing. The project leaders of the participating universities however will probably first think about possibilities to use the resource for their nearest colleagues.

Another example of this way of working was found at SAUT. When 50 computers were provided to the university from the united states. The lecturer who arranged this, wanted to distribute these computers equally over the university. This lecturer was an American from origin and still followed the universalism laws, although he lived in Mwanza for 12 years already. His plans however failed, since he did not have the authority to make decisions about the computers. The academic officer who was to decide about the plans for the computers already started distributing the computers over offices of other high ranked colleagues without interference of other university members.

Power distance does influence the project as well. When someone is asked to make decisions about a project, this person will wait for his superior to either give him the mandate to make the decision, or make the decision for him. In the eSAP project at the UDSM the high power distance caused the project to stand still totally. The project coordinator who was selected by the eSAP GPM is a lecturer at the institute of development studies. Now if he needs to make a decision about the way academics should provide the VLO with articles and wants to integrate the system with publication policies, he needs both authority and sufficient allocated time.

The director of the institute does not have much influence on the budget of the institute, but has the mandate to allocate time to the lecturers in the institute according to their job prescription. Since the job prescription of the project coordinator does only include his role for the UDSM, there is no time allocated to fulfil his role in the eSAP project. Even when he had time allocated for the project he could still not make the decision, since he is not authorized to make decisions himself he has to discuss issues with the related organs. For example the directorate of publications. First he needs to get authority from his direct supervisor before he can take any action at all, secondly when he gets the possibility to discuss issues with the directorate of publications he still has to wait for their direct supervisor to approve the decision.

In Sumve this problem of power distance also expressed itself in a simple questionnaire. This questionnaire was used to gather information about the several institutes, needed for Vi@frica ¹³. This information was only needed to get an insight in the institutes so the organisation could write a proposal for the amount of computers they think were needed. The persons who were asked to fill in these forms took a long time to bring them back. In their perception these documents had an official status, even though it was expressed several times that it was just a way of providing information. The persons who were asked to fill these forms were at least part of the top segment of the hierarchies in these institutes, however still they waited with responding since they wanted to consult their higher authorities.

The secondary schools both have a directorate above the direct management of the schools themselves. This directorate operates is located in the city and therefore the questionnaire could only be filled after a long procedure and time needed to send the forms back and forward from the city to the village.

Typically for the organisational culture is the need for approval from a higher level. These organisations are centralized which comes hand in hand with bureaucracy. The organisation works through an established system of procedures and rules causing delays in projects, such an organisation is not highly suitable for project implementation.

4.3.3. Influences on the decision making process.

The culture will determine the pattern by which alternatives will find their way to the negotiation table. The cultural factors of high power and particularism give structural power to the interests of the decision makers. For example in Sumve, the first people to be found as possible trainers in the computer centre are the relatives of the members of the committee.

Work around should be developed to be able to make decisions in the right place. When meetings are usually seen as a social and political occasions, project management should look for other ways to discuss about decisions. A more informal approach could be used by conversation with individual participants. The outcomes of these conversations should be gathered to form a general idea about a decision to be made. This decision could be discussed again in another informal conversation with the individuals, so constructive input from then can be used.

This is quite different from the normal ISPL approach. In the ISPL methodology decision points are used to make decisions on a service. These decision point are characterized by the roles involved in this decision and the deliverables that are exchanged. [ISPL-MR] Decision point planning is done after a strategy is formed to mitigate the risks that were found in the risk analysis.

¹³ Information that had to be provided can be found in Appendix B.

4.4. Technical influences

Although most of the differences in risk factors in developing countries can be found in the political and cultural factors, there are many risks simply caused by technical influences. In the eSAP project differences have been found in the way the project found a base in the participating universities. For example the university in Mwanza: SAUT had difficulties in its network and Internet reliability. Because of this, they could not supply all academics with access to the eSAP system and the VLO had more difficulties with managing the publications from SAUT.

In Sumve many problems during the project initiation were found because of lack of communication and power supply. When less services are available in a certain environment a project will be harder to accomplish. In the village of Sumve, there is no shop where computers could be prepared, therefore precautions have to be taken before computers are installed.

Also transport from and to the village does influence the progress of projects. A technician who was working in Sumve in the period of the case study came to the village with local transport. Since there is only one bus going to the village and one bus leaving the village, he could only be there for two hours a day.

Technology has a price, especially when expensive technology has to be bought for a project, problems can be found in finances. For example the costs of an Internet connection can discourage the project participants in starting this service. Appendix E provides an overview of possible Internet solutions in which causes can be found for these high prices.

As told before, participants all have their own interests in a project. They will first think about relatives before facilitating others with the tools and services they got provided. Sharing services with others is a good solution to solve problems with finances. For example SAUT could help Sumve in the construction of an Internet connection.

4.5. Main differences

During the case studies in the urban environment and the rural environment, many similar complexity and uncertainty factors were found. The table below gives an indication of the risks that were found in the several locations.

	Target		Service		SUA	SAUT UDSM		GPM	Sumve
	Со	Un	Со	Un					
Increased costs of the service	+++	+++	++	++		+++	++	++	++
Loss of control of service	+++	++	++	++		+++	++	++	++
Delay in system delivery	±	+++	++	++			++	++	++
Delays in the deliveries	±	+++	++	++		++	++	++	++
Poor quality of service/system	+++	+++	-	++	++	+++	++	++	++
Uncertain interfaces	+	++		+	++	+++	+		
Non-attainment of business stakes	+	++			++	+	++		
Unpredictable costs for the business	+	+++		±	+++		+++		++
Unclear service/system requirements	+	++		+	++	+			++
Unstable service/system requirements	+	++		+			+		
Demotivation of service actors		++	-	++					
Service system not accepted by business actors	+	++		±	++	+	++	++	
Shortfalls in subcontracted tasks		+	±	+					
Poor quality of deliverables		+	-	++			+		
Lack of business actor participation		+							

Table 10 Risks in different cases

Although the risks found in the Sumve project were roughly estimated they are comparable with the risks found in the other locations. A main difference is the uncertainty about interfaces. It is obvious that the construction of a computer centre in a village has other requirements then the installation of a system in universities. The construction of a computer centre does not necessarily has to follow bureaucratic procedures from an organisation. In contrary, the eSAP project met many problems with the alignment to other services.

Although the technical possibilities are quite different in each case study, the cultural and political factors are very similar. Since these factors have the largest impact on the project, the way that risks will have to be mitigated are not that different. In literature that has been read about other cases and projects in developing countries many of the same problems were found as illustrated in the eSAP case study. Visits to the other eSAP participants in both Uganda and Kenya also showed that similarities can be found even over the borders of Tanzania. This was also seen in the questionnaire included as appendix C.

Mainly differences in the available infrastructure cause extra risks. The system could be of poor quality when power, Internet and phone lines are unreliable. On the other hand, it seems that when a better infrastructure is available, other risks can occur. For example interests of a university computer centre could be very commercial, so when a decision is made to install a system in the computer centre, it could be possible that it is not used since they don't have a commercial interest in it.

5. Conclusion

Although the three eSAP participants in Tanzania were visited iteratively, only one full cycle of the action research paradigm could be executed using the ISPL methodology. However, over time, when actions are taken by the project management, a new iteration could be started and also ISPL can be used again to mitigate risks that will be related to the actions that are taken. Seen from this perspective, ISPL could be used in the same way as action research. Since changes lead to a new situations, this situation should be diagnosed again. In terms of ISPL, new risks can be found which will have to be mitigated again. The methodology covers all aspects of action research as shown in Illustration 15.



Illustration 13 Action Research in Risk management

Approaching the problem of risk mitigation with action research seems to be a useful research methodology. The ISPL framework was very useful to map the actions which have to be taken when changes are made to the situational factors. This is probably not only true for risk mitigation in developing countries but also in Western countries. Now that all aspects of the ISPL methodology have been highlighted conclusions can be drawn toward the use of this methodology in the mitigation of risks in developing countries. First an answer will be provided to the sub questions.

"Can the ISPL methodology be used too manage risks and plan deliveries in a developing country?"

After testing the use of the ISPL methodology in the eSAP project, it was found that the methodology can be applied in the same way as it is done in Western countries. In Illustration [13] can be seen that the way of doing research has similarities with the ISPL methodology, also similarities were found with the development approach as shown in Illustration [14], taken over from [ROZE]. Conclusions can be drawn that the methodology maps on the approaches that are currently used by developing organisations and therefore has a high probability of successful use.

It was possible to use the methodology in the eSAP project by following its steps in the same way it is done in regular projects. Although there were some problems in estimating the financial risks, this was not particularly a shortcoming of the methodology but more a shortcoming of the project. One minor change should be made to the Risk association tables. The risks: increased cost of the service should be related to the service domain instead of the target domain. The methodology warns already that the list is neither definitive nor exhaustive and therefore this change does not harm the way the methodology is applied.



Illustration 14 Development approach

"What typical risks play a role, when ICT is implemented in urban and rural environment?"

Many of the risks that were found in the eSAP project could be found in the different sites and in literature as well. After three months of observation it can be concluded that risks in urban and rural are quite similar to each other, since the influences with the highest risk impact are either cultural or political. These influences can be felt and will be found in the whole country and does not cause a high differentiation between the two different environments. Of course there are differences caused by situational factors like the skills of the business actors or the importance of the triggered changes for the business. These differences were found in the eSAP project but even then, however they did not have the highest impact. The risks that were found in most locations and will probably be found in many other projects are among the following.

- Poor quality of service/system
- Service system not accepted by business actors
- De motivation of business actors
- Uncertain interfaces
- Unclear/unstable service/system requirements
- Non-attainment of business stakes

"What are main differences between stakeholders in Western countries, rural and urban developing countries?"

In the end everything points to the process of decision making. The actions that will have to be taken according to the ISPL methodology lead to a strategy in which decision point have to be planned. Decision planning in developing countries however does have to be done differently. These differences can best be seen in differences in culture. There are four major reasons why decision point planning is not effective:

- 1. Notion of time is very different in developing countries, specially in respect to meetings. In sequential time a meeting takes place when it takes place
- 2. Decision making itself can only be done by top management, decision planning in ISPL needs the right people with proper authority, however in developing countries often top management makes all the decisions while they might not have the knowledge required to make a decision about certain issues.
- 3. Meetings are used to consolidate the authority of the superiors, so decisions are expected to be taken in advance.
- 4. The participants of meetings come with their own interests, in developing countries this interest is mainly on what the system can bring to the individual in personal.

Thorough analysis of the organisation and its members is needed to know who has the authority and who really have interests in the service. This analysis can probably only be done on the site where the project should be installed. Often insufficient information can be gathered about the organisation outside the organisation. Even within a site, stakeholders have many different personal interests as was observed in both case studies.

"What actions can be taken to mitigate risks in both urban and rural regions in developing countries?"

Although not all of the risks that are indicated in the book [ISPL-MR] were found in the projects, it is useful for the methodology to highlight each risk. Below all possible risks are mentioned with remarks about the actions that need special attention in developing countries.

Unclear service requirements & Unstable service requirements

- Appointing a person who is responsible for the consistency of the requirements is very useful, however the selection of this person should be done very carefully with respect to authority and personal interests
- Including business actors as service actors is the only way to make a project sustainable, since responsibility about the project will encourage the business actors to utilize the service.

Uncertain interfaces

• Uncertain interfaces caused many problems in the eSAP project. Since interfaces with other processes were not described sufficiently it was not possible for the business actors to achieve their goals. The service team will have to find out what relations can be found with other processes in the direct environment of the project. This is also true for projects done by other organisations. For example the eSAP foundation should be aware that the introduction of an e-learning module at the UDSM is pointless since another organisation provided the university with such a system already. Acting without certainty about the interfaces can only lead to more complexity and uncertainty.

Lack of business actor participation

• Investigation and analysis of the motivation of business actors should be done even more carefully in projects in developing countries then in Western countries

Loss of control of service

 This risk plays a role in many projects in Western countries, however in developing countries this loss of control will often has to be accepted. As Illustrated in chapter 4 the best approach for projects in developing countries, is the developing approach in which participation of business actors is required. This automatically means loss of control of service. However as envisioned by several developing organisations a project can only be successful when they are owned by the business actors and are self-sustainable. Authority and decision making should be in hands of the target domain for sustainable development.

Delays in deliveries & Delay in system delivery

- Working in parallel is not always possible, but for a Western project member who is working on a project in a developing country, it is advisable to plan multiple meetings at the same time. The chance is high that one of these meetings will not take place at all.
- Don't try to rush the actors in the target domain, since they will only increase the waiting time until you show respect for their authority.

Increased costs of the service

• Decreasing uncertainty about the costs can not always be done by using decision points early in the service execution. Instead decisions about costs should be done together with business actors since they need to know what the budget is as well.

De motivation of business actors & service actors

- It is of high importance for the project to raise motivation under the users. All business actors should be trained, motivated and informed about the project.
- The service actors could also get discouraged, since the project is not showing much result considering the span of time it is running. Therefore more concentration should be on training, motivation and informing business actors. Most importantly, the customers should be involved in the service team to facilitate mutual learning and team building.

Poor quality of service/system

Observations in the eSAP project certainly proved that controlling the interfaces is very important in risk mitigation in developing countries. Persons who play an important role in the services that have an interface to the service that is to be implemented should be invited to discuss about the project and play a role in decision making. A main problem in decision making however is that decision point can not be planned in the way this is done in Western countries.

Service system not accepted by business actors

Causes of this risk are somewhat different then the causes in Western countries. Acceptance of the business actors should be achieved by involving the persons with sufficient authority. One of the actions, namely the use of a participatory description approach is very useful in developing countries, however precaution should be taken in the formality of meetings. Decisions should be made together with the participants without giving them the idea that decision were already made as what is normally assumed in a meeting.

Non-attainment of business stakes

Since the eSAP project is not mapped to the business stakes of the universities, it is
important to work on a better integration of the system. The business stakes of the target
domain should be implemented in the way the service is provided. As long as the real
requirements of the target domain are not attached to the project, it will always miss the
quality and it will not match their needs. It is important to have enough authority and skills
in the project team to be able to make decisions, provide workshops and maintain the
system.

"Can risks in ICT implementation in developing countries be managed in the same way as they are managed in Western countries?"

Finally an answer can be provided towards the main question of this thesis. After analysis of the case studies in Tanzania conclusions are that risk mitigation can be done in the same way as in Western projects. Main differences are the influence of cultural and politic factors which play a role in the risks are associated to the complexity and uncertainty factors that were found. The ISPL methodology provides options for strategy planning and decision points planning which need extra attention in a project in a developing country.

Strategy planning as proposed by ISPL should be done carefully. The participatory descriptive approach is almost always the best option since relations between business actors are different.

Decision point planning should be done carefully and can not be planned against a strict time line. As long as decisions are made by the persons with the right authority it does not matter when exactly this decision was made.

6. Evaluation.

One of the difficulties in performing a case study is that binding conclusions to the findings leads to a new search for information. Insight had to be achieved in the specific risks to be able to find causality and to be sure that the situation is interpreted correctly. Therefore the development of this thesis also lead to a literature study. Without this study it was not possible to fit the findings in a theoretical framework. The work needed to answer the research questions after the case studies was much more then I expected. I assumed that a case study in practice would give me enough insight in the situation to answer my research questions. However, it was needed to search for causalities which could not be explained by my personal observation. Therefore more literature and links between this literature and practice was needed.

The case studies that were done in this research project all had their own characteristics, but also many similarities, I was surprised that cultural differences could be so stubborn and that these differences presented themselves in the different cases.

Not only insight was achieved in risk mitigation as part of my studies in information science, but also insights in an other culture with its different influences on situations that seemed totally normal to me at first sight. Approaching a project from different viewpoints underlines the goals of the studies of information science. I became more aware of the importance of gathering insight in this different views, by observing the way things are perceived in practice.

Using a research approach making it necessary to become a part of the project environment makes it very interesting to study abroad. Experiences with a local way of living, transportation, waiting and communicating enriched my point of view on problems in ICT. It also enriched my point of view on problems in live, for which I am thankful.

Work that has to be done in order to make risk mitigation successful in developing countries include the following:

- The creation of a decision points planning strategy which is better applicable for developing countries
- More in-depth research in development strategies could be useful for strategy planning in risk mitigation.

References

[BALL]

Ballantyne P.; Ownership and Partnership – Keys to Sustaining ICT-enabled Development Activities; IICD Research Brief – No 8, December 2003;

[BASK]

Baskerville R.L.; Investigating information systems with action research; Communications of the Association for Information Systems, volume 2, article 19; October 1999; Computer Information Systems department, Georgia state university

[BRAG]

Braga C.A.P., Kenny C., Qiang C., Crisafulli D., Martino D., Eskinazi R., Schware R., Kerr-Smith W.; Global Information and Communication Technologies Department, The World Bank Group; The networking revolution, Opportunities and Challenges for Developing Countries; June 2000

[DELG]

Delgadillo K., Gómez R., Stoll K.; Community Telecentres For Development, Lessons from Community Telecentres in Latin America and the Caribbean; IDRC Canada; First edition; November 2002; 32 pages: 28 X 22cm; ISBN: 9978-42-666-3

[DYMO]

Dymond A., Oestmann S.; A rural ICT toolkit for Africa; African Connection, Centre for Strategic Planning;

http://www.infodev.org/projects/telecommunications/351africa/RuralICT/Toolkit.pdf; Intelecon Research & Consultancy Ltd.; 2002

[ESAP] http://bij.hosting.kun.nl/esap/index.php?page=esaphome

[ESAP-MAK]

http://bij.hosting.kun.nl/esaptest/makerere2004_files/frame.htm

[FREC]

Frechtling J., Sharp L., Westat; User-Friendly Handbook for Mixed Method Evaluations; August 1997;http://www.ehr.nsf.gov/EHR/REC/pubs/NSF97-153/START.HTM#TOC: Directorate for Education and human Resources, Division of Research, Evaluation and Communication National Science Foundation,.

[GOMEZ]

Gómez R., Hunt P., Lamoureux E.; Telecentre Evaluation: A Global Perspective; Report of an International Meeting on Telecentre Evaluation, International Development Research Centre (IDRC), Canada, Far Hills Inn, Québec, Canada - September 28-30, 1999; http://www.idrc.ca/telecentre/

[GRIF]

http://staff.bath.ac.uk/psscg/RMD-QM-CS-lec.htm: Dr Chris Griffin; (Willig, 2001, ch. 5; & Denscombe, 1998, ch.2)

[HAGEN]

Hagen I.; Going beyond a project approach: embedding ICT support in a wider development context; IICD, http://www.capacity.org

[ISPL-LM]

ISPL Consortium; Information Services Procurement Library, Information Services Procurement for Large-Scale Migrations; 1999 ten Hagen&Stam, the Hague, the Netherlands; I SBN 90.76304.88.2.

[ISPL-MR]

ISPL Consortium; Information Services Procurement Library, Managing risks and planning deliverables; 1999 ten Hagen&Stam, the Hague, the Netherlands; ISBN 90.76304.83.1.

[JENS]

Jensen M. Esterhuysen A.; The Community Telecentre Cookbook for Africa, Recipes for self-sustainability, How to Establish a Multi-purpose Community Telecentre in Africa; United Nations Educational Scientific and Cultural organisation; Paris, 2001

[KAMP]

Informatiekunde Visie 2003 Vormgevers van de digitale samenleving: Informatiekundigen met een β -opleiding, een γ -feeling en een gezonde dosis creativiteit Versie van: 16 april 2004. (in Dutch)

[KAPU]

Kapuscinski R.; Ebbenhout; African meetings; Dutch translation by Gerard Rasch, De arbeidspers, fithtedition, January 2002, ISBN 90.295.2531.2 (In Dutch)

[LATC]

Latchem C, Walker D; Perspectives on distance education Telecentres: Case studies and key issues; The Commonwealth of Learning, Vancouver, 2001

[MCTT]

The united republic of Tanzania ministry of communications and transport; national information and communications technologies policy; march 2003

[PEDR]

Pedrelli m, pragmata s, reggio e; developing countries and the ICT revolution final study; ep/iv/a/stoa/2000/14/01; European parliament, directorate general for research, the stoa programme; date: march 2001; Luxembourg

[PROE]

Proenza F.J.,Bastidas-Buch R., Montero G.;Telecentres for Socio-economic and Rural Development in Latin America and the Caribbean, Investment Opportunities and Design Recommendations, with special reference to Central America; FAO – Investment Centre, ITU – Telecommunications Development Sector, IADB - Social Programs Division, Operations Department 2, Rural Unit, Sustainable Development Department Information Technology for Development Unit Washington, D.C., May 2001 (http://www.iadb.org/regions/itdev/telecentres/index.htm)

[REIJ]

Reijswoud V.E., Proper H.A.; Struggling in the Bush: ICT-onderwijs in Oeganda.; TINFON, 13(2):59-61, June 2004. (in Dutch)

[ROZE]

Rozendal R.; Cultural and Political Factors in the Design of ICT Projects in Developing Countries, RESEARCH REPORT No. 13, March 2003

[ROZE-IF]

Rozendal R.; If it works for us, will it work for them? Een casestudie naar culturele en politieke processen binnen het Kinondoni ICT-project te Tanzania; Amsterdam, maandag 15 juli 2002 (in Dutch)

[SHORT]

Short G., Rice D.; Ten Steps for establishing a sustainable Multi-purpose Community Telecentre (MCT), Step One: Getting Started, UNESCO Bangkok

[TELL]

Tellis W.; Application of a Case Study Methodology; The Qualitative Report, Volume 3, Number 3, September, 1997 (http://www.nova.edu/ssss/QR/QR3-3/tellis2.html)

[THINK]

eThinkTank; Information Document; June 2000; eThink Tank 22 June 2000; Ref: eTT/10/snn

[UNES]

UNESCO; Medium-Term Strategy 2002-2007, Contributing to peace and human development in an era of globalization through education, the sciences, culture and communication; 2002; the United Nations Educational, Scientific and Cultural organisation; 7, place de Fontenoy, 75352 Paris 07 SP

[WSIS]

WSIS executive secretariat; report of the geneva phase of the world summit on the information society; geneva-palexpo; 10-12 December 2003; document wsis-03/geneva/9(rev.1)-e; 18 February 2004; original: English

Appendices

A. List of eSAP Universities

The following list shows all participants in the eSAP project. At each university, two institutes were selected for the pilot: Development studies and Business management.

Kenya

- Catholic University of Eastern Africa, Nairobi
- Kenyatta University, Nairobi
- Nairobi University

Uganda

- Makerere University, Kampala
- Uganda Martyrs University, Nkozi

Tanzania

- University of Dar-es-Salaam
- Sokoine University of Agriculture, Morogoro
- St. Augustine University of Tanzania, Mwanza

Zambia

• University of Zambia, Lusaka

Zimbabwe

• University of Zimbabwe, Harare

B. Profiles of institutes

Sumve designated district hospital

Address: P.O. Box 23, Mantare via Mwanza Contact person: Eliezer MUSA Kaserero

The Sumve Designated District Hospital was started in 1934 as a Midwifery clinic by the white sisters. Nowadays it is one of the biggest district hospitals of Tanzania. The area in which they provide healthcare has the size of 200 sq. kilometres where 500.000 Sukuma people live. The hospital falls under responsibility of the archbishop of Mwanza.

- Number of staff: 200
- Number of Medical Officers: 4
- Size of care area: about 200 sq. km.
- Number of wards: 7 (Male, Female, Child's, Midwifery, Tuberculosis, Infection diseases and Premature)
- Number of people in area: 500.000
- Number of patients seen at polyclinic: 25.000?
- Number of patients taken in hospital: 5000
- Number of beds: 265

Facilities: Diesel generator, solar power, laundry, administration, kitchen, lab, pharmacy.

Importance of the project for the hospital: To give the opportunity for hospital employees to have access to more literature and news in different sectors as well as in depth medical information. Beneficiaries will be the employees of the hospital as well as the Sumve community as a whole.

Target groups and courses: Many of the employees need a computer course for administration, search of information and other purposes. A wide range of courses would be needed in spreadsheet, word processing, databases etc.

Sumve nursing and midwifery training centre (NMTC)

Address: P.O. Box 7, Headmistress: Frace H. Sahali (Contact person), 0744642714 Second master: Jevan Mashi

Information about the school:

- School type: Private boarding school
- School fee: 300.000 Tsh.
- Number of students: 150
- Number of girls: 100
- Number of boys: 50
- Number of teachers: 6
- Number of staff: 12
- · Size of school premises:?
- Number of classrooms: 4
- Number of staff rooms: 6
- Number of dormitories: 5

Facilities: Kitchen, Sport field, Generator, Photocopier

Classes: English, Swahili, Mathematics, Physics, Basic Nursing, Anatomy and Physiology, Medical Surgical Nursery, Community nursing, Midwifery and Child health

87 Maarten Hendriks 16/11/04 B. Profiles of institutes

Target groups and courses:

- All of the students should follow a basic computer course, this could be done in groups of 30 in the afternoon of each workday.
- The teachers should also attend basic computer courses.
- All of the students should have the possibility to work on study tasks on the computers.

Sumve high school

Address: P.O. Box 44, Mantare via Mwanza Headmistress: P.R. Celestine (Contact person) Second mistress: S.M. Mwishauri

Information about the school:

- School type: O + A level, boarding + day school
- School fee: Boarding: 70.000 Tsh. Day school: 40.000 Tsh.
- Number of students: 414
- Number of girls: 220
- Number of boys: 194
- Number of teachers: 14
- Number of staff: 8
- Size of school premises: 20 hectares
- Number of classrooms: 11
- Number of staff rooms: 1
- Number of dormitories: 1

Facilities: Kitchen, Sport field, School shop, Auditorium, D | Hall, D | Science

Classes: English, Swahili, Mathematics, Physics, Chemistry, History, Geography, Biology, Economics, BAM, Commerce, B Keeping

Comments: All of the classes lack sufficient text and teaching materials.

The school is a government school and is therefore dependent on national funds. It is not easy to have a private computer room for the school unless a proposal should be sent to the higher authority that can provide contribution. From the other side, if one is providing a public computer room, the costs could and should be shared.

Target groups and courses: When the government plans to provide computer courses to the students, both the students and teachers of this school will have to attend these courses, as they will be indicated by timetables provided from the government as well.

Sumve girls' secondary school

Address: P.O. Box 30, Mantare via Mwanza Headmistress: Catherina Kisulla (Contact person), 0744643602, Second master: Cleophas Mtobesya, 0744757962

Information about the school:

- School type: Private boarding school
- School fee: 285.000 Tsh.
- Number of students: 700
- Number of girls: 660
- Number of boys: 40
- Number of teachers: 24
- Number of staff: 36
- Size of school premises: 400 hectares
- Number of classrooms: 16
- Number of staff rooms: 1
- Number of dormitories: 11

Facilities: Kitchen, Sport field, School shop, Auditorium, Library, Generator Classes: English, Swahili, Mathematics, Physics, Chemistry, History, Geography, Biology

Comments: The school is constructing an own computer lab currently. There were 30 computers donated by the archbishop and they selected a building within the school compounds that can be used as a computer room. The room will only be available for students of this school and the only course that will be provided is a basic computer course. Provided that there are 30 working computers, 25 classes will be needed during a week, this will be 5 daily. Therefore the computer room will already be fully occupied

Target groups and courses: For the use of the shared computer room they foresee that the lecturers will be send there for courses. Not only for basic computer courses, but also for word processing, spreadsheet, databases, librarian software, administrative software etc.

C. Questionnaire

1. Which part of the academic population was		A 0-20%	2	29%
aware of the possibilities of electronic publication,		B 20-40%	4	57%
by the time that eSAP was introduced to the		C 40-60%	1	14%
university (2001)?		D 60-80%		
Respondents:	7	E 80-100%		
2. Which part of the academic population is aware		A 0-20%		
of the possibilities of electronic publication		B 20-40%	1	14%
nowadays?		C 40-60%	1	14%
		D 60-80%	1	14%
Respondents:	7	E 80-100%	4	57%
3. Do you think that most of the academics have a		A Yes, mainly positive	3	50%
positive attitude about electronic publishing?		B Yes, slightly positive	3	50%
		C Neutral		
		D No, slightly negative		
Respondents:	6	E No, mainly negative		
4. Which part of the academic staff was active in		A 0-20%	5	71%
publishing by 2001?		B 20-40%	1	14%
		C 40-60%	1	14%
		D 60-80%		
Respondents:	7	E 80-100%		
5. Which part of the academic staff is active in		A 0-20%	1	14%
publishing nowadays?		B 20-40%	3	43%
		C 40-60%	1	14%
		D 60-80%	1	14%
Respondents:	7	E 80-100%	1	14%
6. Which part of the academic staff does have		A 0-20%	1	14%
access to the Internet?		B 20-40%		
		C 40-60%		
		D 60-80%	2	29%
Respondents:	7	E 80-100%	4	57%
7. which part of the academic staff has the		A 0-20%	1	14%
availability of a personal computer?		B 20-40%	1	14%
		C 40-60%	1	14%
		D 60-80%	3	43%
Respondents:	7	E 80-100%	1	14%
8.Which part of the academic staff does have		A 0-20%	1	17%
access to the articles in eSAP?		B 20-40%		
		C 40-60%	2	33%
		D 60-80%		
Respondents:	6	E 80-100%	3	50%
9. Which part of the academic staff was introduced		A 0-20%	3	43%
to the eSAP system?		B 20-40%		
		C 40-60%	1	14%
		D 60-80%	2	29%
Respondents:	7	E 80-100%	1	14%

10. Do you think that the eSAP system contributes		A Yes, more academic output is	2	29%
to the academic output in general?		B ⁱ Yeesç Belt only little extra academic	5	710/2
		C Not applicable	J	7170
		D No, the system does not contribute to the academic output at all		
Respondents:	7	E No, the system does even discourage academics to produce academic output		
11. Do you think that meetings with other		A Yes, much contribution	6	86%
participants about the eSAP project did contribute to usefulness of the system?		B Yes, but only little contribution C Not applicable	1	14%
Respondents:	7	D No, the meetings did not contribute to the system.		
12. Does academic staff expect to receive something in return when they provide their		A Yes, they expect a payment for their work	2	29%
articles for publication in the eSAP system?		B Yes, they expect recognition and credits for their work	5	71%
		C No, they don't have any expectations D No, they believe that publication in eSAP is a big opportunity to show their work		
Respondents:	7	E No, they expect that they will have to do something in return.		
13. Do you think that the eSAP project team at your university has enough authority to introduce		A Yes, the project team has enough authority.	3	50%
the system in the whole university?		B Yes, but more authority will be OPRO, the project team does not have enough authority	1	17%
Respondents:	6	D No, the project team totally lacks authority.	2	33%
14. Do you think that the current eSAP project team has enough manpower to fulfill this task?		A Yes, the project team has enough skills and manpower		
		B Yes, there is enough manpower, but skills could be improved	4	80%
		C No, the project team could need some extra members		
Respondents:		D No, the project team does need much more skills and manpower	1	20%
15. Do you think that academic staff will start using the system when more work is done to promote the system?	I	A Yes, they will certainly use the system. B Yes, they will probably use eSAP sometimes, but look into other resources more often.	5	83% 17%
		C No, they will probably still not use the system, but at least try to take a look at it.	-	
Respondents:	6	D No, they will probably not use it at all.		
16. Do you think that workshops are needed to create more awareness among the academic staff about electronic publications		A Yes, this would help a lot B Yes, but this will not change the attitudes	6	86%
		C No, academic staff will not attend	1	1/10/-
Respondents:	7	D No, academic staff will only attend if they get something extra in return	Ţ	1 7 70

17. Do you think that internal or external trainers		A Internal trainers		
are needed to provide these workshops?		B Doesn't matter	5	71%
Respondents:	7	C External trainers	2	29%
18. Do you think that the eSAP management team		A Yes, I have enough influence	2	33%
does involve you enough in decisions made about		B Yes, but although I'm involved, I don't		
the system?		have enough influence	3	50%
		C No, they don't give me any influence at all		
Respondents:	6	D No, they don't involve me at all	1	17%
19. Do you think that the creation of an eSAP		A Yes, I think that other systems are		
foundation can be useful to provide the university		needed and can be very helpful	6	100%
student administration and e-learning modules?		B Yes, Other systems can be helpful, but might not be not necessary		
		C No, we don't need other systems		
Respondents:	6	D No, we don't want other systems from the eSAP foundation		
20. In general, how is your contact with the eSAP		A Lot of contact	1	20%
project management?		B Enough contact	1	20%
		C Neutral	2	40%
		D Little contact	1	20%
Respondents:	5	E No contact		
21. Which quality check is done before a		A Review through review board of	2	40%
publication will be published in eSAP?		的我她能 through review board of	1	20%
		这嘅eəlew by colleague only	2	40%
Respondents:	5	D No review at all		
22. Which quality check is done before a		A Review through review board of	1	20%
publication will be published elsewhere?		函\$#她ew through review board of	4	80%
		这嘅程制 &w by colleague only		
Respondents:	5	D No review at all		
23. Is academic output important for academic		A Yes, for promotion	1	14%
staff? (multiple answers possible)		B Yes, for recognition		
		C Yes, for enrichment of lectures	5	71%
		D No, there is no specific reason to		
		publish articles	1	14%
Respondents:	7	E No, it is only time consuming		
24. Which type of documents would you like to publish in eSAP?		A Only reviewed and published articles in other journals	1	20%
	-	B Only reviewed articles	2	40%
	-	C Academic publications from staff and		
		thesis from students	1	20%
Respondents:	5	D Any document related to the university	1	20%
25. Which way of security would you prefer?		A Full security, each document restricted		
		to members only	3	50%
		B Security related to membership of journals	2	33%
		C Open for the university only and memberships for others	1	17%
Respondents:	6	D Open for everyone		_, ,0

26. Was the training provided in the start of the project helpful in achieving enough skills to be able to maintain the eSAP system?	•	A Yes, the training was helpful even to achieve more goals then my work in the eSAP project		
		B Yes, the training was helpful to be able to manage the eSAP system	1	17%
		C Not applicable	2	33%
		C No, I did not achieve more skills through the training		
Respondents:	6	D No, the training was useless	3	50%
27. Do you think that the outplacement of the FIOs was necessary?		A Yes, they did not have any function in the project	5	36%
		B Yes, their function did not deliver much extra for the project	6	43%
		C Yes and No, the FIOs are not very important, but useful for publication collection	3	21%
		D No, The FIOs are important to collect publications and provide information		
Respondents:	14	E No, The FIOs are very important for both training and collection of		
28. How many publications did the VLO receive		p gblications	1,83	
from academics for publication in eSAP during the		2002	1	
last inree years?	8,33	2003	5,5	
29. How many publications were published by		2001	5,6	
academic staff during the last three years		2002	4,8	
Votal.	24,2	2003	13,8	
Structural improvement of awareness		2001	0,27	
		2004	0,73	
Active in publishing		2001	0,19	
		2004	0,44	

D. Telecentre Components

Photocopier:

Currently some of the institutes have their own photocopier, but this could be shared equipment as well, so all the institutes and the public can use it. A decision has to be made whether such a shared photocopier is required or not.

Personal computers:

There are currently several computers in the hospital, nursing school and the girls' secondary school, but there are not many people who have the skills to use them in their full capacity. The Girls' secondary school was recently provided with computers, but without side equipment. The personal computers could be gathered in the TC, or the institutes could apply together for more computers from an organisation such as COSTECH or Vi@frica. As mentioned before in the profile of the secondary school, their computers will be used in a separate computer room, however trainers from the TC could give courses in this separate room as well.

Printers/ scanners:

There are some printers available at the moment, however not available to public. It is therefore important to have one high quality network printer in the TC as well. Scanners can be used to copy existing documents, so they can be duplicated and edited. On the moment there are no scanners in the village.

Telephony / fax:

The centre could be a good spot for a public telephone, however since the village lacks telephone lines, this is currently not possible. In the future, when TTCL or other providers with different solutions are able to connect the village, the TC would be a good place to install public telephones. Fax will only be possible when telephone lines are there.

Books:

Separate from a computer room, a library could be equipped with chests and books on several subjects. This would also be a good place for public use and access to reading and education material.

Computer training:

This would be the most important function of the TC in the near future. Since many of the employees of the institutes could use basic computer skills to develop their education programs and materials more efficiently.

Information services:

Access to regional and national data banks will provide the employees of the institutes as well as the students and public with a lot of information that can be used for their personal development and improvement of their skills. Although these information services will have to be updated by use of CD ROMs, instead of Internet based databases, they will still provide large amounts of information and are more easily brows able then books. There are many CD ROMs available with whole databases and books.

Internet access:

Internet access is a common facility despite of many technical and financial problems

E. Internet solutions

As mentioned before, Internet bandwidth in Tanzania is low. At the end of 2003, only 200.000 computer users and slightly more Internet users are found in the country. Most of the facilities can be found in the Economic and Touristic centres: Dar-es-Salaam and Arusha. In Dar-es-Salaam, there are two organisations with a 2 Mbit backbone, this are COSTECH and UDSM. They both use this bandwidth for their own organisation but also provide part of it to other business. So in general the bandwidth provided to one individual is much lower. Currently it is possible two have a 8 Mbit connection at home in Holland for as little as \$ 60,- per month. These connections are 4 times as fast as the connection of the entire UDSM, while they pay \$ 10.000,- for this connection.

Internet in the Mwanza region is far less reliable, there are only few providers, bandwidth is low in the whole region. The st. Augustine university is located out of the centre of the city and therefore it has more difficulties with connections. However, if they invest more in other Internet solutions, they could even be a hub for villages in the direct environment, like Sumve. There are several possibilities for the creation of an Internet connection, an overview of possible solutions can be found in [DYMO, page 35]. Below some suitable solutions are discussed.

Very small aperture terminal (VSAT)

Satellite systems have traditionally been very expensive, but satellite capacity and power has increased substantially during the 90s. VSAT systems are in use for rural telephony and hybrid VSAT/wireless networks are being deployed in scattered rural communities distant from the Public Switched Telephone Network (PSTN). No VSAT system supplier has achieved any significant deployment yet of VSAT integrated with WLL. Installation cost are \$2,000-\$4,000 for small installations. Although this sounds very promising, bandwidth in Tanzania is still to expensive and costs will be over \$400 monthly to have a reliable connection. As example of these high monthly fees can be found in the table below.

Installation	\$1.495,00	\$1.495,00	\$1.495,00	\$1.495,00
Transport	\$595,00	\$595,00	\$595,00	\$595,00
	\$295,00	\$295,00	\$295,00	\$295,00
	\$477,00	\$477,00	\$477,00	\$477,00
Total	\$2.862,00	\$2.862,00	\$2.862,00	\$2.862,00
Monthly charge	\$225,00	\$395,00	\$750,00	\$1.250,00
Datalimit	1 Gbyte	3 Gbyte	6 Gbyte	12 Gbyte
Badwidth	64 kbps	150 kbps	200 kbps	300 kbps

Table 11 Internet Connection Prices Radio Node

Wireless Local Loop (WLL)

WLL is a radio system used for voice and data services in urban and peri-urban areas. WLL is useful where wire-based networks would be too expensive or time consuming to deploy. WLL systems are used in rural areas where subscriber numbers and density per location are low and installing wire-based local loops is not cost effective. Average cost of WLL installation are \$1,000-\$1,500, but highly dependent upon population density, terrain, and availability of power. WLL systems can extend typically up to 35kms and can be moved or enhanced according to the location and amount of market demand.

Point to multipoint radio (PMP)

Point to Multipoint radio is a distributed wireless network infrastructure used to connect numerous scattered settlements to the PSTN. Because of the high costs, subscriber density at each remote station should ideally be fairly high. Average cost can be \$2,000-\$5,000. The

main strengths of PMP systems are: ability to connect settlements over long distances from the PSTN; and cost effectiveness in mountainous terrain. PMP systems have a long range; using repeaters some systems can connect settlements hundreds of kilometres from the PSTN. The system utilises network central stations, each of which typically connects to remote sites located in villages. Subscriber equipment in villages is connected to the remote via a wire drop between the terminal and subscriber radio equipment Some vendors can also provide wireless local loop sub-systems with a range up to 50kms, eliminating the need for drop wire at the customer premises.

Solutions for Mwanza region

The PMP network as described above could be used for the connection of the campuses of the st. Augustine university as well as the Sumve community. When the university would act as ISP, a PMP network could be established to connect Sumve as well. During the case studies some of these solutions were discussed, but until now, no concrete plan was established.





Illustration 16 SAUT network

Illustration 15 Kwimba district