

Haga, Ulrikke B.

Conditions for health information systems in
South Africa – Small-scale initiatives to
promote development from within

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Foreword

This thesis makes up the main part of my studies towards a cand.scient. degree at the Department of Informatics at the University of Oslo.

I would like to thank everyone who have helped and supported me during the work. My field work could never have been performed without the goodwill shown me by the HISP team members, and the thesis would never have seen the light of day if it wasn't for the amount of help and understanding surrounding me during the writing of the thesis.

Ulrikke B. Haga, Oslo, August 2001

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Chapter 1

Introduction

The main topics in this thesis are information and communication technology (ICT; used interchangeably with IT) and development, and health information systems development in South Africa. The thesis is based on field work in South Africa, primarily performed during three months of 1999.

Who can read this thesis?

Little background knowledge on the themes of this thesis is required. The most central concepts of information systems and systems development are explained to ensure readability to the people who provided me with help and support during my field work. This is also the main reason why I have chosen to write it in English. (As this is not my first language, errors, typos and americanisms will have to be excused.)

To ensure readability also outside of the studied project's core team, little background knowledge on globalization and health issues, or the South African context, is required.

One copy of the thesis will also be sent to the Norsk Fredskorps, partial funders of my case study. I hope this thesis have value for people currently involved in processes similar to the one described in the thesis.

1.1 Motivation

Many (e.g. [JBraaII], [Castells]) see the possibility to use technology, notably IT, to promote development¹ and empowerment, and reduce world

¹ Development embodies a varied range of economic, demographic, social and political characteristics. The United Nations have proposed a composite measure of economic and social well-being known as the human development index (HDI), based on average per capita purchasing power, literacy and life expectancy, thus concentrating less on economic performance than traditional classification schemes. (For a further



Figure 1.1: The North-South divide [B&E,p.85]

poverty [undp], but there are differences between the first and third world contexts that indicate that a simple transfer of technology is not adequate or sufficient. Braa et al. [JBMR] promote the need for technological *learning* rather than technological transfer, denying the possibility to simply import technology to leapfrog from one stage of development to another. The lack of resources also makes it important not to reproduce the failures seen both in the first and the third worlds.

The health sector is described e.g. by Braa et al. [JBMR] as a suitable sector within which countries or societies can learn about IT and how to deploy it, where experiences relevant to the local setting can be made. One central characteristic of developing countries is the experienced health problems of the majority of the population and the generally low level of public expenditure on health [B&E]. “[M]any would argue that a healthy population is not only a goal of development but also a prerequisite” [B&E,p.188].

South Africa is currently restructuring its health sector according to a description and discussion, see e.g. [undp] or [B&E].) Third world countries are those considered less developed than the First and the Second world. South Africa is often excluded from this list, although large parts of the country without doubt deserve this label. (Cf. fig.p.2. Remark also how the line drawn between North and South falls together with differences shown according to the HDI, p. 19.)

All characteristics and definitions of development are based on some sort of value judgement, which I am reluctant to take part in. ‘Development’ is used in this thesis to label the process towards more equality within and between countries.

comprehensive primary health care (PHC) approach, and the associated information system (IS) have to be restructured to reflect and support the changes in the health system - or even initiate them. As the health status of a population relies on all aspects of life, health information is "relevant for all sorts of planning" [Boerma, p.1]. Many (e.g. Sandiford et al.[SAC], [Opit], [Boerma]) consider timely and correct health information as central to improved PHC delivery, more specifically through local use of (local) information [JBHS].

South Africa belongs to both the first and the third world. This duality provides both possibilities and constraints: the previous governments haven't paid much attention to the third world parts of the country [JB&Hey], and the rural areas have been particularly neglected [NHP]. Now, the democratically elected government may need to draw on experiences made in other African countries because of the lack of own experiences. The first world parts may be used both as nodes from which to spread development, and to "link up" with the industrialized world [Castells] and the global economy [undp]. Experiences made in both settings combined can be important in developing district based health information systems.

My focus will be on the third world aspects and context, where problems with development and health service delivery are accentuated and where the need for improvement in health status and health service delivery is much greater. There is a general low level of expenditure in public health in developing countries [B&E], and very little research and development is aimed at the public sector or the world's poorer countries [undp].

In systems development, the importance of the context of a given information system (IS) is increasingly gaining focus. The lack of context sensitivity is often seen when an IS does not support the actual work tasks that it was meant to support [KBraa, G&K]. Walsham et al. [WSW88] argue that looking at information systems as social systems provide a useful framework for both development, and assessment and evaluation of information systems.

In developing countries, contextual constraints are more pronounced, and it is even more important to pay attention to them. According e.g. to Walsham [W98], the use of so-called bottom-up approaches will result in far more appropriate ISs, both when it comes to management and use. The failure of many IS projects in developing countries is, according to him, due to a lack of context sensitivity and local knowledge. Experiences made under these "third world" constraints may also feed back into first world systems development ... "[i]t is worth trying at least" [W98, p.396].

Bottom-up

During both my field work and my literature study, I have discovered that a great deal of confusion exists regarding the term 'bottom-up' (one critique claim that many are "confusing bottom-up community action with top-down efforts to stimulate it" (Illsley in [Opit], p.427)).

To try to explain the use of this term (primarily in the context of systems development, but also in a more general development context [B&E]) during this thesis, I start out with presenting the opposite approach: typical 'top-down' approaches include the initiation, decision and design uniquely taking place in the higher levels of organisation with no regard to what goes on at the lower levels, where the system will be put into use. Needs, work practices, social relations; the reality, of the lower levels are ignored [W98].

I use 'bottom-up' to label most approaches that, to some extent, pay attention to these lower levels, the future users and uses. This can be achieved through a range of different more specific methods, common for them is the inclusion or involvement in one way or the other of the grassroots levels. (Some more discussion and specific methods are described in chapters 4 and 3.3.)

The line between the two approaches is difficult to draw, i.e. to what extent users will have to be involved for it to be labeled a 'bottom-up' approach. The degree of 'appropriate' user participation may also vary from situation to situation. A central point, though, in systems development, is that the resulting system must be used for the information in the system to be reliable and usable; the user must *want* to use the system.

1.2 The study

The goal of this study has been to gain greater knowledge and understanding of development and information technology, and on information systems development. Information have been collected through literature studies, and a case study have been performed to highlight and gain a better understanding of these two main themes.

1.2.1 The case study subject

During my case study, I have been looking at a project aiming at developing an information system (IS) for the South African health sector; the Health Information Systems Program (HISP) project. Since 1996, this project have gone from identifying an informational chaos in three pilot districts outside of Cape Town via design, development and implement-

ation of an IS in all provinces and districts of South Africa, to initiating similar efforts in countries like Mozambique and India.

Most work undertaken by HISP is performed according to the principles of participatory, bottom-up approaches, and the vision is not only to set up a district based health information system, but to use this IS to support the planned restructuring of the South African public health sector. An evolutionary prototyping approach is adopted both in the development and the dissemination of the information system.

1.2.2 Problem areas

The main theme of this thesis is to study the conditions for health information systems in South Africa. This has been done through the identification of constraints to systems development and how these constraints can be overcome. I have also, to some extent, tried to identify differences between the first and the third world contexts.

My primary research question is whether the choice of methods and approaches during design and development really can affect the resulting IS to such a degree that the use of communicative, evolutionary, participatory, bottom-up approaches (which, in the short run, often are more costly and time demanding than traditional methods) can be legitimated.

- **What are the conditions for systems development in the public health sector in South Africa?**

How can these constraints be overcome?

How important is the process for the result?

How important is it to involve the users?

My hypothesis is that the use of bottom-up approaches supporting local, small-scale initiatives can create favourable conditions for sustainable development.

Adjacent to these questions is the question whether it is possible to draw any general conclusions at all and to come up with some answers.

My conclusions are drawn on the basis of the examples from my case study. Whether or not the generalizations I have made are valid, is a central question, and I have tried not to be too categorical in my conclusions. There is an imminent danger that the results seen in South Africa are not reproducible and not generalizable.

Questions that I will not try to answer exhaustively, but that are important to bear in mind are: Are the so far promising results seen in South Africa merely caused by the work of a handful of workaholic idealists? Is the situation in South Africa too unique to transfer the experiences to other parts of the world? Is it possible to generalize sufficiently to use the results as 'proof'?

1.2.3 The contents of this thesis

I will, in this thesis, try to identify contextual constraints met in South Africa and their effects on the development, dissemination and use of the information system in question. I will also present some of the approaches used to overcome these constraints, and of preliminary results of these efforts. I will try to assess whether the experienced problems are met only in developing world or if they are equally present in developed countries. The answer to this question also affect the transferrability of the 'solutions' to other settings.

Most literature and information about the third world and on systems development in developing countries focus on negative aspects and failures. Although it is always much easier to see failures and to criticize than to be constructive or to recognize where things are actually working smoothly, I have made an effort in this thesis to focus on positive aspects and promising trends.

What you will *not* be reading about

Information systems in general, and health information systems in particular, are highly social systems with strongly expressed human and sociological aspects. [Boerma] describe them as bringing together "experiences of medical and social sciences" (p.v). I claim that a broader understanding of the contextual factors are necessary to make sure that the information system cover the needs of the different user groups. The social systems perspective lead to a realization that, in the interplay between the organizational, human and technical parts, information systems are continuously and dynamically changing. A complete study would be highly interdisciplinary, including e.g. sociologists and anthropologists, just to mention some.

This openness is exactly what I find so interesting with information systems, but at the same time, it is what has made it such a painstaking experience to limit the study to anything less than the totality - which is far outside of the scope of this thesis and the case study on which it is based.

I have also chosen not to focus specifically on computers in this thesis. One central reason has been that in a third world setting, infrastructural and technical constraints deprive a lot of places the possibility to implement the computerized parts of the system. It is also true that I found the more social and human aspects more interesting, intriguing and challenging to study than the more technical aspects. There are those (e.g. [Opit], [WSW88]) who warn about the too narrowly technical view on information systems. The more technical aspects clearly

is an additional area in need of further investigation, equally reopening towards other disciplines, and thus equally far outside the scope of this thesis.

Another issue which do not receive any special attention in this thesis is differences that may exist between designing a new information system and redesigning or transform an existing one.

Health related issues, various views on ways to improve health status and health service provision are also areas that are mostly neglected in this thesis.

I perceive my background in the humanities and social studies to legitimate my choice to focus on more social and human aspects of the information system at hand, and the development and dissemination process. The delineation has been very difficult, and can regrettably be unclear at several places in this thesis, a flaw that I have obviously been unable to avoid.

Macrolevel generalizations from microlevel experience?

Despite my efforts to narrow down the focus of this thesis, it treats both macro level and micro level issues. The findings of my case study consist primarily of micro level examples, which I to a certain extent try to generalize to a higher level. An inherent problem with case studies is the richness of the descriptions obtained and the inability to generalize based on these descriptions (e.g. [Bada]).

One of the goals of this thesis has been to generalize experiences made at facility or district level to be valid at a national level, and to generalize these South African examples even further to be valid not only to all developing countries, but equally to a certain extent at a global level. Whether these shifts in level are valid, will be up to the reader to judge.

1.3 The case

I spent three months in 1999 (and three weeks in 2000 as a short follow-up) in South Africa looking at various aspects of the implementation of the health district and information system setup performed by the HISP (Health Information Systems Program) project. Because of their pilot approach, I was able to look at different phases of the implementation during a relatively short period of time, ranging from provinces and district recently included and thus still in the start-up phase, to the districts that were among the initial pilot districts participating since 1996.

The basic design and development of the information system was already in place when I arrived, but the underlying philosophies of a

participatory bottom-up approach are still present, and the continuous evolution of the system is also following the same approaches.

Adopting qualitative methods, I focused mainly on gaining a holistic understanding of the contexts and actual use. Rather than interviewing users, I have tried to obtain an understanding of their attitudes towards the system, and rather than asking directly their views, I have participated and sat in on meetings, training sessions etc. to observe the process and actual use of the system: I have tried to grasp what they do rather than what they perceive the right answer to questions asked.

I regard this holistic approach and context focus as essential to understanding the future potential of the information system. The sustainability of the system rely heavily on whether or not the system meets the needs of the users and the degree of 'ownership' felt towards the system to ensure system acceptance and use: only a system that is used can provide usable information.

According to the focus on context and actual use as key issues, these will also be the central issues of this thesis, both in the introductory chapters and during the presentation of my findings.

My findings, my assessments and my conclusions are all based on the situation as it was in 1999.

1.4 Content of the chapters

In this introductory chapter, problem areas and research questions have been presented as well as the frames of my case study, along with motivation and some explanations.

The subsequent three chapters will provide the readers with what I consider sufficient background knowledge:

Chapter 2 short presentation of methods and the formal framework of my case study

Chapter 3 a more thorough presentation of my motivation, description of and what I perceive to be important background knowledge on development, globalization, some health issues and health information, South Africa, the South African health sector and its information system.

Chapter 4 a presentation of the traditional theoretical framework of information systems development, the move towards new approaches, and the theories' relevance to a third world context.

Chapter 5 various aspects of the HISP project, the subject of my case study, are described.

Chapters 6 & 7 the presentation of the main bulk of my findings is split on two chapters.

Chapters 6 an overview of the situation at the various geographical locations studied

Chapters 7 a more thematical presentation according to the problem areas presented and questions asked during this introduction.

My findings are presented mainly as examples. Some of them I use to highlight problems which might be valid also for other similar settings (in other developing countries, and to a certain extent in a Western world setting). Some exemplify more general information systems or health information systems related issues, while still some are examples of actual problems met in South Africa and that the HISP project are faced with during the implementation of a district health information system.

Chapter 8 an assessment of the degree of achievement towards the main goals set by the South African government in the National Health Plan, and those expressed by HISP.

Chapter 9 some discussion and conclusions, where the findings are set up against the research questions expressed in this chapter.

Appendix A A guide to the themes studied and questions asked during my field work in South Africa

Due to the resource situation in South Africa, I did not have easy access to a computer during my field work period. This is the main reason why my field notes were never transferred to computer files and hence why e.g. interview transcripts are not included as appendixes. This also means that only data judged "relevant" during the write-up of this thesis is included.

Appendix B A short list of the major elements of my field work.

Appendix C I have included a list of the most commonly used abbreviations and acronyms used in this thesis.

Chapter 2

Methods

Most of the theoretical presentation in this section is built on Easterby-Smith et al.'s [E-S] presentation in their book. The theories presented are well-known, though, and most presentations of methods and methodology incorporate the same issues and arguments (although the names might differ).

2.1 Quantitative and qualitative methods

Most literature on methodology distinguish between quantitative and qualitative methods, where the extremes are described while, in practice, aspects from both used together is the most common approach. Quantitative methods are used to study external, quantifiable factors, while qualitative methods are deployed to look at meanings and intentions.

Quantitative studies will typically involve questionnaires with closed questions, yes or no, or a set of pre-coded answers, which are accordingly easily quantifiable, comparable and manipulated to provide "objective" results.

Qualitative studies, on the other hand, are more open, and qualitative interviews can resemble conversations. The answers are thus far richer and more subjective, and not easily comparable. The subjectivity of qualitative methods also includes the subjectivity of the researcher apropos assumptions, meanings and prejudices which will influence both the interview and the following analysis and interpretation of the results. The results are often far more difficult to analyse, generalize and draw conclusions from as the answers usually contain very rich information. Qualitative methods are described by van Maanen [VM] as

"an array of interpretive techniques which seek to describe, decode, translate and otherwise come to terms with the meaning, not the frequency, of certain more or less naturally occurring phenomena in the social world." (p.9)

Drawbacks and advantages

There are several difficulties involved with the use of questionnaires even when the study subject is appropriate. [Boerma] mention that the results can be misleading if “wrong, inappropriate or incomplete categories are used” (p.55), and also draw in the number of questions, and cultural factors. This latter is a problem mentioned also by Bowker and Star [B&S].

The use of questionnaires hinder the adjustment of the focus under way as it would render the previous results impossible to compare with the new ones. Interviews can be performed with a varying degree of openness: if unforeseen interesting issues should come up during the course of an interview or a study, further investigation may be undertaken without any other effect than deepening the understanding and further enriching the picture.

In both approaches, a central question is whether to perform a broad comprehensive study of a few issues where a lot of people are asked a few questions, or a deeper, more thorough research involving fewer people providing more information each.

2.1.1 My choice of methods

According to the various social aspects related to the problem areas in this thesis, qualitative methods have been applied during the research and field work. The social systems paradigm [WSW88] and the focus on contextual issues, ownership and use situations are what can be seen as such “phenomena in the social world”. For some aspects, though, more qualitative methods could have been applied e.g. to “count” amount and degree of use through data entered in the database, to measure degree of user satisfaction on a scale from one to ten etc., and the results could have been seen together with trends or indication found during more quantitative studies. This has been left out due to limitations both in time and scope. In addition, I have made (qualitative) use of other researchers’ quantitative studies in the same areas where such material has been present.

2.2 My sources of information

The information in this thesis is collected either during my case study or during literature studies prior to, during and after the case study period. The case study information provide the primary sources of information, while the literature studied are treated as secondary sources.

2.2.1 Field work methods: understanding through immersion

My field work was performed as a case study during three months of 1999. Contrary to case studies performed on themes e.g. in organisations located in Norway, there have been few possibilities for me to collect other than secondary information when the field work period came to an end. A short three-weeks' follow-up during May-June 2000 provided some filling in of the picture.

Observations

The 'case study information' have mostly been obtained through purely qualitative methods, mostly observations and participation - in meetings, training sessions and daily and routine use of information and the information system. Informal talks and discussions have also played a central role. The main bulk of informants have been facility and district staff involved in information handling, and HISP team members and facilitators.

Almost without exception, all meetings, training sessions, site visits etc. have been accompanied by such informal talks. For instance, most of the time spent in the townships of Cape Town was spent together with a HISP facilitator, and traveling to other provinces was not done alone. In addition, I stayed together with another student studying the same project, and many unclear issues were discussed and sorted out 'at home'.

Interviews

I have also conducted a handful of semi-formal interviews. These interviews have mostly been conducted with some help of interview guides (overall guide presented in appendix A). Revolving around the central themes of the study, these guides have acted like check-lists on what information I have been looking for according to the current or previous roles of the interviewed. No two interviews can thus be set up against each other to quantify the answers in any way.

Written but informal

I equally consider the informal written sources of information encountered, read and studied during my field work to be primary information sources. These include e.g. e-mails (for instance on-going discussions, and also information obtained from more private e-mails), meeting minutes and agendas, training course material, and equally reports at stages from draft to final.

What can be seen as a lack of formality also provided me with the opportunity to adjust focus underway according to preliminary findings, to setting and who I have been talking to, and to the given context at the various places. The main theme, i.e. the identification of constraints and approaches, and of use situations and patterns, have remained relatively stable throughout the case study.

I have made an effort to look at the same thematic issues all places, although the angle has differed considerably, both with regard to level (ranging from provincial to a personal level) and time aspect (retrospectively, present situation or hopes for the future). Both for my own preparatory work and in order to provide the reader with some 'historic' insight, much of the information obtained is of retrospective character, while the main focus of my findings is the present day situation as it was in 1999.

2.2.2 Secondary sources of information

Rather extensive literature studies have been undertaken during this study. These secondary sources of information have been crucial to my understanding both of the case study context and the more general themes of this thesis. Required background knowledge, to me and to the readers, are to a large extent obtained from articles and books.

The formality of these sources vary slightly as a large amount of articles have been used in addition to some books. This is somewhat due to some of the themes of the thesis: health information and systems development in the third world. These are areas that recently have received more focus, and many of the writings originating in the third world have been found in the form of articles.

The origin of the sources equally vary somewhat as many academic fields meet in development and information systems, ranging from papers on health issues and on organizational change through conference proceedings on the impact of information systems in developing countries to curriculum books and articles both from informatics and geography. I find that this variation have provided me with different views and angles to the subject matter.

Most literature not directly referenced, e.g. South African Health Reviews, various IFIP articles (e.g. [IFIP2000]) and purely health or district setup related articles are left out of the bibliography, although they have provided me with valuable background knowledge of the themes of this thesis and a more general understanding of the context.

2.2.3 Reproducibility

In theory, my study and my findings are reproduceable. In practice, this is probably not the case. First of all: the world moves on, and information systems and organisations are social and dynamic entities which constantly change. There are also purists that claim that no study is ever exactly reproduceable because the studied phenomenon is always affected by the study itself. I am convinced that my presence have influenced the interviewed or other participants where I have been an observer, so that someone else performing the exact same study would probably receive at least slightly differing answers.

2.2.4 Reliability and validity

My lack of experience with case studies in general and with the contexts of South Africa and the health sector more particularly means that there is a risk of studying phenomena that are not relevant and missing important ones. The openness of my themes and interview/observation guide have hopefully removed the obvious risk of getting answers to other questions than the ones studied. This is one of the advantages with open, qualitative interviews as opposed to closed, quantitative questionnaires. I was able to adjust this guide (and focus) underway according to what was perceived relevant. This is what is often referred to as an exploratory approach.

During the short period of three months and in a difficult (and to me unknown) context, I had to go for all possibilities and openings I got. The selection of interviewees and places to observe have therefore not been scientific, they can rather be characterized as “who I met under way”. Hopefully, this selection ‘by chance’ means that it has not been overly colored by my (or others’) meanings or assumptions. I have seldom contested the sincerity of these people, although contesting views have been met. Meetings, training sessions etc attended have mostly been picked on the basis of my co-location in time and space.

The limited time period of my field work clearly affected the possibility for planning, which was perceived a serious drawback e.g. during my stay in Kwa-Zulu Natal Province. I offered to help the Durban district with whatever they needed help for, several suggestions were given, but it turned out that they were not able to accept any of these offers on such short notice.

During talks, discussion and interviews, and equally during observations, there is always a danger of misunderstandings and misinterpretations due to communicational issues (treated somewhat in chapter 4) and assumptions about the situation or respondents. My links to the HISP project may also have influenced the behavior seen and answers

given.

Context knowledge

Not only in systems development, but also in the assessment and evaluation of information systems, context knowledge and sensitivity are crucial. Prior to my field work, I tried to learn as much as possible about the reality I was about to face, and this knowledge grew noticeably during my stay.

In addition to the cultural barriers, which are somewhat abstract and difficult to comply to, the one barrier that I was not able to overcome, was the language barrier. Of the eleven official languages of South Africa, I cannot claim to know but one: English. This means that during training sessions, meetings, discussions etc held e.g. in Xhosa or Afrikaans, I was not able to follow other than the issues that were translated to me, no matter how well I knew the subject matter. Luckily, this didn't happen more than a few times, but these incidents made me painfully aware of this problem. (This obviously introduced another source of misunderstandings and misinterpretations, and a general lack of information and information richness from these few sessions.)

Apart from the limited period of time dedicated to field work, I consider that the nature of the case and the themes legitimated my choice of methods. Studying social systems and human behavior would have been difficult through rational, formal methods. The richness of the results obtained could not have been obtained otherwise.

Chapter 3

Development, globalization, IT, health and South Africa



There are several theories trying to explain differences in development and how to decrease the existing differences. The globalization of economies, the widespread use of information technology and the increasing networking of economies and societies have lead to new forms of interaction, and new theories on development.

Several (e.g. [undp], [Castells], [JBraaII]) claim that information technology (IT) is a technology which, properly deployed, can counteract the tendencies of increasing differences in development between countries. Braa et al [JBMR] stress the need for countries to *learn* the new technology rather than relying on a simple technological transfer, and point

out the health sector as a suitable context within which to learn about IT.

Both Braa and Heywood [B&Hey] and [Castells] point to South Africa as a possible node from which development can propagate in Africa, the former two reminding us that South Africa also need to learn from its neighbors. The [undp] equally talk about the need for South-South collaboration.

In South Africa, efforts are renewed and redirected following the fall of Apartheid and elections of the Government of National Unity. Paraphrasing the general (United Nations; UN) principle of 'welfare for all' [B&E], the new governments have chosen to restructure the entire public health sector according to the vision of 'right to health for all' [NHP]. The health information system, an integral part of the health system, equally needs restructuring.

3.1 Development in the Network Age

Development is a vague term, which I will not try to define comprehensively. An effort to clarify is made in the footnote on p. 1; based on [B&E] and [undp]. Because of the current globalization (see next section), both causes and effects are manifested differently now than just a few decades ago, and new approaches may need more attention when – and if – the inequalities in the world are to be lessened. There is growing agreement among scholars that the development process should be based locally through support of 'small-scale' development and small enterprises, i.e. bottom-up, instead of top-down implementation of ground schemes. Training, human resource development, skills enhancement: several names for an important part of bottom-up approaches.

3.1.1 Development theories

There are two main schools of development theories ('modernisation theory' and 'dependence theory'), in addition to two more recent approaches ('alternative development' and 'basic needs'). This short overview is based on Sylvia Chant's presentation [B&E].

The '**modernisation**' theory emerged in the optimistic 50s and 60s and proclaimed that the third world would need a social change (from 'traditional' to 'modern' values) to follow the same model of development as the West had followed a century or two earlier. The exposure to technologies and ideas would lead to an 'imitation' of the Western development process. Inequality was seen as a short term phenomenon: development would 'trickle down' from the centre (the cities) to the 'backwards' rural peripheries. The approach has been criticized, e.g. for its

view on values, and the central role of attitudes in development, excluding external factors.

The **'dependency theory'** from the late 60s and early 70s view all exposure of developing countries to the West as damaging: the West is developed just *because* of the underdevelopment of the third world, and the places with the closest historical links are the ones currently in the worst situation. The West and the local urban elites restrict these countries' development potential. A major problem with this theory, apart from the fact that the closest links has not always led to the worst situations, is that it offers few realistic political measures.

During the 1970s, and as a reaction to the previous theories, the two approaches of **'alternative development'** and **'basic needs'** emerged. They do not attempt to explain the contemporary patterns, but how to redress the existing inequalities. The 'alternative development' approach promote small-scale self-sufficiency; equitable development through deployment of indigenous techniques and organisation. The primary goal of development should be, urges the 'basic needs' approach, the eradication of poverty and the fulfillment of basic needs (compared to traditional development goals of economic growth, which has proven to benefit only the few). Both approaches argue for development as a bottom-up process building on economic and social traditions of the people of the third world and sensitive to their needs. Equally adopted by the United Nations during the 70s and the 80s, "development" has become a broader concept sensitive to local needs.

3.1.2 Technology to promote development?

Writers like Braa et al. [JBMR], [Castells] and [undp] present technological development as a key factor to explain differences in economic development between countries, information technology (IT) being particularly important. The increasing globalization and rapid spread of new technological advances has led to a deepening of the existing North-South gap (see figs. 1.1 and 3.1) and an increasing marginalization of disadvantaged societies.

The inability of sectors, regions and countries to use or produce advanced technological equipment creates a downward spiral where each leap forward in technological change or development increases the marginalization of excluded areas [Castells]. IT, they say, should be exploited to promote development of disadvantaged sectors and regions [undp].

[undp] are among those who claim that IT can be used to promote development in the third world because of this particular technology's potential to overcome social, economical and geographical barriers, increase access to information and education, and enable people to par-

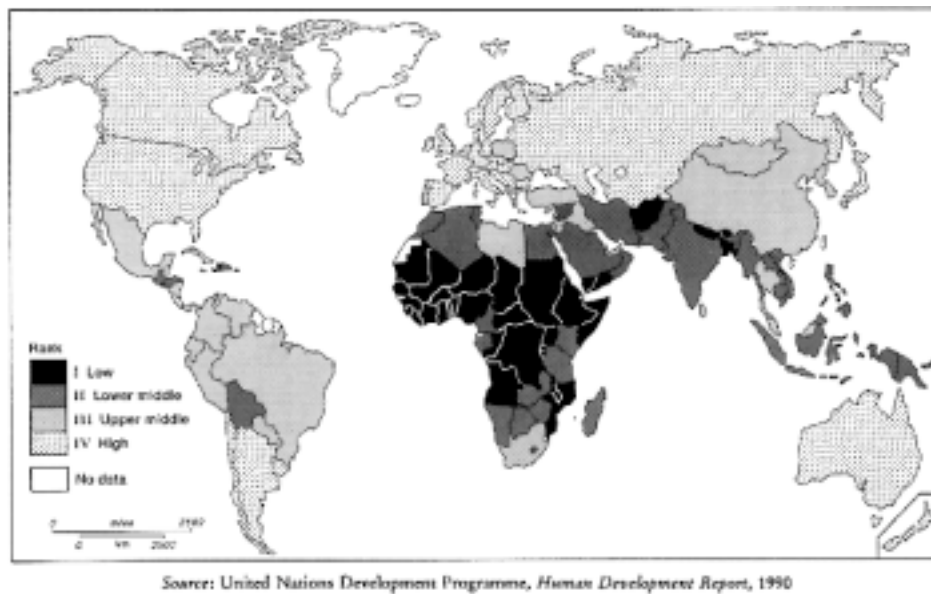


Figure 3.1: Countries ranked according to the Human Development Index [B&E,p.161]

ticipate in more of the decisions that affect their lives [undp]. But the mere transfer of existing technology has proven to be difficult, and there are numerous examples of failures (e.g. [JBraaPhD], [W98]).

There are also those who reject the view that technology leads to development [Akpan] because this view draws attention away from the fact that a majority of the populations in question is without access to basic services like clean water, health services and electricity. She mentions a few basic flaws to the assumption: the language problem (3/4 of the African population being illiterate and a large proportion having a non-English language as maternal tongue), and the fact that most of the developing world has a substantial lack of basic infrastructure taken for granted in the Internet world, like electricity and telephone (3/4 of Africa's population living in rural areas without basic infrastructure).

This is also a worry within international development circles, where it is recognized that the technology 'fad' might distract donors and draw resources away from more traditional development goals [undp]. Both Walsham [W98] and the United Nations Development Programme [undp] argue that the developing countries run a greater risk in addition to the additional benefits they are offered by the new technology.

Still, there are examples of problems that by their mere size require a solution deploying IT, Madon and Sahay [M&S] mentioning the management of so-called megacities in the third world. It is no doubt that

technology affect the environment and the location of economic activity, and the way we do things [B&E,p.242], and much of the criticism might be aimed at *inappropriate* computerization.

3.1.3 Development bottom-up; human resource development

According to Sylvia Chant (in [B&E]), the Western models of economic growth have proven inadequate and have not led to development in the third world. She states that “[i]f ‘development with equity’, along the lines suggested by the advocates of the alternative development and basic needs strategies, is to become a realistic prospect, then major changes in the handling of development planning are called for.” (p.173) It is crucial to take into account that the third world is not a uniform place, and that development processes must recognize particular characteristics and problems of each area – and the needs of the particular social groups within those areas.

Due to the contextual constraints found in developing countries, it is even more important to pay attention to these when developing information systems (IS) than it is in a first world setting [W98], and also e.g. Braa et al [JBMR] and [Opit] suggest the need for technological *learning* rather than technological transfer. It is important, to promote a sustainable development, not to create ‘first world bubbles’ but to adjust the technology to the context. These writers focus on the need for local human resource development. Both draw heavily on theories revolving around information systems as social systems and promote the importance of deploying a bottom-up approach to systems development in a third world context. But learning, and skills enhancement, is important also by itself: both the United Nations [undp], Singer in [Opit] and several of the writers in [B&E] equally stress the importance of human resource development and local capacity building to promote development ‘bottom-up’.

Local or small-scale development

In the context of manufacturing, Bennett claims there is a shift in thinking by managers and governments away from top-down initiatives towards “development ‘from below’” [B&E, p.114], where local needs are addressed. He mentions that the same questions are raised “for a wider bundle of industries”, and I judge his arguments valid in a wider development context as well. “Indeed, the local development game has increasingly replaced, or at least supplemented, national perspectives in the competition for development.” (p.115)

According to Bennett, efforts are made to identify conditions for regional economic success. A key issue is “sufficient technology and in-

formation links to create a 'critical mass' of activity within a local context" [B&E,p.114]. Favorable local development conditions may create a synergy effect, with endogenous development in the area. Local leadership is crucial for the synergy effects to work, and local forces must draw efforts together. In this regard, local education or training initiatives are important. A close local collaboration and co-ordination is necessary to provide local capacity.

This shift from top-down initiatives to development from below can also stimulate regional change. Two cases are given by Bennett and Estall [B&E] on networks of smaller firms acting as engines for growth. It is exactly the small size that makes it manageable, while the links with others provide support when size is needed. They describe such efforts as offering "one of the best means of 'development from below' in the Third World" (p.155). The bottom-up approach of HISP is based on similar assumptions towards development as discussed here but within the area of information systems development.

Agents in the development process: the major role of NGOs

Sylvia Chant (in [B&E]) recognize four major agents in the traditional, institutionalized development process: the national governments, international aid and development agencies, governmental development organisations of the first world, and non-governmental organisations (NGOs). She mention the often major role of NGOs as they're not tied to government policies (and thus stand freer), they are often committed to reach out to the poorest, they are responsive to local needs and initiatives, and are often encouraging and helping communities to help themselves.

Braa and Hedberg [JB&Hed] argue that it is similar aspects that has been important in the creation of the relative success of the HISP project.

3.2 Globalization

The world is experiencing an increasing globalization, defined by Giddens as "the intensification of worldwide social relations that links distant localities in such a way that local developments become a function of events occurring many miles away and vice versa" [cited in Bada p.2]. The effects of this interplay between local and global tendencies are "ranging from the highly deterministic 'homogenisation' thesis of the global institutionalist school to the interactive 'mutual influence' views" [ibid.]. The growing interdependence of national economies lead to a situation where nations become "less fully in control of events that affect their development" [B&E,p.103], these effects depending on the social and political characteristics of each individual country.

The industrialized countries of the world share, to a large extent, a mutual history and have a centuries-long history of interaction and intercommunication [W98]. This makes the differences between these countries smaller than between the West and the rest of the world, and the (comparatively) painless diffusion of ideas and technologies between Western countries may have misled many to believe that globalization is a purely one-way process.

Both [Bada] and Walsham [W98] advocate the view that local actors – in the form of established cultures that display “an enormous stability” [W98] – mediate these global influences. What we are witnessing is thus not a one-way transfer of Western ideas and ideologies, rather an interplay between global and local influences where the local culture provides the ‘glasses’ through which global trends are seen and filtered, adapted and adopted, creating a multitude of variations over the global trends. Also Castells [CastellsI] tends to see the globalization as interactive, global phenomena being adapted to different social environments, all countries having a different capacity to adapt to the global change [B&E].

3.2.1 The Information Technology Revolution

The globalization is driven – at least partly – by what [Castells] refers to as the “Information Technology Revolution”, a technological revolution centered around information. He considers it important “because of its pervasiveness throughout the whole realm of human activity” [CastellsI, p.5]. An central aspect of this revolution is, according to Castells, the linking up of “valuable people and activities [...] while switching off from the networks of power and wealth, people and territories dibbed as irrelevant from the perspective of dominant interests” [CastellsIII, p.1]. The result is an informationalized, global economy and an increasingly *networked* society displaying an “exclusionary logic”. This view is supported also by the United Nations Development Programme [undp].

The Fourth World

The global economy is “deeply assymetric” and is polarizing the world in new ways, leading to “new geographies”. Bennett [B&E] claim that new ‘core’ regions and new ‘peripheries’ are emerging, but according to Castells the trends largely follow “the patterns of domination created by previous forms of dependency throughout history” [CastellsI, pp.108-109]. Africa, in particular Sub-Saharan Africa, is being increasingly marginalized – or delinked, being the least computerized part of the world.

Castells claims the creation of a Fourth World “made up of multiple black holes of social exclusion throughout the planet” [CastellsIII, p.164],

consisting mainly of Sub-Saharan Africa, impoverished rural areas of Latin America and Asia, and of socially excluded groups in every 'participating' country. Akpan characterizes this as "another level of disparity between information haves and information have-nots" [Akpan, p.5], and these disparities in the distribution of technology between and within countries is also recognized by the United Nations Development Programme [undp].

3.2.2 Technology transfer or technological learning

The globalization of technology is dominantly going from the north to the south. All tools have inscribed into them (e.g. through use patterns) the values of the society in which they were created, and information technology (IT) can be seen as "Trojan horses" [W98] (or as Castells puts it: "technology *is* society" [CastellsI, p.5]).

This leads to the recognition of the fact that all technologies have to be carefully considered and adapted to the actual use situations and local contexts (e.g. [W98], [M&S]): Castells emphasizes "the importance of unintended social consequences of technology" [CastellsI, p.6]. The transfer of technology encompasses a lot more than a simple translation of the software, as differences in culture and work practices are seen as important aspects of the social systems that constitute information systems.

According to Braa [JBraaII], technology transfer from the first to the third world often focuses on transfer of computer applications, which are "first world solutions" to "first world problems". The successful transfer of such technology "will often rely on the transfer of the entire *context* of the technology, including work routines and organisation" [p.15]. Castells points out that developing countries may have - or acquire - local knowledge on how to operate off the shelf software, but not on how to program or repair it.

The 'technological learning' approach to avoid 'bubble' situations and a general lack of local ability to sustain the information and computer systems is described by [JBMR]: "IT has to be used, interpreted and learnt in its proper context of use". "Only in this way is it conceivable for less developed countries to catch up technologically and, consequently, economically" (p.21).

3.2.3 "The South African Connection"

A triangular model of co-operation

The new ways of exclusion means that in addition to experiencing a de-linking as a whole, "[t]he 'South' is increasingly differentiated internally,

and some of its fragments are being incorporated into the 'North' over time" [CastellsI, p.146].

According to Castells, South Africa, its history locating it both the first and the third worlds, may provide the Southern African subcontinent with a possibility to link up with the global economy with South Africa playing the role of a node in the networked society.

"The most hopeful prospects for future development in Africa come from the potential role that could be played by the new, democratic, black-majority South Africa, with strong economic and technological linkages to the global economy. The stability and prosperity of South Africa, and its willingness and capacity to lead its neighbors as *primus inter pares*, offers the best chance to avoid the human holocaust that threatens Africa, and through Africa, the sense of humanity in all of us." [CastellsI, p.136]

About 95% of Africa's Internet users live in South Africa [Akpan]. But, as Braa and Heywood [JB&Hey] point out, "[r]esources and technological capability alone is not enough to ensure development". "South Africa has not paid much attention to developing the 'third world' part of the country" (p.205). They recognize the potential of the country to be an innovator, but recommend to undertake a South-South collaboration to draw on the experiences made in other African countries.

The [NHP] also recognizes that there is a need for reconstruction and development of the region as a whole, and that South Africa, health-wise, has a great deal to learn from its neighbors. In this way, they say, South Africa can be a locomotive for regional development; an alternative horizontal model to the more traditional (and increasingly questioned) north-south technological transfer. This 'reciprocal learning' model may eventually also benefit Europe as lessons and experiences feed back and may provide a broadened experience base in systems development. [undp] equally promote the need for South-South collaboration.

3.3 Health and health information in developing countries

The major health problems in developing countries are often quite different from the ones found in the first world, and are mostly due to economic factors (e.g. malnutrition) social factors including e.g. education (e.g. tuberculosis spreading due to crowded housing, diarrhoea prevailing due to lack of access to clean water and lack of education in

prevention) or climatic conditions (e.g. malaria and other tropical diseases). HIV/AIDS is linked to the two former.

According to Sylvia Chant (in [B&E]) and Sabbatini (in [Opit]), developing countries generally have a low level of public expenditure on health. The health care is also inappropriate with large and costly hospitals, sophisticated equipment and imported pharmaceuticals beyond the means and requirements of most of the population: a basic mismatch between health service supply and demand. “Instead of highly technical, centralised facilities, people need basic medical care in the form of local health centres, immunisation schemes and elementary training in hygiene, nutrition and first aid” (p.189).



3.3.1 Health information and health information systems

A rather important distinction to remember when it comes to information systems, is the difference between data (mere numbers) and information (numbers put into a context and carrying meaning). Using Walsham's [W01] words, data is "a formalized representation of elements of the real world: facts, concepts or instructions" (p. 36), while "data is turned into information when meaning is attributed to them" (p.37). In this section, all authors not otherwise indicated appear in [Opit].

Health information has two aspects. It is necessary for planning purposes, and to monitor and evaluate the effect of actions taken [Boerma]. More importantly, though, in this thesis, is the ability of a local level

information system to ensure active community participation through communication and involvement.

The main purpose of any health information system (HIS) should be the well-being of the population it serves [Opit], and few contest the importance of health information for health services. Particularly in a PHC approach, which may be referred to as action-oriented health and information systems, accuracy and timeliness are fundamental for the provision of right care to the right person.

[Opit] claim that most HISs tend to turn into ends in themselves, where the amount of data stored (facilitated by a widespread use of IT) is seen as a status symbol: “information is valued more highly than action” (p.409), and managers often suffer from a surfeit of information. But “[i]nformation is of value only as a source or product of action” (p.416).

Sandiford et al. [SAC] are among the writers that promote the view of improved PHC provision through information, more specifically through reforming the associated information systems (IS). Also [Opit] and Braa et al. [JBHS] emphasize the importance of *local use of local information* as a central aspect of the PHC approach, i.e. data should be analysed and used immediately, at collection level to support local action; to improve the services. This action-led approach to information contrasts with the data-led approach of top-down HISs.

Top-down

Most HISs, both in the developed and developing world, are typical top-down systems designed for e.g. national level planning purposes and imposed on the lower levels [Opit]. The data items to collect are seldom related to the information needs of local managers or health workers. The physical and functional distance between collection point and where the information is used means that much time usually elapses, and the information is mostly used for retrospective analysis.

The high level of administration where the information is intended used leads to a substantial margin for errors, hidden effectively in highly aggregated numbers [JBraal]. Willful or not, the lack of *reliable* data from many developing countries is considered a problem by many (Singer).

Health workers are “inundated” with forms with purposes that are far from clear: they expect to be “obeyed rather than understood” (Bentley), and little or no time is left for local staff to collect, collate or analyse data for the community. The contents of the IS is decided by people with other interests than the low levels, and can change often, which is one of the error sources mentioned by [Boerma]. The aim of data items (e.g. identifying problems, facilitating administration, improving health conditions) are often not explained to the collectors

Top-down HISs are generally ineffective, wasteful and unduly expensive structures for acquiring and processing health data, and this is often seen as the main problem with developing countries' HISs [Opit]. One reason given by Opit for the widespread use of top-down HISs in developing countries is that they are much used in the developed world, and health and information technology experts from the developed world are often used as advisors in the third world. Walsham et al. [WSW88] equally argue for a less narrowly focused education of computer scientists and systems developers to avoid a situation where IT experts without knowledge or interest in health guide the development. Another reason for the occurrence of unintegrated top-down systems, mentioned by Israel (in [Opit]), is that international funding organisations may demand the use of certain systems in projects.

Effects

In general, the information of these systems is of little value to decision-makers at lower levels: it is inappropriate and erroneous and lack the timeliness needed. Health workers, who initiate much data collection, are not interested and alienated from the HIS and its use. This makes accurate collection difficult, and more importantly, it induces a state of mind where it is regarded as a "useless bureaucratic task" [Opit,p.412]. This has introduced a sometimes "enormous" resistance towards data collection procedures and equipment, including the introduction of new ones.

Recommendation: bottom-up

The primary focus of the HIS should be on local information and possible local action based on this information: what information is required for local action to be taken. [Opit] claim that a striking feature of the successes seen is the sensitivity to the local context and the community involvement in information use and action. E.g. Wainwright argue that user-oriented information that benefit the collectors will provide an incentive for accuracy and speed in the data collection, in addition to reduced costs. According to Bentley, both community and health workers become enthusiastic when given an opportunity to participate and solve problems. The action orientation of the PHC approach may not be feasible to support through a centralized IS (Abrantes). Turning the situation around will ensure information that is "readily and responsibly collected because it is meaningful to its users [...] to improve the community's health" [Opit,p.424].

Bottom-up approaches and action-oriented information systems "implies political and administrative willingness to devolve power and re-

sources to the grass roots” [Opit,p.417]. Local level analysis and use will also improve the quality of the data at all levels as errors are spotted early in the process [JBraal].

[Opit] claim that the opportunities for community-based action-centered (health) ISs are better in developing countries because of their focus on primary health care and the usually large and scattered rural population, and the less pronounced top-down structures of the organisations. This is contested both by Sabbatini, who point to the rigid top-down structures of most PHC, and equally by e.g. Braa and Walsham (see ch. 4).

Local management

In a PHC system, front-line health workers “should be able to take certain decisions” [Opit,p.421], but managers often have insufficient authority to act on information that is present. There must be a political and administrative willingness to devolve power to the grass roots.

Due to inadequate training, managers often display a lack of knowledge. They are often unable to state what decisions they have the authority and responsibility to make (Abrantes) and what data they need to make them.

The view that a simple transfer of power from central to local levels is contested e.g. by bin Sahan, as he claims that the problem often is a lack of ability - or willingness - by managers to use the information they have. “The improvement of information systems should be regarded as an integral part of a comprehensive strategy to improve management” (p.431). “Information systems cannot compensate for the deficiencies of policy-makers who do not adequately plan ahead” (Illsley p.427).

Training, support and feedback

Existing training of both health workers, their supervisors and managers is often inadequate, especially in information handling issues. The focus and examples used during training usually reflect national rather than local problems. Health workers also have to be “convinced that such systems will be useful for their work” (Sabbatini in [Opit], p.433). He recommends that training (considered a very important task to undertake as early as possible) should be started at the lowest possible level to convince the health workers that the HIS is for their own benefit.

Bentley give an example of a bottom-up initiative in training from Cameroon and Sudan. In order to successfully implement PHC, they saw that a prerequisite was to change the basic training of nurses. The training of the community health *teachers* was reorganized, with the result that “[t]eachers were thus stimulated to provide similar experiences for students in the collection and use of health information and

the propagation of problem-solving approaches to learning and health care” (p.424)

There is usually a lack of feedback in centralized top-down systems. Feedback is recognized as a very central part of training as an on-going process.

Mandara propone regular analysis of data and feedback to facilities to enhance continuous learning. In PHC, communities are supposed to be active participants in the health system, this can only be done through communication (in “readily understandable form”) and feedback.

3.4 South Africa



Figure 3.2: Africa

South Africa, covering the southern tip of the African continent and with a population of just above 40 millions is undergoing major changes following the associated fall of Apartheid¹ and ANC’s (African National Congress) victory in the first free elections in 1994.

Building on colonial structures and mindsets, the Apartheid regimes kept deepening the divides between people with European ancestors and the rest of the population. The population was divided into four race

¹The word ‘apartheid’ comes from “*apart* apart + *-heid* hood” and is defined as “racial segregation; *specifically* : a policy of segregation and political and economic discrimination against non-European groups in the Republic of So. Africa” [WWWebster Dictionary; <http://www.m-w.com/>].

groups: White, Asian, Coloured and Black. The country was split up according to strict “rules”: rich and fertile land was dedicated to the white population while drier and poorer areas were set aside for the rest of the population. These enclaves were called homelands or bantustans, and blacks were forcefully moved there. The homelands were given limited (and in many cases rather pro forma) independence and self-government.

Cities and towns were for whites only, with black (and coloured) people only allowed in during daytime to work for the white residents. In the outskirts of the cities, there were townships and other residential areas for the non-whites, following strict rules governing the non-mixture of the different “races”. The cities and towns were governed by Municipalities taking care of the town-dwellers, while everybody living outside of the town were confined to the government in charge there. This resulted in ‘White only’ town Municipalities and other local government structures for the black/coloured *peri-urban* areas.

The new South Africa

One of the main objectives of the new government is to try to ensure equity for all inhabitants of South Africa including the former homelands. As for the health sector, the goal is set: to ensure affordable primary health care provision for all.

Including provinces, former homelands and other quasi-independent areas (Cape, Orange Free State, Natal, Transvaal; Venda, Bophutatswana, Gazankulu, KaNgwane, KwaNdebele Transkei, Ciskei, KwaZulu, Lebowa and Qwaqwa), nine provinces were delineated to form the new Republic of South Africa: Western Cape, Northern Cape, Eastern Cape, North-West Province, Northern Province, Kwa-Zulu Natal, Gauteng, Mpumalanga and Free State.

All provinces keep struggling with relics of their old structures and old power relations in some way or another. The different administrations for the different areas and for the different races couldn’t be removed overnight, even when not working properly or in the wanted way, without creating an even worse chaos. Some immediate changes had to be brought forth within the existing structures, as had slower changes requiring more profound structural changes before they can be carried out.

As the existing structures many places kept functioning adequately, the necessity of restructuring has not been recognized by all involved parties. New structures have grown up existing in parallel with the old ones, creating duplication of work and products and masking the possible gains of the restructurings. This self-supporting system of old structures continuously reproducing themselves form barriers to

change, and the people within it are often reluctant to commit to changes.

3.4.1 Health in South Africa

The influence of the First World parts of South Africa often leads to a characterization as a *developed* country (e.g. [B&E,p.159]). But outside of these first world 'bubbles', the health system and the health status of the population clearly indicate inclusion among the Third World countries. The white minority might be compared to what e.g. Sylvia Chant [B&E] refers to as the 'urban elite' in developing countries (with some geographical extension).

The South African health sector is often characterized as one of the least equitable health systems in the world (e.g. by Braa and Heywood [B&Hey]), reflecting somewhat the society as a whole: 95% of the poor are African, and 65% of the Africans are poor [CastellsIII].

During the Apartheid era, the health care provision for the privileged 20-25% of the population was focused on curative, hospital based services including the use of high-tech solutions. The rest of the population had inadequate or no health service provided for them, and the major health problems of the population as a whole continue to reflect this situation. Rural areas were particularly neglected [NHP]. Few kilometers from where the world's first heart transplant took place in a Cape Town hospital some 25 years ago, measles and malnourishment are still killing children, and tuberculosis is among the major health problems.

The inequity of the health system is promoted by an extreme degree of division following racial and geographical lines and according to type of service. These inequalities in health status and health care provision are among the major challenges facing the new South Africa, and the 'third world' part of the country is the focus of the new government [B&Hey].

The South African health sector

The South African health sector is characterized by extreme centralism and fragmentation. In 1994, there were as many as 14 different public sector departments of health to be integrated into one single comprehensive, equitable and integrated National Health System. Kwa-Zulu Natal, for instance, struggle with the integration of six different departments of health.

Each geographical area had separate public services (and organisations) for curative and preventive care, and for the different races - in addition to the multitude of non-governmental organisations, private practitioners, community health workers, traditional healers etc. The hospital system and the academic institutions made up separate systems.

The various 'vertical programs' (e.g. nutrition, tuberculosis, mother and child health) were also run and administered through other structures. Lack of communication and coordination between the service providers led to a situation where some areas saw a duplication of certain services while other areas were without any public health services at all. This is what I refer to as the **fragmentation** of the health services.

The extreme **centralism** refers to the vertical command lines and one-way reporting routines and information flows existing within each organisation, with all authority and powers concentrated in the organisations' head office.

3.4.2 Restructuring – towards district based PHC

Already in 1994, prior to the elections victory, ANC published its National Health Plan [NHP] where is stated the vision for health in South Africa including major priority areas and some tentative descriptions of how to get there. The NHP clearly bears the mark of the preceding period and shows the need and willingness to break with the past, reflected in the keywords mentioned in the introduction: equity, right to health and respect for all. They agree with [B&E] that "a healthy population is necessary for social and economic development" [NHP,p.9]. During the course of the document, much weight is put on the importance of "promonition of health through prevention and education" (p.19).

The NHP also states that the way forward should be following the Primary Health Care (PHC) approach as it is defined in the Declaration of Alma Ata² and as it is recommended by the WHO (World Health Organisation). This approach is based on decentralization of services and full community participation, with underlying principles of integration and coordination. It also incorporates traditional methods and local personnel (e.g. traditional healers) [B&E], and "aims to reduce inequalities" [NHP,p.19]. The health district is envisioned as the basic administrative unit of health service delivery. In short, a bottom-up approach to health care delivery which is sensitive to local customs and which preaches prevention rather than cure.

To overcome the experienced health and service delivery problems in South Africa, the authors of NHP also recognize and emphasize the need for intersectoral collaboration in addition to the integration of all former structures into one single central body called the National Health System. This view stems from the fact that the health status of people

²"Primary Health Care is essential health care based on practical, scientifically sound and socially acceptable methods and technology made universally accessible to individuals and families in the community through their full participation and at a cost that the community and country can afford to maintain at every stage of their development in the spirit of self-reliance and self-determination." (cited in [NHP] p.20)

relies not solely on the health services provided them, but on nearly all aspects of life from housing, schooling and workplace situation to pollution issues and more subtle and general issues affecting their life situation directly or indirectly; hence a more holistic view.

The envisioned centering of the health services around the family and the community as declared in Alma Ata implies the need for decentralization of the management of the services, which the NHP promotes strongly - but not, it says, without some centralized co-ordination (to avoid the remaking of the previous fragmented and spaghetti-like situation).

NHP proposes four main levels of health care delivery and management (community, district, province and nation) with shifts in functionality from health care provision and local responsibility at the lower levels (community, district) towards coordination, integration and overall management at the higher and more centralized levels. At each level, the NHP emphasizes the need for intersectoral collaboration and inclusion of all stakeholders to ensure a comprehensive health system.

These four recommended levels can, in turn, be further split up and adjusted leaving the actual implementation to the individual provinces: some provinces include regions or other forms of "clusters" of districts as an intermediate level between province and district (e.g. Eastern Cape, Kwa-Zulu Natal and the Cape Metropolitan Area in Western Cape), and some districts are split into sub-districts due to size of population or geographical area (e.g. the Mount Currie district in Kwa-Zulu Natal).

3.4.3 Health information in South Africa

Health information includes information about health, health services and other factors affecting health, and is "required for health-planning purposes and for the monitoring and evaluation of health programmes" [Boerma, p.1], and is equally relevant for planning in other, related, sectors.

Information systems (IS) are reflections of the structures within which they are produced and function [Giddens]. This is seen very clearly in South Africa, where the health information system (HIS) inherited from Apartheid is characterized by fragmentation and vertical command lines, lack of communication, and lack of coordination, and is typically 'data-led'. Health information has been collected for the sole purpose of reporting (as raw data) to various higher levels. The organizational fragmentation has created a substantial amount of duplication, and the (usually weekly) reporting to head offices have taken up a large amount of time of the health workers.

Errors, unless extreme, has seldom been spotted - or corrected, and duplication of data items thus has lead to internal inconsistency. The

focus has been mainly on managerial issues, like workload, not on the health status of the population or the quality or efficiency of the services.

Often even without higher-level use other than the creation of e.g. annual reports containing aggregated data, there has been a piling up of items as every new form has been designed from scratch and no-one have taken the responsibility to remove older forms.

A restructuring and decentralization of the South African health system according to the PHC approach has to be accompanied by a decentralization of the related HIS (and vice versa). The development of a new HIS is thus seen as an integral part of this reconstruction of the health system [JBraal]. The National Health plan recognizes the need for a “a comprehensive health information system that begins at local level” [NHP, p.83].

“Attempting to change an information system in isolation is unlikely to result in anything being changed, not even the provision of relevant data.” [Opit, p.415]. Political and managerial support for the changes is crucial.

But, in many developing countries, e.g. South Africa, the use of local information in local decision making “is not part of the PHC management culture and it will be important to integrate training in use of information in the process of developing the HIS” [JBraal, p.141].

Chapter 4

Information systems and systems development

In this chapter I will present some theories on systems development which I will use in the discussion of my findings in later chapters. The theories presented are mainly based on the Scandinavian approach to systems development, and are deployable both in the first and the third world. I try to assess the value of the various aspects of these theories more specifically to a third world context, with a special focus on South Africa.

Introduction

According e.g. to Braa [JBraaPhD] and Walsham [W98], the contextual constraints found in a third world setting makes it substantially more important to pay attention to these contexts when designing and developing information systems (IS) than it is in the first world. But also in the Northern hemisphere, there is a growing evidence that (at least for certain types of ISs) context matters.

E.g. Walsham [W98] and Braa and Hedberg [JB&Hed] point out that developing countries have had their fair amount of failures. Contextual constraints are more pronounced than in the first world, and the lack of economic resources make the contingent failure of expensive projects hit them even harder.

But even though the crucial issue, according to Braa et al [JBMR], is not that of technology transfer but of technological learning to enhance economic development. Braa's [JBraaPhD], building on Korpela's work to argue the need for not only local development of technology but just as importantly of locally developed *methods*. It is important, though, to not throw the baby out with the bath water: there are many aspects where 'first world' methodology can be used as point of departure or building

blocks in this local development.

Since the 70s, there has been an increasing awareness of the importance of context knowledge when developing interactive context dependent ISs. Many of the views and theories that 'developing countries' systems development' are building on have emerged e.g. from the so-called Scandinavian school, and according to Braa and Heywood [B&Hey] and their presentation of a Triangular model of co-operation, experiences made in and lessons learnt from systems development in developing countries will feed back into first world systems development to broaden the experience base.

Point of departure

Computers and computer systems have come to be present in nearly all aspects of our working and social lives. These computer systems can roughly be seen to fall into one of two categories: the traditional stand-alone context free and independent application, or the context dependent interactive, often networked, information system. I will concentrate on the latter type. These "[c]omputer systems are a lot more than the simple flow of information represented in the flow charts" [G&K, p.2]; context knowledge is crucial in order to make a computer system useful [JBMR].

There is a growing awareness that traditional theories and models are not providing the appropriate tools to include this context in the design and development of information systems (IS), and researchers are increasingly questioning the suitability of the existing methodology in the development of such systems. E.g. Braa et al. [JBMR], K.Braa [KBraa], Walsham [W98] and [Ehn] promote the view that systems development constitute not only the software design, but also the aspects of communication and mutual learning. (This is the debate that is appearing with force apropos IS development in the third world.) The widespread use of computerized ISs has also led to a heterogenization of the users and user groups [Grudin] and of the use situations, indicating a need to keep these use situations in mind during design and development.

4.1 Critique of foundation

A continuously growing pool of writers promote the need to change the traditional view on information systems and their functioning in organisations as, according to Walsham et al.[WSW88], traditional perspectives are "inadequate to explain the impacts of information systems in organisations" (p.52).

[Ehn] and Greenbaum and Kyng [G&K] promote the need for a fundamental shift of paradigm on which to base the new design and development approaches and procedures. According to them, the thoughts of Descartes, inherited from the engineering and natural science “roots” of informatics, are still permeating the world of systems development with no regard as to what kind of system is planned.

4.1.1 Web models and social systems

The works of Kling and Scacchi [K&S], and their Web Models, have influenced many writers presented in this chapter (e.g. Walsham et al [WSW88] and Braa [JBraaPhD]). This model provides a theoretical framework for understanding how and why large ISs “tend to be tied to the social context through a complex web of associations” [JB&N, p.237]. Kling and Scacchi see information systems as complex social objects constrained by their context, infrastructure and a set of historic commitments, with no especially separable human factor.

This is opposed to traditional discrete-entity perspective on organisations and information systems. “When an analyst uses a discrete-entity model to understanding the computing capabilities of an organisation he usually begin by asking, “What kind of equipment and facility do they have?” In contrast, analysts using a web model begin by asking: “What kind of things do people do here?”” [K&S, p.9]

Using Kling and Scacchi’s [K&S] Web models as framework, Walsham et al. [WSW88] are among the writers that promote a conceptualization of ISs as social systems in which technology is only one of the dimensions; information systems “can be defined as a combination of people, equipment and procedures” [Boerma,p.24]. This, they argue, is necessary to understand their development and use. Contrary to a rationalistic view of organisations, organisation are better seen as arenas for conflicts, and human and social factors (and actors) seen as central to IS development and use. ISs involve human actors that cannot be reduced to human factors [Ehn]; ISs are social systems which use is highly dependent on the use situations and contexts.

Actor network theory

Another theory which is based on the view of society (and organisations) as webs or networks is the actor-network theory. It has been seen as useful by many, e.g. [JB&Hed], to identify stakeholders and roleplayers in the social web of organisations to ensure all interests, work patterns etc are included.

According e.g. to Hanseth and Monteiro [H&M] or [Akrich], an actor-network consist of and tie together all technical and non-technical ele-

ments; *actants*. Technology is often considered an actor/actant in its own right. Different user groups are equally considered actants, and one person may even act as several actants according to his/her different roles and thus interests. Society can be considered a collection an actor-network; a socio-technical web.

When different actors enroll in an actor-network, their interests have to be *aligned* through a process of translation of these interests. These aligned interests are *inscribed* in the system, or the network. This perspective hence focus on process and participation to ensure stability of the network. It provides a way of looking at the relations between human and technological actors or elements.

The inscriptions, e.g. of use patterns, may differ in strength from network to network, stronger inscriptions being more reactive to changes, adjustments or integration efforts towards other systems or networks. Inscription is a concept similar to the “frozen discourse” concept of Bowker and Star [B&S], and both are resistant to change.

Walsham et al. [WSW88] criticize the traditional methods in systems development, which are based on discrete-entity models. They argue that technology and infrastructure are not unlimited resources, especially not in developing countries, and hence not neutral.

They also criticize the use of a positivistic cost-benefit analysis to evaluate the success of an IS, as the apparently objective quantification actually reflects values. The critique, they say, applies with great force also in developing countries as it raises questions on whose values should be used during the quantification process. And the favored short-term planning and gains provide an inadequate basis for an emerging IT strategy [WSW88].

4.1.2 Discrete-entity world view

Methodology based on the discrete-entity model is typically associated with words like ‘rationalism’, ‘formalism’ and ‘objectivity’, and with the belief that there exists a clear and objective answer to everything. The Waterfall model (presented below) is a good illustration of this discrete-entity world view where it is assumed that it is possible to clearly and in detail specify the problem that needs solution (or break it down to smaller, identifiable elements), and that it is subsequently possible, building on this specification, to build the “perfect” IS to solve the problems identified.

Writers like [Ehn] and Greenbaum and Kyng [G&K] argue that this is not the case. Context dependent ISs are not clear-cut isolated entities that are possible to break down into small, describable details, or as

Bowker and Star [B&S] puts it: all uncertainty and ambiguity cannot be defined away. ISS involve human actors that cannot be reduced to human factors (paraphrase of Ehn); ISS are social systems which use is highly dependent on the use situations and contexts.

According to e.g. Ehn and Greenbaum and Kyng, the methods and the language used in traditional systems development are often alienating to the users as a result of their strict formality, thus effectively stopping any communication between the developers and the users.

This is an even more valid argument in the third world, where computer literacy levels among the users typically is much lower than in the west.

4.1.3 The Waterfall model

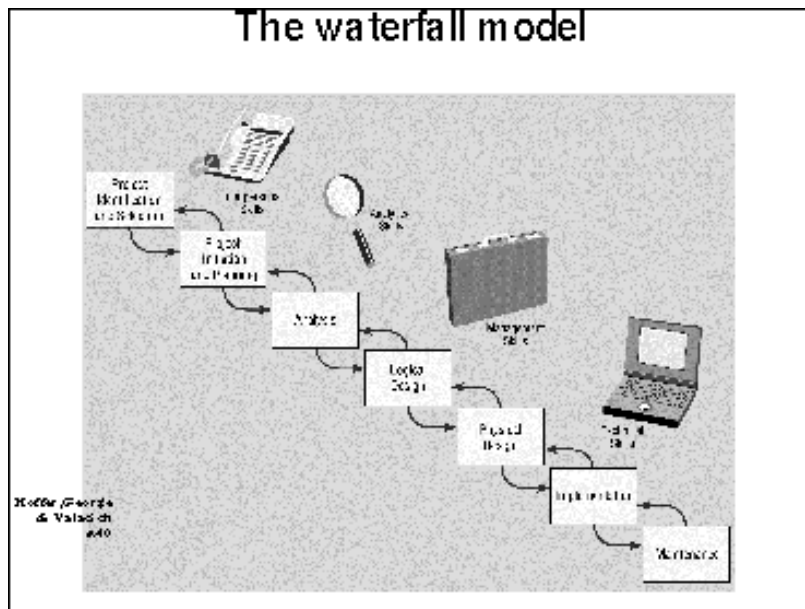


Figure 4.1: The waterfall model [Hoffer, George & Valarich, p.40]

Traditional applications programming and systems engineering have inherited their methods from other engineering disciplines, often following a rather strict Waterfall model during development. The Waterfall model depicts a stepwise, document oriented process where the development process is divided into separate steps, each step finalized through the production of a document (problem identification phase > specification; design phase > design document etc). The users of the system are often only considered when it comes to training, pushed aside as the ubiquitous 'human factor'. [Grudin] characterizes the waterfall

model as not very suited for systems “that supports substantial user interaction” (p.61).

Although later variations over this model include the possibility to provide feedback to a previous phase and thus take a step back and introduce changes, this is often very expensive as each step builds directly on the assumption that the previous step was completed, and changes to early steps inevitably runs down the whole waterfall affecting everything downstream.

Yet another modernization of the Waterfall model has earned its own, rather descriptive, name: the Spiral model. Here, the need for feedback and iterations is taken more seriously through user involvement, prototyping and iterative design [Grudin], but it is still modeling a mainly unidirectional process though often characterized as risk driven. Grudin comments that “The spiral model is not yet widely used” [Grudin, p.59].

Boehm (cited in [Grudin], p.59) “observes that the dominant waterfall development model “does not work well for many classes of software, particularly interactive end user applications””.

4.2 Context always matters

Greenbaum and Kyng [G&K] and [Ehn] argue strongly against the Cartesian strive for a perfect system, which they claim do not exist. Information is an integral part of all human activity [CastellsIII]. The ‘objective’ descriptions and specifications do not take into account the contexts that inevitably influence any given person’s perception of the same reality.

Language and actions only have a meaning when seen in a context; neither take place in a vacuum: “[t]hrough practice, we produce the world” [Ehn, p.63]. Information handling is social interaction, and practice is a social activity. “Hence, as part of practice, knowledge has to be understood socially – as producing or reproducing social processes and structures as well as being the product of them” [JB&N]. According to Bjercknes and Bratteteig [B&B], computers should be “understood in the context within which they are used” (p.80). Braa et al. [JBMR], adopting a ‘technological learning’ view as opposed to traditional theories on technological transfer.

4.2.1 Information Infrastructures

These complex social webs of ISs, including both human, social and technical components, develop and grow over a long time, layers upon and within each other. This is what e.g. [Hanseth] calls Information Infrastructures. New features tend to be added to, or implemented as

changes to something already there; the Installed Base. As this installed base grows, it becomes increasingly difficult to implement substantial changes or to build new systems from scratch.

The installed base is a web of social systems, each resistant to change [W98]. Thus, argue Braa and Nermunkh [JB&N], “the larger social system needs to become part of the study” (p.238); “[t]he health system must be developed in a holistic approach” [JBraaI, p.132]. These social systems are not neutral, they say: politics, meaning, values and behavior are inscribed into the systems. This is illustrated with descriptions of the Mongolian and South African health information systems, where the marks of the Soviet and the Apartheid regimes, respectively, are clearly seen.

[Opit] mention that the amount of existing health information systems form powerful barriers to change, and the amount of investments of human and financial resources already undertaken lead to a situation where “a fresh start would be almost impossible” (p.413).

4.3 Changing information systems

Greenbaum and Kyng [G&K] and Braa [KBraa] say that the introduction of a computer system will change the organisation. According to Star and Ruhleder [S&R], technology both drives and hinders organizational change: the IS will still reflect the organisation at the same time as a new component is introduced. Changes to an IS thus has to be carefully planned as its effects cannot always be planned ahead [Bada]: (management) decisions are not actions, and intentions are not the same as realized activities.

Also Braa and Nermunkh [JB&N] are opposed to the view of computers as “independent ‘agent[s] of change’”: “its impact on institutional change relies upon how the introduction is used and supported by the actors in the social system” (p.250).

4.3.1 Structuration

When using the social systems framework for understanding ISs in organisations, it is easier to see why it is so difficult to change information systems – and organisations. A major theory with both explanatory power as to the problems experienced and at the same time providing some hope for success, is [Giddens]’s structuration theory: The complex web of social relations that make up an information system is a product of the structures within which it functions, at the same time also reproducing them. This is why e.g. [Opit] claim that changing the IS alone is not sufficient to bring forth changes.

E.g. Braa and Nermunkh [JB&N] describe the Mongolian health information system as built to support the vertical structures through “institutionalized work practices”, constituting and reproducing “the social relationship and the social fabric within the health services” (p.239). A major reason why the intended changes in Mongolia did not come through, was the lack of organizational changes to accompany the changes in the HIS [Opit].

In South Africa, “[d]ata flows [...] directly re-enforce existing social contracts and administrative structures” [JB&Hed, p.4] creating “a vicious cycle [that] reinforces centralisation and fragmentation” [JBraaI, p.137]. In order to change the behavior of the health system and the health information system, the social system and the behavior of the users have to be changed [JB&N].

4.4 Uses and users

Also in the first world, seemingly ‘correct’ systems turn out to be failures “in terms of the usability of the system” [Ehn, p.41-42], which leads to the conclusion that it is time to focus more on the use contexts rather than on the formal demands to the system. Braa and Sandahl mentions “lack of understanding in the design of existing work practice” [KB&S, p.194] as a reason for failure, and Ehn states that quality is closely related to the product’s “relevance, suitability, or adequacy in practical use” (p.61).

Walsham refers to Ciborra to highlight the need for ‘plastic’ technology, and focus on improvisation as a central characteristic “which typify action in context”, i.e. what Ciborra refers to as “the multiform practices of the actors involved” [W98, pp.395-396]. The technology should be ‘moulded’ to support these actual processes.

In the case of the new South African health information system, it is obvious that a rather high degree of flexibility is needed to support the daily work of a very large number of PHC workers and district employees with varying backgrounds and skills, and living and performing their various tasks under differing conditions in very different realities.

4.4.1 Top-down or bottom-up?

Participatory design is often used synonymously with a bottom-up approach (although ‘bottom-up’ usually is assumed to include more aspects than only user participation). This is seen as opposed to the more traditional top-down approaches. Walsham [W92] uses this distinction to classify large-scale ISs based on their primary purpose, their design approach, and their implementation approach.

Typical top-down ('type A') systems are developed to provide higher levels of an organisation with information about the activities of the lower levels to support control and administration, while bottom-up ('type B') systems are meant to support the lower levels employees in their daily work. The design phase of the latter consists of making the lower levels realize and express what information can be useful for them, and implementation includes repeated design cycles and continuous improvements based on experiences made. Parallel and on-going training and support are also important elements.

According to Walsham, top-down systems tend to turn out as failures. They impose extra work on the low levels (or at least the impression of it), and tend not to be used. He finds it interesting that the information in these control and management systems is often inaccurate since they, unlike type B systems, don't give a correct representation of what goes on at the lower levels.

Many cultures, especially in developing countries, favor centralized systems and an autocratic approach to decision making. People in power prefer conservatism to keep their position, and are not willing to give up powers or authority [W92]. Top-down ISs will, according to Walsham, never have any success in developing countries, mainly because of the extra work they put on the lower levels. But bottom-up systems are not widespread because they break with the established ways of managing and administering, despite the fact that these systems can be just as useful to management because the users are more likely to use them and the information contained is more correct. He hopes for a change now that more and more African countries are moving towards multi-party democracies (although a bottom-up approach not automatically leads to empowerment [Ehn][B&B]).

Braa [JBraal] stresses the importance of basing development on local initiatives and interests, which are crucial to ensure ownership and appropriateness to the local context; context knowledge. A decentralized health information system requires 'local enthusiasm'.

As the term 'bottom-up' is very vague (see p.4) and can be perceived to incorporate only efforts that are *entirely* bottom-up without even being initiated from the top, many choose to recommend a combination of the the approaches, e.g. Israel. A combination of methods from the two approaches will result in information systems that "avoid the major pitfalls of systems dictated from the top without regard for local needs, and the uncoordinated systems constructed at the grass roots which are neither compatible with each other nor responsive to the needs of national health planning and evaluation" [Opit, p.429]

4.4.2 Work task support

What is clear, is that the introduction of a new IS will have consequences for the users' work style [FRS], and may "create new demands from the users and hopefully new work practices" [KBraa, p.30]. This makes it important to understand and focus on the actual work processes, both existing and anticipated. It is important to design "for people, not for technology" [G&K, p.12]. The basis for design should be "work routines rather than production routines" [B&B, p. 80]

This tool perspective on ISs and the associated focus on the support for *use situations* represent a shift in attention from features like reliability, efficiency [Ehn] and automation [W98]. Work activities should be supported, not made more rigid, a view promoted e.g. by Forster and King [F&K] and Bowker and Star [B&S]. [Boerma] mention that the data to feed into the information system must be simple to obtain. Braa [KBraa] and Greenbaum and Kyng [G&K] are among those who claim this will result in increased quality of work.

In developing countries like South Africa , where an overall goal is to restructure the entire health system, the focus has not only been to support existing work, but on creating and institutionalizing new work practices at a microlevel and routines to, over time, induce changes to the entire health system: "New daily routines aiming at local analysis and use if information ('means') will help 'structuring' new 'bottom-up' structures and local ownership ('ends')" [JB&N, p.250]

"Information systems to support primary health care need to be tightly connected to the work processes and community interests which are dynamic and changing" [JBraaII, p.17]. This is somewhat opposed to traditional development for work processes that are "relatively stable and that already exist" (p.21). User involvement and 'real' participation is crucial to ensure that the new system responds to local needs.

4.4.3 User participation

"In terms of the actual work the system is intended to support, the users are the experts" [KBraa, p.246]

According e.g. to Walsham [W98], Braa and Sandahl [KB&S], Star and Ruhleder [S&R] and [Ehn], there exist no single unique and unambiguous way of using an IS: work practices are heterogeneous and often improvised. Different users and user groups have different ways of conceptualizing the system, it is thus important to include the future users of the system in order to obtain an understanding of the use situations the system is to support [B&B].

Several writers point out that "[u]sers are pretty conservative" [KBraa

p.30] as the input to the discussions inevitably tend to be established work habits. Ehn too points out that this “may be a hindrance to really revolutionary designs”, but as “[f]ew designs [...] are really revolutionary [...], the participation of traditionally skilled users are critical to the quality of the resulting system” [Ehn, p.70]. This use quality and appropriateness should be the main concern of all involved parties, a point also stressed by Greenbaum and Kyng [G&K] and Walsham [W98].

Ownership

It is noted e.g. by [Grudin], [Bansler] and Bjercknes and Bratteteig [B&B] that participation may affect system acceptance “because participating users acquire an interest in the outcome; they may accept features that they otherwise would have resisted” [Grudin, p.67] because “[t]hey feel that they have influenced the design decisions and they will therefore be committed to make good use of the system”. It will also, claim Bjercknes and Bratteteig, “enable people to develop realistic expectations” towards the new system (p.74), the gap between expectations and the reality mentioned by Heeks et al. [HMS] as one of the major reason why so many information systems fail.

These aspects are important to note when designing for change, no less so in a developing country context. This is what often is referred to as a feeling of ‘ownership’ towards the system. Braa and Nermunkh [JB&N] mention user participation as crucial “in order to create a sense of ‘ownership’ towards the information system” (p.253). According to Wainwright (in [Opit]), user-oriented information that benefit those who collect it is an incentive for accuracy of information.

4.5 Communication, learning and empowerment

Braa [KBraa] notes that there still is “a certain lack of willingness and ability to carry out participatory design” (p.1), and both [Ehn] and [Grudin] mention that even in projects where users have participated, few successes have been reported. According to Braa, the reason is usually that users, when involved, “are solely involved in the process of proposing changes, not in the actual decision making” [KBraa, p.2]. [Ehn] claims that “most users find design work boring”, and suggest three conditions to be met: “(1) it makes a difference for the participants, (2) implementation of the results are likely and (3) it is fun”(p.74): users must have a guarantee that their efforts are taken seriously.

Braa argues the need for “real user participation”, where the users must be given “insight into the design decision process” [KBraa, p.2]. She says that users should be included as early as possible to ensure

'real' participation. Also Greenbaum and Kyng stress the need for ISs to be designed "with *full participation* from the users. Full participation, of course, requires training and active cooperation, not just token representation in meetings or on committees" [G&K, p.1].

When a participatory approach is chosen, it is important that this participation is not only pro forma. But the experienced difficulties in expressing use patterns and work practices through traditional formal methods have raised an awareness that measures have to be taken and new methods have to be developed to ensure real participation and to facilitate communication.

Abrantes (in [Opit]) point to the relatively high level of abstraction and management sophistication needed for e.g. local managers to state what decisions they have the authority to make and what information this requires. He thus identifies helping users identify their needs as the major challenge for IS professionals.

4.5.1 Communicational pitfalls and mutual learning

As observed e.g. by Braa [KBraa], traditional design methods and terminology are very alienating to the users. Walsham et al [WSW88] mention the traditionally too narrow technical training of computer scientist, with no focus on social skills or the human and social aspects of ISs and the use situation, as a reason for these problems. The varying practices and amount of improvisation and tacit knowledge involved in these highly social work situations also make traditional formal descriptions fall short.

Model Monopoly

Kristin Braa uses Bråten's [Bråten] Model Monopoly theory to explain the need for mutual learning during the process. According to Bråten, all communication is about increasing knowledge and gaining a better understanding. This requires symmetrical power relations between the communicating parties where both participate in delineating the universe of discourse and choosing what models are valid. If not, the stronger part will have some degree of Model Monopoly, and the weaker part will act as a passive recipient. Any effort of the weaker to increase his knowledge will be on the stronger's premises - a monologue. An example may be a systems developer presenting an IS to a user using diagrams and symbols and terminology inherent to the discipline, and afterwards trying to make the user "participate" in the design process.

One way to avoid this situation or rebalance the power relations is to discontinue the discourse for a limited period of time, during which the

weaker part make up his own understanding outside of the stronger's influence. Such measures may also be taken in advance [KBraa].

These issues are even more relevant - and important - in a developing country context where both language and culture barriers as well as the generally much lower level of computer literacy should be carefully considered.

Learning

[Ehn] concentrate on the aspect of mutual learning when addressing communicational problems: developers and users should, together, learn about each other's discipline or domain. His point of departure is to avoid the deskilling of the users traditionally seen when automating work tasks. Not only the future information system, but also some of the design activities and decision making should be presented to the users [KBraa]. Also Walsham [W98], Braa and Sandahl [KB&S] recognize that "a detailed and continuous process of learning by the actors involved in any particular location" is necessary [W98, p.396],

Ehn focus "on human learning and communication in both the use and development of software" [Ehn, p.61]. Also Braa et al. [JBMR] emphasize the need for mutual and continuous learning "in its proper context of use" (p.21) and the need for an institutionalization of this learning.

Contributors in [B&E] and the United Nations Development Programme [undp] strongly promote the need for human capacity development in the developing countries to provide not only solutions to current crises "but also build the means to cope with future ones" (p.8). Both the [NHP] and [Boerma] stress the importance of 'human resource development', both generally and more specifically apropos the information system. [Opit] equally provide several examples of the importance of training of local managers and health workers to overcome resistance and to inspire action.

4.5.2 Empowerment: the Scandinavian approach

The Scandinavian Approach to systems development has three clearly distinguishable aspects which are characteristic for the approach: solidarity (with the grassroots levels), criticism (of established theories and "truths") and learning (evolutionary, prototyping approaches to development).

According e.g. to Bjerknes and Bratteteig [B&B], [Ehn], Braa [KBraa] and [Grudin], what distinguishes the Scandinavian Approach to systems development from other participatory approaches is its political bias. Departing from a handful of trade union initiated projects from the

1970's and onwards, focus has revolved around skilling of labour, worker satisfaction, working conditions and user empowerment. (For a more thorough description of these projects, see e.g. [B&B], [Ehn] or [Bansler].)

Braa [KBraa] uses expressions like “[e]mpowering participation” (p.30), but according to Bjercknes and Bratteteig [B&B] and Ehn, there is no direct connection between a democratic process and a democratic result: user participation is not sufficient to ensure workplace democracy.

[Grudin] claims that these projects have strong management support, contrary both to Walsham's [W92] and Ehn's view: “[p]articipatory design raises questions of democracy, power and control at the workplace. In this sense, it is a deeply controversial issue, especially from a management point of view” [Ehn, p.41]. Also Braa [KBraa] points out that “the main problems are organizational rather than technical” (p.??).

This empowerment perspective can be successfully used e.g. in South Africa, where the strive for democracy permeate all spheres of life, and where the inherited health information system, designed purely for reporting, is highly disempowering [JB&N]. It is important, in developing a decentralized health information system, to address the “empowering of local users and the creation of local ‘ownership’ to the system” [JBraaI, p.135].

An important aspect in the current restructuring of the South African health system is also the empowerment of the communities: community participation is one of the basic building blocks of the new (PHC) system, the users of the health services are also users of the health information system [JBraaI]. The IS should thus be “helping the community to formulate their needs and requirements for health services and uses the information system as a tool” (p.140). [Boerma] sees a local level health information system (HIS) as crucial for active community participation.

One of the characteristics of a “good” HIS is that the health workers are users of their own data [Boerma], that they use the information at hand to make informed decisions. There is a crucial need for political and administrative willingness to devolve power to the lower levels for them to be able to act. Bottom-up approaches and action-oriented information systems can improve usefulness, cost-effectiveness, accuracy and timeliness of information at all levels, and “implies political and administrative willingness to devolve power and resources to the grass roots” [Opit,p.417].

But although local management in many cases may lack the authority to make decisions, bin Sahan (in [Opit]) claim that “many managers at the periphery are not fully aware of the authority they possess and so do not fully exercise it. Decentralization [...] should be accompanied by a willingness and ability to manage better” (p.413), and he ask for a commitment to achieve better management. Managers often display a lack of knowledge on how to act.

The concept of empowerment also include the previously mentioned learning aspect where system and technological knowledge no longer should be confined to computer experts.

4.6 Approaches, methodology

A user can not be expected to be able to explicitly describe how a work task is done or state how a computer system may help him doing the task [Ehn], [G&K], [FRS]. This means that a shift away from the formal methods and specifications towards skill enhancement should take place: “relying more on the experiences of the designers and users can lead us towards systems that are more suitable for the workers involved” [G&K, p.15].

Walsham [W98] focus on the need to pay attention to “local norms, values and ways of doing things” when talking about IS development in the third world: many failed projects have ignored “this basic message” (p.396).

Budde et al. [Budde] and Floyd et al. [FRS] highlight a shortcoming of traditional methods: specifications cannot be completed until during construction, and many requirements to the system are not apparent until the system is in use. It is thus central not to wait for the perfect specification and the ultimate all-encompassing system to be finished, but to design something incomplete that can function as a communications enhancer and that can evolve according to experiences.

Design by doing

Practical, hands-on activities, examples and artifacts have proven useful during the design process [B&B]. They can more easily be related to the actual use situation [G&K] - or a future one [Ehn].

Both Floyd et al. [FRS] and Budde et al. [Budde] focus on the learning aspect in evolutionary approaches, promoting the use of prototypes as design artifacts to enhance communication and learning and the cooperative aspects of the design process.

4.6.1 Software evolution

Information systems are social systems, evolving and adapting to changing circumstances over time [G&K]; no tool is made once and for all [KB&S]. This should thus be addressed when designing information system: the system should evolve rather than be developed. Walsham [W92]

mention adjustments made to the systems according to experiences as a reason for bottom-up systems' success.

A central characteristic to evolutionary development approaches, compared e.g. to the traditional waterfall model (see previous section) is their lack of phases [FRS]. Development is not seen as a linear, stepwise process from problem statement to finalizing the product, rather as a cyclical, on-going process where continuous development, refinement and adaption is constantly influenced by use situation experiences. Development and application go in parallel.

4.6.2 Prototyping

Prototyping is often a central part of an evolutionary approach to systems development. There are several kinds of prototypes [Budde]: they can be early working versions to provide feedback for further development or to clarify specifications or development problems, they can be used for experimental purposes and for gaining practical experience, or they can be used as basis for communication and discussion and as aid for decision making.

The use of an evolutionary approach can be useful also in a developing country context for several reasons. The use of computers in the application domain may be previously unexplored. The future users cannot be expected to be computer literate, so the way to go is much longer from initial introduction and training to using the resulting system. So both the experimental and communicational aspects of an evolutionary prototyping approach may be used.

Chapter 5

Health Information Systems Program

In response to the proposed restructuring of the South African health sector according to a district based primary health care (PHC) approach, the Health Information System Program (HISP) was established in 1996 as a co-operative effort between two of the universities of Cape Town (the University of Cape Town - UCT - and the University of Western Cape - UWC) and the University of Oslo. The project also had support from the provincial department of health of Western Cape, the City of Cape Town Municipality and the Cape Metropolitan Council, and had administrative links with the Provincial Administration of Western Cape (PAWC). It was mainly funded by the Norwegian governmental aid organisation NORAD (until the end of October 1998).

Recognizing the interplay between an organisation and its information system, the difficulties involved with changing one or the other, and the importance of having an appropriate information system to support organizational changes, the goal of HISP was - and still is - to develop a district health information system (dhis) to support the emerging decentralized administrative structures in South Africa. The work started in three pilot districts in 1996. Today, in 2001, it is being implemented in all provinces and districts in South Africa. My findings, though, describe the situation like it was in 1999 when I performed my case study.¹

¹Such information systems are often denominated (district) health *and management* information systems ((d)h&mis) because of their intentional use to provide support for local management. I chose to use the shorter 'dhis' although management support is an integral part of the system(s) described. I have also chosen to distinguish between 'dhis' and 'DHIS', the former used for information systems in general, while the latter is used for the actual application developed by the HISP team for use in the district health system (see section 5.3).

The main objectives identified to reach this goal were:

- to design a district information system
- to ensure participation of all role players
- to develop training programs
- to computerize the system using standard software and a prototyping approach with a focus on user friendliness and adaptability
- to develop an “information culture” including regular assessment and local use. [OpenDay]

A central issue is that the information system of HISP is not meant to include all health information in South Africa. Although the new, simplified information flows are supposed replace the previously fragmented reporting system, it is only the routine monthly aggregated data that is included in the forms and in the computer system. Additional information needed at facilities, e.g. patient records, will still be present.

5.1 The three phases of HISP

HISP's life span can be roughly divided into three phases according to the shifts - or rather expansions - in geographical focus: the pilot phase, the national roll-out phase and the internationalization phase. These are not happening during isolated time periods, rather building on each other and existing in parallel. For instance, although the pilot period strictly speaking came to an end in 1998, the pilot approach is still being deployed, the pilot districts are not “finished”, and the national roll-out (still using a pilot approach, at several levels) is far from finished although the possible use of the experiences made in South Africa are being investigated in other countries.

5.1.1 The Pilot Phase: HISPP (1995-98)

Three ‘proposed health districts’ were chosen to pilot the project's procedures and approaches. Situation analyses with a focus on the existing information system (IS) were performed in the pilots, proving that the ISs in place were true reflections of their ‘organisations’ (the various health service deliverers) showing all features of centralization, fragmentation, non-coordination, lack of communication, duplication, and vertical command lines. (For a closer description of these initial findings, see p. 65.)

By the end of 1998, the pilot phase was coming to an end, and HISPP (Health Information Systems Pilot Project) presented their findings, experiences and achievements on the “HISPP Open Day” 14 October 1998. Continuous funding was not assured until just before closing date, and was provided by NUFU (Norwegian University Council) and USAID.

5.1.2 Deployment of pilot experiences: going national (1998-2000)

The promising results from the pilots motivated for a continuation of the HISP project. Approaches, methods and procedures have been continuously adapted and refined without losing the focus on empowerment, inclusion, bottom-up and local use.

In 1999, the national Department of Health decided that this “orphan” of Western Cape provided an acceptable approach to health district IS development, and more and more provinces and districts are included in the project with dissemination of procedures and ideas - and the computer system - in a “national roll-out”.

New districts in Western Cape have been included, drawing on the experiences made in the pilot districts. The new provinces use Western Cape as a pilot for provincial level aspects of the health district and dhis setup. In each province, action plans are written down, provincial Minimum Data Sets (MDS) are drawn up, and pilot districts are chosen to provide local experiences to be made, adjustments to the process to the given context, and local capacity building. Experiences are then gradually spread from these nodes.

Other organisations, e.g. the national level non-governmental organisation (NGO) Health System Trust through its Initiative for Sub-District Support (ISDS), are working on setting up health districts. Work is undertaken to co-ordinate the efforts of these organisations with HISP's to minimize overhead and duplication, ensuring effective use of sparse resources. ISDS is deploying a somewhat similar bottom-up participatory pilot approach to health district setup, so both philosophies and goals are coherent with those of HISP.

In the Kwa-Zulu Natal province, the Centre for Health, Education and Social Studies (CHESS) is included in the HISP efforts. A CHESS facilitator act as facilitator for the current pilot districts in addition to being part of the provincial MDS elaboration. EQUITY is a USAID funded project in Eastern Cape. Through an agreement with the national department of health, they has agreed funding to the HISP rollout in all the provinces. The only condition is that the provinces have to present them with an action plan for the process.

5.1.3 Globalization (2000-)

Both due to the international composition of the HISP team, to the academic links of the project and to the emerging and promising results seen, the possibilities to adapt the experiences, procedures and methods (and software) to other countries as well (South Africa acting as pilot at a national level) are being looked into. The HISP project itself draws on ex-

periences made e.g. in Ghana [JB&Hey] and in Mongolia (e.g. [JBraaPhD]), and the methodology is inspired by the Scandinavian approaches to systems development.

In Mozambique, pilot districts are chosen where situation analyses and other context investigations are undertaken, translation of the database and other documentation is under way, and Masters and PhD programmes are established at the University Eduardo Mondlane. District Health Information Systems courses have been given at the University of Oslo, and Masters students are introduced to the HISP project. Work is recently started on setting up the project in India, and several Sub-Saharan countries are looking into the possibility to adapt the process - and the software - to their local contexts.

5.2 HISP is not like the others

Major underlying philosophies of HISP and HISP procedures include empowerment, local adaptation and local use through a bottom-up process. Contrary to traditional, first world software engineering, context sensitivity and local ownership are seen as crucial elements to ensure the sustainability and use of the information system. Methods and approaches to promote these aspects are chosen to support the principles of local driven processes, context sensitivity, institutionalized training, local adaptation and user friendliness.

The ultimate goal is a sustainable information system where local use of local information supports local action according to a PHC approach.

The aim of *appropriate* computerization of the information system shows an awareness of the dangers of being overwhelmed by the technological possibilities and forgetting the original focus, and also the difficulties involved with “[t]ransforming paper-based work practice” [KB&S, p.189]. Heeks et al. [HMS] claim that half of all computer based information system projects fail, and provide many examples. They argue that ‘over-selling’ and promises causes unrealistic expectations, which in turn lead to failure of the system. HISP stands out in this regard, as the information system, not the computers, have been the focus.

5.2.1 Training issues

A central task undertaken by HISP in every new district, is the revision of the inherited information system. New tools are made to replace all the previous related to routine collection and reporting of aggregated data. (Because HISP does not aim to act as an all-embracing, comprehensive health information system, there are many tools serving other purposes at facility level that are not discarded.) All local stakeholders and service

providers are included in this initial stage, which includes sensitization of health staff to information and information system issues.

Usually, the database is installed in the district office (with appropriate training), while the recently drawn up district MDS (see p. 57) is installed at facility level - where staff is trained in its use. Additional training is provided the (voluntary) facility information personnel over time, in information handling and equally in the use of the software.

Two per facility are trained. To ensure local management support, and equally to avoid their resistance, at least one of these is from the higher level staff (nurses). As the turnover over higher-level staff many places is high, the more stable lower level is equally included in the information system, usually in the form of a clerk.

Training (of facility staff) is performed primarily as workshops where practical, hands-on training using local examples is an essential part of the agenda, and primarily performed district by district by HISP personnel. The training is usually somewhat targeted according to the participants with a shift of focus e.g. from clerks to managers. Specific training for local managers is planned.

The University of Western Cape have established Summer and Winter Schools, offering three one-week courses in information handling twice a year (beginner, intermediate and advanced levels). These are usually attended by managers of various levels, and are run by members of the HISP team.

5.2.2 Top-down failures in South Africa

There are plenty of examples in South Africa of failed health information systems (HIS). There are the 'spaghetti', top-down ones inherited along with the fragmented health system. There are also various more recent efforts. Probably due to the inherited curative and hospital focus, these are mostly hospital information systems. Still today, roughly 90% of all expenditure on new HIS development is spent on hospital information systems [JB&Hed]. Most of them suffer from "megalomania", developing all-embracing top-down systems that are supposed to include 'everything'. Key decision makers believe it is possible to 'leap-frog' from poorly functioning paper based HISs to sophisticated fully integrated solutions. According to Braa and Hedberg [JB&Hed], a majority of similar complex efforts have turned out failures in developing countries, drawing "considerable resources and attention" away from simpler, decentralized solutions.

An example is a now abandoned system in Kwa-Zulu Natal based on extensive data collection and scanning of the data to be sent electronically to be included in the central system. This system had several flaws. Firstly, it was based on high-tech solutions that soon collapsed (the scan-

ners stopped working). Secondly, the massive amount of data collected soon, especially with the technical breakdown, piled up creating an unsurmountable backlog. Thirdly, the information system included the extensive work and amount of data associated with a patient record system, while only using the elements needed for aggregation. In addition, it was an expressed intension that there should be no local use of the system except from 'feeding' it. This is, according to Walsham [W92], a typical feature of top-down systems which add extra work to the lower levels.

5.3 DHIS: the software

One of the objectives of HISPP was to provide "appropriate" computerization of the information system. The HISP software is a computerization of parts of the information system proponed by HISP, the development of the database exemplifying many aspects of the HISP process. The software has also proven to be an important actor in its own right in the district setup process ([Akrich], [JB&Hed]).

An Access database has been developed to store the routinely collected data, keeping it at a per facility basis and with links also to Excel spreadsheets to facilitate collation, analysis, presentation and use of the information. The District Health Information System database (DHIS, which I use for the software package, including both the Access database and the Excel spreadsheets) is an application incorporating the main steps of the information system: data collection and collation, semi-automated validation and reporting, and facilities for graphical presentation.

DHIS is based on the principles of freeware and open source. The software comes free of charge to enable anyone to use it. The open-source policy is adopted to support the principle of adaptability, and there has also been a wish for a network of developers to ensure continuous, locally based evolution of the software.

5.3.1 The development process

Several of the HISP members have a background in the Scandinavian approach to systems development, and the whole project is built on the assumption that information systems (ISs) are social systems into which behavior, organizational structures and ways of thinking are inscribed (see also e.g. [B&S]). There has thus been an expressed will to inscribe the "right things" also into the computerized parts of the information system, i.e. the underlying philosophies of empowerment and sustainability through ownership and bottom-up approach; of flexibility, local

adaptability and usability.

Drawing heavily on theories of participatory approaches to design and development, the first efforts included for the local driving forces themselves to design and develop the database. This proved to be a dead end: the HISP team realized that there was a need for computer experts to design a system flexible enough to incorporate and support the desired inscriptions. According to the United Nations Development Programme's Human Development Report [undp], "[p]rofessional researchers and trained technicians are essential for adapting new technologies for local use" (p.4).

This recognition didn't change the basic wish to include the users both to provide the developers with valuable knowledge about the use contexts and to provide the users with a feeling of ownership towards the system: user requests and suggestions have all the time been "a determinant factor in all decision" [JB&Hed, p.13]. There has been a process of mutual learning from day one, and people have been encouraged to provide the developers with input and feedback in any way they prefer - personally or through HISP trainers and facilitators. This has led to descriptions of the development process as "activist driven".

The adopted experimental prototyping approach with rapid developing cycles, where early working versions of the software are presented to the users, means that the users did not have to wait a long time to have some preliminary version to work with or to see the effects of proposed changes or error corrections, during the earliest stages, there could be several releases a week! As the software has grown more stable, the need for such frequent releases is diminished. The package also includes an increasing number of features and modules, and is thus much bigger and 'heavier' than during the early days, which suggest less frequent and more formalized release procedures.

Guided user participation and a prototyping approach, mutual learning and a focus on horizontal dissemination; the HISP team members have mostly been perceived as neutral moderators. This new facilitating role of developers is mentioned also by Walsham [W98] and by Bjercknes and Bratteteig [B&B]. The horizontalness can be seen as a characteristic feature of the network age [undp].

5.3.2 MDS, RMR - the information pyramid

One of the first tasks to perform in setting up the information system is reviewing the existing system(s) - tools, procedures, information and information flows. One of the more striking features of the previous system is the enormous amounts of data items to collect and report, with no local level use and often lack of use even at higher levels.

One of the foundations of a decentralized health system is the local

use of information and local actions taken according to this information (an action-led approach). The higher levels are responsible not for the health care delivery, but for ensuring the functioning of the levels below and providing them with an enabling framework to work within. This means that the information needs diminish at the same time as the information needed is of a different kind (less detail is needed). Detailed information about the lower levels should be restrained to the lower levels, resulting in an information pyramid (turned upside down in fig.5.1). An assumption is that data items and information that is not needed at local level is unlikely to be used at higher levels (Wainwright in [Opit]).

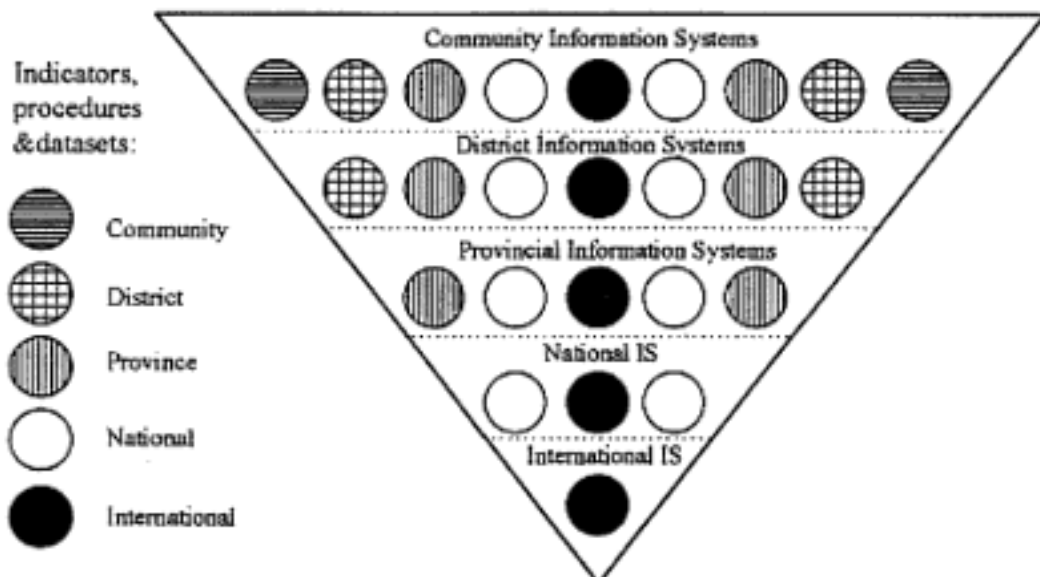


Figure 5.1: The information pyramid [OpenDay,p.42]

“Keep the focus on *minimum!*” was the advice given by an ISDS site facilitator to other districts in their start-up phase. The contrast to the previous system is striking, where success or accomplishment was proven through number of items reported as sign of work being done. [Boerma] highlight the need for HISs to include only relevant data; managers often suffer from a surfeit of information (bin Sahan in [Opit]).

Even without computerization or local management (use of information), one accomplishment in districts where HISP is or has been involved is the revision of the data collection tools and procedures (as described by [Boerma]). The local stakeholders participate in the process of drawing up a Minimum Data Set (MDS) for the district in question, building not on what has been done until now, but on the actual needs of the fa-

cilities and of the district office. There is a shift of focus from raw data, which has proven practically useless, towards data turned into information; an indicator driven approach². Basic indicators are defined according to the local context and experienced or perceived health problems. The numbers needed to calculate these indicators make up the district's MDS. Included are also the data items demanded by the provincial level (which have been going through the same process of drawing up their *Minimum Data Set*).

All facilities are to report monthly (perceived by some as too often, but a huge improvement of the multitude of weekly reports of the previous system) to the district; a Routine Monthly Report (RMR). This constitutes the district MDS, and these two terms are often used interchangeably. I tend to do the same.

Information flows

The inherited system included several separate different, partly overlapping information flows, usually one flow and command line for each and every report and higher entity. These flows often ended up in the same office or in "neighbouring" offices in the same department. Reports were often weekly.

In the district model, all reporting and communication between facilities and higher levels are supposed to go through the district office. This is a simplification for the facilities. They will report to the district, and the information will then be sent on from there to the appropriate recipient. It can also be seen as a simplification for the higher levels, which to a lesser extent need to relate to the individual facilities.

5.3.3 Flexibility

The current software allows all users to make almost any changes they want to the database. The only restriction is that for most of the changes, the user has to be logged in as 'administrator' with an openly known password. This is to provide some minimal security and avoid unintended changes.

The changes and adjustments to the database can be roughly divided into two types: the ones being done 'once and for all', or at least infrequently, and the 'daily' adjustments. A third may also be included the

²**Indicators** are an example of data turned into information and of the difference between absolute and relative numbers. Typically, indicators are calculations where a data item is divided by target population. 'Immunisation coverage' can be used to illustrate: data telling that 1000 infants have been fully immunised carries no information until combined with how many infants should have been immunised (no. of infants in the target population).

more static category: the adjustment of both the information system as a whole and the software package to other realities, like other countries. The static information is usually not subject to change by the end-users of the system as the bulk of it is entered into the database before the system is put into use in a district or facility.

'Static' information

The 'once' category includes the initial setup of the database e.g. in a newly included districts and provinces. District and facility names are entered and linked to the organizational hierarchy, along with the province's MDS, indicators etc. Experiences have shown that this is not entirely static information, though: district borders change, and the facility lists have proven to be erroneous and outdated with mistypings and wrong names, duplication of names, lacking facilities etc. New facilities may also be built or old ones abandoned. E.g. the assets of the different facilities (bed count, electricity, different types of equipment etc) is also relatively static information.

The recommendation from HISP is to revise the MDS at least once a year. The continuous evolution of DHIS and the inclusion of new modules also means that the information already present should be adjusted to the new 'versions'.

When moving into new countries, the database have to be adjusted to a new reality. For instance, the nature, name and number of the various levels in the health system may differ from the South African, and other assumptions made, consciously or not, are also brought into light. In South Africa, there are eleven official languages, and work is going on to translate the database to other languages than English. Differences in culture, world view, work practices etc are even bigger when crossing the border into other countries, and a total reconceptualization of the information system should also be reflected in the database.

Adjustments to a system in use; the most used change features

The information system is built on the assumption that local information used locally may contribute towards better management and ultimately improved health care services. The information system should be flexible enough to handle changes in the local situation without delay. At facility level, the database is currently mostly used only for data entry, thus the possibilities to change and adapt the database that are most used are the ones related to this task.

There are several rudimentary 'safety nets' built into the database to avoid the most obvious errors due e.g. to mistypings. Data should

be captured as close as possible to where it is collected such that errors spotted can be corrected immediately by the ones familiar with the actual health status of the population.

One of the safety nets that can catch the most obvious mistypings is the 'min/max' mechanism. Based on previous information for the same facility, a 'normal' range is set for all data items. Should a number be outside of these limits, a warning is displayed on the screen giving the user three alternatives: if the number was not correct: enter the correct number, if the number was correct but representing a special situation: add a comment explaining the reason, or if the number is correct and representing a lasting change in the community or its health status: edit the min/max fields to avoid superfluous warnings on later entry of correct numbers.

Another safety net is the data validation functionality, which is treated in the next section because the lack of local adjustments of the pre-defined validation rules.

One feature which often receives much attention from training course participants (maybe because of its graphical interface and because of its perceived advanced underlying algorithm), is the regression analysis. Previously entered numbers for a particular data item is used to calculate what the current number should be if the real world followed exact rules. This is presented as a graph, and the user have the possibility to change the numbers that deviate from the graph to follow the displayed line more or less precisely.

To provide the a degree of responsibility and a possibility to go back and ask the data enterer if there are any problems, each user is registered with their own user name, which is then linked to the entered data. Adding new users is done through the 'administrator' account. To ensure this link is kept, the 'administrator' is not allowed to enter data.

Less frequently used change options

The low levels of computer literacy, the lack of management and decision making culture, the long-term nature of changing information systems and mind sets, and the lack of time and resources, are probably reasons why most users still stick to the simplest use of the database. As the information system as a whole grows more mature and a district management and information culture evolves, the more advanced features of the database will probably be more used.

The information pyramid where each level should only demand a *minimum* of information from the level below to support own functions, leaves up to the lower levels to include additional information in the system for own use. Provinces and districts define their MDS by adding indicators and data items appropriate to the local situation to the next

level's MDS. There are also differences between facilities within districts, and they have the possibility to add to the district MDS what they find suitable for own needs.

One of the legacies of the previous information system is the focus on data items. The road towards a more indicator driven, action-led approach to information is long, and the possibility of districts and facilities to add, change or remove indicators is currently not much used.

Another 'safety net' in the database are the validation rules, which can be changed (or new ones added) but seldom are. These rules are included to catch errors, or to provoke a reaction at facility or district levels as breaking them may represent a problematic situation. A handful of predefined validation rules are added to the database. Succeeding each data entry, the users are (automatically) reminded to run these rules on the data set.

There are two types of such rules: absolute rules and expert rules. The absolute rules are included to catch mistypings and errors in the data sets, while the latter type may indicate a health problem in the population. One example is that not more than a third of the children weighed should be malnourished (more specifically defined in the software and procedure guidelines), an expert rule. The number of malnourished children seen should not be higher than the total number of children weighed - an absolute rule.

5.3.4 Other features

The current use of the software (1999) vary between provinces, districts and facilities. Levels of computer literacy, how long they have been part of the project, amount of experience, accessibility of nearest computer, personality of the local key person(s), training approaches, amount of support and feedback - and demands! - from above, all play part in explaining the reasons.

The information pyramid, where lower levels are free to add items to what is demanded by the next level, could have made the monthly reporting rather cumbersome when fields would have to be removed or included, one by one, by hand. In DHIS, each data field includes the information of which level it 'belongs' to, and when the user chooses which level to report to, the fields are automatically sorted according to level.

Where there are facility computers, they have a choice on how to deliver their RMR to the district office. They can e-mail it or use a floppy disk (or print it out, but that means duplication of work as the data would have to be entered one more time, also opening for additional errors to occur). The database has export/import functionality which makes this a rather simple procedure.

One rather simple feature that is very much used and appreciated is the 'crosstab listing' where a facility can see their own data for the previous six or twelve months listed together.

Excel

Linked up to the Access database data files are some pre-defined Excel spreadsheets. They provide the opportunity for the users to see the data presented in pivot tables, and to present chosen items or indicators as graphs. These graphs can then in turn be linked into Word documents to be included in reports.

One of the apparently more attractive uses of these graphs, in addition to showing related phenomena's or indicators' correlation, is the possibility to compare several clinics.

Graphs, histograms and other graphical presentations of the data are equally a way to facilitate communication with non-health and non-information persons, e.g. the community. "[G]raphs will enhance insight" [Boerma,p.41].

5.4 The Six Steps

A district health and management information system is seen as a crucial element in the process of developing district structures and create awareness. The District Management Team (DMT) need supply of reliable information, and the legacy was an information system that did not serve their management needs. HISPP elaborated their "Six Steps to develop a district health information system" (e.g.[JBPhD]); "a few simple steps towards empowering district teams to turn available data into locally useful information" (p.258):

0. Select pilot sites
1. Form an information team
2. Perform an information audit
3. Set objectives, targets, indicators and elaborate MDS
4. Create district based information system and structures
5. Develop staff skills and understanding of information management
6. Create a **district information culture**

These steps are neither rigidly followed nor mutually exclusive, on the contrary they are used as guidelines and go on in parallel as an ongoing and cyclical learning process. Another central point is the need for a local team to drive the process, be it the local DMT or a more targeted team.

Chapter 6

Data and findings: Places I have been

In this chapter and the following one, I will present the findings of my field work. I have chosen to split this presentation into two separate chapters to improve readability.

In this first chapter, I have adopted a geographical view to present the different places (provinces and districts) from which I draw my examples, in a somewhat condensed form. This is to give the reader an overview of the situation. Some retrospective information is also included. This chapter may function as a sort of abstract or referential chapter.

In the next chapter, chapter 7 (starting on p. 79), examples are presented at a much more detailed level to highlight some major areas of concern presented in the introductory chapters.

In this chapter, I will not be able to present, point by point, exactly the same aspects in every place I have been looking at. This is due partly to the nature of the project that is the subject of my case study: different areas find themselves at different phases of the implementation, and much of the process is adjusted to the local context, so that it might not have been possible to pay justice to the project – or the process – if I had adopted a more narrow methodology during my case study.

Another reason is the different weight put on the different areas during my case study: my main focus was on the Cape Town area as this is where the HISP project started and thus the experiences covering the longest time span can be found. Being the central location of the HISP team, this was also a practical choice. To avoid too much extra work for participants other places, I chose to look at and participate in what was going on there at the time instead of demanding much extra attention

and special considerations being taken. I have tried, though, to find similarities and links between various levels and to generalize to a certain extent.

The places

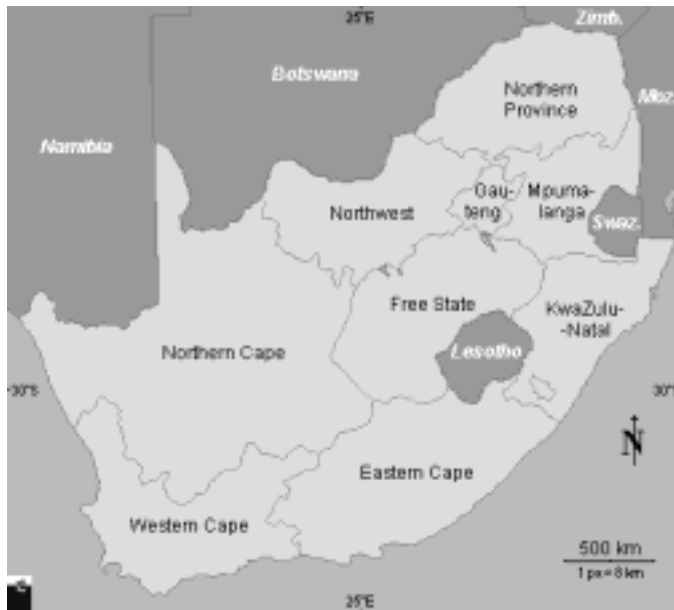


Figure 6.1: The South African provinces

There are many similarities between the different South African provinces. Overall characteristics of the health system include fragmentation and segregation, centralism, top-down bureaucracy and administration; curative hospital focus; inefficiency and inequity. Even when looking only at the public health services, the extreme fragmentation has led to a duplication of services in many places. Although the provinces display differences, internally and in face of each other, these common problems have to be faced in the current restructuring of the health sector.

Information systems

The existing (inherited) health information systems, they mirror the overall characteristics of fragmentation, lack of communication and co-ordination and centralism. There has been a one-way delivery of huge amounts of raw data mostly used for archiving at higher levels, these higher levels'

aggregation hiding deviations, facts and errors. If used at all, these workload-focused data have been used solely for retrospective analysis.

The initial situation analyses that were carried out in the three HISPP pilot sites have proven to be valid also in other parts of the country. The major findings of these analyses were [OpenDay]:

- huge amount of data were collected and reported separately, most often at a weekly basis (sometimes even ending up in the same head office!), often incorporating the same data items several times (leading to duplication, inconsistency, errors). Up to 40% of the nurses' time (Atlantis) or about 20% of all staff's time (Mitchell's Plain) was spent on data collection and reporting.
- the multitude of forms was also caused by the practice of designing new forms from scratch each and every time there was a (perceived) need for something new, seldom abandoning old ones (instead of reviewing and adjusting the existing forms), leading to the inclusion of a lot of irrelevant and "outdated" information
- a strong workload focus (versus health status or relevance or quality of services)
- no or very little feedback on reported numbers - only in case of obvious errors, and aggregated data in e.g. annual reports
- lack of standards for data definition, reporting and the use of different target populations meant that data from different sources could not be compared.
- no central point in district where information for the district could be found, not even within the various organisations
- "holes" in the data as no-one had been focusing on data for the district as a whole
- no local processing, analysis or use of information. Often no use at higher levels either due to the amount of data they received
- no management experience or expertise at local level, no local structures to demand, keep or make use of information.

The provinces from which I draw my examples are Western Cape, Eastern Cape, Kwa-Zulu Natal and North-West Province. Western Cape is somewhat different from the other provinces as it is the only one not to include any new areas (formerly autonome or self-governed areas, e.g. homelands) inside of its 1994 borders. These two "groups" of provinces thus have slightly different histories as Western Cape is -

only - a part of the old Cape province, while the others (Eastern Cape, Northern Cape, North-West Province, Northern Province, Kwa-Zulu Natal, Gauteng, Mpumalanga and Free State) cover areas with different historical backgrounds and administrations. This amalgamation of different areas have, to a much greater extent than in Western Cape, called for a more thorough and total restructuring of administrative structures.

6.1 Western Cape

The Western Cape Province, the “heart” of the old Cape Province, covers the south-west corner of South Africa with Cape Town located in the south-west corner of the province. At the redrawing of the provinces, it was possible to keep the administrative, organisational and political structures already in place with just a smaller geographical area to administer.

Western Cape is one of the provinces where the delineation of districts is not yet finalized. All district related names, posts and functions are thus only interim, and these interim structures have no powers invested in them, budgetarial, decision-making or otherwise.

All districts included in this thesis are located in or around Cape Town, in what is often called the Cape Metropolitan area, the area that is supposed to be brought together under one single regional authority; the Unicity (see below).

Health care delivery

Public primary health care (PHC) delivery in Western Cape is administered from three different levels: clinics (offering mainly preventive care) are run by the local governments, Maternity Obstetric Units (MOUs) are run from a regional level, while curative care, offered by Community Health Centres (CHCs, formerly known as Day Care Hospitals), is administered from provincial level. Vertical programmes like nutrition, family planning, mother and child health, tuberculosis (TB), HIV/AIDS are administered separately. In addition, health services are delivered from a variety of private and public hospitals, private practitioners, non-governmental organisations, community health workers and traditional healers, filling out the picture of vertical and horizontal fragmentation.

The Cape Metropolitan Area and the Unicity

The Cape Metropolitan area (with its Cape Metropolitan Council; CMC) is presently divided into six local governments, this thesis focusing on three of them (the Cities of Cape Town and Tygerberg and the Municipality of South Peninsula). Except from South Peninsula, each local government covers several districts ranging all the way from upper class residential areas to poor, under-resourced and under-developed townships and shack dwellings areas. These local governments are part of the legacy from Apartheid (see ch. 3.4).

A new restructuring is planned in the area. In an effort to provide a more coherent structure within which to set up the district health system, the creation of a Unicity covering the whole Metropolitan area is

on its way. According to the original plans, it was to be in place at the time of the local government elections of fall -99, but by May 2000 it was “delayed by at least a year”. The hope is for this overall structure to lessen the separation that the current local governments imposed on the health districts; to facilitate the low level functional integration of the various service providers and to have a general unifying effect.

Townships

Generally, the townships around Cape Town are very poor areas, some mainly built up from and around shacks and squatter camps, areas that by any standard can be called ‘slum’. Some places, the government has provided some housing schemes, without this introducing any luxury into the lives of the inhabitants. The infrastructure is mostly poorly developed. During Apartheid, it is said that the government waited for people to go home where they belonged, i.e. their homelands (mainly Transkei), with an enormous infrastructural backlog as the result. It is not unusual for the unemployment level to close in on 50% (reaching nearly 70% in an area in the outskirts of the Cape area¹), and the crime rates tend to be very high. Many other sorts of related social problems also occur, like drug and alcohol abuse, and the health status of the population is clearly affected, with e.g. violence as one of the major causes of death, and tuberculosis as a main problem with staggering high interruption rates and accordingly low cure rates.

The main “township districts” providing examples in this thesis are Khayelitsha and Guguletu/Nyanga. Mitchell’s Plain is also mentioned. Both Khayelitsha and Mitchell’s Plain have been part of the HISP project from its first start as a pilot project (HISPP).

The South Peninsula Municipality, borders coinciding with those of the South Peninsula district, covers an area with about the same internal diversity as any other of the local governments (ranging from informal shack settlements to middle class residential areas) including also the conservation area of Cape of Good Hope.

A very central difference between these districts is their legacy. The City of Cape Town (CCT) was ‘whites only’, and included Mitchell’s Plain (coloured township) under the Municipality. Neighbouring Khayelitsha (black township) was administered from another local government, the City of Tygerberg (CTy). South Peninsula (SP) was a separate local government. At the delineation of the “proposed” health districts, CTy was split into several districts, as was CCT, while the SP district came to cover the same area as the municipality.

¹<http://www.mg.co.za/>, 9. February 2001

Although not covered to the same extent, examples from other districts within the three main local governments may appear, and some things are also seen from a higher level's view (e.g. provincial).

HISP in Western Cape

The organizational fragmentation in Western Cape persists. The province and the local governments still deliver health services in a non-integrated manner. The "district" structures are relying on other people's and structures' good will to be able to perform their duties.

The district information officers of the Metropolitan area meet on a monthly basis as a "warm up" to the Unicity situation and the formalization of the districts.

Khayelitsha One of the original three HISPP pilot sites; been part of the project since the start in 1996. The information system was developed at district level, where various committees were in place but no formal district structures. This lack of structures was soon seen as a big problem. They realized they needed a stable administrative framework within which the information system could function, and focus shifted gradually towards a regional level. Here, between the province and the districts, there were administrative structures and stability, and the new "integrated information" was analysed, used and fed back to the facility level.

Still (1999), after additional years of work, there is no stable framework for the information system to work within, districts are still "proposed" and district functions are interim posts.

All signs of a functioning local level information system ceased to exist by the beginning of 2000 (descriptions changing from "stand-still" (-99) to "going backwards" ('00)) - at the time of the withdrawal of the local HISP facilitator. Before that, local clerks entered own data ("supervised entry") and brought back crosstab listing as feedback to their facilities - apparently no discussion or use of information at facility level. Non-functioning information flows from district towards higher levels (local government). Monthly district team meetings, regular information staff meetings. Lack of routines and formalization. Relatively high turn-over of facility staff: Khayelitsha is a place people want to move on from. Resistance from the main public deliverer of curative care, the CHSO (Community Health Services Organisation) - appointment of a local CHSO manager as site co-ordinator mid-99. All facilities in Khayelitsha have computers.

Guguletu Monthly information staff meetings – apparently little use of the data or information collected by the staff. Monthly supervised data entry at district office. According to the local facilitator, facility staff “shows initiative” compared to e.g. Khayelitsha, where “they have to be pushed”. There seems to be an understanding of the importance of integration of all stakeholders including the community. Very few computers.

Mitchell’s Plain One of the HISPP pilots. Went from total stand-still and no signs of district life mid-99 towards functioning discussion groups by mid-00. Since the start, there has been a lack of stability not only among the local health workers, but also of HISP facilitators. According to the current facilitator (-99), little enthusiasm among the staff.

South Peninsula Apparently doing well with formal administrative conditions more favorable a propos health district and district information system establishment. This district “has good prospects for integration” [OpenDay], facilitated through the coinciding borders of the local government and the (interim) health district. Continuous work on the integration of the different public health service providers. Clustering of facilities, regular discussion groups (“supervised meetings”) which give some kind of group pressure to try to improve the situation. Special attention given to recognized areas of concern (e.g. tuberculosis).

Problems

One issue that is brought forth by several as a the major reason for the slow-down, stand-still or lack of progress of the process in some districts, is the lack of formality of the district structures and the continuous fragmentation of the health services. Some of the districts have participated for several years, and the lack of coming through of anticipated changes and the continuous struggles with the same problems for years have led to disappointment and burning out of facility personnel, key persons and other driving forces.

Some also mention the pilot approach as a possible reason as previous pilot sites have experienced abrupt changes in amount of attention and help received. The more general burn-out might have been reinforced by a ‘pilot period ended, what now?’ feeling. But, on the other hand, if a project cannot survive without “life support”, the process can hardly be called sustainable.

Another central issue is the lack of time of facility staff – to attend training and to perform the tasks associated with the new information

system. Apart from the more obvious resource reason, this is partly caused by lack of management support and lack of progress in the formalization process since job descriptions at all levels do not yet include information handling.

6.2 Eastern Cape

The Eastern Cape province covers the areas stretching the east coast of South Africa from the Western Cape border up to Kwa-Zulu Natal. The province can be seen to consist of two main parts: the included parts of the former Cape Province, and the former homelands of Ciskei and Transkei. The province is further divided into five regions named A through E. According to a HISP trainer, the attitudes towards the restructuring of the health system clearly differ between these two settings

The previous homelands are poor areas with poorly developed infrastructure (a general lack of e.g. tarred roads, clean water, electricity, ...) and an underdeveloped health sector. Education and training were also neglected areas, there have been claims that this was done on purpose. The concept of 'Bantu education' covers this - deliberate or not - lower level or standard of education.

Each region has a dedicated information co-ordinator, and there are two posts at provincial level to handle health information. Most of the communication between the districts and the provincial level goes through the regional co-ordinator.

The lack of infrastructure also affects the health facilities, with internal variations within the districts: in Mount Frere, no clinics in the Tabankulu sub-district had "both piped water and electricity while 20% in Mount Frere had both water and electricity." [MFAnn, p.12]. Tabankulu hospital, for instance, gets its electricity from two generators, while the Mkemane clinic has a solar panel driven refrigerator to store vaccines (the latter funded by an American aid organisation).

The general trend is to find computers in the district offices and in the major hospitals. Due to the lack of resources, physical and technical infrastructure and other supportive structures, facility computers is not an issue.

A majority of the population survive on subsistence farming, and large areas between the villages are covered with grassland for cattle and goats. Districts have been delineated since early 1998, HISP implemented at district level from late -98.

Apart from some general views on the the province as a whole, the two districts from which I draw my examples - Flagstaff and Mount Frere - are both located east in Eastern Cape (region E) in typical Transkei landscapes, the latter bordering the neighboring province of Kwa-Zulu Natal.

Health care delivery

Primary health care (PHC) in the former homelands was primarily administered through a district hospital system. Each (district) hospital (most of them former mission hospitals) would serve a clearly defined target area through a number of “daughter clinics” and mobile/satellite services (going around to the farms at e.g. six weeks intervals) in addition to providing some clinic services at the hospital.

At the establishment of health districts, district structures being added “on the side” of the district hospital system. Most of the districts cover the area of more than one district hospital, sometimes the district border is even drawn between a clinic and its ‘mother’ hospital. The resulting problems are similar to those experienced in the Cape Metropolitan Area apropos mismatch between local government and district borders. The districts hospitals provide some degree of sub-district functionality. This situation with two parallel systems presents an internal fragmentation within the districts and is causing some slow-down of the progress of the health district system – both through the inheritance of procedures and structures and through the resistance to change seen in the old system.

The district hospitals are also in charge of distributing drugs to their clinics. They receive drugs from the central store every six weeks, and redistribute them to the clinics according to varying schemes and frequencies. Recognized as a problematic area, both due to theft, lack of transport and a general lack of access to essential drugs, Eastern Cape was the first province to develop an Essential Drugs List (EDL) to monitor the drug distribution of the province. Others are building on their experiences.

Districts and HISP

District teams are formed, with three(!) information officers (data entry clerk, support and information officer), and managers for the different (still separated) vertical programs. Monthly data (RMR and EDL) come to the district office on paper, where data is entered into the district computer. Mainly due to lack of communication and transportation, monthly data are often delayed. The timeliness is also affected by the instability of the staff mentioned above.

Due to the physical characteristics of the area and the lack of infrastructure and means of transportation, regular meetings is difficult, but one of the district managers arranges meetings every month in each of the sub-districts (divisions following the managerial borders of the district hospitals). The characteristics of the area still makes visible the need to adjust the HISP procedures to the local context as e.g. supervised

meetings (South Peninsula) or supervised entry (Khayelitsha) is hardly feasible, and other methods must be deployed.

A central issue that has been pointed out by several, e.g. HISP team members, is thus the importance of providing the lower levels with regular feedback. Its perceived importance can be seen in the planning of a semi-automatic feedback module to include in the HISP software. The least to expect should be “what they send in”, i.e. a crosstab listing like in Khayelitsha. Several of the staff members mentioned the possibility to compare themselves to other facilities when asked what they would like to receive.

Problems

One obvious and recognized problem with the continuous existence of the district hospital system is the institutionalized rotation of nurses. All clinics traditionally “belong” to a hospital, as do the nurses. These nurses are sent out to the facilities for six months at a time, “constantly longing back” to the hospital. “People don’t want to stay out there”, and terms like “isolation, motivation, sanitation” are used as explanations. This instability of (higher level) facility staff strongly affects the functioning of the district health and information systems both when it comes to training and to use.

A similar problem has been encountered in Khayelitsha, where the lack of stability of the staff was seen as a threat to the IS. As the lower level staff is much more stable, it was decided to include them in the information system to ensure some continuity. A central point was how to present this to the nurses to avoid them feeling bypassed or their powers threatened in any way. This approach is investigated also in Eastern Cape.

The lack both of resources, infrastructure, and information and management training and culture clearly affect the setup and functioning of the information system, but still, Eastern Cape is mostly referred to as “doing OK”: data is entered every month, but the ability to analyse and use the information is sub-optimal.

6.3 Kwa-Zulu Natal

Kwa-Zulu Natal, stretching east and north from the Eastern Cape border, is much in the same situation as Eastern Cape trying to incorporate under one single administration several types of previously self-governed areas. With some internal differences, district setup work started in 1997/-98.

Much like in Western Cape (ch. 6.1), district structures and boundaries are not yet formalized, with similar problems associated. Some few pilot districts were chosen to implement HISP in 1998, and during 1999, three more were included in the process.

Included in this thesis are the districts of Mount Currie, bordering Eastern Cape in the province's far south-west corner (sharing many of the Transkeian characteristics and hosting e.g. health services for the population across the province border²), and one of the Durban Metropolitan area's districts (Western Health District). There are also some references to the Impendle/Pholela/Underberg (IPU) district north-west of the Mt Currie district, which was the first ISDS pilot site in the province (a very short presentation of ISDS is included on p. 53).

Health care delivery

At provincial level, the area now incorporated into the Kwa-Zulu Natal province had as much as six separate departments of health administering health care delivery to different areas and races. Most public PHC is now delivered through the province and through local governments. Previous homelands also have a district hospital system similar to the one found in Eastern Cape (see previous section) facing similar problems.

Information systems in the districts

In Durban, there are district teams which are currently (1999) engaged in meeting and workshop activity to set up the information system. A situation analysis on information was performed during August 1999. Work was undertaken on drawing up a MDS and new information flows during my field work period. The district management team met regularly assessing the process and the progress.

²"It is significant to note that some 90% of the two towns [of Mount Currie] trade is from the Eastern Province, while more than 60% and at times up to 90% of the Mount Currie hospitals and clinics patient load are also from across the border." [<http://www.hst.org.za/isds/map/mtcurrie.htm>, 3.May 2001]

The Kohtsong SANTA (South African National Tuberculosis Association) TB hospital located in Mount Currie also see a substantial amount of their patients coming from Eastern Cape.

It was apparently some difficulties associated with the selection of the Western Health District as a pilot because all of the Durban districts wanted to participate. Both as the pilot approach has proven successful and as HISP resources are scarce, one district was picked out to receive special attention while the others are allowed to join in on workshops and some overall training.

In the IPU district, a district MDS has been elaborated and implemented at facility and district level. Inclusion of local staff and bottom-up approaches have been central during the entire process. Facilities send in raw data to the district office, but are reluctant to compile and analyse the data: they are supposed to include a short report to follow the data. Regular meetings are held. District hospitals are not integrated, and the ISDS facilitator has experienced constraints and hostility based on her status as NGO representative. There is no active use of information, and a substantial amount of errors are spotted in the facility data.

In Mount Currie, a district management team is set up, and they describe themselves as having a relatively integrated health sector due to the difficult resource situation. A district MDS were under elaboration during my stay; through an indicator-driven approach.

Facilitating in the current pilots (Mount Currie and Durban mentioned here) is undertaken by a CHESS facilitator with support from HISP.

A provincial MDS is under way (1999). The province is starting to recognize the work and initiatives at lower levels, also recognizing the usefulness of the experiences made e.g. by ISDS.

Problems

The continuous fragmentation of the health services is a problem in Kwa-Zulu Natal, as is the lack of formality of the district structures (applying for district related posts characterized as “not a career move”) and the lack of decentralization of powers from provincial level. There has been a lack of provincial support for the reorganization (one of the major tasks to undertake in Durban identified as being “to sell the idea”).

6.4 North-West Province

The North-West Province is located in the inland in South Africa. I have not focused on any particular districts in this province. Incorporating both Cape areas and previous homeland areas, and thus struggling with immense internal differences, this was one of the provinces to start over from scratch rebuilding all administrative structures.

Districts were delineated and district teams formed during 1998, and district managers meet monthly. The HISP project was introduced in the province early 1999, and staff training was planned to start in September the same year after the finalizing of a common district Minimum Data Set in June.

This is the province that has been described by one of its previous district managers as “the province that has come the furthest”. The whole district setup process can be characterized as a bottom-up process where they have been used to “take what [they] want” faced with a reluctant provincial level. District managers meet up monthly, but “it is not sufficient to appoint a district team to make a functioning health district” [HISP member].

Health care delivery

This province experiences many of the same problems as Eastern Cape and Kwa-Zulu Natal with different areas, each internally fragmented, being incorporated into one province. This can be seen e.g. in the drug distribution system, where the entire province is part of the same system and has one common distributor – except from the former homelands.

Problems

The reluctance of the provincial level to decentralize powers and authority is perceived a major problem. It also reinforces the effects of the overall lack of and inequity in the distribution of resources, both human and technical through heavy, top-down bureaucracy and on-going fragmentation of services.

The lack of provincial interest and support vis-à-vis the health district development have, in the North-West Province, turned an incentive for the whole district setup process to be initiated and performed bottom-up.

The district managers are reluctant to buy the idea of choosing pilot districts as they would rather include all districts and help each other on the way “like they are used to”.

Chapter 7

Data and findings: Things I have seen

My findings cover a wide range of aspects, different geographical areas and administrative levels. This has made it somewhat difficult to find a way of presenting them according to the subject matter of this thesis. The previous chapter includes a geographical overview, while this chapter presents examples of constraints seen (constraints to systems development in South Africa), of problematic areas in need of attention, and of efforts made and approaches deployed and their results.

Functioning or functioning?

A major divide concerns what I have identified to be “the two levels of functioning” of the information system. At a ‘technical’ level, there is a need for a stable organizational framework within which to install the information system and within which it can run. But then there is a ‘social’ or ‘human’ level where data is turned into information, which in turn is used to trigger action (what is also called “information culture” [JBPhD]). This second, ‘social’, level, is closely related to integration and training.

The different sections of this chapter highlight different central problem areas related to this dichotomy: first concerning the technical functioning, then looking at more social aspects. The former type can maybe be labeled organizational or contextual, while the latter, ‘social’, include e.g. description of training approaches and of elements of the information system.

The difference between the two types is often far from clear, in this complex web or network, most if not all aspects are related and influence

each other, and there are many border cases.

7.1 The two levels of functioning

Three examples are given below to illustrate the two levels of functioning, starting with a success story. These are seen in contrast to the situation in Khayelitsha, where not even 'technical' functioning have been achieved (see p. 70).

Delineation to promote focus

South Peninsula (SP) is the only district in the Cape Metropolitan area where the district borders coincide with those of the local government in the area; the South Peninsula Municipality. The two administrations even reside the same building.

This obviously facilitate the integration between the two administrative entities and between the various service providers. One reason is that the focus of the two bodies apropos health issues and areas that need special attention is the same because of the overlapping target area and target population, and thus also goals. The physical proximity also enhances the possibility of the two to communicate and integrate efforts. The common forces and the possibility to share sparse resources make results more probable.

Not only the physical co-location creates this favourable environment, these already existing administrative structures have proven decisive for the establishment of the information system, the 'technical' functioning of the information system. Later sections will provide examples of use of information in this district.

According to [Opit], it is crucial that changes in the information system and organizational changes go in parallel for any changes to come through.

Lack of use

In most districts, the information provided by the facilities is seldom used. This can be explained by many factors, factors which hopefully disappear over time as the new information system gets institutionalized and changes come through.

First of all, there is a general lack of management expertise and knowledge particularly at lower levels. It is difficult to train people to see numbers not as data but as information, but there are examples of progress (see above). Secondly, the districts often lack authority and powers to act on the information (e.g. Western Cape, Kwa-Zulu Natal), which makes

a first, 'technical', level functioning of the system difficult. The new information system is not yet institutionalized, and job descriptions at all levels still do not include information handling. This has led to persistence of the inherited view of informational work as additional work. At least in Western Cape, this situation is slowly changing.

Drugs out of stock in Flagstaff

Flagstaff clinic located in the Flagstaff district of Eastern Cape usually have a staggering 30% out of stock on essential drugs. Located in one of the towns where people attend this clinic when in town for other business, this clinic has a high and variable number of patients; a fluctuating target population. They themselves mentioned a handful of reasons why they do not receive the ordered quantity of drugs from the distributing hospital: gaining larger budgetary responsibility, the hospital has become more careful with sending out expensive drugs, starting with those ordering the largest quantities (other clinics of the same hospital generally receiving more or less what they ordered). The clinic is also aware of the situation, so they tend to order more than they need so that they at least receive as much as possible. In addition, the guy responsible for the dispensary at the hospital was characterized as a not very 'organized' mind.

The lack of use of the information was seen at my visit to the district office. When asked if there was anything out of the ordinary to look at, the District Information Officer (DIO) did not mention this high out-of-stock level of the clinic next-door. The DIO claimed that the number was correct; he had apparently checked it out - but not recognized it as a problematic situation.

This illustrates the second, 'social', level of functioning of the information system. In Khayelitsha, for instance (see overview p. 70), there were no administrative structures within which to implement the information system. When HISP was rolled out to Eastern Cape, such structures were in place and district information teams already employed. The district information office was seen as a technical office, and was not integrated with the district health management. The information team have not been trained in health issues.

The example shows that this situation persists: the information office is still unintegrated with the district management, the information officer is still unaware of health and management issues; there is a lack of *use* of information.

Awareness of strange numbers

As one of the recognized shortcomings of the previous information system was the amount of errors found in the data, some semi-automatic features are added to the software: the min/max range and the validation rules (for a further explanation, see ch. 5). They have a double function as they react on 'strange' numbers: these numbers can be wrong, or they can indicate a problematic or unwanted situation; covering both levels of functioning (see p. 79, and the above example on drug availability in Flagstaff).

The purpose is thus also to make staff aware of the information contained in the numbers. A problem, though, is that most people, when getting a warning from the system, tend to change the 'legal' range of numbers instead of reacting on them. This is somewhat related to the generally low level of informational and managerial competence in South Africa and other developing countries. During training sessions and supervised entry, a major task is to make people discuss these strange numbers instead of automatically adjusting the system to accept them; focusing on the 'social' functioning of the system.

7.2 'Technical' functioning; context issues

7.2.1 Organizational change

"All provinces struggle with some sort of political and administrative problems." [HISP team member]

According to the two levels of functioning, changes in the information system have to be accompanied by organizational changes. There needs to be a strong political will to commit to changes. The previous section described how the lack of administrative structures in place forms a barrier to implementation of the information system. This necessitate a strong political will both to commit to the changes and to devolve the powers necessary to act locally [Opit].

One of the very first steps in setting up a health district and health information system is to delineate the district. Without knowing the target population, it is very difficult, not to say impossible, to deliver targeted, comprehensive primary health care and to set up an information system to support it. In South Africa, it has been left to the individual provinces to decide how and when to draw the borders. Adding to the existing chaotic picture, this adds an extra layer of difficulties in the current restructuring.

Mismatching borders and internal differences

The internal differences in South Africa are huge, the divides further deepened by the separative politics adopted by the previous governments. The current inclusion of all areas under a common administration often brings these differences to light, seen e.g. in the North-West Province, where poorer districts complain why they wouldn't receive no government vehicles while other, neighboring, districts had several. This can be seen as an example of the reluctance at provincial level to commit to changes. Political will to devolve powers and managers' commitment to changes are seen as crucial by [Opit] to ensure a sustainable development.

During the years after the 1994 elections, several restructuring efforts have been undertaken to try to overcome the inherited inequities. Not all efforts have been successful, according to a Western Cape provincial information officer, and not all have been co-ordinated. Still new restructurings are being performed. In the Cape Town area of Western Cape, there is a mismatch between local government and district borders, creating problems when it comes to focus and areas of concern of the different administrative structures. Most local governments cover more than one district with huge internal differences both within and between districts. This can also be a problem at provincial level several places.

This situation in Cape Town is meant to change when districts are formalized and given more administrative and budgetary independence and authority (with the creation of the umbrella Unicity replacing the current six local governments). The lack of powers of the (interim) district structures has been identified as one of the main barriers to the information system [JB&Hed]

The opposite is seen e.g. in South Peninsula (see previous section), where the district efforts are facilitated by the cooperation between the district and the municipality, enhanced by their common borders.

In Eastern Cape, previously neglected areas are drawing attention away from the previously privileged ones. This can obviously be frustrating for health personnel working in these latter areas, having a hard time providing services to their target populations. According to a HISP trainer, the differences in attitudes towards the health information system and restructuring between previous Cape areas and previous homelands are striking.

In Eastern Cape, a redrawing of all the districts' borders is currently under way (2001), drastically reducing the total number of districts. It is too early to say what this will do to the already established districts, both when it comes to the emerging information system and when it comes to existing employees of the districts. In the Northern Province,

district borders were drawn just to be discarded.

The issue of internal differences is reinforced by the general lack of resources. This is far more expressed in developing than in developed countries. The issue of instable and mismatching borders, though, is present in both settings.

Lack of formality and authority; burn-out

In both Western Cape and Kwa-Zulu Natal, the lack of formality and thus authority in the district structures are creating problems. One is the general lack of ability to act, another is the difficulties experienced when trying to employ people: Applying for the *interim* district posts (information officer or other) is “not a career move”, according to the District Team of the Western Health District of Durban (Kwa-Zulu Natal), especially since no-one knows for sure when the situation will turn more stable.

In Western Cape, where some districts have been participating for more than four years, the lack of organizational change and progress towards functioning health districts is often mentioned as a reason why people are getting “fed up of waiting” and “burning out” [various HISP members]. It is a rather poor incentive, too, to do a lot of work, often perceived by over-worked staff as additional, when there is no further use of the outcome.

[Ehn] is among those who point out that implementation of the results must be likely.

The extremely rapid prototyping cycles undertaken during the early development stages of the software was partly due to the importance of providing feedback to the participators as ‘proof’ of their efforts being taken seriously. It was also crucial to avoid negative stakeholders to determine the pace of the process, and the HISP team was already early on aware of the danger that the local driving forces could “run out of steam” if results and feedback were slow.

This can be linked to what e.g. [Ehn] mention as an important aspect to ensure continuous goodwill and participation: “implementation of the results are likely” (p.74). Kristin Braa [KBraa] focus on the need to support not only current, but equally anticipated work tasks.

7.2.2 Communication

No motivation for vertical communication

There are other examples of the lack of communication between local government and ‘district’ structures seen e.g. in Khayelitsha. In this district, facility personnel come to the district office once a month to

enter facility data into the district computer. For the district to function as the intended gateway of information (facilities report to district, they handle the further distribution of information), information is supposed to be reported monthly from the district to the local governments (the Routine Monthly Report; the RMR).

The local governments are relics from the past (see ch. 3.4). At the creation of the Unicity (p. 68), they are supposed to be abandoned and the health districts will be formalized.

In Khayelitsha, facilities have kept duplicating the information flows still sending the monthly (paper-based) RMR to the local authority (City of Tygerberg; CTy) in addition to entering these data into the district computer (instead of the district forwarding the information). When directly asked, the facilitator claimed that “it is the district’s job to know”, probably pointing to the future, not yet implemented structures, where the district is a administratively functioning unit and the local authorities are replaced by the Unicity ‘region’.

But, as the CTy information manager pointed out, the duplication of processes and information in the ‘district’ and the local government has to continue until the district functions “perfectly” - and the lack of reporting obviously was a sign that it wasn’t. There was apparently no effort to institutionalize this routine upwards reporting.

The institutionalization of new work practices is at the core of the development from within approaches [JB&N], but has to be accompanied by changes in the organizational structures [Opit].

The situation was pointed out by the CTy information manager, which then attended a Khayelitsha site meeting to inquire the situation - an ad hoc attendance.

One reason for the lack of communication between the CTy local government and the district seem to stem from personal relations as the local facilitator and the CTy information manager were not getting along very well. It equally seemed that such more personal issues was behind several of the problems experienced in this district.

The workload of the facilitator, the future disappearance of the local government structures, and the personal relations, provided no incentives or motivation for the local facilitator to establish routines for the new information flows. Motivation is crucial for the development and functioning of bottom-up projects (e.g. [Boerma], [Ehn]).

A positive aspect may be read out of this situation, though: the initiative found in the local government to make the district information system function, with time changing the informational and administrative focus of this next administrative level.

Information flows and administrative levels

The problems related to the fragmentation of the health services are reinforced by the amount of levels involved in the health system, seen e.g. in the number of reports that individual facilities and hospitals still have to make. This equally adds to the work tasks of the district information officers as all levels and all head offices will still demand these reports, no matter how little use they may make of them. This shows that the establishment of a district office or a district management team does not mean that the surrounding organisation turn perfect overnight, its organisation and structures are just made more invisible to the facility level.

At the Matatiele Hospital (Mt Currie, Kwa-Zulu Natal), for instance, the same reports will still be sent to the same head offices although they will go through the district office. At the attended Durban workshop (Kwa-Zulu Natal), none of the participants made any attempts to lessen the number of levels (some even adding a step or two) when asked to redesign and redirect information flows.

In Western Cape, a pilot project has been undertaken at provincial level to receive data directly from laboratories instead of through private practitioners and hospitals. The number of infectious diseases suddenly increased by 50%. Further investigation proved that the new figures were the correct ones, proving gaps in the reports from hospitals to local government and from local government to central level.

For each level, there is a possibility for errors to sneak into the data. This also leads to an evaporation of the responsibilities. The inclusion of rudimentary error checking of the data and the linking of the name of the person to the numbers indicate that the HISP team is aware of this issue.

Although hidden from the lowest levels, the organizational structures do not change. This is one of the major problems encountered in South Africa. Changes in the information system have to be accompanied by a political will to commit to organizational changes (e.g.[Opit]).

Training needs

Education is pointed out e.g. by [undp] as a central issue. In developing countries in particular, there is a low level of informational and managerial training [Opit] which makes it very difficult to make the second level of functioning work where information is routinely used to trigger action. A further discussion on training issues is included in a later section.

The difficulties with finding qualified information personnel is felt also within the HISP team. The facilitators, who are supposed to facil-

itate, train and support facility and district personnel, are often inadequately trained for these tasks. Some continuous training is done at the facilitators' meetings, but there are often so many other issues to treat that little time is left for any specific training.

The lack of spare time of facility staff means that they are often not able to attend training. At one training session assisted, only three out of the foreseen eight attendants showed up. This can maybe be improved with a proper adjustment of their job descriptions to include informational work.

This is an example of lack of organizational change to follow the changes in the information system mentioned e.g. in [Opit].

7.2.3 Management support

Relatively closely related to the issues of organizational change and of training is the need for management support. Staff need management support to perform their informational tasks, especially when organizational changes have not yet come through and the managerial is appropriate, both with health staff and local level managers [Opit].

Local government backup and integration

During the latter half of 1999, Guguletu (Western Cape) was looking for a District Information Officer. It was promised, by the City of Cape Town (CCT) information manager, that if no-one local applied for the post, an information officer from the local government would fill it. Due to the links between HISP and CCT (the information being a former HISP team member means that there had been a focus on informational training of the CCT information managers.

This illustrated the two points the general lack of information personnel in South Africa, and the need for political will and managerial support to ensure sustainability (e.g. [Opit]).

During a sum-up of the Cape area facilitators in May 2000, several mentioned the bringing together of people from different services as one of the positive effects of mixed training sessions (as compared to more targeted e.g. in-service training).

In the City of Cape Town (Western Cape), a centralized 'data warehouse' is under development for all branches of administration to use to promote integration and co-ordination of all related services.

Management support

A very central issue in information systems development and use is management support. One aspect is of course the need for support from

the highest levels for them to buy the project/system/idea. But more importantly seems the support of lower and middle level management support in order for the system to function. This affect both the degree of decision-making based on the information and the more general ability of staff to participate in the system. At least as long as little formalization is carried out in the form of revised job descriptions and formalization of districts (e.g. Western Cape), both facility and district staff is dependent on the good-will of others to be able to perform.

In Khayelitsha, one of the major problems, according to the facilitator, is that trained staff do not do what they are trained for. They lack spare time to participate in the information system and to perform informational tasks. The situation is similar in neighbouring Mitchell's Plain. The fact that there are "always some new faces" attending the monthly meetings means that it is not the ones who are trained but the ones with spare time that attend.

HISP has, from the start, had links to different administrative bodies, e.g. the Provincial Administration of Western Cape (PAWC) and various departments of health and local governments.

There is some internal disagreement within HISP whether managers should attend 'regular' training or receive more targeted training. Many would like for the managers to see "what the staff have to struggle with" [HISP facilitator], while more targeted training will certainly give a more immediate and practical outcome.

It is very difficult to do *anything* without management support. During the years of its existence, HISP has been continuously struggling with management at levels ranging from local to national. Both Walsham [W92], [Ehn] and Braa [KBraa] mention that the use of so-called 'empowering' participative approaches are likely to cause management resistance because they raise questions on - or introduce shifts in - power relations in the organisation.

It is also important for staff to see that the data they collect is used, remarked e.g. by the City of Cape Town information manager. Local managers often lack the power to make decisions based on the information present, and they also often lack the ability to act upon it due to inadequate training [Opit]. There is not much incentive to collect data that is not used for anything.

7.2.4 Fragmentation and inclusion

Organizational change has been somewhat treated in a previous section, but this one equally treats the need for a stable administrative framework. This section concentrates more specifically on integration, inclusion and communication, important aspects in the implementation of a unified health services. This chapter also includes examples of the con-

tinuous fragmentation seen at various levels of organization and their effects on the information system.

The examples in this section illustrate the strong inscription of work practices, command lines and political and managerial ideologies in the inherited system [Akrich].

Resistance from the Day Care Hospitals

During the early days of HISPP, decisions were mainly taken at district or provincial levels, creating a feeling of exclusion of the middle-level management of the Community Health Services Organisation (CHSO; in charge of the delivery of curative services). A previous Khayelitsha site co-ordinator once over-heard a conversation where a local CHSO manager claimed to “work actively against everything that has to do with districts”. The effects of this lack of inclusion can be far reaching as the CHSO is in charge of 55 Community Health Centres.

What was several times described as a ‘clinic focus’ of the MDS may also add to this lack of participation. Apparently, very few ‘curative’ data items are included in the MDS, creating an extra need for CHSO clinics to keep additional records and reporting.

Training (and thus a bottom level inclusion) of *all* health care staff is a crucial element in bottom-up health information systems to convince staff “that such systems will be useful for their work” (Sabbatini in [Opit], p.433).

The district hospital system

In Eastern Cape, Kwa-Zulu Natal and the North-West Province, the continuous existence of the district hospital system side by side with the new health districts in some parts of the province is creating some obstacles to the functioning of the districts. The district hospitals are traditionally in charge of all service delivery in their area, and provide some sub-district functionality in areas lacking infrastructure and transport. PHC services are often integrated at this sub-district level (e.g. IPU, Kwa-Zulu Natal). But with the district structures added, a certain amount of duplication is the result. There is also an inertia and reluctance to change residing such established systems.

The borders of the Impendle/Pholela/Underberg (IPU) district of Kwa-Zulu Natal split the previous administrative area of two district hospitals, including some of their daughter clinics but excluding the hospitals. This has created some problems e.g. apropos reporting, as the hospitals, now located outside of the district, still want to receive reports from their daughter clinics. For a long time, they refused to accept the district

office as gateway of information, and kept calling the clinics directly asking for their reports. After further investigation, it turned out that they had received them (from the district office).

In the previous homelands, drug distribution is performed through the district hospital system to their daughter clinics. E.g. in the North-West Province, this is making the common provincial system somewhat incoherent: everybody receive their drugs from one common source, “except from the previous homelands” [North-West Province District Managers’ meeting].

The lack of integration of the district hospital system may continue to cause problems similar to the problems experienced in Cape Town (Western Cape). It is worth noticing, though, that a model similar to the district hospital system is put forward in [Opit] as a possible framework for small-scale development. The system seems to be functioning, and it delivers comprehensive care. It is remarked by Heeks et al. [HMS] that the risk of failure of a new system is proportional with the amount of changes foreseen.

Inclusion

During the elaboration of a first district MDS for the Mount Currie district of Kwa-Zulu Natal, several branches were visited and areas discussed: indicators for finance, drugs provision, community participation etc, and for various vertical programmes (e.g. STD/HIV, immunization, nutrition). In an effort to include also the Matatiele Hospital run by the “Transitional Local Government” (although enough information on the activities and health problems in the district were collected), a meeting was booked with the sister-in-charge.

To ensure her good-will and collaboration in the district IS, the information flow model was presented as a proposal that needed her consent. The meeting was planned headed by the district information coordinator, but was instead performed by the CHES facilitator - to have a “boss” break the news (show **her** importance to them?).

E.g. in City of Tygerberg (Cape area, Western Cape), staff suggestions have been included for no other reason than to show them that their voice is heard.

This may be linked to the very nature of bottom-up, participatory approaches as compared to the traditional top-down dictate. Both [KBraa] and Greenbaum and Kyng [G&K] argue the need for real participation to ensure system acceptance.

E.g. [Grudin], [Bansler], Bjercknes and Bratteteig [B&B] and Braa and Nermunkh [JB&N] claim that the feeling of ownership towards the system created through participation strongly affect system acceptance. What we see here is the opposite: the lack of participation of repres-

entatives from this organisation from the start, their feeling of being bypassed in the decision-making, the lack of focus on curative services' information needs, the higher workload affecting the staff's ability to attend training and participate in the new information system, all these create a vicious cycle of lack of participation, lack ownership and resistance. These are not 'third world' problems, but inherent in most, if not all, organisations and social settings.

Home Affairs in Cape Town

All deaths are recorded by the Home Affairs and reported directly to the Pretoria head office, uncoordinated and mostly without communication with local governments, districts, even the local mortuaries. Most local governments have oral agreements to drop by and collect - going through the records by hand - "their" deaths. Many smaller districts, like South Peninsula (SP), have an agreement that the City of Tygerberg (CTy) representative would collect their and bring data as well.

Some time during late 1999, the agreement with CTy ended. This happened at the same time as the SP information officer was on leave, leaving her with an enormous backlog when she returned to work. She now has to go, once a week, to go through the records. In addition, she will, since January 2000, have to go once a week to the local mortuary to go through their records. This lack of co-ordination thus creates a lot of extra work. A duplication of work have, e.g. in the previous information system, proven to increase the risk of errors.

This is another example of the problems that may arise from a lack of integration.

Lack of horizontal communication: Facility computers in Khayelitsha

All facilities in Khayelitsha have computers. These were bought by the City of Tygerberg (the local government; CTy), but without co-ordination with the HISP efforts. The result is that the bulk of computers are without the HISP software (to enable data entry at the facilities) - with the exception of a few computers planned as back-ups to the central district computer in case e.g. of computer breakdown.

The computers do not have the required software pre-installed (MS Office, rather a cheaper version with more limited functionality), and they do not have hardware that is compatible with neither the required MS Office nor the HISP software as both software packages come on a CD-ROM: the computers are without CD readers. HISP have bought some portable CD readers, but what seem to have been an effort to save money adds extra steps to an installation procedure that is already perceived by many as cumbersome.

Most of these computers are thus seldom used. In some facilities, staff spends their lunch break to play computer games, but at least in one place visited, the computer wasn't even plugged in.

Computers are relatively rapidly outdated, in itself posing a problem as bureaucratic procedures tend to take long time and the computer purchases are no longer a good deal when money finally is allocated. In the case of the Khayelitsha facility computers, a lot of money have been spent, a lot wasted – and some few saved – by stacking soon-to-be outdated, inadequate and superfluous computers in all facilities.

The focus on costly technology in health information systems can, according to Sabbatini (in [Opit]) lead to a “cultural clash” when the greatest needs “include medicines, surgical instruments, and competent manpower” (p.433). This may cause considerable resistance.

Also e.g. in the North-West Province, the slow pace of the bureaucracy is seen as a constraint. One district manager did not bother to wait for an answer from the province, and took money from another budget to purchase a computer “illegally”.

The lack of communication between different bodies, in this case between the HISP project and the local government, is equally seen in the northern and western hemispheres. The effects, though, strike harder in the setting of a developing country where resources are much sparser. In Norway, the much referred case of the TRESS-90 project¹ provide a similar example where computers were purchased long before the information system was finished, in fact the whole project was abandoned at a later date.

More lack of horizontal communication

Another example of what might happen where there is a lack of horizontal (or internal) communication, is an attended training session in Groenvallei (City of Tygerberg, Western Cape). When the training session was planned, the trainers (the local HISP facilitator and some additional HISP personnel to treat ‘special’ issues²) were informed that the attendants would be data entry clerks with some computer experience, while the participants turned out to be relatively unexperienced with computers. This means that the planned level of training was too high. The session was conducted, but the HISP members soon realized that the attendants would have to be retrained at a later date.

¹I have not been able to find any description of this project in English – a short overview in Norwegian can be found e.g. at <http://www.ifi.uio.no/paalso/artikler/fiasco/fiasco.html> (23.July 2001)

²“special issues” in this setting means e.g. parts of the database where the local facilitator did not have enough knowledge to conduct the training on her own

Resources

One serious problem with the integration of the services in Western Cape is the differences in working conditions between CHSO and local government facilities: the working hours are longer and the salaries lower in the former (about 30%). Lowering salaries is not a popular option, and raising them will “amount to billions of Rands” and has to be implemented over time.

In IPU, there is a severe shortage of staff both at the public (district) hospitals and at the facilities.

HISP's information system is not primarily a computer system. Only “appropriate” computerization has been the goal. This is a recognition of the social and human aspects of information and information systems. [Opit] mention the tendency to focus on complex and costly technology both in the health system and when developing information systems. Examples of this has been seen in South Africa (e.g. ch.5.2.2). Sabbatini (in [Opit]) mention the possibility for resistance towards the system when the basic needs of the population are not met because of a lack of resources [Akpan].

The lack of resources and infrastructure equally means that many facilities may not afford a computer, and in South Africa, large areas are without electricity.

Integration of efforts

HISP are not the only ones involved in the health district setup. Various non-governmental and aid organisations are similarly involved with related or different aspects, and work is being done to co-ordinate these efforts. One example is the ISDS, who have two facilitators in each province, another is CHES, who have provided HISP with a local facilitator for the process in Kwa-Zulu Natal, while EQUITY funds the rollout in the provinces. (For a very short description of these three, see ch. 5.1.2).

7.2.5 Concluding this section

Although the constraints and problems illustrated here are inherently South African through its presence in South Africa, I think it is fair to conclude that these contextual constraints clearly affect the setup and functioning of the information system in more general ways. No information system, no matter how well designed, seem able to be successful without paying attention to the setting within which it is put into use (e.g.[WSW88]). It has also turned out that the presence of a stable administrative framework is important for the information system setup and ‘technical’ functioning. Changes in the organisations should be going in

parallel with changes in the information system [Opit]: no improvements can be expected if only one aspects is changed.

The efforts made to visualize and overcome these issues provide examples both of the awareness that these issues matter, and show that the problems can be overcome.

7.3 ‘Social’ functioning: information culture

7.3.1 Sustainability

Sustainability is a complex issue, and I will only provide some few examples of sign of sustainability or lack of such. To be sustainable, the first level of functioning is crucial. The sustainability issue is mostly concerned with the ‘physical’ aspect of this level, including the level of parallel organizational change. But for the information system to have an impact, the second level have to be in place as well.

South Peninsula approached HISP on own initiative during the final months of the pilot phase, and have been “best in the class” [HISP team member] for most of the time. In May 2000, they were hoping to have a sustainable IS “by the end of the year” [SP Acting DIO]. The (interim) SP district team is “looking forward” to the formalization of the districts and “standing on their own feet” [Acting District Information Officer]. The IT section of the municipality is just starting to be involved (May 2000) in the district information system lessening the importance of continuous HISP support, thus showing signs of sustainability. Motivation is crucial for the success of the information system (e.g. [JBraal],[Grudin]).

Lack of documentation and wish for training

A facilitator that arrived in Mitchell’s Plain (Western Cape), found that no record existed on who were trained although staff training was supposedly completed. Even when directly asked, no-one would admit to having received training. The facilitator was not allowed to retrain everybody, according to her because HISP was “afraid to loose face” [HISP facilitator].

This lack of formalization of the actual process and procedures somewhat influence the information system and its sustainability.

There might be several reason why it was so difficult to find the ones previously trained. One is that Mitchell’s Plain is one of the areas where there is a high turn-over of facility staff, and trained people are drained from the district. Another is that people are generally very eager to learn about computers, hoping to receive more training. Yet another is the fact

that initial training is often undertaken while the information system is still not up and running, so that the lack of practical training makes people forget what they have learned. Still, it is pointed out in [Opit] that training of low level staff should be started as early as possible.

In Guguletu (Western Cape), this general wish for training was clearly seen. At an evaluation form handed out to the participants after completed HISP training, several mentioned that it was “nice to have workshops” and that they “would like to come again”. Both the facilitator and the according local government information manager have had a hard time explaining why two per facility is perceived enough to ensure sustainability of the information system. The participating facility personnel argued that the system would be more realistic and integrational if more people from various services and providers were included.

Routines

But it is not always simple to create routines. In Khayelitsha, much of the training of the clinic personnel was seen as “wasted” because of the lack of time to practice these new skills (and the turn-over of staff). This is partly due to lack of management support (setting off time to perform informational tasks) and the lack e.g. of appropriately adjusted job descriptions to include them. The lack of spare time of staff is seen by many as a “main obstacle”, and also affects their ability to participate in training, workshops, discussion groups etc.

The recruitment of information staff and the adjustment of existing job descriptions are examples of the IS's impact on the organizational structures, and these organizational structures will have to change for the information system to be sustainable [Opit].

Lack of learning opportunities

One of the HISP facilitators of the Cape Town area (Western Cape) was of the meaning that much of the lack of progress – and set-backs – seen both in Mitchell's Plain and in Khayelitsha was due to over-eager facilitators. Instead of training people on how to perform tasks, some facilitators have had a tendency to do the tasks themselves – to show how it is supposed to be done, and to take some work off over-worked staff's shoulders. This makes the information system less sustainable as the routines include the facilitator's work instead of using the facilitators to help creating routines involving facility and district staff. For bottom-up information systems to be sustainable, an institutionalization of changed work practices is one of the central aspects [JB&N].

During my stay, the facilitator of Khayelitsha and Guguletu did all the work involved with quarterly and annual reporting, a job that should

be performed by the district information officer. When the facilitator left in the beginning of 2000, the situation in Khayelitsha went from “stand-still” to “going backwards”. This is a clear sign that the information system was not viable (the explanation most often used is the lack of organizational changes).

These over-eager facilitators creates an environment characterized by a lack of learning opportunities.

Turn-over of staff – and facilitators

The initial vision of HISP was that training of two per facility would be sufficient as the knowledge would ‘trickle down’ both to the rest of the facility personnel and to the new information responsables if the trained ones should quit. This has proven difficult.

At our arrival in Flagstaff, none of the trained nurses were still present, turnover of staff being a problem many places. Higher level facility staff (nurses) tend to be unstable, whether due to the rotation system of the district hospitals (e.g. Eastern Cape) or due to the wish to move to better areas as soon as a chance presents itself (e.g. Mitchell’s Plain or Khayelitsha in Western Cape). This has led to the more active inclusion of lower level staff in the information system, an approach that has to be “presented carefully” not to threaten higher levels’ authority and thus provoke resistance [Opit].

More pronounced than elsewhere, this drainage of trained personnel to other positions (or even other countries) is what I would regard a third world issue. In developing countries, where the general level of education is low but the need for trained and experienced personnel is huge, such drainage is the rule rather than the exception. And the lack of resources make these countries incapable of competing in salaries. This of course have other effects, like the spread of “HISP mindsets” into other parts of the health sector and also to other sectors.

Key person importance

The South Peninsula district team is headed by some very dedicated local people, being central for driving the process in the district. The TB manager (equally heading the district team) and the information officer and their efforts, illustrated above e.g. by the TB example and the supervised meetings, have been central in driving the setup process and inspiring local staff. The degree of success seen in this district seem infeasible to achieve without these key persons. Visitors from Mozambique wandered where they could find similar people to ensure success there too...

The two neighboring districts of Mount Frere and Flagstaff (both in Eastern Cape) are quite similar, both when it comes to staffing, physical

characteristics and progress in district and information system setup. What is different, though, is the resource situation: Mount Frere is also an ISDS site, which means that they have an extra share of resources and a local ISDS facilitator. Most efforts and progress is due rather to the personal efforts and initiative of the district information personnel than e.g. the number of computers in the district.

When HISP was still in its pilot phase with just a few districts to focus on, Khayelitsha had a whole team of key persons driving the process. The abrupt change from three full-time key persons to one part-time facilitator made obvious the problems experienced in this district apropos the lack of structures mentioned earlier. Lack of functioning without key persons is an obvious sign of lack of sustainability.

The HISP team itself constitute a handful of dedicated key persons who the entire project has been relying on. Starting out in different fields (health and informatics), there has been a substantial degree of mutual learning within the team, and between the project members and the participants. This learning has been central to the evolution of the project, the process and the software according to experiences made. A question is of course whether or not the process is sustainable, and the results reproduceable, without the HISP core team.

This key person importance is one of the issues I regard as sufficiently more pronounced and important in the context of a developing country than in the first world to label it a 'third world issue'. The constraints to overcome are much more pronounced, the local contexts can be far more sensitive to social relations, and the general level of competence in the population and in the organisation are much lower.

7.3.2 Training

Training, or Human Resource Development, is seen as crucial for the entire restructuring of the health system and is also important to include when shifting the focus from curative to preventive care [NHP]. It is also recognized e.g. by [undp] and [B&E] as a central task to promote more general social and economic development, and is equally crucial in the setup and functioning of the information system [Opit][JBraaII]. The second, 'social', aspect of functioning (see p. 79) is decisively linked to integration and training.

There is a serious lack of people trained in information handling and managerial issues in South Africa, mentioned equally in [Opit]. HISP provide training for district and facility personnel in all districts. Two trained people per facility is perceived sufficient to ensure sustainability of the information system. In many places, e.g. Eastern Cape, facilities tend to be small, often with as few as four or five employees. The more targeted training of managers and the courses offered at the University

of Western Cape provide a small-scale initiative to improve the situation.

The huge need for qualified personnel and massive HISP training has a subtle effect. Trained people are head-hunted and get promoted. Apart for the obvious drainage of qualified personnel from the facilities and districts and the continued need for training this creates, this introduce "HISP mindsets", HISP approaches and bottom-up ideas (e.g. to training, information and management) into other levels (and possibly other branches) of administration, helping also to create the important management understanding and support.

In the Cape Town area (Western Cape), the information manager posts of two of the six local governments are filled with people formerly or currently strongly linked to the HISP team. In Region E of Eastern Cape, not only the district personnel, but also the regional information manager attended UWC Summer School courses.

This development from within or from below shows similarities with the example mentioned by Bentley in [Opit], where the implementation of new approaches to health care delivery (in Cameroon and Sudan) started with a retraining of the nurses' local teachers.

Lack of information personnel

There is a general difficulty involved with finding qualified personnel to fill all the newly created information handling posts at all levels. In Western Cape, more than half of the informational posts are not filled, they even have an entire informational department without any employees, "and we are not the worst" [PAWC Information Manager].

The acting District Information Officer (DIO) of South Peninsula (Western Cape) was transferred there (from the City of Cape Town) at the creation of the district along with someone else, the two of them were to perform the necessary district information tasks. The other one refused to go there, so she now has to perform the tasks originally meant for two. She still makes an effort e.g. to answer positively to all support calls as she has to "maintain the good attitudes towards the system".

This is one of the issues I have chosen to look at as a 'third world' problem. Although the problems involved in finding appropriately qualified personnel are valid other places as well, this is a problem which is inherent to developing countries [undp],[WSW88]. The general level of education is low, and highly educated or qualified personnel often leave the country. In South Africa, the term 'Bantu education' describe this problem of insufficient training to a certain extent, the National Health Plan [NHP] mention the 'inappropriate' training of health personnel as an area that needs redressing, and the United Nations [undp] equally recognize the huge need for Human Resource Development.

Training and institutionalization

The HISP effort has included a massive training scheme throughout South Africa. In every new district included, facility and district personnel go through 'sensitization' where general principles of health information and management are presented. Two people per facility are chosen to receive training and to act as facility information officers.

Due both to the high number of applicants at the courses given at the University of Western Cape and to the usefulness of more targeted training using local examples to enhance learning [J&S], there are plans to decentralize most of the advanced courses to the various provinces.

This demands, though, a higher level of formalization of the courses from HISP. So far, there has been little or no formal documentation to the courses, except from various personal efforts by some of the trainers. This is perceived a growing problem because it has serious effects on the sustainability of the system, more particularly on the training which is so central. It will also demand some degree of local knowledge to be able to target the training sufficiently, to be able to make use of the local examples.

This training is one of the single most important tasks to undertake in the implementation of a new information system (e.g.[Opit]). Aimed at supporting the on-going changes in the entire surrounding organisation, an institutionalization of new practices and new ways of thinking are decisive [JB&N]. The City of Cape Town information manager characterized the hardest part of his job being to "change people's mindsets".

7.3.3 Localized approaches

Group work enhances learning in many settings, and is particularly successful during initial training. Some specific approaches are described below.

It is important to bear in mind that these approaches, where smaller groups are set up to discuss and to perform some tasks, are not easily deployed in areas where infrastructural issues (notably transport) are making it difficult to meet at a regular basis. This might be a problem e.g. in the rural areas of Eastern Cape and Kwa-Zulu Natal. Such initiatives also require some driving force in the district with sufficient knowledge to trigger discussions and action. This shows that there is always need to adjust to the local context.

Except from some peripheric exceptions, this is a problem seldom seen outside of the third world - or seldom seen as a problem.

Supervised data entry

In the two districts Khayelitsha and Guguletu in Western Cape, facility staff have been entering their own data into the district computer with the facilitator present. The facilitator has thus provided continuous support and feedback during entry, and engaged in discussions around strange numbers. Mostly, dedicated data entry clerks with little or no knowledge of health issues or the health situation in the target population have done this work, reducing the usefulness of these discussions. Usually, they have been sent back to their facilities with the task to discuss these numbers and, if wrong, to come back with the correct ones.

Feedback and support are important to promote learning in a bottom-up approach ([Boerma], [Opit], [J&S]).

Supervised meetings

Since the latter half of 1999, the monthly meetings of the facility information staff in South Peninsula have included the presentation of a handful of indicators (starting with a few) by representatives for four to five facilities. This is seen as training both in information use (they have to understand what the numbers mean to be able to make a presentation of the situation) and of presentation skills.

This “forced” presentation has led to more support calls to the district as people want to have graphs to include in the presentation, and by May 2000, people were starting to ask for training in how to make graphs.

The presentations may also trigger some actual action as it is perceived as embarrassing to present some poor health indicator or some problematic situation to all the others.

This method of practical training is also tried out in Mitchell’s Plain (Western Cape) with so far promising results (May’00).

Feedback

Feedback and support are central issues related to the functioning of the information system. Both timely and relevant feedback to ensure a two-way communication, and evidence that the numbers collected do trigger action (are used), provide incentives to learning and reliable data collection. “Feedback on information to the providers of the health data is essential”, and is characterized by [Boerma,p.24] as an important characteristic of *good* health information systems.

One of the flaws in typical top-down systems like the one inherited in South Africa is the lack of feedback on the often huge amounts of data collected by the lower levels [Opit], where the data collectors are

alienated from the system. The only feedback was negative feedback in case of serious errors, and usually have to guess what is expected from them.

Routine collation, analysis and feedback of information to facility level give them a chance to continuously learn from own and others' experiences through comparison and competition (Mandara in [Opit]).

Crosstab listings

A very simple form of feedback make use of the crosstab listing feature of the database. Both in Khayelitsha and in Guguletu (Western Cape), the data entry clerks brought back listings of their facilities' numbers for the previous six months. In addition to the supervised data entry, district meetings and occasional visits by the facilitator, this was the only feedback given.

The South Peninsula (Western Cape) effort to include the district's hospital involved a crosstab listing of their own numbers, enabling them to see trends over time.

In Eastern Cape, where means of transport are rare, there was no feedback routines established by August -99. It was concluded that the district team would have to start establishing routines for monthly feedback to the facilities, the least the facilities should receive is what they send in, i.e. crosstab listings.

Compare to others

When a routine feedback and communication lines are established, it will be possible to take it one step further. As the HISP software package evolve continuously, a semi-automatic feedback module is one of the planned future modules. The monthly routine feedback should also include a few indicators each time (illustrated with graphs and explained shortly), depending on the local situation.

During the meeting at Matatiele Hospital (Kwa-Zulu Natal), the sister-in-charge showed us the only "feedback" she received on the five different monthly reports sent in; the provincial annual report. She pointed out a table where several facilities were listed side by side, and remarked that nobody had commented that their number of patients seen was more than a double of any of the others'. As these numbers were obviously not "seen", they had no effects e.g. on the budgets either.

Good performance at the lowest levels (facility and community) should be congratulated [Opit] to inspire empowerment, local initiatives and further responsibility for own situation. This was equally seen in the South Peninsula TB example above.

A common answer when (Eastern Cape) facility staff was asked what they would like to receive, was a possibility to compare themselves to other facilities in the area. In South Peninsula (Western Cape), this has been actively used in the effort to bring the number of TB defaulters down, both to provide extra support to the bottom three performers, and to show them that other comparable facilities managed to turn the situation around.

Personal feedback and support

The more targeted and personal feedback and support are areas that suffer when workload is high. In South Peninsula (Western Cape), facility information staff only receive general feedback during the 'supervised meetings'. In Khayelitsha (Western Cape), the lack of time to go around and provide on-site support was used as an argument to keep the monthly data entry in the district office instead of making use of the facility computers.

7.3.4 Local foundation

Intersectoral overview, horizontal communication

Both in Durban (Kwa-Zulu Natal) and in Mount Frere (Eastern Cape), the wish for intersectoral overview makes them search for a DIO with background from environmental health. There is some worry within the HISP team that the number of information officers in Eastern Cape, three in each district, is creating too much separation of the various tasks to be performed so that the intended district level overview is lost.

The participants on the Durban workshop attended were all eager to develop inter-district communication lines when planning the new information flows for the new information system. The ISDS facilitator of IPU (Kwa-Zulu Natal) mentioned "meet up, have fun and discover that you can make decisions" as an advice to other districts in their start-up phase. [Boerma] point out that local staff should be users of their own data. Then the data and data collection will have meaning to the users, improving equally the quality of the information [Opit].

Personal relations

In Khayelitsha, where CHSO resistance and reluctance have been felt for years, a local CHSO manager was appointed site co-ordinator in mid-99 in an effort to include CHSO in the information system. Similar efforts were undertaken in Mitchell's Plain, where the facilitator was hoping to find a local (CHSO) manager to employ as District Information Officer.

The hope was that involving one from their own ranks will make the resistance less pronounced (ownership through participation, see e.g. [Grudin], [Bansler], [B&B]), and for the “man knows man” effect [Bada]. An additional point is that applicants with previous health management experience are hard to find – a general and serious problem in developing countries [undp].

Inclusion of other services

The South Peninsula (Western Cape) district information officer (DIO) is trying to spread motivation in the district for people and services to *want* to participate. One example concern the previously unintegrated hospitals. The hospital information system in use do not include functionality to extract data for more than the current and the previous week. During the DIO’s leave, there was a system breakdown, and the process of recapitulating the backlog was painful. Now she have visited the hospital with crosstab print-outs of their data for the previous six months, and “they were amazed” of what they saw. She was planning another trip where she would bring some graphs to make them want to be part of the new system. At the establishment of the Unicity, all health service deliverers will have to report through the district office whether they are prepared or not.

In Mount Currie (Kwa-Zulu Natal), the facilitator and district information co-ordinator made an effort to include all service providers during the MDS elaboration. Although enough information was already collected for a first district MDS, the local sister-in-charge was presented with the situation as if the decisions on information flows and needs were not yet decided. The district team claimed that the different branches were usually cooperating quite closely to make the best out of scarce resources.

Motivation is very important for the functioning of the information system and to create an information culture (e.g.[Ehn]), and the inclusion of all roleplayers is important with regard both to the health service delivery [NHP] and the functioning of the information system [Akrich]. But it is important not to be too eager in selling the system, overexpectations often leading to failure [HMS].

In the Cape Town area, all new facilities are ‘combined’, i.e. preventive and curative care is offered in the same building. This can be seen as a first step on towards functional integration. But the sharing of two organisations of one building causes some practical problems, e.g. guarding of the premises and pest control (both on the agenda of a Khayelitsha Site meeting of August -99: who are to pay, and where should the ‘borders’ between the two be drawn?).

Wait till they're ready

A central point in the adopted bottom-up approach of HISP is to carefully balance the need to push in order to see any progress and the importance of not pushing onto people too much at the same time, often promoting centralist, top-down associations and resistance.

When it comes to training, this balance between pushing and restraining is difficult as most of the concepts introduced are new and abstract, at the same time as it is important for people to obtain an overview of the entire system.

The failure of the facility computers in Khayelitsha (presented in the previous section) can provide an example not only of lack of communication, but also of the too eager pushing from above as computers were installed before staff was comfortable using them on their own and before surrounding structures were in place and the system was still only partly implemented (e.g. the facilitator lacking time to provide on-site support to all facilities).

In South Peninsula (SP), there seems to have been a successful mix. Training and implementation went on in parallel, with introduction of the RMR in facilities and computerization at district level as the first step. Later, computers have slowly been introduced also in facilities, and retraining have been undertaken during this computerization.

The staff thus have an idea of what is waiting, and still they are allowed to “learn to crawl before they try to run” (often used HISP motto and ‘explanation’ of the piloting prototyping approach).

The pace of the computerization of the facilities have been decided by the lack of resources. The first few computers were strategically placed to act as nodes within limited areas and **clusters** of facilities. Facility staff would meet up once a week to enter data, continuously discussing, supporting and helping each other out. Later, more computers have been provided for them, but the clusters and “self-help” discussion groups seem to persist.

The effort of the SP acting district information officer (DIO) to tempt the district’s hospital to want to join the system (presented in the previous section) is equally an example of preparing people and make them *want* to participate and learn more.

Competition to create action: use of information

In South Peninsula, tuberculosis (TB) is a major health problem, especially as interruption rates are high. Interrupted treatment is a problem not only because the patients do not get well, but also because the tubercle bacillus turn resistant to drugs. A new TB information system was introduced, leading to disappointment among staff and district per-

sonnel when there were no apparent changes in the cure rates seen. (One of the first things they noticed, though, was how the figures changed (grew correct) as staff received training.)

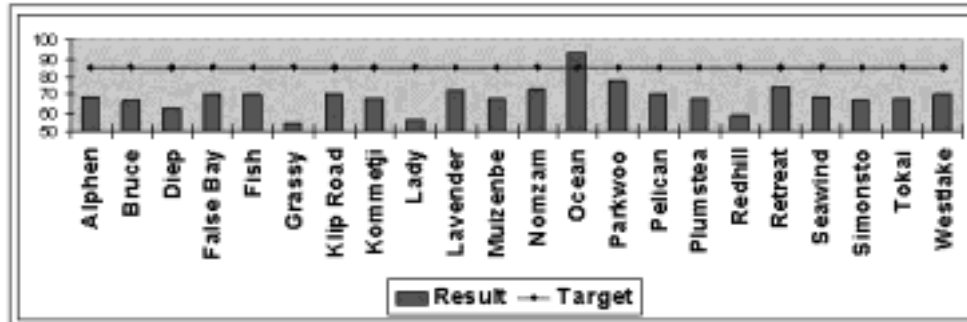


Figure 7.1: TB cure rates in South Peninsula

But when they started to disaggregate the numbers, huge internal differences were seen (see example in fig.7.1). This provided the district TB manager with information to bring to the individual clinics to ask why the cure rates were so low. In some cases, the reply was that they were doing all that they could and that it was impossible to achieve any better results. This argument proved invalid as the TB manager showed them that others were performing far better.

Each month, the three worst and the three best facilities were picked out, the bottom three to receive special attention and support, the top three to investigate what they did to improve the situation, and small competitions were set up. It turned out that one of the most common ways to ensure that the TB patients completed treatment was to perform individual follow-up, and including people in the community to support the patient. The worst performing facilities then were taught to do the same, and improvement was seen within short time.

Mandara (in [Opit]) mention and the possibility for comparison and competition between health centres and communities as a spur of action and to promote learning. The learning aspect is further enhanced by the feedback provided to the facilities and the recognition given the local initiatives of the top three performers. This example equally illustrate how local initiatives can be learned from and be used in a wider setting. These are crucial elements in bottom-up development efforts (e.g.[B&E],[Opit]).

This is a very good example of how local information can be used to trigger local action, and in this case also improving the health situation in the population. It also illustrate the need for including the community in a PHC approach. “TB supporters” were personally congratulated by staff when successfully reintroducing TB patients to treatment.

Locally driven process (HISP)

One of the first and central tasks to perform when starting out in a new area is to form a **local team to drive the process**. This is incorporated into the more general 'bottom-up' label used to describe the different elements and aspects of the HISP process. The local teams act as change agents at a lower level than that of the overall HISP project.

These local driving forces are crucial to the process as they provide invaluable local knowledge. They will also possibly enhance some "man knows man" effect [Bada]. In addition, they will ensure a lesser degree of dependence on the HISP team members (HISP also being short of staff). But the most central issues are the need to base the development on local interests and initiatives to ensure ownership of the system (e.g. [JBraal]), and the human resource development involved with the shift of responsibility of driving the process from central to local level as the local team will receive training and support from HISP.

Local knowledge

An example of the need for local knowledge for local numbers to be relevant and useful is the results seen in a survey performed in Cape Town Central (Western Cape), an area covering the down-town Cape Town business area. The survey was performed primarily to know where the patients come from to attend the facilities in the area. Combined with the routine information showing surprisingly high number of STDs (sexually transmitted diseases, often used as indicator for HIV/AIDS prevalence) treated in the area, it turned out that most attendants were not inhabitants of the area. This means that efforts to lower the STD numbers should be undertaken elsewhere. (Possible reasons for people attending other than their local facility may be that they work in the area and attend health services where they are during day-time, that they are embarrassed and would like to receive treatment from someone *not* local, or that the services of the down-town facilities might be rumored better in some way.)

7.3.5 Information system

The main goal of HISP is to develop an information culture with local use of local information. This includes developing a bottom-up information system, based on local driving forces and local initiatives.

Introducing changes to the inherited information system - and making them permanent through use - is a long-term process. There are some results to be seen: some standstill, some improvements, some setbacks, some challenges, and signs that progress is being made.

Integrated district information

In districts where the MDS has been implemented at facility level, there are no examples of anyone returning to the previous multitude of forms, although reluctance to abandon the old system is seen in many places (see below). In most places and for various reasons, there is not much use of the information yet neither at facility nor district level, and e.g. in Khayelitsha, information is not forwarded upwards. But in most places, district information is present for anyone to use – in the database and/or in the district office. This is an improvement compared to the previous situation.

The local action promoted by the PHC approach should be based on local (and reliable!) information; control of the information is decentralized. This will be an incentive for accuracy and speed and ensure more reliable information at all levels [Opit].

They analyse and decide already!

It takes time to change people's habits, and they have been used to a system overloaded with requested information of which they have had no interest or use. A point mentioned by Abrantes (in [Opit]), and equally by the IPU facilitator (Kwa-Zulu Natal), is the automatic analysis and daily clinic decisions made every day by facility staff. They are already based on the information seen, but the staff seem not fully aware that this is the same task they are asked to perform more openly and formalized.

Persisting spaghetti

At the Matatiele TLC Hospital (Mount Currie, Kwa-Zulu Natal), the sister-in-charge was not hard to convince that the district information system is an improvement to the current five separate reports sent through different channels to end up in the same provincial Department of Health: one single exit point located at a much closer level sounded like "a good idea – if it works". Of all the data items included in a tick sheet used in Durban (Kwa-Zulu Natal), where "anything" can be included, it turned out that only a few were actually used before the card was discarded.

Many places, they are reluctant to abandon the old system and the old forms. This has been seen e.g. in Mitchell's Plain of Western Cape. The strong workload focus of the previous system, where the amount of data collected and reported was seen as proof of work being done, is hard to get out of people's minds. At the Tabankulu district hospital in Mount Frere (Eastern Cape), the staff seemed proud to show us the multitude of forms and registries still kept in addition to the monthly

district forms (MDS and EDL). Equally in the IPU district (Kwa-Zulu Natal), staff was very reluctant to stop using the old tools.

This might also be an illustration of what Braa and Sandahl [KB&S] discuss apropos the physical *and social* properties of (paper) documents in institutions and their coordinating roles in the web of work practices. (s198) “Documents are integrated into social activities, and cannot be separated from the practice in which they are incorporated” [p.198].

It is important to note, though, that the HISP information system and software only include aggregated monthly data, thus *not* being able to replace e.g. various kinds of patient records and other tools where for instance personal follow-up is required.

Different information needs at different levels

The differences in focus areas, health problems and thus information needs at different levels depicted in the information pyramid (ch. 5.3.2) can be illustrated by some examples: malaria is considered a health problem only in three provinces. The opposite was seen e.g. in Flagstaff (Eastern Cape), where the local staff considered rabies a rather serious health problems because of their location close to the border of Kwa-Zulu Natal. No information on rabies is included in the provincial RMR. The lack of information on STDs (sexually transmitted diseases, which are seen as indicators to the HIV/AIDS prevalence) was also commented, as this is maybe the one biggest health problem in the area (and equally at a national level). This shows the immaturity of the information system as it is up to the various districts and facilities to add data items to the MDS.

In Mount Currie (Kwa-Zulu Natal), the local drug manager seem to have grasped the concept of the information pyramid. Performing amongst the district’s drug distributors, pharmacists etc. a situation analysis, he was full of ideas on how to implement a drug distribution and monitoring system in the district to suit the needs both of the urban and of the rural areas. But he was clear on the point that exactly how this was performed and the details in the distribution system should not be the concern of the district office as they were already “drowning in papers”.

His recommendations was for only a few basic indicators to be reported at e.g. a quarterly basis to the district office allowing them to focus on trends rather than on details. Then they could rather ask for more information if they wanted further details e.g. if seeing some problematic situation.

Data – too little or too much

Compared to the old information system, where there were huge quantities of data to collect and report, the *minimum* focus of HISP is difficult for people to get used to. It also turns out, from time to time, that there is need for other items than the ones included in the MDS. But the use focus and recommended MDS revision at least once a year ensure that only data items that are used are included and that the form reflect changes imposed by the surrounding context [B&S]. Of the original 47 data items of Western Cape's RMR1 (first RMR), only six remain.

In the database, every data item has a comments field linked to it. This is not transferred to the paper forms, maybe because of the Western Cape relatively high prevalence of computers where facility staff enter their own data. In Flagstaff (Eastern Cape), there was an expressed wish for the possibility to add comments both in the RMR and in the EDL (essential drugs list). At my visit there, there was an on-going revision of the EDL where both the district drug manager and the facility drug responsables were included in the work.

As Eastern Cape was the first province to start using an EDL, this form and their experiences have been used as point of departure for other provinces. In this EDL, the included 30 drugs ('tracers', used as indicators on the general level of drug availability) are ticked (marked) if an out-of-stock situation occur during the month, no matter for how long, how many times or for whatever reason they are out of stock on that particular drug.

In Mount Currie (Kwa-Zulu Natal), the district drug manager insisted on keeping the amount of information reported to the district office at a regular basis on a minimum, while the opposite approach was adopted in North-West Province. There they wanted a list where each incident would be marked to be able to extract more information about "how much" out of stock the various drugs are.

A central question is whether the North-West Province will be able both to keep all this information correct and to make use of it. The previous information system is a good example on how the sheer number of items may form a barrier to use.

The point of departure is that only data that is used should be collected; the information system should contain only relevant data [Boerma]. The choice of items should be action- or indicator-driven, based on local needs [Opit]. With the so far few examples of actual use of the information, there should be little need to keep collecting massive amounts. I see this as mainly relics from the past, where amount of data were equal to work done.

Erroneous data

The information in the previous system was both incomplete and erroneous, displaying all characteristics of typical top-down health information systems as described e.g. in [Opit]. Due to the higher levels' aggregation, both errors and differences were hidden (the disaggregation of numbers not being the favorite activity of politicians as they reveal inequalities).

Many errors were caused by the high number of items to collect and report without local relevance or use, without coordination, and many of the data items were duplicated. Lack of local use means that no-one with local knowledge could assess the quality of the data. The lack of coordination between organisations had also led to inconsistency through the use of different target populations and different definitions of the data items, further removing the ability to use data locally (and to a certain extent also centrally, at least in an integrated manner), and to spot errors.

The general lack of feedback and support added to the general lack of inspiration to report correct data, and with the strong workload focus, some might have been tempted to tamper with the numbers to make the amount of work done seem more impressive.

This attitude of willfully entering wrong figures still persist to a certain degree, as I was told that some actually enter erroneous figures just to avoid the computer system to display warnings (often called 'work-arounds'). The data focus at higher levels might also provoke erroneous reporting, e.g. if goals are expressed as absolute instead of relative numbers (an example from Mozambique is where a goal was set to vaccinate e.g. 2000 children per district, without regards to the population numbers).

According to [Boerma], there are four main sources of errors: forgetting to tally, misclassifications (more likely when the forms keep changing), miscalculations, and figure "cooking", i.e. invention. Sabbatini, in [Opit], mention the incompetence and inefficiency found in highly centralized systems leads to unreliable data.

From data-led to action-led

The case of drugs in Flagstaff described earlier in this chapter equally shows the inheritance of the old system, where centrism was thoroughly inscribed in the information system [Akrieh], illustrated e.g. through the lack of local use and 'technocentrism' of the information staff. This indicates that the focus, which is supposed to be action-led or indicator-driven, is not sufficiently shifted. But the participants are human actors [Ehn], and it is difficult to change people's mindsets.

The focus on data quality was equally seen at an attended training course in Guguletu (Western Cape), where, in the evaluation forms, ‘analysis’ was equalled to ‘spotting errors’, and ‘feedback’ was ‘correcting errors’. The quality of the data quality can equally be improved through use: data tend to grow correct when used. This is seen when including new districts into the database. The lists of facilities tend to be error-prone with duplications, mistypings and holes, often with several names for the same facilities. After about six months of use, the lists are usually correct.

Data definition and varying practices

To be able to compare data and indicators, it is important that the definition of all data items is the same and reflecting the varying practices between the users of the information system. It is also claimed, e.g. by the authors of [ANSI], that standardization within the health sector gives lower maintenance needs and reduces the cost of the information system.

An example is the indicator for under-nourished children, which computed from the data item ‘number of children weighed’ since the actual number of children in the target population often is an estimate. In some places, they weigh all children attending the facility, thus duplicating the ‘number of children seen’ item. Other places, they weigh the children seen for nutritional purposes, and in yet some, they weigh only those *looking* undernourished. A common practice has to be defined along with the data definition. HISP has come up with a Data Dictionary to be used along with the information system. It is open also for other branches in the Data Warehouse (see previous section).

The health sector and its information system are well established and highly social systems where what Walsham [W98] refers to as ‘improved multiform practices’ are common, necessitating a certain amount of flexibility. One of the obvious flaws of the previous information system was the lack of possibility to compare the numbers from different sources or different areas. To redress this, a balance between the need for local adjustments and standardized definitions have to be found. It is important to avoid the impression of standards being imposed from above creating resistance towards the entire system [Opit].

7.3.6 Concluding this section

The social systems perspective on information systems [WSW88] stress the importance of paying attention to the human and social aspects of information systems, training being identified by several (e.g. [Opit],

[undp]) as the one single most important task to undertake. The examples given support this view (e.g. supervised entry). As not only the design and development process, but also the training in itself has to be context sensitive, different approaches are adopted in the different settings. The continuous and massive training performed by HISP are an important part of the institutionalization of changes (“change from within”).

The two different levels of functioning have been used also in this section, the second, ‘social’, level illustrated by some examples (e.g. the TB example and the supervised meetings; and the drugs out-of-stock example). If not functioning at both levels, it seems to be difficult to lessen the key person importance and have a sustainable information system.

Chapter 8

Goals assessment

Both the South African government and HISP have set goals for the current restructuring and health district setup process. Although these, in particular those expressed in the National Health Plan (NHP), are long-term goals, and it would not be fair to judge them decisively on the basis of my findings, I will try to assess the degree of achievement. It is also a fact that the situation has changed since I performed my case study.

8.1 HISP goals

To support the goals set in the NHP, HISP has the overall goal to develop an “information culture” including regular assessment and local use. This is to be done through the modeling and design of a district information system, using a bottom-up approach. More specific targets to support this are:

- To involve the community and ensure participation of all roleplayers
- To develop training programs
- To provide appropriate computerization of the information system using standard software and a prototyping approach, with focus on user friendliness and adaptability

These processes are interconnected and somewhat mutually reliant on each other. I will try to assess whether or not these goals are reached, or reachable, through the current efforts and approaches. At the end of the HISP pilot phase in 1998, three major problem areas were recognized based on experiences made in the three pilot districts. These areas persist as problematic today, although progress is made. New problems, other aspects of similar problems may have arisen with the inclusion of

other provinces in the project after 1998, and I will also try to highlight such differences. Experiences made in other provinces may also help highlight the recognized problem areas.

8.1.1 Major problem areas and their effects

Lack of districts

Western Cape is one of the provinces (along with e.g. Kwa-Zulu Natal) where the delineation of districts is still not finalized. This is making the development and implementation of a district health information system difficult: an information system to support something that is not yet there.

This lack of formality also has other implications. With the general shortage of qualified information personnel, the difficulties experienced many places with employing e.g. District Information Officers is aggravated by the temporariness and lack of formality – and authorities and thus possibility to act – of the structures and positions.

Although many people are aware of the problems this lack of formality and stability is posing for the general health district setup and functioning, the situation has not changed much since 1998. In the original pilots, key persons and other involved persons are getting fed up with waiting for ‘promised’ changes to come through, burning out and losing inspiration and initiative. A relatively high turn-over of facility staff has made the situation even more troublesome as trained personnel do not stay, somewhat counteracted by a more active inclusion of lower level, more stable, facility staff in the information system.

The drainage of trained staff to other areas and other positions or sectors is not solely caused by the lack of formality of the district structures, though, but this situation reinforces a more general problem. Many provinces and districts have rather serious problems with employing people in remote or otherwise underserved areas (e.g. in Eastern Cape, the rotation of nurses ensures a systematic turn-over and drainage of trained personnel in addition to ensuring nurses at all facilities). Throughout South Africa, there is a general lack of qualified and experienced information personnel, and people trained e.g. by HISP are obviously attractive also for other sectors and other positions.

The lack of powers and authority decentralized to the district structures clearly affect their ability to act on the basis of information provided them. Although there seems to be a growing awareness in the HISP team that the goal of local action based on local information is too much to hope for in the short run, the district teams have few possibilities to start small-scale training in order to create routines for such tasks.

The lack of integration of the various service providers was considered a problem already in 1998, when it was commented that the staff still considered themselves part of different organisations. HISPP's recommendation was to create district management teams to provide a coherent framework within which to establish and manage the information system. This common information system was supposed to initiate functional integration.

This situation has not changed much since then, but efforts are undertaken, and there is a growing awareness also among facility staff of the need for co-ordination, integration and inclusion of all service providers and stakeholders. Due to different history and background, the fragmentation manifests itself in different ways in the different provinces, but the bottom line is the same: the inherited fragmented health services are a major problem, and without a coherent framework, it is difficult to expect any successful integration.

Lack of resources

The constant lack of resources clearly affect both the district setup and HISP processes. This is one of the reasons why the HISP software package is built on standard software and is free of charge, as is HISP training and support. Facilities are chronically short of staff, who thus has limited time to participate in training, workshops, discussion groups and routine information use at the facilities. Since the resource shortage is chronic, other approaches need to be investigated to promote participation, use and the establishment of routines. One is to revise the current job descriptions at all levels to include information handling.

As more and more people all over the country and at various levels are introduced to and included in the information system, the approaches and ideas are gaining terrain, and hopefully this will increasingly facilitate the continuous establishment and functioning of the health districts and information system, and lessen the resource situation's effects.

Lack of management expertise

Another persistent problem with mainly historical reasons is the lack of management expertise at local level, and the lack of use of the information provided. Together with the lack of formal powers in many districts, this is a major problem to the functioning of the information system: data entry and information flows are not sufficient to characterize it as 'functioning', the local action based on local information is one of the basic building blocks of the adopted PHC approach.

Sensitization and training continue, of facility staff and of local managers, in information handling and use, and low level managers are in-

troduced to the principles and included in the information system.

E.g. in South Peninsula (Western Cape), discussion groups are formed, and facility staff acquire an information awareness. HISP has recognized that these discussion groups are all the use they can hope for in the short run. Becoming routine, this reading information out of data will hopefully - with more favorable supportive structures surrounding it - inspire more action later on.

A major improvement compared to the previous system is that standardized district information, which is possible to disaggregate into the individual facilities, now is present in most places, thus ready at hand for people to use.

8.1.2 Progress made and goals achievement

Inclusion of all

The HISP project has made several efforts to include all roleplayers in a comprehensive information system (IS), which is an important aspect when developing large-scale information systems [B&S]. During the start-up in a new province or district, as many as possible of the local stakeholders are introduced to the system and the principles. It is infeasible, though, to include them all in the entire process from day one, and efforts are primarily concentrated on setting up an IS for the public health services. Later, when some degree of institutionalization is reached and the process is rolling, more services and stakeholders are included.

But the fact that the start-up initiatives focus on a limited group of stakeholders does not mean that anyone is actively excluded from the process: anyone can approach HISP, participate and receive a certain amount of support. There are also differences between the provinces and districts as much of the process rely on personal initiative from local key persons.

All places seem to be aware of the need to include the grassroots (the local staff and the communities) in the setup of the IS, to a degree where things are slowed down because the local facilitator refuse to do the job for them (IPU in Kwa-Zulu Natal). The involvement of the community is a bit more tricky to achieve, but as the IS becomes established, it is meant to function as a communications enhancer vis-à-vis the community.

Development of training programs

In all districts, two people per facility are trained. District staff is also trained, as are local managers. Training programs are established and ran both centrally (in Cape Town at the University of Western Cape's

Summer and Winter Schools) and decentralized in the provinces. Localized training and workshops are also performed in the various districts, mostly undertaken by the HISP facilitators and/or other team members. There has also been established training courses at universities in Norway and Mozambique.

Although these training programs are well established, they suffer from a lack of documentation. The main subjects are well known, but the level of detail and the details on how to perform the training is mostly left to the trainers, and vary much. This also make the system vulnerable to staff changes.

The various training courses are currently being documented to ensure sustainability (lessen key person importance), and also to improve the quality of the courses because e.g. hand-outs have proven effective as aide-memoires.

Computerization

The information system have been successfully computerized, and the principles of user friendliness and adaptability are still central. The computer system have proven an important actor by its own right, and it creates an even higher level of interest in facility staff to participate e.g. in training.

I consider the continuous focus on the information system, not the computer system, as central to the progress made by HISP, since large parts of the country are without the necessary infrastructure to have facility computers.

I have not focused on the computerized parts of the information system in this thesis, but consider the fact that it comes without cost, the support system (now being somewhat spread e.g. by the introduction of the IT department of the South Peninsula Municipality (Western Cape) to the system) and the continuous evolution of the system (through bug fixing, the inclusion of new modules and the interfacing towards other systems (e.g. the web interface)) as important aspects promising a continuous life and dissemination.

Summing up

The more overall goals of creating an information culture through the development and dissemination of a bottom-up information system are not yet reached. An information system is designed and is continuously refined and adopted to new contexts, but the goal of regular assessment and information use are still far ahead. Small steps towards this goal are taken (e.g. the discussion groups in several districts around Cape Town, the initiatives of local staff all over the country, the starting inclusion

of local management and the semi-automatic feedback module that is under development, and more generally, the continuous training of an increasing amount of people).

With the exceptions of the reluctance to abandon the old system mostly due to mindsets and habits, and the setbacks experienced in Khayelitsha, I have not seen examples of places reverting to the previous system. Generally, the project seem to have become sufficiently institutionalized to roll somewhat on its own, but it is still highly dependent on a small handful of key persons in the HISP team (at least to ensure the continuous focus on the bottom-up aspects). Whether that situation will change or not in foreseeable future is hard to assess.

8.2 NHP goals

The National Health Plan (NHP) presents a vision of a unified, equitable national health system where the previously highly fragmented and inequitable public health services are co-ordinated and integrated into one common National Health System. This is to be achieved through the deployment of the principles of a district based primary health care (PHC) approach. Intersectoral collaboration at all levels and community participation through decentralization are important aspects. (For a more elaborate description, see ch. 3.4.2.) The proposed changes are bound to take time, and the goals set are thus long-term.

Demarcation

The NHP assumes four levels in the health system, and new administrative structures are created to provide a better framework to overcome the separation, fragmentation and inequity of the previous administrations. Nine new provinces have been created, but on the lower levels, there is still a substantial amount of instability. Without well defined geographical areas to relate to, it is difficult to concentrate efforts and provide the envisioned district based PHC.

In the Cape Metropolitan area of Western Cape, the local governments that replaced the previous different administrations as intermediate level between province and districts have proven inadequate for the task. There are plans to replace them with a more unified region; the Unicity, but its creation is postponed. District borders are drawn, but not formalized, district “teams” are interim constructions without powers or authority. In Kwa-Zulu Natal, the situation is somewhat similar, with only interim districts and district teams. In Eastern Cape, the number of districts is currently drastically reduced.

Both Kwa-Zulu Natal and Eastern Cape include areas where the inherited district hospital system sees a continuous existence side by side with the health districts. Apparently, these existing and well established boundaries are not always considered when delineating the districts.

District based PHC: decentralization and community participation

The district based PHC approach relies strongly on and is centered around community participation. This requires a decentralization of authority and powers. This is one of the areas where little progress is made yet. There is a vicious cycle of structural and personal resistance in the established organisations, and a general lack of management culture and experience at the lower levels, reinforcing each other.

The entire HISP project is an example of a decentralization effort. The inclusion of facility staff and local roleplayers, and the local use of information, are central aspects. The institutionalized centralism of the South African health sector takes time to turn around.

In Western Cape, the lack of progress, the lack of formalization of and of decentralization of powers to the district structures are often seen as the main obstacle to the restructuring: "People are fed up of waiting" Various more specific efforts have been undertaken: the initial work in Khayelitsha during the pilot period included *all* local stakeholders, ranging from sangoumas (traditional healers) and the local health forum to private and public service providers. In Guguletu, the facility information staff is well aware of the importance of informing and including the community and other stakeholders.

The inclusion of tools to graphically present information in the software package (Excel spreadsheets) is a way to facilitate communication with the community. Both in 'computerized' and in other areas (e.g. Region E of Eastern Cape), colorful graphs are displayed on the walls of the facilities.

The approaches deployed e.g. in South Peninsula (Western Cape) (where 'supervised meeting', discussion groups and competitions actually trigger information awareness and even some minor germs of action based on the information) seem to enhance a closer inclusion of the community. The staff of the Nkozi clinic in Flagstaff (Eastern Cape) explained that they had just recently held training courses for the communities.

This is an area where there is still a long way to go before the goal is reached, but the trends seem promising, both in health related aspects and apropos the information system.

Integration

One of the major flaws with the previous system was the fragmentation of the health services. The integration of the various public service providers have proven difficult, and the inclusion of other health service deliverers is still far ahead.

In the the previous homelands e.g. of Kwa-Zulu Natal, North-West Province and Eastern Cape, the parallel district hospital system is still in place although efforts are being made to integrate the relevant (clinic) parts of these services in the district health and information systems.

In Western Cape, the different (public) service rendering organisations are still separate, although efforts are made to integrate them - at least functionally at the lowest levels. In South Peninsula, efforts are made to inspire local hospitals to participate. In the entire Cape area, all new facilities that are built are so-called 'combined'. At the creation of

the Unicity, both the local governments and the CHSO will be replaced by this new structure. A functional integration will take longer.

Intersectoral collaboration

Still struggling at all levels with integration of the various parts of the public health sector, let alone the non-public parts, the vision of all related sectors working together for the best of the population seems far ahead. Apart from the wish of several districts to have a DIO with background from environmental health to bring with them an intersectoral overview, the City of Cape Town Data Warehouse effort and the recent restructuring of the HISP database to a web interface with unrestricted access are maybe the only examples seen. (The HISP software has always been free for anyone to use and add changes to, but I consider the Web interface as a step further as this takes the software one step further in the standardization process.)

Success?

The health sector is an organisation where it is not possible to scrap the entire old system to start setting up a new, as people are in constant need of health services. This is expanding the time aspect of the proposed changes, and the inherent inertia and resistance to change in the existing organisation and its information system is posing additional constraints and slowing down the changes.

In many areas, changes to the inherited situation may be hard to spot. But the trends are promising. There is a spread of knowledge and ideas and methods to more and more places. The massive training efforts of HISP, and the co-ordination with other, e.g. ISDS, forces, is initiating a change from within through the institutionalization of new ideas and work practices.

Chapter 9

Discussion and conclusion

During the Introduction chapter, I presented my main problem area as “conditions for health information systems in South Africa” through the identification of actual constraints and how to overcome them. More specifically, I put forward the hypothesis that bottom-up approaches based on local, small-scale initiatives can lead to sustainable development.

This thesis is to a large degree based on the social systems perspective as presented e.g. by Walsham et al. [WSW88] and discussed during the thesis. This perspective says that information systems are social systems, a perspective that is particularly important in the third world where the contextual constraints are accentuated, resources are scarce, and failures are more likely.

Although the constraints may be more pronounced in developing countries, all information systems are social systems. This means that changes in the information system will have to be backed up by organizational or structural change, also in the first world.

In this final chapter, I present the main constraints to systems development in South Africa identified in my findings, and a handful of the bottom-up or small-scale initiatives and approaches used to overcome experienced barriers.

9.1 Status

The main constraints identified can be characterized as being caused by lack of resources, rigid organizational structures, or low level of education. Some few examples from previous chapters are repeated to illustrate each type of constraint.

9.1.1 Lack of resources

Lack of resources is inherent to developing countries, and the public health sector is cronicly under-resourced also in the first world. The lack of resources is most clearly seen in the former homelands and in the township districts of the Cape Town area.

Most of the facilities in Transkei (Eastern Cape) are without electricity, some of the district hospitals using generators to produce electricity (e.g. Tabankulu district hospital). The sanitational conditions and the remoteness of many facilities were mentioned as one reason for staff turn-over.

Not only the lack of infrastructure in the form e.g. of tarred roads, but equally lack of finances restrain the transport possibilities of the population, health staff and district personnel. This affects the possibilities for horizontal communication, but equally of feedback and follow-up. The lack of transport was mentioned as a reason for varying timeliness of monthly data in to the district office (Eastern Cape). The lack of resources is equally behind the high demand for government vehicles seen e.g. in North-West Province

Although not strictly speaking a 'township district', South Peninsula have just recently acquired computers to all their facilities (by May 2000 they were still not there). They started out with one in the district office, and have kept asking for funding "everywhere" since then. E.g. researchers visiting have been asked to leave their computers behind when finished, and they have been in touch with local enterprises.

One of the barriers to a functional integration of the two major primary care deliverers of Western Cape, the clinics and the community health centres, are the huge gaps in salaries and working conditions.

9.1.2 Organizational structures

The rigidity of the organizational structures and the lack of organizational change still hamper the progress of the health district setup and the functioning of the health information system. For changes in the information system to come through and be sustainable, a parallel organizational process is crucial [JB&N], [Opit]. There is both inherent and expressed resistance towards change in the inherited structures, and devolvement of power, which the PHC approach is based on, is difficult in centralized systems [Opit]. Lack of integration between the two processes of organizational and information systems development was identified already in 1996 as a major constraint for HISP [OpenDay].

Lack of a proper organizational framework within which the information system can function (and lack of training, see below) have highlighted the duality, or two levels, of the term "functioning" (technical

and social). This duality has been presented at p.79 and discussed during the presentation of my findings.

During the pilot phase of HISP, the lack of structures in Khayelitsha was perceived an impassable barrier, and the focus gradually shifted towards a regional level, where they found an administrative framework to work within. Despite years of work, Khayelitsha still struggle with a lack of stable structures and lack of power and authority, and do not have a sustainable information system; the information system is not technically functioning.

South Peninsula, on the other hand, was in the situation that the borders of the established structures coincided with those of the proposed health district, providing stable structures within which to implement the system. The information system has been successfully implemented both in the district office, and later also at facility level. There are many examples of good results at various levels, and I have shown examples of information being used to trigger local action. The TB case outlined later in this chapter illustrate this. The information system in South Peninsula functions at both levels: it is up and running including e.g. routine collation, and information is used.

When expanding the project to Eastern Cape, district structures were already established and district personnel had been employed. But the institutional framework had been put in place as a technical support function, not as an integrated part of management of the services and of the running of the health services. As a result, the district information officer was employed as a 'technical officer', typically with no health background and no particular training in the area. The district information team has thus remained unintegrated with the district (health) management.

The case of drug availability in Flagstaff, where the information officer had noticed that the neighbouring Flagstaff Clinic experienced serious shortages of drugs, but was content when discovering that the figures were correct, is a good illustration of only technical functioning of the information system.

9.1.3 Lack of education

The generally low level of education has huge effects on the health information system. Training and human resource development is pointed out e.g. by [undp], [B&E], [OpenDay], [JB&Hey] as one of the single most important elements in bottom-up development, both of information systems and more generally. The term 'Bantu education' is often used to describe the situation in the former homelands.

There is a lack of training in information awareness and handling among health personnel. There is also a general lack of managerial ex-

expertise, particularly at the lower levels. These are obvious obstacles to the goal of immediate analysis and use of local information.

Low levels of training increase the support needs. This is not entirely unproblematic, seen e.g. in Western Cape, where the facilitators from time to time experienced both lack of time and lack of appropriate skills.

The opposite, the lack of knowledge of health issues was also seen. The data entry clerks in Khayelitsha (Western Cape) were very seldom able to explain “strange numbers” in the data sets when they were pointed out by the facilitator. The tendency was rather to adjust the min/max limits (see p.60) than to recognize deviating numbers as information about a possibly problematic situation. This same lack of knowledge of health issues and of managerial issues was seen in the example from Flagstaff mentioned above.

The sometimes institutionalized turnover of staff (the rotation of nurses in the district hospital system e.g. of Eastern Cape) is a general problem in the health sector, and makes both training for and functioning of the information system difficult. In Flagstaff, none of the nurses that had received training were present at the facilities six months later. The turnover is somewhat reinforced by the HISP training, as the lack of information personnel is huge also at other levels and in other sectors. At provincial level in Western Cape, less than half of the informational posts are filled.

9.2 Overcoming the constraints

Scholars and writers from various disciplines (e.g. [undp], Singer and others in [Opit], [Ehn], [Budde], [B&E], [SAC]) that development (information systems and more generally) should be based on small-scale initiative and focus on local needs and interests.

The HISP project; piloting, prototyping, basing work on local driving forces and focusing on adaptability; may provide an example of such an approach, and in my findings there are various examples of more specific initiatives and efforts to overcome the experienced constraints. A small handful is presented here.

The tuberculosis (TB) example from South Peninsula provides an example which highlight many central issues. Local information was used locally to identify problem areas with particularly low cure rates. Not only were special attention given to the bottom three performers amongst the facilities, the top three were consulted to provide the District Manager and TB Manager with successful procedures to improve the situation, in turn used as incentive for the bottom three. The procedures included extended co-operation and collaboration with the community. The procedure was repeated monthly (identifying, learning, helping).

This cycle equally provide the lowest levels with regular feedback on their efforts.

Another example from South Peninsula is the 'supervised meetings' effort. Starting at a small scale, staff is hence provided hands-on supported training in simple analysis, information handling and presentation using locally relevant examples. On-site immediate feedback and support is given, as well as help under way. The previous clusters (set up while computers were sparse) see a continuous existence as discussion groups. As the skills grow, the staff is eager to receive training in the more advanced features of the software (e.g. to be able to produce graphs on their own).

The efforts of the South Peninsula information officer to make previously unintegrated services want to participate in the district health information system is yet another example of small-scale initiative to provide motivation and ownership towards the system.

The turn-over of staff, and trained staff in particular, can also be seen as a hidden way of introducing changes as people trained in HISP procedures, ideas and philosophies are spread.

9.3 Conclusion

I have shown that the constraints are more pronounced in developing countries, although present also in the first world. The use of bottom-up approaches and locally based, small-scale initiatives seem to have been the decisive to produce the relative success of the HISP project.

Chapter 10

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Appendix A

Guide for interviews and observations

This interview guide do not provide an extensive list of questions asked and themes treated during the course of all interviews or observations. The guide also include issues to remember to *observe* (i.e. not ask directly). It is thematically arranged, and do not reflect e.g. the sequence of questions asked during interviews (hence the denomination “guide”). Additional themes and questions were also often added according to the situation at hand.

The guide is partly colored by the fact that it was drawn up rather early during my study, and thus includes themes that are not treated in this thesis although interesting. The leaving out of themes can have several causes: it may have proven difficult to get people to understand the question, it may have been difficult to get people to answer the questions, and the theme or angle may have proven irrelevant to the actual situation.

One example of an issue seldom asked (but maybe observed) and which turned out problematic to learn about is the “expectations” towards the new system. In 1999, the three pilots and Eastern Cape were the only places where HISP was not only recently introduced. This means that there were very few experiences to draw on to spot gaps between expectations and reality.

This guide is revised and rewritten since the original one was partly in Norwegian, full of abbreviations, additional notes etc, and have been somewhat structured for this presentation. Very little (if anything) is left out, only a little is added to clarify; and it reflects the original one well.

‘Personal’ :

- role (health? district? clerk? other?)

- where?
- time (for how long?)
- information tasks?
- use of information
- training
- what do you consider important reasons for success?
- recommendations to others?

Pre-situation elements of current IS

- tools
- procedures
- reporting
- feedback
- use
- structures, flows

New system (HISP, RMR, DHIS)

- training
- implementation (how? when? level?)
- support
- other tools? use of these?
- other tools - where does the aggregated numbers come from (RMR)
- experienced differences
- attitudes (observe)

“Context” :

- health sector - transformation
- integration
- differences (both vs before and vs e.g. Norway)
- changes

Appendix B

My field work

9 training sessions and workshops :

Cape Town area (Western Cape): Guguletu, South Peninsula, Helderberg, Groenvallei, UWC Winter School;
Durban (Kwa-Zulu Natal province).
Plus 2 “trainings” of a HISP facilitator performed by me

12 regular meetings attended :

5 HISP meetings, 3 Site meetings (Cape Town area), 2 District Management Team Meetings (Cape Town, Durban), 1 District Managers’ Meeting (North-West Province)

23 site visits (facilities) :

16 Cape Town Area, 7 Eastern Cape
It have to be added that because many of these visits were unannounced, it happened that the staff did not have much extra time for me to perform any in-depth questioning.

9 district offices visited, some several times :

5 Cape Town, 2 Eastern Cape, 1 Durban, 1 Mount Currie (Kwa-Zulu Natal)

12 “technical” visits :

3 NGO office (Cape Town), 7 facilities/district offices Cape Town, 2 Eastern Cape.

10 formal interviews :

1 District Information Officer (Cape Town)
1 District Management Team (Durban)
2 local government Information Managers (Cape Town area)
1 provincial level Information Manager (Western Cape)
3 HISP members and 1 previous Site Co-ordinator
1 ISDS facilitator

17 less formal interviews :

2 local government Information Officers, 1 District Information Co-ordinator (Mount Currie), 3 District Information Officers (Durban, Eastern Cape), 1 District Manager (North-West Province), 1 Regional Information Co-ordinator, 4 HISP members, 2 HISP facilitators, 1 CHES facilitator, 2 Cape Town NGO

9 targeted meetings or visits :

2 local government Information Departments (Cape Town), 4 facilities (Cape Town, Mount Currie), 3 District Offices (Cape Town, Eastern Cape), 3 Cape Town NGO

Conference The International Federation for Information Processing (IFIP) 2000

The categories

The above list is provided as a “physical” overview of my case study period to provide the reader with an impression of how I spent my time in South Africa.

The two first categories are self-explanatory. I have chosen to distinguish between site visits on facilities and district offices and “technical visits” due to the different nature of these sites and the reason for visiting. Compared to the former two, “technical” visits were visits initiated by some technical (i.e. computer) problem at the site.

The three next categories are distinguished by their primary purpose and their formality. I label only interviews planned ahead per se as “formal interviews”. More accidental meetings that turned into interviews are listed under “less formal interviews”. The latter of these three categories, “targeted meetings or visits”, label meetings with a (research) purpose where I found the occasion to perform more or less structured interviews with one or several of the other people present.

During the last week of May 2000, an IFIP conference was held in Cape Town for the “Working Group 9.4”, subtitled “Social Implications of Computers in Developing Countries”. This provided a good chance for me to combine a short follow-up of my case study with a wider and more theoretical study. There was also a rather large gathering of people related to the HISP project from several countries present in Cape Town for the conference.

The NGO (Non-Governmental Organisation) appearing several times in the list is an umbrella organisation for five different NGOs working in the Cape Town area. I provided their information manager with help and

support in his efforts to adapt the HISP information system to their use. During the write-up of this thesis, it has turned out that the experiences that this provided me fall outside of the scope of this thesis.

Some of the “targeted meetings” mentioned equally were initiated by “sub-projects” or tasks that have not been included in this thesis, e.g. a survey performed in a Cape Town facility as part of a larger survey on waiting times, workload and workload distribution (during the day) in facilities.

Appendix C

Acronymes

Below is a non-comprehensive list of abbreviations and acronyms used in this thesis.

WC, EC, NWP, KZN The provinces that are included in this thesis: Western Cape, Eastern Cape, North-West Province and Kwa-Zulu Natal.

PAWC The Provincial Administration of Western Cape

CHSO The Community Health Service Organisation of Western Cape. Administered from a provincial level (PAWC). In charge of delivery of curative services; runs the CHC's (see below).

PHC Primary Health Care

CHC, DCH As opposed to clinics, which are traditionally offering only preventive services and which are most often run from local government level, the Community Health Centres (previously known as Day Care Hospitals) of Western Cape are run from a provincial level - by a different organisation than the clinics.

MOU Maternal Obstetric Unit: maternal and child health, family planning, deliveries. Administered from regional level.

TB Tuberculosis

STD Sexually Transmitted Disease

HIV/AIDS Human Immunodeficiency Virus;
Acquired Immunodeficiency Syndrome

HISP, HISPP Health Information Systems Programme with its pilot phase name Health Information System Pilot Project.

DHIS District Health Information System; the software developed by HISP. The denomination is not used for other district health and management information systems (called **dhis**, **dh&mis** with or without dots between the letters (d.h.i.s.)).

This software package for entering, collating, validating and reporting routine monthly data consists of an Access database, with Excel spreadsheets are dynamically linked to the database to facilitate presentation and analysis of the data.

The DHIS package also includes a TB module (with similar functionality), which are not included in the case study.

MDS Minimum Data Set - the minimum amount of data demanded at one level for the level below to report. Thus, the district MDS will include the national and provincial MDSs in addition to the data items wanted at district level.

RMR Routine Monthly Report - often used interchangeably with MDS. The RMR vary from place to place and from level to level.

DIO The District Information Officer(s) are responsible for information handling at district level

DMT Each district is supposed to have a District Management Team consisting of a District Manager, DIO(s) and people handling the various other district level tasks, e.g. a financial officer, and people taking care of the functioning and lower level integration of various programmes.

district information team By district information team, I mean the people within the district that are dedicated to or responsible for the information handling. In most cases, this will be the DIO(s) and the chosen (and trained) facility information staff.

NGO Non-Governmental Organisation

CHESS Centre for Health, Education and Social Studies

HST The Health System Trust is a large, government supported NGO which is sub-divided into several specific efforts.

ISDS Initiative for Sub-District Support - branch of HST. Providing each province with two facilitators (three in Kwa-Zulu Natal), they work with the setup of the health districts.