NEGOTIATING MULTIPLE RATIONALITIES IN THE PROCESS OF INTEGRATING THE INFORMATION SYSTEMS OF DISEASE-SPECIFIC HEALTH PROGRAMMES

Baltazar Chilundo
Department of Informatics,
Faculty of Maths and Natural Sciences,
University of Oslo, Blindern, NO-0316 Oslo, Norway
and
Faculty of Medicine, Eduardo Mondlane University,
Ave. Salvador Aliened, 702, P.O. 257, Maputo
Mozambique
chilubal@yahoo.com

Margunn Aanestad
Department of Informatics,
Faculty of Maths and Natural Sciences,
University of Oslo,
Blindern, NO-0316 Oslo,
Norway
margunn@ifi.uio.no

ABSTRACT
The topic of this paper is the integration of different information systems, and in our case study we analyse information systems in the Mozambican health care sector. The context is a health care sector reform that involves the integration of separate, stand-alone, or so-called vertical health programmes. These programmes are usually disease-specific, i.e. targeted towards malaria, HIV/AIDS, or other major diseases. The reporting and monitoring systems for the activities within these programmes are organised differently, in terms of which data elements are collected, to whom and how frequently they are reported etc., but in general they are all paper-based, at least at the peripheral level. The multitude of different systems places an unnecessary high workload on the health care personnel who do the initial data collection. However, the practical challenges related to the integration of the diverse information systems have not yet been the focus for the decision makers. Our aim with this paper is to describe some of the differences between the systems. Our claim is that these differences are not arbitrary. On the contrary, they may be significant indicators of different realities and different interests. Integration of these systems will thus not be a purely technical or practical issue, but will entail a political negotiation of interests. We employ the notions of multiple rationalities as a theoretical tool to discuss this issue. In particular we find tensions between rationalities ‘on the ground’, i.e. in the health care facilities, and ‘on the top’, among the policy makers, the government and the donor organisations.

Key words: Integration, Information Systems, disease-specific programmes, developing countries, rationalities.

1. INTEGRATING SEPARATE HEALTH PROGRAMMES
Health care services in developing countries are usually provided in collaboration with national authorities, international aid agencies and NGO’s (non-governmental organisations). In order for donors to have direct control over the funds, support has traditionally been organised as stand-alone, vertical programmes, often targeted to address specific health problems. External aid may also come as earmarked funding, or be given as general budget support. In Mozambique several donor-driven, disease-specific programmes exist, of which the Tuberculosis, Malaria, and HIV/AIDS programmes will be further discussed in this paper. While often efficient, these separate programmes do have some problematic effects. Such arrangements do not facilitate transparency, nor are the national authorities able to perform comprehensive and long-term planning. This situation may lead to duplication of functions, lack of coordination, and wastage of resources (Hutton, 2002). This remains a problem even
though the three programmes discussed here are all administratively and physically located within the Mozambican Ministry of Health, in the Directorate of National Health Services. The problem was clearly expressed by the Mozambican Minister of Health in 2002:

“The ministry was a ministry of projects’ rather than a Ministry of Health. This led to confusion. Officials lacked clear direction. They dealt with different donors and owed their loyalty to the donor, competing with each other to keep certain teams of individuals around certain projects, receiving differential and unknown top-ups from different donors (even now). The demands are on the few qualified staff to serve particular donors, to follow their routines, to ensure that the donor’s money goes to what the donor requires. …Even now in the provinces it is common to hear people say ‘this is a Country X project, while this is Country Y’s. This is an issue of symbolic importance, undermining the sense of nationhood and weakening the sense that issues are a matter for government. Government is frequently seen as the problem while donors are the solution.’” From Batley (2002), Box 3, page 20.

Problems such as these are being recognised by the international donor and aid community, and currently there is a global trend, backed by major actors such as the World Bank and the World Health Organisation (WHO), towards the integration of stand-alone programmes into larger sector or sub-sector programmes, often named SWAp – Sector Wide Approach programmes. A SWAp project aims at rationalising and improving the coordination of external assistance (i.e. donor support) (Cassels and Janovsky, 1998), and at supporting national governments in reaching their development goals, through establishing appropriate institutional and financial structures (Schreuder, 2002). In an integrated programme, functions that would have been performed by different staff assigned to separate programmes will be combined. This may reduce costs related to time, training, transportation, etc. (Miller and Wolff, 1996). The integration attempts are followed by hopes that the local processes of prioritisation shall be facilitated and supported, leading to increased local ownership, engagement and motivation. The increased financial stability shall allow planning with longer time horizons (Chao and Kostermans, 2002). Like in many other developing countries, the Mozambican Ministry of Health (MoH) has started to implement a sector-wide approach (SWAp) in the health care sector. So far the implementation has focused on establishing high-level policy discussions with donor organisations. One aim is to pool donor grants into one common account, instead of accounts tied to specific programmes. The authorities at the provincial level should assume responsibility for the allocation of these resources. The integration also involves elements of decentralisation and reform. Mozambique is moving towards a model of different “mini-SWAp”s in different stages of development (MISAU, 2002). An example of a mini-SWAp is the case of the “Drug Pool” (Institute for Health Sector Development, 2001), pooling arrangements for the purchase of medicines, including common auditing, administration, management and monitoring procedures.

In this paper we discuss a crucial, but hitherto overlooked issue concerning this integration: how the diverse reporting and monitoring systems within the multiple separate programmes should be approached. We describe the information systems that exist for three central disease-specific programmes, the malaria, tuberculosis, and HIV/AIDS programmes, in addition to the official, general health information system (SIS). Within these systems different datasets are being collected, there are multiple channels for information flow, and widely varying practices regarding the use of the data. The result is several parallel and overlapping flows, a high work burden on health workers in the primary health care facility, and suboptimal data use for planning and administration. Thus some kind of integration or alignment of these multiple information systems seems desirable, both from the perspective of the health care workers and the management levels. However, this is not trivial, and we

The Electronic Journal on Information Systems in Developing Countries,
http://www.ejisdc.org
now turn to examining previous experiences with the integration of information systems, with a particular focus on literature that discuss the potential for conflict between multiple actors and stakeholders. Then, in order to muster some theoretical resources that may assist us in making sense of such conflicts of interests, we discuss the notion of rationality and multiple rationalities.

2. RELEVANT THEORY

2.1 Integration of Information Systems

Integration has been an issue within the field of information systems for several decades. An early research area was inter-organisational systems (IOS) and networks, for example established through the use of EDI technologies\(^1\). Such systems offer organisations the possibility for changing the relationships with customers and suppliers, and thus to achieve more efficient collaboration. However, to achieve the reconfiguration of the business relationship that is necessary for realising the benefits might be challenging, as it involves multiple actors with different agendas, interests, existing technologies, and organisational cultures. A study of EDI deployment in Finland concludes:

“The major keys to understand the success of EDI diffusion in Finland are not solely technological, nor economic, nor rational. Instead they cover a blend of institutional, technological, socio-economic and cultural factors” (Damsgaard and Lyytinen, 1998, p.293)

This emphasis on the significance of inter-organisational relationships is underscored in a seminal study of the British automotive and retail industry by Juliet Webster. In her study the issue of power differences is identified as crucial in order to explain the challenges that the EDI deployment encountered (Webster, 1995). She describes how Ford, as the dominant actor in the automotive industry, was seen to impose EDI-supported inter-organisational relationships, characterised by domination and subordination, rather than partnership and collaboration (Webster, 1995, p.34). Similarly, a study of the implementation of EDI in the Scottish health care system (Spinardi et al., 1997), describes the political aspects of a project aiming to integrate several health care actors. In the context of a recent health care reform resulting in more autonomous health care trusts, the project encountered limitations to the planned radical restructuring because of the need to maintain consensus within the network of actors. The attempted imposition of a centrally defined IT strategy was difficult, and political issues came up in the disguise of technical controversies around data formats etc. The ‘power issue’ is also seen as crucial for the result in another EDI study in the public sector (Cox and Ghoneim, 1998), where a public entity took advantage of its position to reconfigure the surrounding network of customers and suppliers.

From these early integration studies a focus on asymmetrical relationships can be seen. If dominant or central actors have a disproportionate influence on decisions this may create fatal tensions to the integration attempt. The degree of asymmetry may vary, and inter-organisational relationships may come in different varieties (see e.g. Williams, 1997). In any case, the cooperative arrangements between organisations are highly influenced by issues such as asymmetry, trust and reciprocity, and IOS is seen to support or shape these relationships in particular ways.

An important trend in the early 90’s was Business Process Reengineering (BPR), based on Hammer and Champy’s ideas of radical change and restructuring of business processes (Hammer, 1990, Hammer and Champy, 1993). The approach aimed at

\(^1\) EDI: Electronic Data Interchange: structured electronic message, often containing financial or purchasing information such as orders, invoices, cheque-clearing data etc.

The Electronic Journal on Information Systems in Developing Countries, http://www.ejisdc.org
reengineering and optimising cross-functional or even cross-organisational processes (Kettinger et al., 1997). The BPR ideas are clearly recognisable as the basis for a major IS trend, the Enterprise Resource Planning (ERP) system. Such systems are built around complete business processes that are thought to represent best practices in industry. The system, consisting of a central database, plus work and information flows, provides one integrated system for the information requirements of the entire enterprise. Implementing an ERP system requires examination and possible re-engineering of most organisational processes. Also here expectations with ERP were grand, as the systems were seen as agents of substantial organisational change. By replacing legacy systems it was thought that one would avoid problems with interfaces and inconsistencies between multiple systems, and achieve complete integration. Implementing an ERP system would facilitate rapid organisational change in an increasingly globalised, volatile and competitive market environment, where it was important to be lean, transparent, process-driven and integrated (Robinson and Wilson, 2001). The efficacy of the BPR approach, and in particular its emphasis on ‘clean-slate’ approaches has long been questioned. It has also been criticised as having been just an excuse for companies to down-size, particularly in the North American context (Mumford, 1999).

The ‘politics of BPR’ were early identified as the most persistent barriers to the success of BPR programmes (Willcocks and Smith, 1995, Galliers and Swan, 1999). Also when we turn to the IS literature on implementation and use of ERP systems, failure stories abound (Mabert et al., 2003). While much of the literature is concerned with technological challenges and IS/IT aspects like project management, configuration, and architecture, we also find studies describing the organisational dynamics within the process (Kremmergård and Möller, 2000, Besson and Rowe, 2001, Sia et al., 2002). One aspect of these dynamics is the dissonance between the managerial and the users’ needs (Kawalek and Wood-Harper, 2002), or the focus on senior managers at the expense of skilled workers (Westrup and Knight, 2000). However, it also pertains to the wider context of the complex and reciprocal interactions between several organisations that play out over time (Truex and Ngwenyama, 2000). In multi-site ERP implementations there is a potential for conflict between the multiple perspectives, technologies and terminologies that need to be aligned, as well as issues concerning trust (Markus et al., 2000). Also the technicalities of the ERP system itself might constitute challenges. A customised implementation might prevent an easy merger of two similar systems (Truex and Ngwenyama, 2000). An ERP system is also embedding ways of using it as well as organising the implementation (Hanseth and Braa, 1998). Davenport (1998) describes how ERP systems impose their own logic on a company’s strategy, culture and organisation, and may produce unintended and highly disruptive consequences. The complex nature of ERP systems implies limitations to the managerial wish for control by leading to unpredictable effects (Hanseth et al., 2001).

The issue of integration is still of major importance within the information systems field: Large multinational companies consist of several subsidiaries, and mergers bring together companies with different business cultures as well as different technological systems. The wished-for integration of these information systems is far from trivial, either technically or organisationally. E-business, with an emphasis on customer responsiveness and service orientation, constitutes another major driving force towards integration of fragmented systems (Jarvenpaa and Tiller, 1999). Middleware and data warehousing are some of the solutions that have been around for some time, and during the last decade, many EAI tools (Enterprise Application Integration) have emerged, although mostly proprietary. Customised integration of systems plays a significant role in practice, but also novel approaches like Web Services are increasingly discussed and deployed. However, concerning these novel
technologies the area of integration seems to be primarily a practitioners’ issue rather than an academic core topic in the current IS field. The result is that while on the one hand the academic literature seldom discusses the practicalities of integration, the practitioner’s literature on the other hand seldom discusses the organisational challenges associated with it. In the practitioners’ literature we may occasionally find insights that integration of an organisation’s systems require the meeting of both business and technology managers, and that “their philosophies and agendas are different” (Ramankutty, 2003), but in general the issue is treated as a technical one.

We believe that integration should represent a topic of considerable interest to the academic IS field. Then the insights from studies of previous integration technologies concerning the political nature of the process will be of considerable value. We believe that issues of organisational differences and tensions may become even more important and visible in today’s settings of greater complexity. For example, in integrating the activities of the health care sector of Mozambique, multiple actors with non-overlapping interests are present. Some of these actors are local, some national (Mozambican government and other states’ aid organisations), and some international (the WHO, the World Bank). The diseases, towards which the programmes are targeted, are different both with regard to their mechanism of spreading, the bodily and social consequences of the disease, the incidence and prevalence, as well as the organisation of and effect of treatment. In aligning these multiple actors, negotiations between different needs and interests will be crucial. In our view, this implies that the needs and interests should be charted before the integration is planned. We now turn to discussing theoretical concepts that may assist us in going somewhat beyond the IS literature’s focus on interests and stakeholders.

2.2 Multiple Rationalities

This subsection examines the notion of rationality and multiple rationalities. These are concepts which we see as helpful in understanding the multiplicity and heterogeneity of the interests, actors, structures, tasks and systems involved in the process of IS integration.

Issues of reason and reasoning have been debated in philosophy, economics, political science, psychology and sociology. A major source for theories on rationality is Max Weber’s work, which aimed at understanding the institutional character of modern society. His work describes different types of rationalities in societies and organisations (Weber, 1978). Formal rationality is logical, rule-based, codified, and usually involves quantitative calculation. This type of rationality may also be called instrumental, or ‘means-ends’ rationality. Later Habermas (1984) splits Weber’s formal rationality into instrumental and strategic rationalities. The former, instrumental rationality, is considered when it is performed according to technical rules and when it is judged in terms of the effectiveness of intervention in a physical world. The later, strategic rationality, is considered when actors achieve their ends by influencing others (Cecez-Kecmanovic et al., 2002). The formal rationality is the main type discussed by Weber himself, but he also suggested the existence of another type of rationality, substantive rationality, which considers the results against some value standards, rather than on logical abstraction. Substantive rationality explains how a particular course of action satisfies the value choices of a society – if the formal rationality can be characterised as a “matter of fact”, the substantive rationality is a “matter of value” (Weber, 1947). Value ideals are rationalised and become the guiding standard of all human action. One example of value rationalisation provided by Klein and Hirschheim (1991), is the elaboration of Christian doctrine by church fathers, where followers acted substantively rational if they oriented their actions to God’s word, regardless of cost and consequences, for example even if it involved martyrdom. If the actors weighed the consequences of whether or not to follow Christian
values they acted formally rational (ibid. p. 160). Weber saw the spread of formal rationality into all parts of life, with its aim of increasing the economic and administrative efficiency, as a central feature of the Western modernisation process. Utilitarian practical calculations replaced decisions based on ideological or religious values.

Within organisational theory, issues of rationality have been extensively debated, mostly connected to theories on decision-making. Often “rationality” is conceived in a narrow sense, which presupposes that there is an economic logic underlying action. Rationality implies a logical consistency of goals and action, where the goals can be to maximise benefits, to improve the material conditions (for individuals), or determined by the operations of the market (for the organisation). Nevertheless, Simon’s (1957, 1982) seminal work on limited or bounded rationality criticised the assumption of economic rationality, or the automatic implementation of the most profitable strategy, as idealistic and unfeasible in practice. He proposed instead that organisations make a deliberate effort to achieve the best possible results, given limitations in cognitive and material capacities and resources, and with the understanding that it is impossible to know what the results will be in advance:

*Rationality denotes a style of behaviour that is appropriate to the achievement of given goals, within the limits imposed by given conditions and constraints (Simon, 1982, p.408).*

Weber discussed rationality within the context of social action, which also includes non-rational or irrational action. A social action is deemed non-rational if it is oriented to affections and emotions (mainly oriented to others by feelings, such as love, hate, temptations) and traditions (mainly oriented to others by shared behaviour pattern) that is followed as a matter of course “through the habituation of long course” (Weber, 1947, p.117). Hence, non-rational action may be seen as the means not matched to the ends. Several authors have emphasised the downsides of rationality, how rationally oriented systems produce irrational or detrimental effects, e.g. around the current drive to standardise globally and create services of a ‘uniform quality’, of which the fast food chain McDonald’s is an iconic proponent (Leidner, 1993, Ritzer, 2000). The unexpected consequences of seemingly rational decisions and actions is also recognised within the IS literature, e.g. with regard to the above mentioned ERP systems (see e.g. Hanseth et al., 2001).

We may thus proceed with a notion of rationality which is broader than the merely instrumental ‘means-ends’ calculation; in other words a notion of rationality where values and constraints are significant factors. We should also retain an awareness of the non-predictability of seemingly rational actions. In addition to this, we have found it helpful to build on a recent contribution to IS literature from Chrisanthi Avgerou, who discusses diversity in information systems research (Avgerou, 2002) in relation to (multiple) rationalities. She analyses how ICTs are closely aligned with the institution of management, and how this alliance is a formidable force in globalisation. Avgerou cites Shenhav (1999) who studied how the professional managerial rationality has become the almost undisputed way of governing an organisation. Recently, the “managerial rationality [has] become … the all-pervasive rationality for reforming [also] non-business organisations”, such as [national public organisations like health] (Avgerou, 2002; p. 29).

This point is significant because the field of information systems is closely linked with this managerial rationality and we need a reminder about the ideological nature of rationality. For example, the mainstream discourse on socio-economic development does not discuss the problematic role of ICT to any significant degree, while within the critical research stream one may find voices that point to the contrary (Madon, 1993, Appadurai, 1996, Sahay, 1998, Walsham, 2001). One of the main messages emanating from Avgerou’s
book is that we need to acknowledge that there is not just one kind of economic and managerial rationality, but multiple kinds of rationalities that are historically developed and context dependent. These different rationalities have resulted in different modes of organising, which are congruent with the rationalities. We find her ‘contextualist position’ regarding the rationality of organising to be well suited for our aims of exploring the multiple actors and interests in our case.

Our aim is to explore some of the differences between the various information systems and the reasons for these differences. In this we believe it is of crucial importance to understand the different rationales behind these systems, how they have been historically formed, how they are shaped by the characteristics of the problems (i.e. diseases) addressed, and how they are embedded into different institutional settings, both at the local, national and international level. Although we do not perform a comprehensive historical analysis of the many involved institutions, our work goes part of the way towards this. Uncovering the different rationalities that are underpinning the local work practices of data collection and reporting, the programme-specific requirements, and the donors’ and the Ministry of Health’s practices, will be a pre-requisite for integrating the health programmes discussed in our case.

Our claim is that integration of diverse information systems should not be perceived as primarily a technical issue. It is rather a complex and politically charged activity where multiple institutional influences and different, possibly competing, rationalities need to be aligned. In Mozambique, the policies of change formulated by the national health authorities and the donor communities are significantly shaped by the dominant rationality of management, supported by the international donors, and visible e.g. through the World Bank and IMF’s insistence on public sector reforms and the introduction of ‘best’ management practices. From this point of view improving and integrating the diverse reporting and monitoring systems of health care seems self-evident, and the national health authorities’ and the donors’ interests seem reasonably well aligned in this matter. The rationality of integration can be described as the goal of achieving efficiency and control through implementing a seamless, consistent, coherent, non-redundant and uniform reporting system. However, as commendable as this aim is, our purpose with this paper is to problematise such taken-for granted notions. Such high-level aims may not mean the same for all involved actors. Equipped with the notion of multiple, limited, and situated rationalities, which we denote ‘contingent rationalities’, as well as an awareness of the relationship between power and rationality, we set to ‘unpack’ the rationalities within the diverse health care programmes.

3. Research Method and Case Study

We have chosen to study three of the major vertical health programmes: the malaria, tuberculosis and HIV/AIDS programmes. All of these programmes receive significant amounts of funding from donors, and are subject to international guidelines and policies from, for example, the World Health Organisation (WHO).

3.1 Study Area and Design

The workings of these programmes’ information systems were studied by the first author in selected districts in the provinces of Inhambane (5th to 16th of August 2003) and Gaza (between 18th of August to 1st of September 2003). The disparities between the programmes are also the topic of previous studies (Chilundo and Aanestad, 2003). In both provinces, the study was initiated in selected health facilities (health centres and district hospitals), and then proceeded to the respective district directorates of health, province headquarters and finally to the national level. In the Ministry of Health (MoH) both the Health Information Department
(in the Planning and Cooperation Directorate), and the Department of Epidemiology and Endemics (in the National Health Directorate) were visited, as well as the Malaria, Tuberculosis (TB) and HIV/AIDS programme headquarters (co-located with the National Health Directorate).

3.2 Data Collection and Analysis

Qualitative methods of data collection were adopted, namely observation of work practices, interviews with key informants, and reviews of existing reports and register books at all levels. Table 1 presents the list of respondents in relation to their working places (health facilities, district and province). In addition, our study has been informed by extensive reading of general and programme-specific policy documents.

Table 1: List of respondents in relation to their working places

<table>
<thead>
<tr>
<th>Working level</th>
<th>Health workers</th>
<th>Staff Responsible for statistics</th>
<th>Managers</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inhambane Province</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maxixe Health centre</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Urbano Health centre</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Chicuque Rural hospital</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Maxixe District Office</td>
<td>-</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Inhambane-City District Office</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Provincial Directorate of Health</td>
<td>-</td>
<td>3</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td><strong>Gaza Province</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chokwe-Sede Health Centre</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Chokwe Rural hospital</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Chicumbane Rural hospital</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Chokwe District Office</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Xai-Xai District Office</td>
<td>-</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Provincial Directorate of Health</td>
<td>2</td>
<td>6</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td><strong>National Level</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td></td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>25</td>
<td>18</td>
<td>25</td>
<td>68</td>
</tr>
</tbody>
</table>

As shown in Table 1, the data gathering process was performed at four organisational levels. The focus for observations and interviews differed between these levels. These foci are as follows:

1. Facility level: Routines for data collection for local statistics and reporting, clinical practices and procedures, laboratory work practices (where HIV, TB and some malaria cases are detected or confirmed). Also other HIV testing facilities such as blood banks and voluntary counselling and testing centres were included.

2. District level: Data collection and reporting routines, use for local statistics, organisational structure, supervision schemes and major problems and constraints from the perspective of district managers.

3. Provincial level, and

4. National level.

In both Provincial and National levels, data were gathered on the essential indicators used and on the specific data elements needed to calculate the essential indicators. We acquired data in both electronic and paper formats, for the purpose of matching data, checking for completeness, correctness and consistency.

Health workers were asked questions regarding clinical practice, patient management, treatment and possible discrepancies between the three diseases programmes, use of register books, their contribution in statistics and the usefulness of data reported. The persons working on statistics and their managers were asked questions pertaining to the usefulness
and quality of data received, data processing in both paper and computer systems, the
constraints encountered in using different database management systems, existing plans and
integration strategies as well as about potential influence from donors towards shifting local
decisions.

During visits, a research diary was used to take relevant notes and depending on
previous consent a tape recorder was also used to record information. The bias resulting from
this data gathering was minimised in all places by providing feedback to the key workers and
respondents and by visiting each place more than once to confirm the earlier observations and
discuss the main findings with the respondents and other colleagues.

4. THE MALARIA, TUBERCULOSIS AND HIV/AIDS PROGRAMMES

In this section we give details about the three diseases, the organisation of the work to fight
them, as well as the diverse reporting systems that exist within the programmes.

4.1 Malaria

Malaria is endemic and accounts for the highest incidence of disease in Mozambique (15% of
the total illnesses burden in Mozambique) (MISAU, 2001). Children under five years of age
and pregnant women are the most vulnerable groups. The disease accounts for up to 44% of
all out-patient consultations and 57.6% of all paediatric admissions at the rural and general
hospitals (Mozambique Country Coordinating Committee, 2002).

4.1.1 The Organisation of Malaria Work

Since 1982 Mozambique has had a national Malaria programme with the objective of
reducing the mortality and morbidity due to the disease. The programme works towards this
goal partly by promoting a range of preventive activities, mainly the distribution of bed-nets
and indoor and outdoor spraying campaigns, and by working towards an increased access to
cost-effective anti-malarial drugs. These efforts were enhanced since 1999 when Roll Back
Malaria\(^2\) started to extend its action to the community, by enrolling the society to actively
participate in preventive and malaria control activities (MISAU, 1999, WHO/UNICEF,
2003). The most relevant donors supporting this programme are NORAD (Norwegian
Agency for Development Cooperation), LSDI (Lubombo Spatial Development Initiative), the
WHO and UNICEF (United Nations Children's Fund). The programme is represented
countrywide, having specific managers at the Provincial Directorates of Health. However,
due to resource constraints, prevention such as spraying is only performed in a few selected
areas. Treatment is being offered in a hierarchical structure, where the level of the health
facility corresponds to the drugs that are available. At the peripheral health facility only first
line drugs are available; at rural or general hospitals some more drugs are available, while the
most advanced treatment is available at province or central hospitals.

4.1.2 Work Practices and Data Sources

Most patients that present malaria symptoms are immediately treated as having clinical
malaria (not confirmed with laboratory test). The treatment consists in administering the so-
called first line drugs. If the patient does not present classical symptoms, is severely ill (for
example with anaemia), or is considered a complicated case (e.g. if self-treatment by first-line
medication has not helped), the clinician will usually request plasmodium screening (malaria
blood test) from a clinical laboratory. The request is written on any piece of paper, there is no
standardised form for this. The test and its result are registered in the laboratory’s general

\(^2\) RBM is a global partnership between WHO, UNICEF, World Bank (WB) and United Nations Development
Programme (UNDP).

The Electronic Journal on Information Systems in Developing Countries,
http://www.ejisdc.org
register book. Due to the high prevalence rate of malaria, this test is usually the most frequently performed in the laboratories at the district level. This is the case even though, due to resource constraints, only a small minority of patients with suspected malaria are being tested. The majority of patients remain as outpatients and only a few are hospitalised.

4.1.3 Malaria Data Flow in Several Parallel Subsystems

All malaria data being reported from health facilities are primarily gathered from register books in consultation rooms, infirmaries and laboratories. Malaria data may be reported in up to four reporting channels (Figure 1):

a) The Weekly Epidemiological Bulletin (BES)

This reporting system belongs to the Department of Epidemiology and Endemics within the National Directorate of Health and is based on weekly reports from health workers from all health facilities (i.e. health posts and centres, district, province and central hospitals). These data are collected for epidemiological purposes, in order to alert managers in case of outbreaks. Through the BES, cases and deaths of the following diseases are notified: malaria, measles, tetanus, meningitis, diarrhoea, dysentery, cholera, acute flaccid paralysis (poliomyelitis), sleeping sickness and rabies. The system is mainly paper-based at the peripheral level and is computerised at the provincial and national levels. Malaria data are aggregated into two categories: number of cases and deaths. The paper forms do not distinguish between malaria patients with a laboratory confirmed diagnosis and clinical cases (non-confirmed, suspected). This is problematic because clinical cases can easily be misdiagnosed due to the similarity of symptoms with meningitis, typhoid fever, septicaemia, influenza, hepatitis, all types of viral encephalitis, gastro-enteritis and hemorrhagic fevers (NEHC, 2000). At the provincial level, data are entered by the person dealing with epidemiological data (the person responsible for BES) in an electronic BES database (based on DOS application) with the same attributes as in the paper forms. The BES database is only managed by the person responsible and is usually located in a specific division. The output of data comes in text files that are exported to floppy disks to be sent to the national level. The text files are highly structured; the first row of each column shows the name of the disease, followed by weekly data aggregated per district. From the Department of Epidemiology and Epidemics the data is further reported to the Malaria Program at the national level.

b) Malaria Programme reporting system

Some provinces are using a parallel subsystem that is specific to the Malaria Program. In this system malaria data are collected on a monthly basis from all health facilities. The system is entirely paper-based. The forms used register the most important variables in order to calculate most of the malaria indicators. The data collected are from ambulatory (outpatients) and infirmaries (inpatients) and are grouped by age (0-4; 5-15 and above 15 years old). In this form it is also indicated whether the number refers to laboratory confirmed cases or not. These data are aggregated by the district into one paper form and are sent to the province level where they are again compiled in a province form (also paper) to be sent to the Malaria Program at the national level. However, this system has not been extended to all provinces.

c) District hospitals reporting system (sentinel malaria sites)

This is an integral part of the main health information system (SIS) within the National Directorate of Planning and Cooperation (i.e. the information is thus managed in a different section/department within the Provincial office and the Ministry of Health as compared to the two previous systems). Similar to BES, SIS is mainly paper-based, being computerised at the provincial and national levels. The paper form provides monthly data from inpatient wards in categories such as surgery, maternity, paediatric and medicine including important causes of
admitting patients e.g. laboratory confirmed malaria, diarrhoeas, AIDS, tuberculosis, anaemia, etc. The data concerning the diseases like malaria are categorised separately for children and adults and are subdivided into discharges (cases) and deaths. At the provincial level, data are entered in a SIMP\(^3\) database (based on Excel spreadsheets) by the person responsible for general statistics (this is the person who deals with all data managed in SIS) with the same attributes as in the paper forms. Thus the output of malaria data comes in a spreadsheet called “AnaExtra” that includes also inpatients data of TB, sexually transmitted diseases/AIDS, etc. These spreadsheets are further exported onto a floppy disk to be sent to the National Department of Information for processing and analysis.

d) The laboratory system reports data regarding two main tasks: one for reporting the volume of laboratory tests performed (including malaria slides) and another for reporting needs in terms of reagents and other supplies. So, data are primary gathered from the laboratory register book and reported monthly to the national laboratory managers oriented towards managerial and logistic areas. The information on performed malaria tests is not being forwarded to the Malaria programme managers.

This multiplicity of channels contributes to duplication of effort, and consumes time. Within all of the subsystems our study revealed instances of sub-notification and mismatches in data (Chilundo et al., 2004).

4.2 Tuberculosis

Mozambique was added to the list of high-burden countries following a revision of tuberculosis incidence estimates for 1999. Tuberculosis (TB) is the third leading cause of hospitalisation, after acute respiratory infections and malaria. There are 21,000 TB cases per

---

\(^3\) SIMP comes from a Portuguese acronym “Sistema Integrado de Monitoria e Planificação” that is Integrated System of Planning and Monitoring recently adopted by the Planning Directorate.

The Electronic Journal on Information Systems in Developing Countries, [http://www.ejisdc.org](http://www.ejisdc.org)
year and 30-32% of them are co-infected with HIV. The estimated annual risk of TB infection is 1.7%, empirically corresponding to about 94 new smear positive cases per hundred thousand inhabitants per year (Mozambique Country Coordinating Committee, 2002).

4.2.1 The Organisation of Tuberculosis Work

Since 1977, Mozambique has had the national TB/Leprosy programme, aiming to reduce morbidity and mortality and the transmission of the disease. The programme has traditionally had a rather independent position, and is also regarded as very successful and well managed. The most relevant donors supporting this programme are NORAD, ILEP (International Federation of Anti-Leprosy), the WHO and the Damien Foundation.

While the national programme management is located in the Directorate of National Health Services, there are also programme employees at all levels of the health structure (i.e. at provincial, district and rural hospitals). The treatment and patient administration is performed separately from the other health services, although usually within the same health facilities. The programme has also had its own system for logistics, most notably drug supply. The province administration provides administrative support, while policy and planning are administered at the national level.

Treatment of tuberculosis is long-term (at least 6 months), and is strictly managed in order to secure patient compliance. It is important that an infection is entirely combated before medication is terminated, in order to avoid the development of resistance to the treatment. The first 2 months are an intensive phase, where several drugs are administered to the patient. The previous sanatorium-based approach to treatment has been replaced by a direct observation treatment (DOT) approach. This implies that TB patients need to come to the health facility every day in the early morning (6 a.m.) and take the medication under the observation of the TB manager. The aim is to strictly control both patient compliance to the treatment and to avoid a black market for TB drugs, which would dramatically increase the risk for development of multi-drug resistant TB. Patients living very far away, or with severe symptoms are admitted as inpatients in TB wards. After the first two months, the drug regime changes to a maintenance phase that can be taken on a home basis for non-severe patients. After the 2nd, 3rd and 5th month the patient is laboratory controlled and weighed to allow adequate follow-up of the treatment.

4.2.2 Work Practices and TB Data Sources

Similar to a malaria patient, a tuberculosis patient is screened for tuberculosis in a screening consultation room. In case of a typical (pulmonary) pattern, the clinician will order a TB test (baciloscopy) from the laboratory by filling in the standardised and specific form for such purpose (model PNCTL5). This form has several tick-boxes and structures the information to be entered. In the laboratory the test is registered in a specific TB register book (Model PNCTL1), together with the test result. The result is also noted on the request form that becomes the TB lab report and is given back to the patient who takes it to her/his clinician. These forms and register books are provided by the TB district coordinator who travels to health facilities regularly. If the TB test is positive, the patient is referred to a specific tuberculosis facility. This is usually another office within the ordinary health facility. The tuberculosis facility is run by the tuberculosis programme and is staffed by a TB manager who conducts and oversees the treatment, usually supported by medical doctors or medical technicians.
4.2.3 TB Data Reporting

Due to the previously described nature of the disease and the treatment, the information system for Tuberculosis is patient-centred in addition to providing statistical information. When the patient is admitted to the TB facility, the case is registered in a standardised register book for inpatients (model PNCTL 2). In addition patient information is registered in an individual card for TB treatment (model PNCTL 3) and in a patient-held card for identification of the TB patient (model PNCTL 4). The card is supposed to be brought to the treatment.

The information systems for tuberculosis (Figure 2) are mostly paper-based. They are only computerised at the national level (using Excel spreadsheets). The tuberculosis reports are sent only quarterly, using two forms (model PNCTL 7 and model PNCTL 8). The former, model PNCTL 7, reports new cases, treatment failure, transfers and the cases being submitted for a second chance of treatment (e.g. due to failure in a previous session). All new cases are categorised by age group (<15 years or >15 years) and pulmonary or extra-pulmonary TB. The latter, model PNCTL 8, called quarterly evaluation of treatment results of TB cases, is used to follow up in a 12 months retrospective manner the treatment success of TB patients with positive slides (sputum). A patient with TB is registered in the reporting system after the intensive, direct observation treatment regime (after 2 months). The main recipients of the TB data are the TB programme managers, located in the Directorate of National Health Services. However, at the provincial level the TB data are also reported through the main health information system (more specifically the application SIMP) (Figure 2).

4.3 HIV/AIDS

Mozambique is significantly affected by HIV/AIDS with a prevalence rate of about 13.6% among people between 15 and 49 years age (MISAU PNC DTS/HIV-SIDA, 2003) with significant variations between the provinces (from 7.5% in Cabo Delgado to 26.5% in Sofala). An estimated 1.1 million of Mozambique’s 18.1 million inhabitants were living with HIV/AIDS in 2001, of whom approximately 6.2% were children (0-14 years of age) infected.
primarily through mother-to-child transmission. Over 500 new infections occur daily, and it is estimated that HIV incidence will not begin to plateau until the end of the decade. By 2010, without lifesaving treatment and aggressive prevention, an estimated 1.9 million people will be infected and 167,000 people will die, 19,000 of which will be children under the age of 15. It is projected that by the end of the decade, the epidemic could lower life expectancy from the anticipated 50.3 years to 36.5 (INE et al., 2002).

4.3.1 The Organisation of HIV/AIDS Work

The HIV/AIDS control programme is part of the STD/HIV/AIDS national programme. (STD = Sexually Transmitted Diseases). The major goal is to reduce the spread of HIV/AIDS and mitigate the impact on those infected and affected. The strategy is to provide a comprehensive programme of prevention, care and support that builds upon existing community, governmental, and non-governmental activities. Treatment, e.g. with antiretroviral drugs, has not been generally available. Some private (mostly religious facilities) and public health facilities have introduced antiretroviral therapy aimed specifically to prevent mother-to-child transmission, but officially this is not yet part of the government activity. However, it is included as one important aim in the new strategic plan (2004-2008), oriented towards the prevention of mother-to-child transmission (MISAU, 2003a). The programme is established countrywide, with managers at national and provincial levels. The most relevant donors supporting this programme are NORAD, the Centre of Diseases Control-Atlanta, PSI (Population Services International), DANIDA (Danish International Development Agency), the WHO, PNUD, UNAIDS (the joint United Nations Programmes on HIV/AIDS) and USAID (United States Agency for International Development).

4.3.2 Work Practices and HIV/AIDS Data Sources

HIV/AIDS data come from four population segments, namely: (1) Pregnant women, selected from a few antenatal clinics, used as the source for periodic estimates of HIV prevalence; (2) Individuals voluntarily checking their HIV status in Voluntary Counselling and Testing (VCT) centres; (3) Blood donors donating blood in blood banks; and (4) Patients visiting health facilities and showing symptoms of AIDS. Here we do not describe the work practices of the surveys, but focus on the other three systems for information flow.

When a voluntary client comes to a VCT centre, s/he is first given information about the aims and advantages of taking the test. The counsellor has a register book (daily register for counsellor activities), which identifies the client using a numerical code instead of the name. In this book the gender, age group, test result, education level and status of the pregnancy is also registered. Except during campaigns, for example organised by churches, the average work load is low, with a number of 4-6 cases a day. These centres appear to be well resourced, for example, equipped with new computers, but they are not necessarily well run. In many of the facilities we visited, we found VCT workers experiencing several constraints in entering data into the new database (based on EpiInfo 6) called “Data System for VCT in Mozambique – A Local System for Collection, Analysis and Data Processing.” This observation of the use of the EpiInfo application was in line with other criticism made by health information systems specialists about the inadequacies of EpiInfo for routine data management (Braa and Blobel, 2003).

The blood bank facility is where blood is collected from donors for the purposes of transfusions. Tests are performed to screen for infectious diseases (HIV and syphilis), and the donor is informed that if his/her blood is considered unsafe for transfusion it will be

---

4 During the last couple of years, a number of VCT centres have been established in both rural and urban areas. They provide advise/counselling and on-site testing to persons who voluntarily approach them.
discarded without further information. If the donor wants to know the HIV status s/he is referred to the Voluntary Counselling and Testing service. All samples collected are identified by names and registered in specific register books. In many of the health facilities visited, the register books being used were seen to be improvised from ordinary exercise books, with no clearly defined report formats. As a result, there were many mistakes in the report books caused by illegible handwriting, the spread of ink blots, and incomplete entries. The absence of standardised reporting formats led to a number of problems such as blood donation data being reported without HIV screening data, and discrepancies between the totals of HIV and syphilis positive cases and that of discarded blood. These totals should theoretically be equal.

When an AIDS condition is suspected, the admission of a patient to a health facility is dependent on the severity. This means that the non-severe patients usually are treated as outpatients and typically referred to the Voluntary Counselling and Testing services or to the day clinics that provide specific follow up services to the HIV/AIDS patients. So, these patients are excluded from the registration system for the purposes of reporting. The ones admitted are guided to the infirmaries. In the infirmaries, the majority of “AIDS patients” are not objectively confirmed in the laboratories due to resource constraints on testing facilities, and the clinical Bangui criterion is most commonly used to perform AIDS diagnosis. The small group of patients being tested is usually those that do not clearly fulfil the AIDS clinical diagnosis and therefore the clinician is uncertain about the cause of the clinical pattern. The majority of health centres and district hospitals frequently lack adequate HIV test kits, so in general, the assays available are primarily for screening blood donors and clients tested in Voluntary Counselling and Testing services. In the cases where the clinician requests the laboratory test, s/he fills in a paper form request identifying the patient’s name, age and the clinical diagnosis. A nurse collects the blood specimen and both the request form and the specimen are sent to the laboratory. In the laboratory, the blood specimen is tested, using the determine method, and the result is translated into the same paper form request that then becomes the laboratory report. The report is then sent back to the infirmary where the patient’s HIV result is registered in the individual clinical process and later is counted to be part of the monthly statistics.

4.3.3 Reporting System for HIV/AIDS Data

From Figure 3 we notice the multiplicity of reporting channels. These contribute to the complexity of HIV data flow from one level to another with no clear collaboration amongst the workers dealing with the data.

1. Periodic surveys for HIV epidemiological surveillance under the responsibility of the Department of Epidemiology and Endemics together with the HIV/AIDS programme. The surveys have been conducted in HIV sentinel posts (selected antenatal care facilities) every 2 years, with a focus on pregnant women.

2. Routine system for reporting data from VCT centres on a monthly basis. It is operated directly by the HIV/AIDS programme together with NGOs.

3. Routine system for reporting blood banks’ data on a quarterly basis. HIV tests of blood donors are quarterly reported by the blood bank channel at all levels with transfusion facilities as part of the National Program of Blood Transfusion.

---

5 Bangui criterion is a set of standardised clinical signs and symptoms proposed by the WHO in 1986 for the establishment of AIDS diagnosis in Africa without the use of laboratory tests.

The Electronic Journal on Information Systems in Developing Countries, http://www.ejisdc.org
4. Routine system for reporting inpatients with AIDS. The AIDS patients are monthly reported through two parallel ‘standardised’ reporting systems from the district hospitals, namely (a) *AIDS inpatients case-reporting subsystem*, which is a system of the Department of Epidemiology and Endemics operated together with the HIV/AIDS programme and (b) *the monthly summary for inpatients from district hospitals*, which is an integral part of the main health information system within the National Directorate of Planning and Cooperation. The more advanced hospitals (central and provincial) report the data in a largely ad hoc manner because no formal system has been set up to report AIDS cases and is thus excluded from the official national reports (MISAU DPC, 2003).

Figure 3: HIV data flow - an overview of HIV cases reporting in Mozambique

4.4 The Quality of the Reporting Systems

In general the quality of data reporting from these three programmes (Malaria, Tuberculosis and HIV/AIDS) varies. We found incompleteness, inconsistency and incorrectness of data, particularly in the Malaria and HIV/AIDS programme, but also good quality data collection and reporting procedures, as in the TB programme. Table 2 summarises the general problems of data quality between these three programmes.
Table 2 – General problems of data quality between Malaria, Tuberculosis and HIV/AIDS Programmes

<table>
<thead>
<tr>
<th>1. Malaria Programme Data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General overview features</strong></td>
<td>Non-standardised request forms and register books; Multiplicity of reporting systems; No specific supervision schemes.</td>
</tr>
<tr>
<td><strong>Types of reporting system</strong></td>
<td><strong>Major problems</strong></td>
</tr>
<tr>
<td>1.a) Weekly epidemiological bulletin</td>
<td>Malaria cases reported not differentiating clinical cases from laboratory confirmed cases; Design problems with the primary collating form leading to non-compliance or “invented” data by the clinicians; Extreme delays in sending the completed form from health facilities to the district; The consequences are large gaps, demonstrating “non-clinical” week to week variations of time based malaria data.</td>
</tr>
<tr>
<td>1.b) Specific Malaria Programme</td>
<td>Abnormally large discrepancy between laboratory confirmed cases reported with positive laboratory tests counted in the laboratory register book;</td>
</tr>
<tr>
<td>1.c) Inpatient Reporting (part of the main health information system)</td>
<td>Significant discrepancy of data reported compared to specific malaria reporting; Non-confirmed cases included in confirmed malaria data reported.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Tuberculosis Programme Data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General overview features</strong></td>
<td>Standardised request and reporting forms; One reporting system: Include both patient and statistical information; Regular specific supervision schemes.</td>
</tr>
<tr>
<td><strong>TB reporting system’s problems</strong></td>
<td>Very insignificant, mostly related to data incompleteness (e.g. contact person address incomplete).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. HIV/AIDS Programme Data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General overview features</strong></td>
<td>Multiplicity of reporting channels: Irregular specific supervision schemes mostly oriented to VCT centres.</td>
</tr>
<tr>
<td><strong>Types of reporting system</strong></td>
<td><strong>Identified problems</strong></td>
</tr>
<tr>
<td>3.a) VCT centres</td>
<td>HIV data sent directly to the national level with no clear validation and processing at local and intermediate levels; Use of EpiInfo database for routine data; Counsellors need to have better computer skills; Little integration into general health services, it still looks like a stand alone facility.</td>
</tr>
<tr>
<td>3.b) AIDS Inpatients Notification</td>
<td>Two parallel reporting systems contribute to duplication of efforts, underreporting, and poor data quality; Few suspected inpatients being tested; Reports only from district hospitals while the majority of AIDS patients are seen in provincial and central hospitals; Most AIDS cases reported based only on clinical criteria; Collection form does not include instructions on how to fill it in; Confirmed cases reported appear abnormally higher than suspected.</td>
</tr>
<tr>
<td>3.c) Blood banks</td>
<td>Absence of formal and standardised register book and reporting form; Blood donations reported with no HIV data; HIV data not matching with discarded blood; Very irregular reporting frequency; District underreporting compensated by a correction factor of 40% to the reported figures by national managers.</td>
</tr>
</tbody>
</table>
5. **MULTIPLE RATIONALITIES AND REASONS FOR DIFFERENCES**

In this section we want to place the empirical material into its general context of the Mozambican health care system. In particular, we want to emphasise the factors and constraints that shape the actors’ actions, e.g. the contingencies for the rationality behind the work practices, systems and policies at different levels.

5.1 Rationalities ‘On the Ground’

Health care services are being delivered in a context of severe resource constraints, if delivered at all. Health care is available to only around 50% of the population, partly due to the destruction endured during the civil war (1976-1992). Availability may relate to both physical distance and costs. Public health care is not entirely free; in approaching a health facility patients have to purchase a ticket (1/25 euro) before being admitted to a general consultation room. The actual fees charged are frequently higher than those set officially (IMF staff report, 2003). Thus seeking health care is often not the first option; patients have often approached a traditional healer first or attempted self-treatment. For example some of the first-line malaria drugs are easily available through pharmacies and on the black market. Malaria is endemic, and in some regions 90% of children are infested with parasites. People can live with malaria, but can also die from episodic, irregular attacks. This is especially true for the vulnerable, such as children and pregnant women. The commonality of malaria together with the chance to survive and the possibility of self-treatment reduce the incentive to seek health care. Tuberculosis, on the other hand, is known to be eventually lethal if it is not treated, and the same is the case with HIV/AIDS. However, there are significant differences in patients’ approaches to these two diseases. It is generally known in society that there exists a treatment regime for tuberculosis, while there has not been any possibility for treatment of HIV/AIDS. Thus patients with tuberculosis symptoms have been more motivated to seek health care than patients concerned about having an HIV infection, who may prefer to avoid a social stigma.

Mozambique faces an extreme shortage of qualified health care personnel (in 2002 the ratio of technical medical personnel per inhabitants was 1 to 2,284), for example, a rural hospital possibly serving a population of several hundred thousands may have only one doctor employed (MIS AU, 2003b). Nurses, midwives, medical technicians and agents, surgical technicians and servants comprise the rest of the staff. Due to the shortage of staff, the work burden on the personnel is extremely high. In peripheral health facilities it has been the norm that a clinician should see up to 60 patients per day, but in reality the number could be a lot higher. The daily work is primarily patient focused, and the registration and reporting of data is perceived to be secondary tasks. The primacy given to patient encounters may adversely impact the data collecting procedures, e.g. often the number of patients seen or condoms or drugs distributed will just be estimated at the end of the day and entered into the register book (Mosse and Sahay, 2003). The little value attached to registering and reporting work is reinforced by the widespread attitude that the information is being registered, reported and collected mainly for reasons of bureaucracy. There is in general no time or interest for local use of the collected data, and much of the requested information is simply not used by anyone; its collection has become an institutionalised routine that must be performed as a part of the job. For example, the inventory information required from laboratories on the stocks of drugs and reagents is not being used in the logistics process for the supply of these drugs and reagents (Chilundo and Aanestad, 2003).

The problems of data collection are aggravated by the lack of infrastructure, e.g. for transport of the reports to the next level. It is quite common that reports are brought to the district administrative office by a messenger who goes there approximately once a month in
order to fetch, bring back and distribute the wages for the local health workers. In particular the weekly reports are thus being delivered late. Lack of resources in general is also affecting the data quality. Often appropriate register books are not supplied, and locally purchased ordinary exercise books may be used, in which the data recorded may vary. In this respect the tuberculosis programme’s well-supported information system stands out, with a regular supply of forms and register books.

5.2 The Particularities of the Diseases

The character of the disease itself also shapes the three different programmes in significant ways. By a disease’s ‘character’ we mean not only the prevalence, incidence, mortality and morbidity of the disease, but also the attitudes towards them and the way treatment has been organised, which is based on social and historical reasons.

One example of this concerns tuberculosis, where a major goal is to avoid the emergence of drug resistant tuberculosis mycobacterium, and multi-resistance is particularly feared. This accounts for the rigid treatment regimes involving close monitoring of drug administration to avoid a black market. It also accounts for the fact that the information system is patient-centred in addition to providing statistical information. A patient-centred system allows the programme personnel to monitor closely the treatment progress for each individual and to redesign treatment if the disease is not fully combated during the first attempt. The success of the TB programme’s approach may partly be explained by the fact that the programme deals with few cases relative to other communicable diseases. The treatment programme is long-term, and thus the reporting is performed only quarterly.

In contrast, the VCT centres offer anonymous HIV testing, and do not register personal information beyond demographic data like age, sex, etc. A numerical code is given to the patient, and the same patient can be identified using this on later visits. The main reason for this system is the social stigma attached to the HIV disease, as well as the fact that the centres do not (yet) offer any treatment opportunities. In that case, person-based information might be needed, e.g. in order to track potential other infected persons (partners). So far, since treatment for HIV/AIDS has not been available, the incentive for testing has not been great. The policy has been geared more towards prevention, e.g. through information campaigns and condom distribution. In such a situation, the data needed and recorded are rather related to prevalence and changes in this. There are also dependencies between the diseases in particular ways. It has been estimated that in a population with 10% HIV prevalence, approximately 40% of the tuberculosis cases can be attributed to HIV infection (of the 480 tuberculosis cases reported by Chôkwe District 69% were HIV positive during the 1st semester 2003). In addition it has been reported that 50% of HIV positive persons will have developed tuberculosis in their lifetime.

Malaria has many more cases compared to tuberculosis, (example: the Chôkwe District has reported 44,771 malaria cases and only 480 tuberculosis cases during the 1st semester of 2003). To replicate the successful tuberculosis system would mean to introduce comprehensive testing, but due to the high numbers this would be prohibitively resource demanding. In general, malaria is cope with, often without accessing health facilities.

5.3 Rationalities ‘At the Top’

In the government’s Strategic Health Plan (MISAU, 2001) increased access to and quality of services is a major goal, together with combating the major endemic diseases (malaria, tuberculosis, leprosy, HIV/AIDS). The main mechanism for monitoring progress is through calculating and publishing indicators. With regard to the goals of the strategic health plan, the indicators chosen are the intra-hospital maternal mortality rate, the infant mortality rate, the prevalence of intra-hospital low-weight births (which is an indicator of nutrition), the
percentage of children under one year of age fully immunised, the coverage of institutional births (an indicator of access to health care), and the distribution of condoms (Government of Mozambique - MPF, 2003). This means that in this evaluation, data for the other central areas of the PESS and endemic/transmissible diseases are not presented.

The fragmentation of the sector, as well as the inequalities between different health programmes is recognised. In a 2003 evaluation the government acknowledges that it will be “essential to improve planning instruments by using indicators that seek to reflect sectoral performance in a more concrete fashion”. It is also recognised that “the information made available by the sectors […] do not always reflect the real situation on the ground” (Government of Mozambique - MPF, 2003, p.44). The sub-optimal functioning of the reporting and monitoring systems is a concern for the Ministry of Health (Chabot et al., 2002), because monitoring the effect of the work and hopefully demonstrating progress, is requested by both the donor community and the general public.

In general, the donors’ main interests are to ensure that the financial support being given is well utilised and has a desirable impact. Controlling and supporting programmes that are disease-specific or limited in other ways will provide more effective means for this kind of control, while round-sum budget support may be intractable in terms of monitoring where the money goes. Some of the national aid organisations may be accountable to their home constituencies, from which there may be political demand on e.g. the mechanisms for control over the money flow to avoid corruption, or with regard to targeting towards needy groups etc. Such demands may be the basis for the emergence and sustenance of vertical programmes. However, as noted earlier, the donor community also recognises the problems associated with this, and has been taking part in the SWAp initiative. A natural consequence of their interests is an increased focus on establishing common procedures for reporting, monitoring, evaluation, and joint review processes (as it is now in the drug pool) (Pavignani and Durão, 1997, Institute for Health Sector Development, 2001).

The donor community in Mozambique is very diverse. Pavignani and Hauck (2001) classify the donors as ranging from the reform-oriented ‘like-minded’ aid agencies (which have adopted policies of harmonisation through sector and budget support) such as Ireland, the Netherlands, the Nordic Countries, Switzerland and the United Kingdom, to those that prefer to act in isolation through their own projects or NGOs such as USAID, Germany, France, Japan and the Southern Europeans. Also the United Nations organisations, the European Union and the World Bank participate actively in the SWAp work that has been initiated some years back, with the previously mentioned drug pool and the recently established Common Fund as major achievements. Ten of the major donor organisations pool their financial support into the Common Fund. The WHO has been faced with criticism that their projects in general rarely are synchronised with the country’s emerging processes aimed at developing their health systems. E.g. an evaluation of the Roll Back Malaria initiative found that the initiative was not linked up to sector-wide approaches, nor was it linked to the World Bank’s poverty reduction strategies or its programme of debt relief for heavily indebted poor countries (Yamey, 2002).

Apart from these donor organisations with a long-term involvement, other actors have recently appeared on the scene to combat the endemic diseases. One is “The Global Fund to Fight HIV/AIDS, Tuberculosis and Malaria” from the Bill Gates Foundation. The purpose of the Gates Fund is to attract, manage and disburse additional resources through a new public-private partnership that will make a sustainable and significant contribution to the reduction of infections, illness and death. The aim is to mitigate the impact caused by HIV/AIDS, tuberculosis and malaria in countries in need, and to contribute to poverty reduction as part of the Millennium Development goals (The Global Fund to Fight AIDS Tuberculosis and
Malaria, 2003). Another major actor is The Bill Clinton Foundation working against the HIV/AIDS pandemic, and in particular targeting low-cost medication to avoid mother-child-transmission. Informal communication during our study indicates that a lot of time and effort was spent by health officials in preparing project proposals and applications to these new sources for financial support. In general, such initiatives tend to work on their own and establish separate control structures. However, some work is also going on in Mozambique to ensure that the private funds like The Global Fund against AIDS, Tuberculosis and Malaria (Bill Gates), the Bill Clinton Foundation and the UN organisations are channelling their financial support through the established Common Fund.

Strengthening the reporting and monitoring systems of the health programmes, and also possibly to integrate them into one comprehensive system, is thus compatible with the interests of both the Government of Mozambique and the donor organisations. The assumptions behind integration of the health care programmes are linked to increased efficiency of the sector, and to completeness, coherence and non-redundancy of the information. The notion of integrated systems involves this rationality of combining systems and achieving these effects. However, the practicalities on the ground and the particularities of the diseases create alternative realities that give rise to different rationalities.

6. IMPLICATIONS

From the government and donors’ point of view the need to improve and integrate the diverse reporting and monitoring systems seems self-evident. Based on an instrumental rationality it would seem natural to blame the bureaucracy and the health workers for ‘irrationality’, implying a lack of understanding of the importance of proper reporting. However, looking into the matter more carefully has revealed several reasons for this diversity of perspectives. If we change perspective from the ‘top’ to the ‘ground’, the actions of patients, health care workers and programme employees can be seen to be perfectly rational. For the rural clinicians, tending to patients is the primary objective, and the line of action which is congruent with this is to spend the largest amount of time on patients rather than on papers which no-one really cares about. Performing rote reporting and attempting to show at least a minimum level of requested behaviour can be seen as the workers trying to comply also with the rationality of the health care system. Over time, these systems have become institutionalised and self-sustaining, representing a taken-for-granted, standardised set of actions that ‘belongs to the job’. However, the reason for the continued maintenance of the systems is not necessarily because of their effectiveness, but because they are sustained by shared assumptions and are an integral part of an established authority structure. The systems are perpetuated by the actors who through their actions participate in the upholding of these standardised practices. Thus, what from ‘the top’ would be interpreted as rational action, representing improved efficiency and control, might be seen as being irrational from the perspective of the individual health workers in the field.

We have also seen how the differences between the disease-specific programmes’ reporting systems are not arbitrary and to some degree are shaped by the characteristics of the disease and the organisation of its treatment. The character of the different reporting systems has emerged for various reasons, some of which we have tried to uncover. Significant aspects of this are the donors’ wish for control over the resources. Although our case study is not a historical analysis, and also does not discuss the donor policies in detail, it has shown how the existing information systems have been shaped by different needs and interests. We wanted to put major emphasis on the importance of local, material aspects, like the physical infrastructure as well as disease characteristics. We thus see not only different historically and socially shaped rationalities, but also rationalities shaped by the material and contextual

The Electronic Journal on Information Systems in Developing Countries, 
http://www.ejisdc.org
realities. We believe that the role of such “contingent rationalities” is of particular importance in a resource-deprived context.

The major challenge for an integration of the reporting systems in the Mozambican health care will be to try to reconcile the visions and policies with the realities on the ground. Here the practices are shaped by the responses to contingencies, opportunities, exceptions and breakdowns. A top-down integration policy has limited chance of success unless this fact is understood and accounted for.

So where does our emphasis on multiple, contingent rationalities lead us? In addressing the specifics of the integration attempts in the Mozambican health care sector, our main aim with this study has been to instil a certain realism in the upper levels of health care management. We believe that integration needs to be a gradual process, involving the different stakeholders and parties in negotiations and discussions at different points along the way. While attempting to improve and integrate the diverse reporting systems, the strategies should take the existing situation and actual practices as the point of departure. These practices cannot be reformed merely through a policy directive, but the constraints and particularities that actually shape them must be acknowledged and addressed. Improving the data quality will be crucial for a successful reporting system, and one approach towards this may be through simplifying the reporting procedures with the aim of lightening the burden on the health workers. This orientation acknowledges the local and contingent rationality behind the existing state of affairs rather than trying to impose a solution solely guided by a managerial rationality. A ‘managerial one-eyed’ solution would rather have focused on achieving ‘quality data’ (involving non-redundancy, completeness, coherence) in order to achieve efficiency and calculability. We do not intend to say that these are not important goals in themselves, and will be for any administrative entity, but we want to emphasise that these aims have a rather limited appeal ‘on the ground’, where other factors are of more immediate significance (for example: the primary focus on patient care).

In turning to practical advice, we suggest that a reform process which takes the local situation as a point of departure might involve the following aspects:

- A thorough revision of which data items to collect (definition of minimum datasets), with the aim of reducing the work burden for the workers as well as data redundancies.
- Designing and distributing standardised forms, books etc. which are easy to use during actual work. This might possibly be piggy-backed on the more successful tuberculosis reporting system.
- Respecting the resource constraints and allowing, for example, for monthly delivery of reports.
- Providing a database (at district or provincial level), where several views and reporting formats could be generated to fulfil the diverse demands for formats, frequency of reporting etc.

7. CONCLUDING REMARKS

Redesigning the health care information systems in a process of integration can be seen as a process challenging an existing organisational system. In such a process the multiple situated rationalities involved, the irrationalities like the beliefs and desires, the contextual resources of the individual actors, the organisational structure and underlying rationalities of the social institutions must be taken into account.

The Electronic Journal on Information Systems in Developing Countries,
http://www.ejisdc.org
We believe that this study can be of value to the broader IS community and to the public health domain. For the IS researchers we hope that it is a contribution to the hitherto overlooked issue of integrating various disparate IS within a constrained setting. And to the public health domain and other practitioners in general we underline that IS integration is not simply a technical–rational process of “solving problems”, it involves important economic and political processes in articulating interests, building alliances and struggling over outcomes. Integration of information systems is an inherently political process, involving negotiations between multiple rationalities. In this case, the tensions were between different realities and rationalities at the top and on the ground. In other cases, the distribution of different rationalities and interests may follow a different pattern. A reflexive and successful practice will have to recognise and deal with this.

ACKNOWLEDGEMENTS

We are grateful for the cooperation from the staff of the Health Districts in Mozambique, with special attention to the health workers and managers in Maxixe, Inhambane-city, Chókwe and Xai-xai districts. We are especially grateful to Dr Francisco Saúte (Malaria Program and Department of Epidemiology and Endemics), Mr António Sitoe and Dr Bruno Piotti (Department of Information for Health), Dr Paula Perdigão (Tuberculosis Program), Dr Martinho Dgedge (National Directorate of Health), Dr José Fernando Langa and Mr Simões Tchaka (National Program of Blood Transfusion), Dr Artur Machava (Chokwe Rural Hospital), Dr Ladino Manuel Suade (Chicuque Rural Hospital) and Dr Naftal Matusse (Maxixe Directorate of Health).

Special thanks go to Professors Sundeep Sahay and Johanne Sundby for support and encouragement. The suggestions and comments from EJISDC’s anonymous reviewers and the respective Editor of this special issue are gratefully acknowledged. Finally we thank the HISP programme for financing the study.

REFERENCE LIST


The Electronic Journal on Information Systems in Developing Countries, http://www.ejisdc.org


The Electronic Journal on Information Systems in Developing Countries, [http://www.ejisdc.org](http://www.ejisdc.org)


The Electronic Journal on Information Systems in Developing Countries, http://www.ejisdc.org


**ABOUT THE AUTHORS**

**Baltazar Chilundo** is a Research Fellow at the University of Oslo, Norway. He was born in Mozambique and has received the Medical Doctor degree at the Faculty of Medicine, Universidade Eduardo Mondlane Mozambique where he is a lecturer. His research area is Health Information Systems, the specific research topic is the integration of information systems of the disease-specific health programmes. His e-mail address is chilubal@ifi.uio.no or chilubal@yahoo.com. Postal address: Faculty of Medicine. Salvador Allende Ave, No. 702, P.O. Box 257, Maputo, Mozambique.

**Margunn Aanestad** is an Assistant Professor and Post Doc at the Department of Informatics, University of Oslo. She was born in Norway and holds a B.Eng. in medical technologies and a M.Eng. in applied natural sciences. She has worked within health care and telecommunications before taking up a PhD study of telemedicine for surgery. Her research interests are broadly related to ICT in health care. Email: margunn@ifi.uio.no. Postal address: Institute of Informatics. P.O. Box 1080, Blindern, NO-0316 Oslo, Norway.