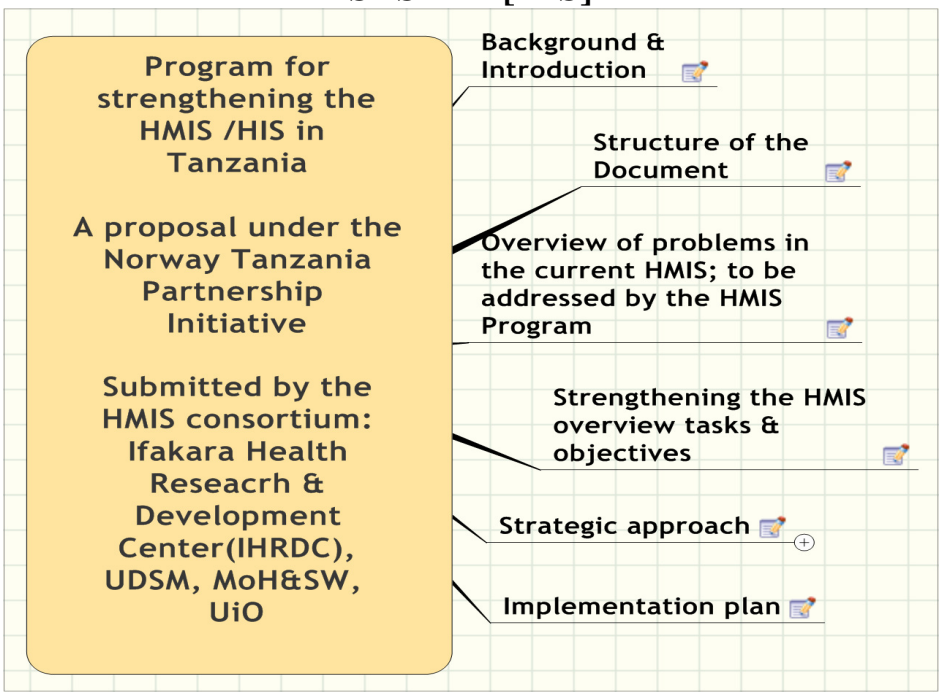
UNITED REPUBLIC OF TANZANIA

Ministry of Health and Social Welfare (MoHSW)

PROPOSAL TO STRENGHERN HEALTH INFORMATION SYSTEM[HIS]



Executive Summary

The HMIS Program described in this document aims at improving and strengthening the current Health Management Information System (HMIS) in Tanzania, known as MTUHA. The consortium behind the HMIS Program is headed by the Ministry of Health & Social Welfare (MOHSW) and consists of the following additional partners; Ifakara Health Research and Development Centre, University of Dar es Salaam and the University of Oslo, representing national and international capacity in HMIS.

The HMIS Program is linked to the Payment for performance (P4P) funding scheme which is initiated by the Norway Tanzania Partnership Initiative. The P4P has a focus on maternal and child health and relies upon quality indicators on performance in these areas from health facilities and districts. The provision of quality data and indicators on MDG 4 & 5 is therefore a key target for the HMIS Program. The chosen approach is, however, to derive these data from the HMIS and *not* to establish a separate data collection structure, hence the HMIS Program.

Quality information by way of essential indicators, such as for monitoring the Millennium Development Goals 4 & 5, are crucial for health services delivery and program management as well as for M&E. Currently, however, the HMIS is not providing such needed data of sufficient *completeness*, *timeliness* and *quality*, leading health programs and funding agencies to establish their own structures for data collection, and thus creating fragmentation and adding to the problem. The HMIS Program aims at changing this negative trend and turning the HMIS into the key source of *shared* essential quality information in Tanzania by;

- focusing on action oriented use of information for management at each level of the health services and by providing timely quality information to all stakeholders
- including all health programs and funding agencies in the HMIS strengthening process – making it an all-inclusive national process
- focusing on capacity development; on-site support and facilitation, short courses and continuous education
- building capacity in the MOHSW and establishing a national network of HMIS support, and by
- building on experience, methods and tools from Africa's "best practices" HMIS, such as South Africa – *and* Zanzibar

Within this proposal the aim is to carry out the HMIS strengthening process in 1/3 of the districts in the country, 7 regions, during the first 3 years. The objective, however, is to cover the entire country during the 5 years duration of the NTPI. By aiming at quick and tangible results, the expectation is that other funding agencies will join forces and thereby ensuring national coverage.

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List of Acronyms

AIDS	Acquired Immune Deficiency Syndrome
CMO	Chief Medical Officer
DHIS	District Health Information Software
DHMT	District Health Management Team
DIO	District Information Officer
EPI	Expanded Programme on Immunization
EPR	Electronic Patient Records
EU	European Union
HF	Health Facility
HIR	Health Information Research
HIS	Health Information Systems
HMIS	Health Management Information Systems
HMN	Health Metrics Network
HRS	Health Research Systems and Surveys (HRS)
HSSP	Health Sector Strategic Plan
ICT	Information and Communication Technology
IHRDC	Ifakara Health Research and Development Centre
ITC	Information Technology and Communication (ITC)
M & E	Monitoring and Evaluation
MCH	Mother and Child Health
HIV	Human Immunodeficiency Virus
MDGS	Millennium Development Goals
MOH&SW	Ministry of Health and Social Welfare
MoU	Memorandum of Understanding
MTUHA	Mfumo wa Taarifa za Uendeshaji wa Huduma za Afya (Kiswahili for Health Management Information System)
MUHAS	Muhimbili University of Health and Allied Sciences
NACP	National AIDS Control Programme
NGO	Non-governmental Organization
NOMA	NORAD's Programme for Master Studies
NORAD	Norwegian Agency for Development
NSSS	National Sentinel Sites Systems (NSSS) and
NTPI	Norway Tanzania Partnership Initiative
P4P	Payment for Performance funding scheme
PRSP	Poverty Reduction Strategy Paper
RMO	Regional Medical Officer
SWAP	Sector Wide Approach
TALI	Tool of Assessing Levels of Information Use
ToR	Terms of Reference
UDSM	University of Dar es salaam
UiO	University of Oslo
USAID	United State Agency for International Development
WP	Work Package – Awork module in this proposal

1 Introduction

1.1 Rationale of strengthening Health Information Systems (HIS)

The Ministry of Health and Social Welfare (MoHSW) through National Health Policy places a great emphasis on a well performing Health Information Systems (HIS). That is why the government is in favour with this new approach of managing Health Management Information System (HMIS) as program hoping that this will promote: -

- Efficiency in all aspects of the system
- The supply of quality information on timely bases for different users
- This will enhance the whole process of strengthening HIS
- The HI&R staff will improve their skills
- Good working relationship with different partners

Demand for health information is currently highly influenced by the health sector reforms which focus on decentralization. That is health systems are managed more closely to the level of service delivery by the people in their respective localities. This shift in functions between the central and peripheral levels generates new information needs and calls for an in-depth restructuring of information systems, with changing data collection, processing, analysis, and dissemination requirements. Health sector reforms also present major challenges to the need for standardization and quality of information, which will need to be addressed by the central level. Other factors which are promoting demand for information are introduction to budget support, implementation of local and international policy strategies etc.

Unfortunately, sound information is rarely available in low income developing countries like Tanzania due to under-investment. As a result of this health information systems have evolved in an erratic, piecemeal way, fashioned by administrative, economic, legal or donor pressures. This has resulted in fragmentation of health information systems. Health information systems are further fragmented by disease-focused programs demands which often relate to donor requirements and international initiatives directed to specific areas such as malaria, HIV/AIDS or tuberculosis.

1.2 What is Health Information Systems?

Recognition of the weaknesses of health information systems is not new. However, currently a number of forces coincide to render the push for strengthened health information systems by making it more powerful at country and global levels. Health Matrix Network (HMN) is a new initiative operating under WHO. The general goal for HMN is to increase the availability, quality, value and use of timely and accurate health information by catalyzing the joint funding and development of core country health information systems. To achieve this goal, HMN in Tanzania is pursuing three strategic objectives:

- **Create a harmonized framework for health information system development** (the HMN framework) which will work with countries to define essential health information platform designs, key health information standards, data and analytic capacities, and guidelines for information use that drive country-level HIS development and local/regional/global access and comparability.
- **Strengthen country health information systems** in developing countries by assisting them to apply the HMN framework at country level, in conjunction with technical and catalytic financial support.
- **Improve access, quality, value and use of health information** through development of policies and offering incentives to enhanced dissemination and use of information by local, regional and global constituencies.

Since the MoHSW has decided to adopt HMN framework in strengthening HIS any support would follow this framework including NTPI.

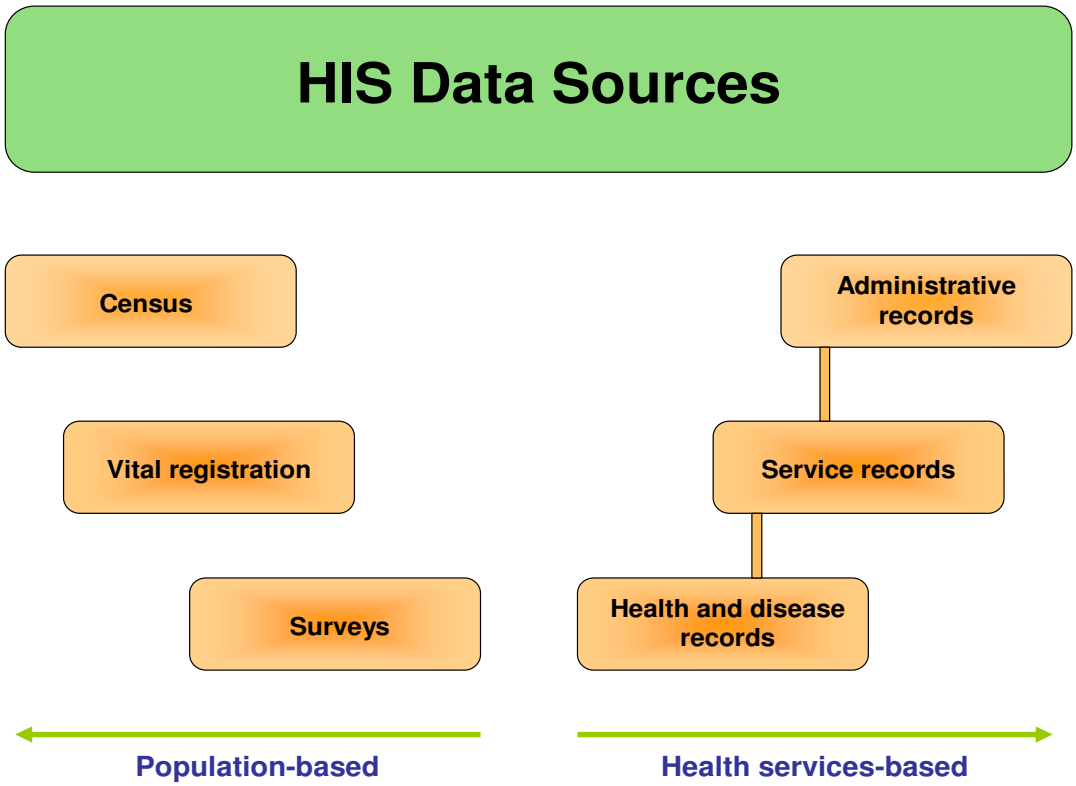


Figure 1: Health Information Systems Data Sources

There are two pillars of health data those that generate data relative to populations as a whole, and those that generate data about the operations of the health services. Population-based health information sources include the census, vital events monitoring (civil registration, as well as sample or sentinel surveillance of births, deaths and causes of deaths), and population-based (usually household) surveys and surveillance. Also included here are vector and environmental quality surveys.

Health services-based sources or sometimes known as Health Management Information System (HMIS) generate data as an outcome of health-related administrative and operational activities. There are a wide variety of health services based data: facility-based data on morbidity and mortality among those using services; types of services delivered, drugs and commodities provided; information on the availability and quality of services; financial and management (e.g. human resource, logistics) information. Administrative records generate data on the overall functioning of the health system such as the availability of human resources, infrastructure and commodities as well as financial flows.

Most of the health service based data are generated "routinely" in the course of recording and reporting on services delivered. Surveys of a sample of facilities and censuses of all facilities provide special methodologies for collecting health service based data and validating routine data through observations of service delivery, inspection of facilities, interviews with health staff and clients and review of archived records.
When the geo-coordinates of service delivery sites have been determined, health service based data (whether from routine collection or from facility surveys/censuses) can be presented as maps displaying the geographic distribution of facility based health events (cases of disease presenting), inputs (facilities, human resources), outputs (services) and outcomes (deaths). Service availability mapping (SAM) is a special approach based upon periodic (e.g. biannual) district-managed censuses of facility inputs, processes and outputs.

Assessing the population based systems are performing well with exception of vital registration. Most of these systems are managed by the National Bureau of Statistics in collaboration with sartorial ministries including MoHSW. Unfortunately, vital registration is under Ministry of Justice and Constitution Affairs.

Vital registration problems have led to the introduction of Demographic Surveillance Sentinel (DSS) Sites operating under MoHSW, IHRDC and NIMR. Sites which are run by the MoHSW are seriously under funded as a result most of the data is not analyzed. Though not nationally representative indicators from these DSS could be useful in making close monitoring and evaluation of MDG 4,5 & 6 indicators. Since DSS collect most of its information routinely this type of information should be part of Health Management Information System package.

1.3 Background of HMIS

The Health Management Information System (HMIS) is considered to be a single biggest routine data system under the Ministry of Health and Social Welfare (MoHSW). It is so because it collects its information from more than 5,400 health facilities. According to the new health policy of having a dispensary in each village, a health centre for each ward and a hospital for each district it is anticipated that after ten years the numbers of the current health facilities are expected to double. Also, HMIS through outreach

program do collect community based data which cover more than 10,000 villages in the country.

In this respect the entire system form a unit known as HMIS which is a key component of Health Information and Research (HIR) Section. This section is operating under the Directorate of Policy and Planning. Other units are: -

- Health Research Systems and Surveys (HRS)
- National Sentinel Sites Systems (NSSS) which run DSS and
- Information Technology and Communication (ITC)

These units either support HMIS operations like ITC or supplement data to HMIS.

The HMIS in its current form was conceptualized in the early 1990s. The main aim was to establish a comprehensive and integrated routine data system using up to date technologies and approaches. This system was established as a key tool for monitoring and evaluation of health sector reform performance in the country. Therefore HMIS is a core system which provides management solutions to management questions through developed indicators which are applied at all levels of health delivery systems. HMIS indicators are in the form of rates, ratios and absolute numbers, and each has a threshold and target value whereby assessment of performance is based upon. In this respect the information is very useful in managing health delivery in the country at all levels of health delivery system in the country

Before HMIS came into existence, several systems were operating. Most of these existed in public and non governmental organization (NGOs) health facilities. In addition, programs such as the TB and Leprosy and the National AIDS Control Program (NACP) had and continue to have their own separate reporting systems due to special requirements that could not be handled through HMIS. In 1980s, several studies were undertaken on existing systems. From those studies the followings were noted: -

- Systems were fragmented since a lot of data were collected with little capacity for analysis, interpretation or use at all levels of health delivery;
- The flow of data was bottom up with no significant feedback between higher and lower levels;
- Health facility workers were overburdened with several forms to fill from different reporting systems;
- There was a lot of resources that were wasted due to duplication of efforts;
- Policy and legal guidelines from the MoHSW directing data collection activities in the sector was lacking.

In 1993 the Ministry of Health decided to implement HMIS as a response to the above findings. HMIS is a part of the Health Sector Reform in the Ministry of Health as such it is operated through Sector Wide Approach (SWAP) structure.

Strategies to strengthen HMIS

The government in collaboration with development partners is currently implementing different strategies in order to strengthen HMIS. Through sector review, it was suggested that a Monitoring and Evaluation (M & E)Technical Committee under the SWAP structure was formed in order to formulate strategies to strengthen and co-ordinate the existing Health Information Systems including HMIS.

At the global level through Health Metrics Network (HMN) a framework has been developed with the aim to strengthen different systems including routine data system like HMIS. The HMN goal is to increase availability and use of timely, reliable health information through coordinated investments in health information systems. In this respect HMN principles are: -

- Country ownership and stakeholders involvements;
- Linking of health and statistical constituencies;
- Harmonization and alignment; and
- Comprehensive approach to health information

The HMN framework has been fitted into SWAP structure whereby M & E Technical Committee report to SWAP Technical Committee which is chaired by CMO and SWAP Steering Committee is co-chaired by the Permanent Secretaries for MOHSW and PMO-RALG. All of these committees, its members are from different stakeholders. Though HMIS through Norwegian Tanzania Partnership Initiatives (NTPI) will be managed as a project but reporting mechanism will be through SWAP structure. This is because HMIS will continue to get limited funding through basket funding.

1.4 Proposed HMIS Program

The overall objective of the proposed HMIS Program is to improve and strengthen the HMIS and information usage at all levels of health delivery system in Tanzania. This would contribute to overall strategy of improving HIS in this country. This HMIS Program is linked to the Payment for Performance funding scheme (P4P) initiated by the Norway Tanzania Partnership Initiative (NTPI). In this respect the specific objectives of the proposed HMIS Program are to: -

- Ensure that the HMIS provides and disseminate quality essential indicators such as for monitoring the Millennium Development Goals – with a particular focus on MDG 4 & 5
- Improve and strengthen the HMIS and information usage at health facilities, districts, and regional and at the national levels.

  The HMIS will be strengthened according to specific criteria regarding data *completeness, timeliness* and *quality,* as well as the *analysis*, *dissemination* and *use* of information. These criteria will be monitored and evaluated for each facility, district and region taking part in the program – as well as for the national level. The criteria are specified in the Tool for Assessing Information Usage (see annex)
- Strengthen the HMIS capacity of the MOHSW at all levels (national, regional, district and facility) and thereby ensure sustainability of the HMIS

This HMIS Program is linked to the Payment for Performance funding scheme (P4P) initiated by the Norway Tanzania Partnership Initiative (NTPI) in that:

1) P4P will rely upon complete, timely and accurate data from the HMIS,

2) A strengthened HMIS is needed to provide data of sufficient quality for P4P

3) Planning and implementation of the HMIS Program will be coordinated with the simultaneous implementation of P4P by focusing on the P4P pilot districts.

4) The HMIS will be made more effective to support Tanzania's achievement of the Millennium Development Goals, especially MDG4 and MDG5 – and MDG6.

Within this proposal the aim is to cover 1/3 of the districts in the country, in seven regions, during the first three years of the Program. Once the program is well established and starts delivering tangible results, it is expected that other funding agencies will join forces, making it realistic to cover the entire county during the five years duration of the NTPI.

2 Consortium and program management

See **Annex B4** for the program management organogram.

2.1 The consortium behind the HMIS Program

The Ministry of Health and Social Welfare (MoHSW)
Role: MOHSW is the owner of the HMIS Program and is responsible for its overall management. The Health Information and Research section of the MOHSW is the operational base of the HMIS Program. The MOHSW regional and district offices are the operational bases for the HMIS Program at these levels.

Ifakara Health Research and Development Centre (IHRDC)
Role: The financial management and administration is outsourced from MOHSW to IHRCD, which serves as the administrator of the HMIS Program. Financial reporting is thus the responsibility of the IHRDC. IHRDC is well experienced in the financial management of large projects and have recently been evaluated by USAID and EU.
IHRCD is responsible for the health professional components of the HMIS Program, including epidemiology, M&E, using information for health action and operational health research.

University of Dar es Salaam (UDSM)
Role: UDSM is responsible for the Information Technology, software and implementation components of the HMIS Program as well as for the training program. The training program will use the Norad funded Masters in Health Informatics as an institutional base. The Muhimbili University of Health and Allied Sciences is a partner in this Masters Program.

University of Oslo (UiO)
Role: UiO represents the international expertise and advisory role on HMIS/HIS and Open Source software in the HMIS Program. UiO has been responsible for developing

the HMIS in Zanzibar, is a long time partner of UDSM and is an associate in their Masters in Health Informatics.

2.2 Project management and reporting – overview

The HMIS Program is managed by a joint management team consisting of all partners and is headed by a program manager. The program team, with the program manager as responsible, will report on the progress of the HMIS Program every 6 month.
IHRCD is responsible for the administration and financial management of the HMIS Program and will provide financial reports and accounts every 6 month.
The responsibility for tasks and deliverables, such as particular software or implementation components, are distributed between the partners and given to individuals, who are then responsible for reporting progress to the joint management team.

2.3 MoHSW – the operational base and responsibilities

The MoHSW is the owner of the HMIS and the Health Information and Research section of the MOHSW is the operational base of the HMIS Program. In order to render the HMIS sustainable, the HMIS Program will focus on developing *capacity* within the MOHSW in all aspects of the management of the HMIS and data analysis and dissemination. In order for this to be possible, it is the responsibility of the MOHSW to prioritise the HMIS and give it high level support, which will entail the allocation of sufficient resources. For the HMIS Program to succeed the following actions are needed:

- Health Information and Research section & HMIS unit need to be strengthened in the areas of database management and epidemiology
- Regional and districts need information officers responsible for the HMIS and data reporting, analysis and dissemination across programs and staff responsible for the database. The district information officer needs to be member of the DHMT
- All facilities need identified person responsible for the HMIS.

The identification and allocation of HMIS staff is the responsibility of the MOHSW. Training and supporting these HMIS staff is the responsibility of the HMIS Program.

3 Situation Analysis of HMIS:

3.1 Strengths of the Current HMIS

- Need for quality information recognised and prioritised by MoHSW
- System implemented across whole country at health facilities and district hospitals
- All role-players involved (MoHSW, NGOs, Bilateral Agencies, Development partners)
- Data collection and reporting tools in place (Books 1-12)
- Reports standardised Annual reports produced for country through Health Statistical Abstract

3.2 Problems in the current HMIS and their proposed solutions:

3.2.1 Facility level

Problem	Proposed Solution
•Data handling at facility level is not working properly; •registration of attendances is far from complete; •data is lost between primary registries to monthly summaries, from monthly to quarterly summaries (from book 2 to book 10).	•Revise data collection tools •Simplify data handling processes •Identify and Support NON- reporters through targeted supervision
•Reporting from facility to district is far from complete; •many facilities are not reporting on time, or not at all.	•Data submission checks at facility and district level •Incentives to improve data submission e.g. P4P
•Data sets for collection and reporting have both gaps and overlaps. •Indicators need to be revised and additional data elements/variables are needed	•Revise indicator set based on MDGs, PRSP, HSSP, Program plans •Define data elements based on indicators •Introduce annual surveys for specific variables
•Too many uncoordinated data reporting forms from vertical programs are in use; • Gaps and overlaps add to the poor data quality.	•Health information policy and strategy •Develop unified system to which all stakeholders agree •Standardised indicator set
•Little or no feedback (on the data) reported from higher levels; the HMIS only directed "upwards."	•Data flow policy enforced •Feedback rewarded (P4P)
•Poor use of own data and indicators to improve services at the facility; •a poor information use culture – •No incentives to use information	•Focus on MDGs monitoring at local level •Capacity building at facility and district •Regular supervision using information •Reward data use (P4P)
•The referral hospitals are not reporting to the HMIS which leads to an incomplete picture of the health status of the district/region.	•Include regional hospitals in MDG reporting •Include Hospital management indicators •Separate project for regional hospital specific needs

Table 1: HMIS Problems and Proposed Solutions at the Facility Level

3.2.2 District level

Poor data quality at the facility level –the origin of all data –is cascaded (and replicated) and also amplified up through the entire system. Additional problems identified at higher levels are;

Problem	Proposed Solution
•The district is not getting all the reports from the facilities •no systematic procedure or software support to track outstanding reports and to provide estimates of totals including the missing reports.	•Data flow policy •Improve supervision and support of NON-reporters •Computerise districts •Provide incentives for improved data
•Support and supervision of the HMIS activities at facility level are not sufficient.	•Appoint district information officers •Improve information-based supervision and support by program managers
•Feedback to facilities on reports received is poor. •Feedback on data reported and support to the district HMIS activities from the region are both poor.	•Enforce Data flow policy •Involve district program managers in HMIS supervision •Monitor action plans using DHIS
•There is no integrated framework (software and procedures) to handle and co-ordinate all the reports and information passing through – or being generated – at district level; •integrated local analysis across data sources and local are therefore difficult to do –and therefore rarely done.	•Computerise districts and implement DHIS software (see Annex B2) •Involve district program managers in data analysis •link routine reporting to payment •Reward good reporting
•Poor use of information for local management and services delivery.	•Link HMIS to MDG program management •Incentive scheme (P4P)
•There is no designated information officer responsible for information handling and management in the districts;.	•Appoint district information officers •(temporary measure = Data focal persons)
•Capacity in information management, analysis and use is poor.	•In-service training of all DHMT staff (NB Program managers) •In-service and short course training program

Table 2: HMIS Problems and Proposed Solutions at the District Level

3.2.3 Regional level

The problems at regional level are similar or parallel to those at the district level –some problems, such as related to data quality are even magnified

Problem	Proposed Solution
•difficult to keep track of missing reports	•DHIS installed in regions
•Inadequate HMIS support and facilitation to the districts	•Place Project implementation Team in region to provide in-depth district level support
•Regional managers do not have needed information	•Train regional managers to use DHIS for data analysis
•poor and incomplete data make policy making and implementation a hazardous process	•Monitor regional plans using DHIS data

Table 3: HMIS Problems and Proposed Solutions at the Regional Level

This is the area on which the HMIS implementation team will focus by providing in-depth support to districts

3.2.4 National level

Problem	Proposed Solution
•No National Policy on data flow and information use	•Information policy and strategy
•There is no integrated framework, such as a data warehouse/repository, whereby data across data sources and types can be analysed and correlated.	•Develop Data warehouse with web-based access
•The fragmentation caused by strong vertical programs running their own reporting systems makes it difficult to manage the overall HIS in an integrated manner.	•Strong national leadership – National Health Information system steering committee •Involve all vertical program and get them to use DHIS •Unified indicator set based on MDGs
•The HMIS unit has limited human resources.	•Appoint national HMIS staff •(Temporary measure = HMIS project implementation team with MoH counterparts)
•The information base does not exist to track and report on achievement towards MDG4 and MDG 5.	•Import data from Vertical programs into DHIS •Focus on MDGs monitoring

Table 4: HMIS Problems and Proposed Solutions at the National Level

4 Strengthening the HMIS overview tasks & objectives

The approach will be of a modular organisation of tasks and deliverables – work packages. The project will be organized in integrated but semi- independent modules called "work packages" (WP), which enables the management of cost, tasks, deliverables and milestones –all according to a timeline. Work packages will be implemented in a phased approach. The first

- WP1 will see a minimum essential package of intervention targeted to 7 regions (5 of which are where P4P will be piloted, plus an additional two regions) to ensure that one third of the country is collecting and reporting quality data (Level 1 information use – ensuring basic systems are in place). In addition, we will focus on the national level to ensure an overall integration strategy (between the old and new aspects of the HMIS), and an effective coordination of all efforts.
- WP2 will be a more extensive package of the detailed interventions in two (whole) regions to develop "best practice" districts where reporting, feedback, supervision and use of information work in all facilities and at district level (Level 2 Information use – where activities of use which go beyond reporting are in place).This may be further spread throughout the country upon successful implementation.
- The third, fourth, fifth and the sixth work packages "W3","WP4", "WP5 and WP6" will see further extensive intervention packages that will be implemented (in a phased approach) upon the availability of resources and achievement of WP1 & WP2 . Overview tasks and objectives for each package are outlined separately in annexes A1 to A5. The individual work packages along with their functional relationships are further summarised on Figure 1:

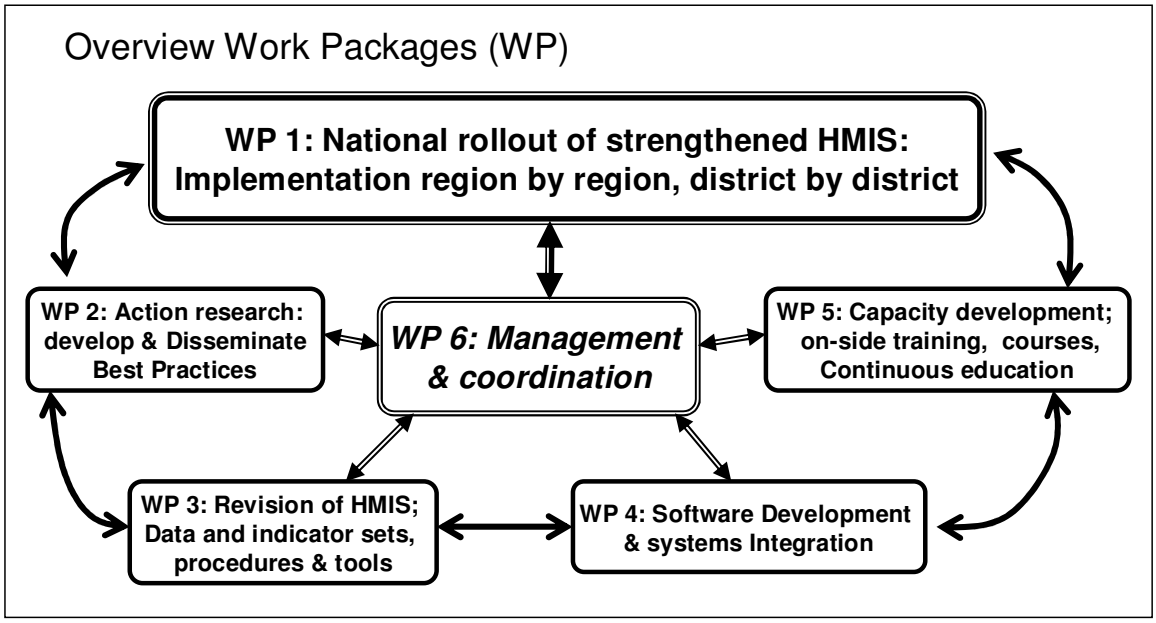


Figure 2: Work packages along with their functional relationships

4.1 WP1: National roll-out of strengthened HMIS

Objective: Strengthen HMIS in first 7 regions – then nationwide – and develop scaleable integrated systems

Start with the current MTUHA reporting system as the point of departure and revise its indicators to make sure it contains all necessary data for monitoring MDGs. Ensure that the revised monthly summary reports (book 2) from the health facilities are reported to the districts and captured in the computer based database (DHIS) and reported electronically to the regions and national. Adapt additional priority HMIS indicators and revise the data set to fit these indicators. Revise data collection and reporting tools to ensure completeness, accuracy and timely reporting of data from health facility to district. This should NOT cause major disruptions to the existing dataset, but should be sufficient to ensure buy-in to the HMIS reform process by the major stakeholders, while still an effective response to the needs identified for the redesign.

While the initial focus will be on primary Health Facilities-(HFs), district and regional hospitals will be included in as much as they are major providers of outpatient care and other activities contributing directly to achieving MDGs 4, 5 and 6. Other disease interventions and internal hospital patient management issues and regional hospitals present much more complex and challenging issues which can be addressed separately.

Overview of tasks:

- Be part of the revision of **data and indicator sets and the revision of the tools (WP3)**
- Establish **monthly reporting** of essential data sets from the facilities to the districts and onwards to regional and central levels. Send monthly summaries from the revised Book 2 immediately to district for entry such that revised F004 is automatically generated for each facility. Other data to be submitted according to management use (Monthly, Quarterly, Half-yearly and annual)
- Include **hospitals** in this indicator revision and tool development process, focusing on basics that are already collected, such as
    1. MDG – related functions of hospitals (Deliveries, C/Section, severe malnutrition, HIV, TB, Malaria, deaths etc)
    2. Hospital management indicators related to patient flow (Bed occupancy, death rate, ALOS, etc)
- Set up and establish data entry and management functions at the **district** to computerise Book 2 monthly summaries from Health Facility (HF).
- Introduce and adapt **DHIS software** at district to support data handling, analysis and reporting to higher levels.
- Develop capacity amongst the health staff at each of the facilities to ensure that they are able to manage all the functions of the HMIS (data registration, report generation, data quality checks, and transmission to the next levels).

Develop and implement a tool kit for the management of data at district (supported by the DHIS software) including quality control measures and data validation rules and protocols for dealing with violations. This would include aspects of completeness

(availability and contents of reports), timelines of reporting and feedback mechanisms including dissemination of comparative performance for HFs.

See **ANNEX A1** for the plan of the resources for WP1.

4.2 WP2: Action Research to develop and disseminate best practices in one region

Objective: Development of Best Practice Sites and establishing mechanisms for their dissemination within and across regions

Develop "best practice" in selected health facilities and districts in two regions where reporting, database management, feedback, supervision and use of information works in all facilities (dispensaries and health centres) and at the district level. WP2 includes the same minimum "HMIS toolkit" (data and indicator set, reporting tools, DHIS database) as WP1 but is better resourced at the local level and can therefore explore innovative ways to collect, manage and use data and for training. Cascaded HMIS support using health centres to support HMIS in dispensaries will first be tested out in WP2, and then further disseminated through WP1. Integrating computer based systems at facility level (EPR) in the HMIS will also be explored in WP2 in collaboration with other initiatives and projects.

Specifically:

- Data Quality: Enhance completeness, accuracy and timeliness of reporting of data at facility, district, regional and the national levels.
- Using Information for Action: Build and strengthen data management and analytical capacity at the facility, district, regional and national levels to effectively support the health system.
- User friendly HMIS Guideline booklet for facility and district staff. A first version based on the Guidelines developed in Zanzibar to be used in the roll-out process (WP 1). The further use and revisions of these Guidelines represent an important link and knowledge and learning transfer mechanism between WP 1 and WP 2 (and also WP 5).
- With other initiatives and projects, Design, establish and evaluate initiative in electronic data capture at facility level and Electronic Patient Record (EPR) Systems will be integrated within the HMIS framework; patient data will be aggregated by month and imported into the DHIS.
- Ensure that lessons learned are adequately documented and disseminated to other facilities and districts

See **ANNEX 2A,** for the plan of resources for WP2.

4.3 WP3: Revision of HMIS

Objective: Revise data and indicator sets and bring them up to current information needs. Aim is to create an inclusive process where health programs and other stakeholders participate.

Specially:

- Indicator set agreed with all major stakeholders
- Data set based on indicators with definitions and sources
- Data collection and analysis tools and procedures developed
- Data flow defined
- HMIS policy developed

See **ANNEX 3A,** for the plan of resources for WP3.

4.4 WP4: Software development and systems integration

Objective: Develop and adapt software to the requirements of the health services and to integrate relevant available data sources

The DHIS will be adapted according to the revised data and indicator sets and other needs of the health services. District, regional and national levels data warehouse will be developed. Other data sources (including existing "vertical" program databases and EPRs) will be integrated by extracting and importing data (into DHIS) from these systems using gateways. Data will also be exported to other computer based systems, e.g. exporting relevant data collected from facility/ district levels to specific software used by health programs.

Specifically:

- Include revised data and indicator sets into the DHIS software. The approach is to start with the essential data needs and to ensure a flexible framework so that additional data needs can be included during the process as the basics are working and the health workers learn to manage the HMIS.
- Introduce revised tools and procedures for data collection, compilation and reporting at the facility level.
- Establish monthly reporting of essential data sets from the facilities to the districts and onwards to the regional and national levels.
- Develop and establish an integrated district (and regional) "data warehouse" software application including data, reporting & indicators from all programs as well as population census and surveys – the first element in the district "information observatory". This data warehouse and its web-enabled access should be clearly linked to existing data warehouses in use by other programs such as local government.

See **ANNEX 4A** for the overview of tasks, objectives and plan of resources for WP4.

4.5 WP5: Capacity development

A training scheme will be established to support the roll-out, based on an initial Human Resource assessment (staff needs, training needs)

Program	**Target**	**Trainers**	**# to be trained**
In-service training	Facility / District staff	Program managers, regional training team	2 / facility 5/ hospital
Supervision and support strengthening	Regional, District program managers	Regional training team	10 /district team
Short courses	Training trainers at district regional / Zonal level	Technical colleges	20 / regional team
Continuous training – (building) Diploma	Information officers& Managers	Teachers with degree, University lecturers	20 in the scheme,
Masters in Health Informatics - UDSM	Managers & leadership	University lectures	5 students

Table 5: Human Resources Capacity Development Programme

A one year diploma course will be developed. The Masters in Health Informatics at UDSM will form an institutional base for the educational scheme as well as educating trainers.

Capacity development will be carried out through a number of linked modalities:

1. Strengthening support and supervision process to focus on data quality and use for monitoring and evaluation. Focus on program managers/ coordinators at district/ regional level to use information during routine supervision
2. **Short courses** (repeated), training health workers, managers and HMIS staff to be run at decentralized locations close to place of work. Short courses to train a **team of trainers** from regional and district level to provide in-service training and HMIS support
    a. Data collection, processing and use
    b. ICT support – hard and soft ware

    Suitable institutions will be identified where short courses can be developed and to facilitate the setting up of a decentralised setting for carrying out large scale regional and district based training will be established (i.e. training of trainers
3. Establishing 1 year **diploma** in health informatics
4. Further strengthen the **masters** degree program in Health Informatics

    The Masters will be used as the institutional base and "school of HMIS trainers" for the HMIS training and support program to address the following categories of staff on a cascade basis:

- Facility level staff and managers; supervisory visits and hands-on training combined with (repeated) short courses.
- HMIS staff at district levels to be prepared as trainers of facility staff; (repeated) short courses, diploma and (eventually) Masters.
- Regional and national managers, including program managers should be master trainers who support districts to run decentralized training; (repeated) short courses, diploma and (eventually) Masters degree.
- Integrate HMIS and information use into pre service training curriculum at schools of nursing, clinical officers and university colleges.

ANNEX 5A for overview of tasks, objectives and plan of resources for WP5.

4.6 WP6: Program Management

Objective: Manage and coordinate the HMIS Programme and ensure that other actors are enrolled

The overall management structure is described in the MoU between MoH&SW, IHRD, UDSM and UIO:

- MOH&SW is the project owner and the host of the program and responsible for all administrative issues
- IHRDC is responsible for financial management issues;
- The consortium members all take part in the Management Team. – Technical support
- A reference group based at the MOH&SW will oversee the program

Specifically, the following tasks will be undertaken

- Develop detailed plans including responsibilities and deliverables for the work packages and the overall HMIS Program – and evaluate progress and revise plans regularly
- Monitor the Program and regularly summarize the status and planning, with inputs from each work package
- Work closely with steering committee (which is chaired MOH&SW) and ensure their full involvement
- Work closely with all health programs and donors and enrol them in the HMIS process
- Work closely with districts to explore possibility for them to pick up most of the cost into their yearly comprehensive plans for future sustainability

4.6.1 Project implementation Team

Level	Management	Health/HIS	ICT	Training
National	Project manager ↔ Head HMIS Administrative support (Ifakara)	Epidemiologist ↔	ICT specialist ↔	Training specialist ↔
Regional	RMO	Epidemiologist ↔	ICT advisor ↔	Master Trainer ↔
District	DMO	DHMT/ Program mng.	Information focal person	

Table 6: Project Implementation Team

4.6.2 Project monitoring

The key outcome of the project is seen to be information use at facility and district level. This will be monitored using the detailed Tool for assessing level of information Use (TALI) outlined in Table 7 (See **Annex B3** for detailed descriptions).

Level	Broad description	Detailed description
Level 1	The information system is working according to specification: • timely and accurate data is submitted to the district; •data entered in district database, • reports sent upwards •feedback to level below	•Essential Indicator set agreed •Data elements and sources for indicators clearly defined •Information manager identified and trained •routine reports submitted on time •feedback reports sent •Guidelines for information handling available
Level 2	•Analysed reports of information produced •Feedback disseminated regularly •Indicators are being assessed against performance / targets regularely	•MDG-related program reports available •indicators graphed •indicators discussed in management meetings
Level 3	•Indicators and information are used by managers to inform their action plans. •Indicators and information used to document performance in all written reports	•indicators interpreted and understood •problems identified based on available information •problems addressed, and steps documented in action plan •MDG service delivery improvement shown using indicators and data

Table 7: Criteria for Assessing Levels of Information Use – general, all levels

4.6.3 Responsibilities of Partners (Consortium members)

The MoH& SW will coordinate all project activities, including initiation, implementation and scaling activities.

Work Package	Leading Partner(s)	Collaborating Partners
WP1	UDSM & UIO	IHRDC and MUHAS
WP2	IHRDC	UDSM, UIO and MUHAS
WP3	IHRDC	UDSM, UIO and MUHAS
WP4	UDSM &UIO	IHRDC and MUHAS
WP5	UDSM &UIO	HRDC and MUHAS
WP6	MOH&SW	UDSM and IHRDC

Table 8: Responsibilities of the Consortium Members

5 Strategic approach

This section outlines some key strategic principles on which the HMIS Program will be based:

1 Focusing on *use of information to improve MDG monitoring.* Use of the tool to assess Levels of information use (TALI) – and achievements.

2 Approaches to the HMIS strengthening *Process*: Flexibility, essential data & indicator sets and buy-in from health programs and other stakeholders.

3 Integration – coordinating and integrating data from different sources (different health programs) & data of different types (Electronic Patient records and statistical HMIS data).

5.1 Use of information for action & and monitoring MDGs

The planning, implementation and continuous M&E of the HMIS Program will be carried out according to a set of clearly defined principles of "levels of information use and information systems performance."

The TALI Tool (Annex 3B) assesses the level of information usage at all levels; facility, district, regional, and central levels. Three levels of information usage are specified from the most basic level (Level 1) to the most advanced (Level 3). Each level is attained when certain criteria regarding data completion, accuracy and use for management decisions have been fulfilled. "Level 1" implies that the information system is working as according to the basic specifications; the specified data is collected, managed and reported – and the information is available for use.

The objective of the HMIS Program is to achieve Level 1 in 7 regions during Phase 1, i.e. the first 2.5 years. Only from this base is it possible to provide the information needed by e.g. the P4P scheme. The criteria that need to be attained for levels 2 and 3 are related to the use of information for management and decision making, traditionally the most difficult tasks to achieve in HMIS development. Fortunately, however, the situation might be different in this case; the P4P provides an important incentive for producing quality data (i.e. Level 1), and at the same time represents an advanced example of effective use of data (i.e. Level 2 and 3). The synergetic complementarities between the

HMIS strengthening process and the P4P in this regard will be important for the success of the Project, and is made part of the planning strategy by e.g. focusing on the P4P pilot districts.

The TALI Tool assesses levels of information use at different points in the information hierarchy (from the facility to the national levels). The criteria that need to be fulfilled differ somewhat at each point in the hierarchy because, for example, the role of the person responsible for facility information is different from that of a district information officer.

5.2 Flexible & scaleable HMIS strengthening process:

The large geographical scale of the HMIS Program makes it necessary to base both planning and implementation of the revised HMIS on the following strategic principles:

- DART: Decentralised, Action Oriented, Responsive, and Time-bound.
- KISS – Keep it short and simple using flexible and effective design. Relatively easy to implement and high level output in terms of needed essential information; flexible because the HMIS needs to adapt to changes – and extensions – over time. The approach will be incremental in nature, starting with small changes, institutionalizing them, and slowly expanding them.
- Start by addressing the basic and essential information needs and identify essential data & indicator sets – taking the current system and its identified short-comings and additional requirements as points of departure – and add and include other components as one goes along (and learn how to do it) – if one delays roll-out until a "perfect" facility-district HMIS is established in pilot districts, scaling within a limited time horizon is not possible.
- Deliver tangible results (quality information) as from the start, and thereby:
- Ensure buy-in from health programs and other stakeholders by providing better integrated information than what the current incomplete, vertical and fragmented systems are providing.
- Roll-out strategy:
    a. Bottom-up: district by district and region by region
    b. Top-down: Integrate the current MTUHA reporting from districts and regions not yet covered, with the strengthened HMIS (different by being monthly rather than quarterly, and by including some additional elements – in one national database

5.3 Scaleable HMIS strategy –integration aggregated & patient data

There has been some discussion on how to integrate computerized Electronic Patient Records at the facility level with a traditional HMIS approach based on aggregated statistical data. The HMIS Program will integrate these two types of computer based systems and the paper based system in a scaleable approach. Scaleable here means that the integrated approach can accommodate "any" combination of computer- and paper based system, and data of different types (individual and aggregated). In Tanzania, there

are districts without computers, and there are health facilities with computers and Electronic Patients Record systems. In the future, more facilities will get computers, while at the same time, other facilities –and for a long time the dispensaries, will be without computers. The scaleable strategy enables the facilities to "plug-into" the HMIS electronically when they become computerized, and use paper reporting if they are not computerized.

A sub-project spanning WP1, WP2 and WP4, will focus on ways to integrate the DHIS/HMIS with computerized EPR systems already implemented or in the process of being implemented in Tanzania. This integrated approach will be followed in particular pilots. A schematic of the proposed integration is provided below:

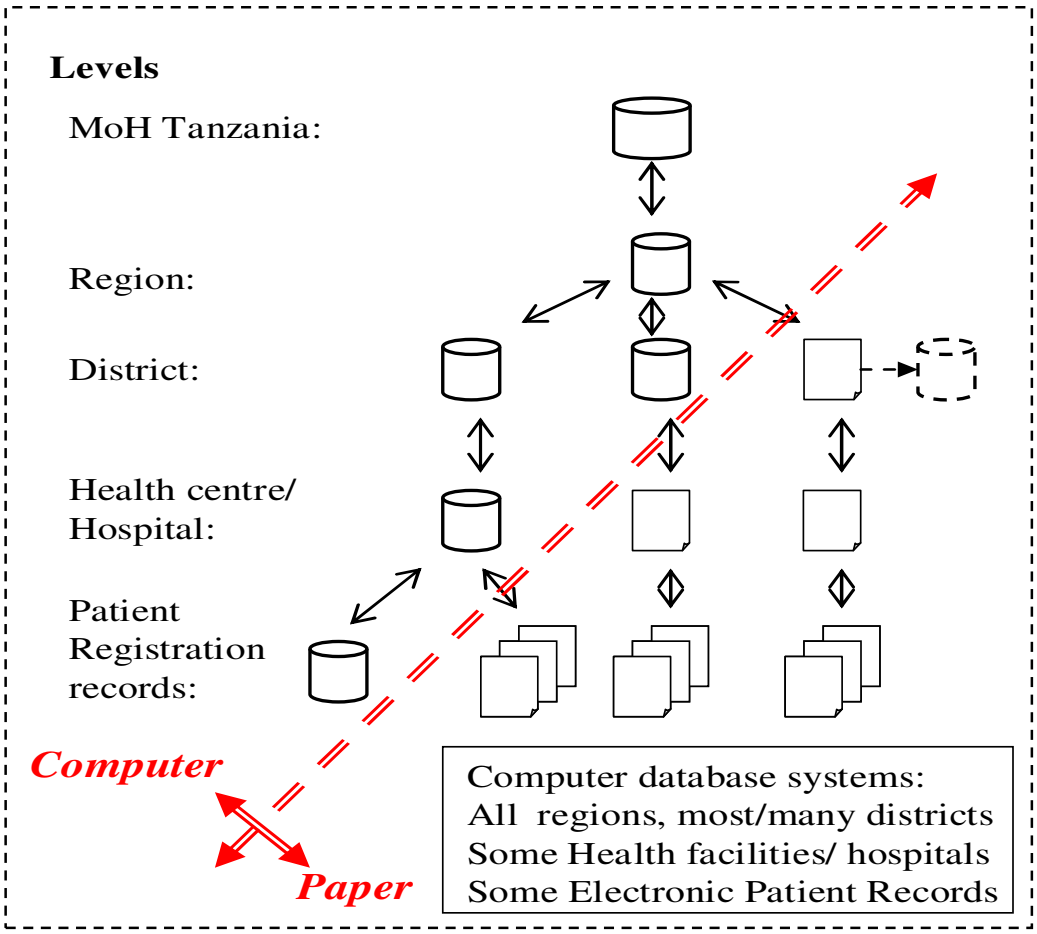


Figure 3 : Integrating computerized patient based data with the HMIS & DHIS

6 Implementation plan

The project will be organized in integrated but semi-independent modules called “work packages” (WP), which enables the management of cost, tasks, deliverables and milestones –all according to a timeline. The major WP is labelled HMIS strengthening and represents the core business area of the HMIS Program and entails the development of a strengthened HMIS and its roll-out to 1/3rd of the country during 3 years, and the further strengthening and consolidation during the following 2 years. In addition, the project will establish a national level presence to ensure an effective integration of the old and the new, and to strengthen coordination and scaling processes. Other WPs, such as “Software development & integration” and “Revision of data and indicator sets and tools” are both crucial in providing the deliverables required by the major “band wagon” (HMIS strengthening) at the right time. For example, if the revised data and indicator sets and tools are not ready by the expected time, there will be no roll-out.

Minimising bottlenecks and optimising parallel processing is the guiding principle for planning of the HMIS Program. The above mentioned revision, however, represents an important bottleneck and a certain risk factor, and will therefore have to focus on the minimal, essential and feasible needs for data and indicators

Implementation; timeline and phases

6.1.1 Overview

A. Initial phase – Initiation of 6 months
B. Phase 1: Roll out of 2.5 years
C: Phase 2: Consolidation of 2 years
A summary of the "**"Rolling" Roll-out implementation approach"** is provided in the Table 9 below. See **Annex B5** for the generic project implementation timeline.

Project Phase	Duration	Scope	Objectives and activities
Assessment	1 month	National	Participatory Assessment of current HMIS status using HMN assessment tool
0: Initiation, design , "Best practices"	0-8 months then ongoing for entire project	1 Region (focused Action research, system Development, dissemination)	1. Establish implementation team of national level, regional staff, - Health, software, Training / HR. 2. Revise indicators, data sets, basic tools, processes, reporting formats etc, methodologies, software and deploy them in all districts and facilities. 3. Commence implementation in the whole region to move towards the achievement of Level 1 in 12 months. 4. Documentation of best practices which we will actively seek to share with other regions.
1: Roll out	8 months - 2. Years (add 2 regions every 6 months)	7 Regions	1. Develop regional teams of 4 members in each of the other 6 regions. 2. Commence implementation of all aspects of the HMIS, using the lessons from region 1 as the point of departure. A phased wise approach will be adopted in this phase of expansion to the other 6 regions (see section 5.1.4). 3. Achieve level 1 in region 1 (within one year of this phase), and level 2 by the end of this period. 4. In the 6 new regions, seek to achieve at least level 1 by the end of the phase, and in some of the more responsive regions, to attain level 2. 2. Establish regional presence in all other regions in the country (outside these 7), which will be subject to the availability of funds from other agencies.
2: Consolidation	2 years	7 Regions	1. The 6 new regions should all be taken to Level 2 at least, and the more responsive ones to level 3. 2. Region 1 should be taken to level 3. 3. Establish national level database and processes, based on electronic data from 7 regions and paper based data from the others. 4. Maybe some of the regions (outside the 7) will be able to secure funds, and our initiative can support them to self-start and scale up. 5. Development of a detailed national roll out plan.

Table 9 : Summary of the Roll-out Implementation Approach

6.1.2 Implementation in one region –to be replicated in all regions

"Implementation" in one region includes;

In each district (including facilities) of the region:

Activities to reach at least Level 1

- Train and prepare districts staff (3-5 staff; programs and information responsible) in revised data collection tools and procedures –district and facility HMIS guidelines.
- Identify and establish HMIS district team with one person responsible for the overall activities.
- Introducing revised tools for data collection in all facilities; Two days training session with 2-4 information users/collectors/responsible from each facility (number depending of type of facility) – first introduction to the (new) Facility HMIS Guidelines)
- Identify and establish facility level HMIS team with one person responsible.
- After 2-3 months; repeated training over 2 days of 2-4 staff from each facility. Topics: the HMIS facility guidelines and problems encountered with new tools.
- On-site support and facilitation in facilities
    - Enable and support the district to supervise and support the facilities.
    - On-site support and supervision of facilities; all facilities with problems in reporting on time need to be followed up.
- Setting up District DHIS database and train "on-site" 3-5 district staff in computers, database, data capturing and evaluation of data, electronic reporting to the region, data analysis (using Excel) and the generation and printing of reports (feedback to facility and monthly report to DHMT) (Procedures and tasks according to the District Guidelines)
    - Initial on-site training; 3 days.
    - Thereafter; at least 2 days support and facilitation *every month, more* if needed.

At regional level:

- Identify and establish regional HMIS team with one person responsible. Target in particular 2 staff responsible for the computerised system, managing the DHIS database and making sure that all reports are coming from the districts and keeping track of outstanding facility reports in each district. Maintaining and updating of the district database.
- Set up and install the regional DHIS database – and train 3-5 people in database management, reporting etc. on-site over 3-5 days.
- Conduct training in DHIS database for 2 from each district over 4 days. To be conducted 1-2 months after implementation of DHIS in all districts in the region (after first exposure and with the first real data)

After the first and initial high intensive implementation (6 month), the above described procedures continue with ongoing support and facilitation for another 18 months (i.e. a total of 2 years for this first phase implementation).

Activities to reach Levels 2 and 3 of information usage
During this phase presentation, dissemination and use of information for management, resource allocation and decision making will be emphasised. At this point quality information will be available and the issue will be how to best use the information. The development of the P4P will be an important when planning this phase in details.

6.1.3 Project implementation - timeline

Initial phase – 6 months
Work in selected pilot districts and at national levels with health programs and other stakeholders:
It is expected that the P4P pilot districts will be part of the focused area in this phase.
Outputs:

- Revised data and indicator sets and development of monthly reporting tools.
- Involve health programs and other stakeholders in the work to revise data and indicator sets. The aim is to include the data sets and requirements of the health programs in the revised *joint integrated* data and indicator sets as – well as reporting and database tools.

It is important to bear in mind that this is the first and basic revision. The HMIS will be rendered flexible so that further revisions will be enabled; this is not the *final* revision. The current book 2 makes up the point of departure for revised monthly reporting forms. The request from various stakeholders is in particular concerning age and sex break-ups of the disease reporting. It is however important to develop a reporting form as simple as possible in order not to make reporting too difficult and thereby make it difficult to achieve good data quality (reporting on sex and each age group doubles the number of data to collect).
Other outputs:

- Develop a user friendly Guideline booklet for the facility and district levels on the various aspects of HMIS, from data collection to information use.
- Adapt the DHIS database application according to the revisions.

The revised data sets and tools coming out of this initial phase represent a necessary input for the next phase of the HMIS Program. In order to make sure that this needed output is produced in time, the following approach will be followed:
Aim at a *first version* of the revised data & indicator sets and tools – with further revisions planned for.
It is always problematic to arrive at consensus in revising data collection standards when (and if) the impression is that the new standards will be cast in stone for the foreseeable future. The following issues are therefore important:

- Ensure that the entire HMIS is rendered flexible and guarantee that "any" future changes in data standards, paper tools and software can be easily accommodated.
- Make sure that the revised HMIS as a minimum will produce all information and reports that are currently produced, in addition it will produce the added /revised information and information of better quality.
- Include the data sets and reporting requirements of the health program in the revised HMIS, and provide these data electronically to the health programs – by

setting up the DHIS database application for them or provide the data in their own software, according to what they prefer.

Resources and scale of the initial phase
This Initial Phase will be intensive in terms of stakeholder involvement at the national level and investigations and testing in selected pilot district(s). The consortium HMIS Program team need to be established and work intensively.

It is suggested that one international consultant experienced from identifying essential data and indicator sets and working and "negotiating" with health programs is engaged both for the task of revising data sets and tool and for the development of the Facility and District Guidelines (here we can learn from the newly developed guidelines for Zanzibar as well as from the facility Guidelines developed in South Africa).

The dedicated software team also needs to be established (3 persons) to support National, regional and district levels, as well as for the integration of facility based EPR systems within the HMIS, and also the other vertical programs.

6.1.4 Phase 1 – HMIS strengthening in 7 regions; from month 7 to month 30 (2 years)

Roll-out the HMIS strengthening process
A: Implementation in one region: 6 months (until month 8)
Scope: All facilities, districts and the regional level.

B: P4P Pilot districts
NOTE:
In addition to this one first region it is necessary to implement and strengthen the HMIS in the P4P pilot districts. However, since the number and location of these districts are unknown it makes planning of the HMIS Program problematic. The selected P4P pilot districts might be 20 or 4, and they might be clustered, or spread out, and some of them might be included in the selected region (recommended), or not. In order to accommodate the needed HMIS work in the P4P pilot districts, it is therefore suggested that this is planned and budgeted for within the P4P pilot. The work will be carried out by the HMIS Program, but the scale is not possible to foresee at this point in time.

C: Additional 2 regions – 6 months (until month15)
For each region, including districts and facilities, as described in 1.1
1.4 Additional 4 regions – 6months (until month 22)
For each region, including districts and facilities, as described in 1.1

D: Consolidate the HMIS in all 7 regions and achieve at least Level 1 in Information use and HMIS performance – 8 months (until month 30)

The objective is to strengthen the HMIS in the 7 regions up to *at least* Level 1 of Information use and HMIS performance; that is to make the HMIS perform according to

its specification in terms of data quality and reporting. The objective of achieving "Level 1" in information use is described in details in the next section.

6.1.5 Phase 2: Strengthening the HMIS in 7 regions and – covering the country; from month 28 to 5 years

During the first 2.5 years, the HMIS Program expects to cover 7 regions, 1/3 of the country, and reach Level 1 of information usage. In addition, a national level HMIS will be established based on a combination of electronic data (7 regions) and paper data from the remaining regions. If this expectation is fulfilled, it is also expected that a momentum is created, sufficient to cover the remaining 2/3 regions of the country. This momentum will be created through achievements and it will be made up by other funding agencies and initiatives coming aboard and joining forces. The planning of the remaining 2.5 years of the HMIS Program will therefore be conditionally divided into two trajectories:
A: Strengthening the HMIS in 7 regions and achieving Levels 2 and 3 of information usage (see next section); 1/3 of the districts achieving Level 3 and 2/3 Level 2. Ad-hoc roll-out to other districts according to the various initiatives that are ongoing.
B: Roll-out to the rest of the country in a "planned fashion" based on additional funding. The further strengthening of the HMIS as according to "A" above is included, following a natural trajectory of HMIS strengthening provided that the level of intervention continues.

The implementation and national roll-out of the P4P scheme represents another unknown in this picture; national roll-out of P4P cannot take place without national HMIS strengthening. The HMIS Program will therefore plan for national coverage during the second phase, although funds are not yet secured.

The plans for the other Work packages are designed to support the HMIS strengthening and are described in following sections.

6.2 Managing risks in the HMIS Program

The HMIS Program is identifying and addressing potential risk within four types of areas:

1. Internal risk factors; Risk of disagreement and conflicts within the consortium itself and between the consortium and the Norwegian Embassy; Disagreements, poor performance, or poor reporting, which again may ultimately lead to withholds of funds and the termination of the Program. This is the classic number one risk factor facing all programs and will be addressed by establishing clear responsibilities and transparent management and reporting procedures
2. Risks related to the MOH&SW policy level; Certain changes in procedures, policy and job descriptions are prerequisites for the HMIS strengthening, such as for example the identification of HMIS officers and responsible staff at all levels and the strengthening of HMIS units at all levels. Such issues are the responsibility of the MOH&SW. The HMIS will recommend changes, but cannot decide.

3. Risks related to the collaboration with other stakeholders; health programs and services, funding agencies. Success will to some extent rely upon the synergetic collaboration, integration and alignment with such actors. This cannot be controlled, only achieved.
4. Risks related to reaching the specific goals of the HMIS Programs. Not many African countries have reached the levels of HMIS quality and usage which the HMIS Program is aiming at. Identification of key problem and risk areas and their careful monitoring and managing are therefore needed.

In the following we give an overview of approaches to managing risk within these areas.

6.2.1 Managing risks within the consortium itself;

Risk of poor collaboration or break-up or of the consortium. Unclear responsibilities and division of tasks between the partners may lead to disagreements and poor performance. Action: The consortium is governed by the memorandum of understanding (MoU) between the MOH&SW and UDSM and the allied partners: IHRDS, Muhimbili University of health and allied sciences and the University of Oslo. The responsibility of, and between, the partners are described in the terms of references (ToR) of the MoU. The ToR is reflected in concrete allocations of responsibilities in for and within each work package in the implementation plan. A joint technical committee is overseeing the implementation of the work packages and the ToR and is responsible for solving disagreements and deviations between partners, and to eventually update the responsibilities described in the ToR and work packages if needed.

The risk of poor management and performance. A management team will monitor and manage performance according to the project plan (deliverables) and LogFrame (see annex B1). Four critical areas are emphasised:

- The strength of the management team is a critical and will be closely monitored.
- Financial management and flow of funds are critical and will follow clearly described procedures.
- Reporting represent another critical issue: reporting procedures will be clearly described and reporting will be monitored carefully
- Performance will be monitored using the Logframe, and deliverables and timeline from the work packages. Deviations will be immediately addressed

The Norwegian Embassy is funding the HMIS program and clear reporting procedures will be established. Unclear areas as to what may and may not be covered by the Norwegian funding will be identified and solved.

6.2.2 Risks related MOH&SW policy and action

During the implementation of a similar HMIS Program in Zanzibar the development of the way the MOH&SW in real terms prioritised the HMIS represented the single-most important critical (risk) factor. In the early phase, the HMIS was not given much top-level support and the process was stalled, then the MOH&SW changed policy and gave adequate priority to the HMIS through concrete action, and the HMIS strengthening process accelerated.

Successful HMIS strengthening relies upon the following actions and priorities from the MOH&SW:

- Strengthening of the HMIS /HIS unit in the MOH&SW, which includes the hiring of qualified staff
- Strengthening of the HMIS units at region and district level: also here staff needs to be allocated and trained and a district HMIS officer is critical. It is also important that the district information officer is part of the DHMT.
- At facility level, a person responsible for the HMIS needs to be identified.
- Overall: Information and HMIS need to be prioritised by top-level managers

The above are examples of needed changes in procedures, structures and job descriptions that are crucial for the success of the HMIS Program and that cannot be carried out by the consortium alone. The consortium, where the MOH&SW is a key partner in this regard, will give such critical "system" issues high priority and advocate them from day one.

6.2.3 Risks in relation to be able to include other actors (e.g. health programs and donor agencies) in the process

In order to reach the overall goal of a strengthened and integrated HMSI in Tanzania, the HMIS Program will rely upon a certain level of willingness to participate and to be integrated from health programs and donor driven vertical interventions. Fragmentation is part of the problem that the HMIS Program is addressing, and need to be overcome. The approach to manage this problem area is twofold:

1. Establish an inclusive process by including all stakeholders in consultations when identifying information needs, and
2. Deliver tangible results needed by these actors as from an early stage of the process and thereby to become an "attractor for change" – that is to build up a momentum for the HMIS process. The implementation plan is designed so as to be able to deliver relatively quick results in terms of needed information outputs.

6.2.4 Risks related to (not) being able to achieve the planned technical outputs

The following are risk factors at the level of implementation

a) Software solutions, networking and available infrastructure not meeting specifications.

Approach: The DHIS software solution is already meeting the general requirements and is running in Zanzibar as well as in a number of other countries in Africa such as South Africa, Nigeria, Zambia and Malawi, and it is tested against current specification in Bagamoyo and Kibaha. The requirements to infrastructure are flexible and include paper, computers and Internet, or other means for data transfer, depending on what is available and appropriate. However, computers at the district level is part of the basic set-up.

b) Capacity problems; within the consortium (e.g. not enough skilled facilitators) or within the health services (e.g. inability to train sufficient large number of health staff to sufficient level.

Approach: A training and capacity building scheme ranging from on-site training and support to short courses, diploma courses and Masters is being developed. The NORAD funded Masters Program in health informatics provides an institutional backbone for this scheme.

c) Planned HMIS strengthening too complex or "advanced" technically or functionally

Approach: the key principle is to keep the HMIS strengthening process simple; start with the basics and gradually build further from that foundation. These principles are developed through practice over more than a decade in a number of African countries.

d) Inability to develop an information culture where information is prioritised, appreciated and used for management purposes.

Approach: By using the "Tool for assessing levels of information usage" (see Annex 3B); 1) clearly defined targets for information use are set for each level, 2) achievements will be monitored closely, and 3) deviations from targets are transparent and can be addressed both at a detailed level (individual facilities and districts) and more generally by revising the intervention. Furthermore, the HMIS Program is part of the P4P scheme which includes tangible incentives for collecting quality data and effective usage of indicators and information.

e) Sustainability; MoH&SW and the health services unable to take over at the end of the period.

Approach: Being able to deliver on the above areas of HMIS strengthening and the provision of needed information represent the foundation for sustainability. In the area of software; a national software team is already formed at UDSM and is actively involved in the development and support of the DHIS in Zanzibar as well as taking part in the international network around the Open Source DHIS. The Masters in Health Informatics at UDSM will every year produce more than 20 qualified "trainers of HMIS trainers" and thereby ensure the sustainability of the HMIS training scheme.

7 Annexure A: Work Packages

7.1 Annex A1: WP 1 - HMIS / HIS strengthening –national scale

Description

Revise and strengthen the HMIS /HIS in Tanzania following a scaleable and integrated approach. This WP represents the central effort and overall timeline of the HMIS Program. The other WPs represent support tasks and are complementary to this lead-process. It is interlinked with the P4P scheme in that the P4P will build on information and indicators from the revised HMIS.

Objectives:

- Revise, strengthen and integrate across health programs the HMIS in Tanzania in such a way that it fulfils the requirements of Levels 1, 2 and 3 of Information usage successively and covers all regions, districts and facilities (public, faith based and private)
    - Within the NTPI scheme at least 1/3 of the country will be covered during the first 2.5 years, the aim is to cover the remaining 2/3 .during the following 2.5 years
- Ensure that the P4P scheme is provided with the needed data and indicators from the HMIS in the districts the P4P is being piloted and implemented, and also towards supporting the MDGs.

- Mobilise and ensure buy-in from health programs, funding agencies and other stakeholders in such a way that the objective of covering the entire country within the 5-years duration of the HMIS Program.
    - In order to ensure buy-in: Create a powerful *attractor* in terms of "best HMIS practice" at facility, district, regional and national levels during the first 2 years of the HMIS Program.
- Develop District Information Observatories; focal points for integrated information management, including a district data warehouse, "library" of all relevant printed material –and a responsible district information manager.
- Establish and institutionalise a system of information managers /officers (and teams) at facility, district and regional levels, as well as a motivating career-path – and establish an educational scheme to support this human information structure
- Establish a national data warehouse integrating and managing all relevant information from various data sources (e.g. service data, population census, surveys), as according to the HMN Framework.

Tasks

T1: Pilot and develop (minimally) revised data sets and tools (see other work packages) in the pilot sites over the first 6 months and prepare for roll-out.

T2: Recruit and train the first batch of HMIS facilitators to be deployed in the roll-out. Part of training to be carried out through active participation in the pilot sites.

T3: Establish and run the roll-out process. Each Region will have an initial 6 months intensive implementation period (3-4 full-time staff), followed by 18 months of somewhat less intensive continuous support (average 2-3 full-time staff), which again is followed by support of lower intensity for the remainder of the HMIS Program period (1-2 full-time staff). A team of about 20 solid HMIS facilitators therefore have to be trained and deployed over the 1.5 years. Implementation and facilitation will therefore continue in all regions while new regions are being added. From year 2-3 it is expected that roll-out and implementation is being carried out in new regions beyond the 7 regions which are part of the NTPI scheme.

T4: Support national level. Establish a data warehouse containing all data coming from the regions that are part of the HMIS Program, as they are included, as well as all data reported from the other regions through the current system. Work with all health programs and integrate them in the HMIS framework; Support them to take part in the revised HMIS and /or import/export data to and from their computerised systems. Build capacity at the national level.

T5: Support regional level. Establish a team and build their capacity and help them both to support the districts, manage the regional data, and to provide information support to the region. The regions are crucial in establishing a cascaded structure of technical support and such capacity (e.g. software, computers, and network) needs to be developed.

T6: Support district level. Establish and train district information team and enable them to support facilities. Focus on getting complete reports from all facilities and feedback to facilities. Support development of District Information Observatory and district data warehouse integrating all health programs. Establish routines of graphing indicators.

T7: Support facility level. Establish information team and develop capacity, strengthening all stages of information handling; registration, compilation, reporting – and local use; as a first step: graphing key indicators.
T8: Dissemination and use of information – feedback routines. At all levels: establish monthly/ quarterly reports and feedback to the level below as well as dissemination at same level. Quarterly information "Bulletins". Make key indicators and reports available on the web (national level).
T9: Develop scaleable and integrated system by linking different kinds of data (patient and number based), and involving both paper and computer based systems.

Milestones and deliverables:
The following deliverables are prerequisites for the roll-out of the HMIS strengthening and are delivered by other work packages
Deliverable 1: Revised data sets, indicator lists and paper data collection tools.
Deliverable 2: DHIS database software customised to revised data sets.
Deliverable 3: Guidelines for facility and district HMIS.

Region /district	**Start month**	**Technical implementation completed by**	**Level 1 of information use achieved by**	**Level (2-)3* of information use achieved by**
Region 1	7	Month 12	30	54
Region 2-3	13	Month 18	36	60
Region 4-7	17	Month 24	42	60
P4P pilots		*To be decided early in the process*		
P4P implementation		*To be decided depending of pilots*		
Further /national roll-out		*To be prepared for during year 1-3*		

Table 10: Key Milestones for the HMIS Roll-out

* Level 3 of information usage implies that information is used actively for resource allocation, decision making and planning. This relates to national policy and organisational procedures and culture and can only be achieved through a wider reform process. Its achievement cannot be ensured by the HMIS Program alone. This said, however, the successful implementation of the P4P will, as it links resource allocation to performance – and thereby to information, will enable the achievement of Level 1, as by definition.

7.2 Annex A2: WP 2 - Development of Best Practice Sites and establishing mechanisms for their dissemination within and across districts and regions

Description
Based on the intensive approach of facilitating and building improved usage of information at facility and district levels – reaching Level 2 and Level 3 of information use – building standardized approaches to data management, feedback, dissemination of information, capacity development etc. these will be documented as "best practices" and be gradually disseminated to other facilities and districts in the regions and also horizontally across the regions.

Objectives:

- By the end of the first phase, develop best practices in the form of standardized:
  - Data sets and elements
  - Indicators
  - Data collections and reporting formats
  - Training manual and methodologies for training
- Identify, develop and implement various dissemination mechanisms (workshops, seminars, meetings etc) for the sharing of the best practices horizontally and vertically.
- Develop mechanisms to monitor and evaluate the dissemination and uptake of these best practices.
- Develop systems to revise and update the best practices based on inputs received as a result of the dissemination processes.

Tasks
T1: Preparation of user friendly HMIS Guidelines booklet for facility and district levels.
T3: Facilitate and develop best practices in information management and use
T2: Train the various HMIS facilitators to understand these best practices, and approaches for their dissemination.
T3: Prepare schedule of various workshops and seminars that can facilitate the process of dissemination.
T4: Conduct various dissemination enabling activities.
T5: Monitor feedback on how these best practices are adapted in other settings, and take required corrective and revision processes.

Milestones and deliverables:
These include:
Deliverable 1: User friendly HMIS Guidelines for facility and district –Month 6
Deliverable 2: Conduct of various workshops and seminars.
Deliverable 3: Adoption of these manuals and practices in various facilities.
Deliverable 4: Develop revised version of various manuals and practices based on feedback received from different sites.

7.3 Annex A3: WP 3 - Revision of HMIS

Description
While the revision of data sets and tools will be the major activity during the initial phase of the project, the activities will continue throughout the Program period through regular revisions. Development of guidelines for the use and management of data and tools is included.

Objectives

- Indicator set agreed with all major stakeholders
- Data set based on indicators with definitions and sources
- Data collection and analysis tools and procedures developed
- Data flow defined

Tasks
T1: Revise **data and indicator sets,** starting with the essential data needs of the various programs, particularly those related to the MDGs. Establish a flexible framework to include additional data needs once the basics are working and the health workers learn to manage the HMIS. It is crucial to ensure buy-in of all relevant stakeholders, particularly those "strong" vertical programs that have specific funding for HMIS, monitoring and evaluation (e.g. EPI, IMCI, MCH, HIV/AIDS, TB, Malaria etc.
T2: Revise **tools and procedures for data collection**, compilation and reporting at the facility level based on the indicators defined above. These tools should be based on the existing tools (e.g. monthly reporting based on current Book 2) and cause as little disruption to existing systems as possible, while accommodating the revised indicators developed. Each data element to be collected should be linked to a relevant indicator.
T3: First test, then monitor and evaluate (in WP1 and WP2) the revised data collection forms in facilities and the capturing of the data in the DHIS at the district level.
T5: Describe current data flow and define revised data flow policy
T6: Establish procedures for the continuous revision process. For example assessing and adjusting revisions periodically.

Deliverables and milestones
D 1: Revised data and indicator sets and tools – month 8

Further revisions to be planned for, to incorporate new needs and requirements.

7.4 Annex A4: WP 4 - Software development and systems integration (communication and web)

Description
This work package includes the customisation and further development of the DHIS software and other applications to the requirements and needs as they develop, the integration of Electronic Patient Record systems and other computerised data sources; establishing web-based data warehouse, electronic reporting etc. The basic principle underlying the various software applications involved in this work package is that first a "first" customised, stable and useful application is implemented, and thereafter it is continuously further developed in order to respond to the additional requirements arising through the roll-out and the exposure of the software to new user groups and stakeholders. The software design and development strategy is therefore flexible and customised for evolutionary development.

This work package includes three major components;

1) DHIS
The customisation and further development of the DHIS software (Annex B2) and other applications to the requirements and needs as they develop, to facilitate standardised data collection, data validation, and data flow up to the national level. Facilitate an integrated data management approach (data warehouse) at district, regional and national level.

2) Presentation
Data presentation and analysis; including (offline) feedback reports and pivot table data analysis for all levels, and a web-based data warehouse for the national level with web-based reporting, indicator dashboards and Geographical Information Systems (GIS).

3) Integration
The integration of other computerised data sources at council and national levels, particular systems used by the health programs, Electronic Patient Record (EPR) systems, and mobile technologies with the DHIS. At the national level the objective is to integrate all data sources such as current HMIS standards (MTUHA), the revised HMIS standards being rolled out, population census data, and other data sources into a country-wide data warehouse.

Objectives
- Customise and establish the DHIS as a district-based data warehouse, based on the revised data and indicator sets and including other relevant data such as population census, facility surveys of infrastructure and staffing.
- Customising and establishing regional data warehouse following the same framework.
- Establish a web-based national data warehouse integrating the HMIS data and indicators alongside data from other sources.
- Make key indicators, data and reports from the HMIS accessible through the web.

- Develop interfaces between the DHIS and EPR systems that are implemented within the roll-out regions, P4P districts and elsewhere.
- Explore the use of the cellular network and cell-phones and hand-held devices for data capture and data transmission.
- Link the DHIS to GIS – use thematic maps to display indicators and data.
- Support the software implementations in all sites and develop capacity at all levels; national, regional and district –and in facilities where computers are available.

Tasks
(Components in parenthesis)

T1 (DHIS): Customise DHIS to the revised HMIS (and current, starting with book 2)
Work with the team revising the data and indicator sets and the national HMIS unit to customise the DHIS according to their requirements (initial phase) for data and indicator definitions, data collection forms, data validation procedures, facility categorisation, and data flow policies. Set up the DHIS to support monthly data capture by facility, and to maintain data per month per facility at all levels of the system through electronic (XML) reporting up the hierarchy between offline installations of the DHIS.

T2 (Presentation): Develop standard feedback reports and tools for data analysis and dissemination
Prepare standard reports for the various levels including key indicators and data, to be used for dissemination and feedback at facility, district, regional and national level. Set up pivot tables for data analysis and chart presentations at all levels where health managers can easily select their "view" regarding level, i.e. whether one wants to investigate data by facility, by type of facility (e.g. public, faith based, or health centres only, or hospitals only), by district, or by region.

T3 (Integration, DHIS): Facilitate integration of other computerised data sources
Work at national level with the MoH&SW and make a systematic overview of computerised data sources in health programs and elsewhere relevant for the establishing of an integrated data warehouse. Work closely with health programs in order to accommodate their needs.

T4 (Integration): Integrate old and new HMIS standards at national level
Establish the integrated national data warehouse by including all health facilities in the country and by importing the "old" data available from these facilities (electronically), and by ensuring that "new" (from the roll-out and from those not yet included) is included every month. The challenge is then to integrate the revised data sets with the current MTUHA data sets, as well as from other relevant data sources. Data from the revised HMIS and the current MTUHA are based on different periodicity, aggregation and to some extent of different definitions (but the current MTUHA standards will to some extent be sub-sets of the revised data sets; i.e. more fine grained: e.g. age groups instead of totals and monthly instead of quarterly.). In order to be able to compare "new"

and “old” data, a comparable level of aggregation needs to be used. Most data will be comparable at the level of the current MTUHA standards.

T5 (Presentation): Data warehouse with online reports and indicator dashboards
Develop a web-based data warehouse system at the national level providing online reports for different programmes and levels, and dashboards for quick monitoring of important indicators.

T6 (Presentation): Link the DHIS with a GIS system
Set up a GIS system for display of data and indicators from the DHIS on thematic maps for all levels.

T7 (DHIS, Presentation): Technical support to the roll-out
Work closely with the implementation teams in regions, districts and facilities and customise the DHIS according to requirements, train and support local teams and establish a cascaded structure of support, i.e. ensure that capacity is developed at regional level.

T8 (Integration): Explore the use of EPR at facility level and integrate with the DHIS
Explore the use of facility based EPR and computerised data reporting in order to improve data quality and better use of information at facility level. Integrate the DHIS with EPR systems by aggregating patient data to monthly summary reports according to the HMIS data requirements and import into the DHIS.

T9 (Integration): Explore the use of mobile technologies for data collection
Explore the use of hand-held devices and mobile telephones as well as the cellular network for the purpose of data collection and data transfer to the DHIS.

Deliverables and milestones
(Components in parenthesis)

D1 (DHIS): DHIS database software customised for roll-out
The DHIS customised according to revised data and indicator sets and new monthly reporting forms and procedures, and for all levels (facility, district, region, national).
First version - Month 6
Continuous further development of the DHIS database application according to needs and requirements from new facilities, districts and regions being gradually covered by the roll-out, requirements from the MoH&SW, P4P scheme, health programs and other stakeholders - Months 7 - 60.

D2 (Presentation): Feedback reports and pivot tables set up for all levels
Standard, easily printable feedback reports for monthly dissemination of data coverage and key indicators set up for each level. Pivot tables customised for each level and health programme for more flexible data analysis and chart presentations.
First version - Month 6

- Continuous further development of feedback report formats and pivot tables and other data dissemination means to cater for new and changing requirements as the scope of the roll-out is being extended - Month 7 – 60.

D3 (DHIS): Include hospital reports in the HMIS/DHIS
Reports from country wide referral hospitals being included in the HMIS and DHIS database application.
First version – Month 9

- Continuous further development: develop a ward based HMIS and reporting at referral hospitals and other hospitals as they get computers (separate roll-out plan) - Month 10-60.

D4 (Integration): A national and country-wide data warehouse integrating current and revised data HMIS standards
A data warehouse set up including all data and indicators reported through current HMIS (i.e. not yet covered by roll-out) together with –and integrated with –data and indicators from the revised HMIS that is being rolled-out (joined database for entire country). This warehouse also includes population census data. Aim is also to include data from health program's vertical systems.
First version - Month 9

- Continuous further development of the national data warehouse integrating various computerised systems from vertical health programmes and other sources as the need arises - Month 10-60.

D5 (Presentation): Web-based data warehouse for integrated data and indicator dissemination
A web-based application set up for dissemination of data and indicators in the integrated national-level data warehouse using online reports (standard and ad-hoc), indicator dashboards, and GIS.
First version - Month 12

- Continuous further development of the national web-reporting, dashboards and GIS as part of data warehouse development (tightly linked to D4) – Month 13-60.

D6 (Integration): Integrate the DHIS with facility-based EPR (patient based) applications and mobile data collection tools
Integrate the DHIS with computerised systems for the facility-level, such as EPR applications and mobile systems.
A gradual and evolving process covering the entire period.

D7 (DHIS, Presentation): Technical support teams established in each of the 7 regions
Following the training of technical staff in each of the seven regions regional technical teams are established and capable of providing first level technical support to the DHIS users, DHIS database maintenance, and general hardware and software troubleshooting.

Resources needed for the software process

Recruit three dedicated software developers to form a national software team that will be engaged the entire Program period. The developers will be responsible for one component (DHIS, Presentation, and Integration) each, but will often need to collaborate on tasks due to the tight linkages and dependencies between the components. All tasks and deliverables above are linked to one or more components. These developers need to work closely with the other project staff and health staff at all levels and in various contexts (urban and rural) to get the necessary understanding of the requirements and needs of the users.

7.5 Annex A5: WP 5 - Capacity development

A training strategy will be established to support the roll-out and general capacity building This will involve 3 levels: 1. Short courses will be developed and an institutional setting for carrying out large scale regional and district based training for health staff. 2. A one year diploma course will be developed aimed at training the trainers. The Masters in Health Informatics at UDSM will form an institutional base for the educational scheme as well as the education of trained trainers.

Objectives:

- Establish an educational scheme in health informatics and information for management so as to ensure a sustainable development of the HMIS/HIS in Tanzania
- Establish regionally based short courses in health informatics and health information for management
- Develop a diploma course in health informatics and HMIS and run it at regional level targeting information officers and managers
- Develop the NOMA Masters in Health Informatics to become an institutional base and a source of HMIS trainers and cadres for the educational HMIS scheme

Tasks:

T1: Develop short courses (1-2 weeks) in HMIS 1 (basics) and HMIS 2 (more advanced) for district and higher level staff and develop similar short courses for facility level staff. Run these courses as part of the roll-out. Key issue of the methodology is to train the staff at least during two course sessions (e.g. with six months in between) and to give assignments to the "students" related to the strengthening of the HMIS in their own context of work to be carried out – and supervised by the HMIS facilitators – in between the sessions.

T2: Develop a short course targeting database management, software and networks for staff responsible for computers and databases. Also this course given as to consecutive sessions (i.e. basics and more advanced) with assignments and supervision in between.

T3: Develop a diploma course and establish a way to run them at regional level (i.e. based institutionally and formally at UDSM and outsourced to Ifakara). Diploma course is important in order both to train HMIS cadres country wide but also in order to provide an opportunity for staff to qualify for the Masters Program –and thereby to provide an educational career path

T4: The NOMA Masters Program in Health Informatics is already started. Key issue is to develop this program into a supporting structure for the HMIS process by making it relevant for the roll-out, ensure recruitment, and by engaging the student in the HMIS process.

Deliverables:
D1: Short courses developed and conducted (for the first time) – Month 12
D2: Diploma course developed, applied for and accepted at the UDSM –Month 12
D3: Diploma course started –Month 18

Resources needed for the training
Per course:
Each course will need a trainer. The HMIS facilitators will act as additional course facilitators. These HMIS facilitators will after some practice be able to act as trainers.
Transport and per diems and eventual accommodation for course participants.

7.6 Annex A6: WP 6 - Management

The overall management structure is governed by the MOU between the partners and is described in an earlier section of this document. Table 10 presents the summary of the responsibilities.

The Ministry of Health and Social Welfare (MOHSW)	Operational base of the program Overall responsibility for managing the program
Ifakara Health Research and Development Centre (IHRDC)	administration and financial management Health components of the program
University of Dar es Salaam (UDSM)	IT, software and implementation components of the program
University of Oslo (UiO)	International advisor in HMIS, IT, software and implementation

Table 11: Summary of Responsibilities of the Key Consortium Members

Objectives:
Develop detailed plans including responsibilities and deliverables for the work packages and the overall HMIS Program – and evaluate progress and revise plans regularly
Monitor the Program and regularly summarize the status and planning, with inputs from each work package
Work closely with the reference group at MOH&SW and ensure their full involvement
Work closely with all health programs and donors and enrol them in the HMIS process

Tasks
T0: Make sure financial management and reporting is carried out to specifications and the reporting on progress likewise.

T1: Develop practical implementation plans for each work package and allocate sufficient resources to the various tasks – compile plans and deliverables into a Program document which can be updated regularly (Program handbook)
T2: Establish internal HMIS Program management structure with WP responsibilities – following the MoU, but in concrete and accountable terms.
T3: Establish overall Program structure where a reference group in the MoH is being involved in overseeing the Program. Establish links and/or include health programs and other stakeholders
T4: Conduct regular Program team meetings and also regular stakeholder and reference group meetings
T5: Keep and update the web-based "Program handbook" (plans, deliverables, responsibilities –and updated according to progress), which may also be made available in a print version. This web based tool will facilitate transparent and effective project management
T6: Revise and update plans regularly
T7: Develop plan for national roll-out at the point where 7 regions are covered
Deliverables and milestones
D1: Detailed plan and WP responsibilities –Month 2
D2: Conduct meeting with reference group and establish overall program structure – Month 3
D3: Web based Program document ("handbook") ready –Month 4
D3: Plan for national roll-out –Month 30

8 Annexure B

8.1 Annex B1 – HMIS Logical Framework

Goal, Purpose, Outputs and indicators

		Indicators
Goal	To strengthen the HMIS in Tanzania	• % Districts achieving levels 1,2,3 as defined by the TALI tool
Purpose	To provide quality information for monitoring MDGs at every level	• % MDG programs producing monthly reports using DHIS • % districts using routine information to manage MDG programs
Output 1	Revision of HMIS	1. Indicator set agreed with all major stakeholders 2. Data set based on indicators, with definitions and sources 3. Data collection and analysis tools and procedures developed 4. Data flow defined and documented 5. Guidelines for monthly, quarterly, annual reports for each level 6. HMIS Policy and strategies developed and enforced 7. National M&E steering committee discusses HMIS reform process monthly 8. Information management system developed and implemented 9. Annual review of Indicators and data sets conducted
Output 2	HMIS Implemented in 7 regions	10. % Facilities providing monthly reports 11. % Facilities with up-to-date MDG graphs displayed 12. % Districts reporting electronically every month 13. % Districts / regions providing monthly written feedback 14. % Districts in which HMIS is discussed at monthly DHMT meetings 15. % Supervision visits using routine information 16. % Districts / regions with Quarterly and annual reports written as guidelines 17. % Hospitals reporting MDG activities using DHIS 18. % Districts with >90% semi-permanent data available on DHIS software 19. % Districts with facility sentinel surveillance sites established
Output 3	Health staff trained to collect, process, analyse and use information	20. HMIS Human resource audit written 21. HMIS Training needs assessment written 22. % District & regional HMIS trainers trained 23. % Districts with MDG-related focal persons using DHIS for program data analysis 24. % Facilities with HMIS-trained health staff 25. Data use Guidelines and manuals written for every level 26. % Information focal persons identified and trained 27. % Information officers appointed to District and regional levels 28. % Districts with action plans monitored using DHIS 29. % Districts with DHIS information used in P4P
Output 4	DHIS Software adapted to support HMIS implementation	30. Specifications for software defined 31. % Indicators and data elements included in DHIS 32. % MDG program with automatic Reports developed

		33. Software manuals developed for district and super-users 34. % Districts with functioning DHIS software 35. % Districts doing monthly validation checks 36. % "other" MDG systems linked to DHIS by gateways 37. % Districts with computer Maintenance contracts 38. % Districts with up-to-date data available on national Data warehouse 39. % Districts with EPR-generated data for ART program on DHIS 40. % Districts with council health indicators available on LG database
Output 5	Action research to support implementation	41. Human Resource and Training needs documented 42. Document activities needed to Achieve level 1 43. Document activities needed to Achieve level 2 44. Document activities needed to Achieve level 3 45. Research mechanisms to develop facility Sentinel sites 46. Research conducted into appropriateness of EPRs 47. Develop methodology to conduct simple surveys to cross-check 48. Further research questions developed and research documented

Table 12: HMIS Logical Framework - Goal, Purpose, Outputs and Indicators

Outputs	•Activities
Output 1 Revised HMIS	•Ensure buy-in of all stakeholders, particularly those "strong" vertical programs that specific funding for HMIS, monitoring and evaluation (e.g. EPI, IMCI, MCH, HIV/AIDS, TB, Malaria etc)
	•Revise and pilot data and indicator sets, starting with the Mkukuta and including essential data needs of the various programs related to the MDGs
	•Establish a flexible framework to include additional data needs once the basics are working
	•Revise tools and procedures for data collection, compilation and reporting at the facility level based on the indicator set.
	•. Other data to be submitted according to management use (Monthly, Quarterly, Half-yearly and annual)
	•Include hospitals in this indicator revision and tool development process, focusing on basics that are already collected,
	•Ensure annual revision of indicators, data sets and tools to ensure continued relevance of program

Outputs	•Activities
Output 2 HMIS Implemented in all districts in 7 regions	•Establish and run the roll-out process. Implementation and facilitation will continue in all regions while new regions are being added.
	•Set up and establish data entry and management functions to send Book 2 monthly summaries from HF to district and to send electronic data monthly to region.
	•Establish monthly reporting of essential data sets from the facilities to the districts and onwards.
	•
	•Support national level to work with all health programs and integrate them by taking part in the revised HMIS and incorporating data from their computerized systems.
	•Support regional level teams and build their capacity to support the districts, manage the regional data, and to provide information support to the region. Make key indicators and reports available on the web.
	•Support district level information team and enable them to support facilities to send complete and timely reports. Focus on district program managers to analyse facility data and provide regular and relevant feedback to facilities, during supervision and in written form. •Support development of District Information Observatory and district data warehouse integrating all health programs.
	•Support facility level, including district hospitals and MDG-related functions of regional hospitals. Strengthen information team and develop capacity, strengthening all stages of information handling and local use; •Establish routines of graphing indicators and discussion of HMIS data at facility management meetings.
	•Establish clear links with the P4P process and ensure that the routine HMIS provide relevant information to improve service delivery performance
	•Ensure dissemination and use of information, with feedback routines at all levels: Establish templates for monthly/ quarterly reports and feedback to the level below as well as dissemination at same level. Quarterly information "Bulletins".

Outputs	•Activities
	•Support roll-out and implementation being carried out beyond the 7 regions which are part of the NTPI scheme.
Output 3 Health staff trained to collect, process, analyse and use available information	•Build and strengthen data management and analytical capacity at the facility, district, regional and national levels to effectively support the health system.
	•Conduct a Staffing assessment and a training needs assessment
	•Recruit and train the first batch of HMIS facilitators to be deployed in the roll-out. Part of training to be carried out through active participation in the pilot sites A team of about 20 per region, including competent trainers from all levels
	•Develop user friendly HMIS Guideline booklet for facility and district staff, based on the Guidelines developed in Zanzibar
	•Strengthening support and supervision process to focus on data quality and use for monitoring and evaluation. Focus on program managers/ coordinators at district/ regional level to use information during routine supervision
	•Develop practice-based short courses at regional health institutions for training health workers, managers and HMIS staff. •Short course programs to cover both data use and ICT aspects at different levels for different users but will focus on practical training of trainers from regional and district level to provide in-service training and HMIS support
	•Develop academic courses at UDSM such as a one year diploma course and a Masters in Health Informatics
	•Integrate HMIS and information use into pre service training curriculum at schools of nursing, clinical officers and university colleges.
Output 4 DHIS Software adapted to support HMIS implementation	•Adapt the DHIS according to the revised data and indicator sets and other needs of the health services. Set up the DHIS to support monthly data capture by facility, and to maintain data per month per facility at all levels of the system through electronic (XML) reporting up the hierarchy between offline installations of the DHIS •Customize the DHIS according to requirements for data and indicator definitions, data collection forms, data validation procedures, facility categorization, and data flow policies.

Outputs	•Activities
	•Develop scaleable and integrated system by linking different kinds of data (patient and number based), and involving both paper and computer based systems.
	•Include revised indicator and data sets, with definitions, into the DHIS software
	•Develop and implement a tool kit for the management of data at district level including quality control measures and data validation rules and protocols for dealing with violations.
	•Develop standard feedback reports and tools for data analysis and dissemination, in addition to flexible pivot table-based analysis and reporting
	•Import all existing electronic data into the DHIS to enable historical comparison for existing system
	•Design, establish and evaluate initiatives in electronic data capture at facility level and Electronic Patient Record (EPR) Systems
	•Ensure a flexible framework that can include additional data needs once the basics are working and the health workers learn to manage the HMIS.
	•Define needs of maintenance of hard and software at all levels and ensure locally sustainable systems in place
	•Develop gateways to other data sources (including existing "vertical" program databases and EPRs) to extract and import data into DHIS from these systems
	•Set up a GIS system for display of data and indicators from the DHIS on thematic maps for all levels.
	•Develop and establish an integrated "data warehouse" software application for district, regional and national levels with online reports and indicator dashboards. This will include data, reporting & indicators from all programs as well as population census and surveys. Link this data warehouse clearly to existing local government data warehouses
Output 5 Action research and dissemination of findings to support implementation	•Develop "best practice" in selected health facilities and districts in one region where reporting, database management, feedback, supervision and use of information works in all facilities (dispensaries and health centers) and at the district level.
	•Develop minimum "HMIS toolkit" (data and indicator set, reporting tools, DHIS database)

Outputs	•Activities
	•Explore innovative ways to collect, manage and use data
	•Data Quality: Enhance completeness, accuracy and timeliness of reporting of data at facility , district, regional and the national levels.
	•Facilitate and develop best practices in information management and using Information for Action:
	•Investigate the feasibility of contracting of private software companies to provide outsourced maintenance of hard and software
	•Ensure that lessons learned are adequately documented and disseminated to other facilities and districts
	•Prepare and conduct workshops and seminars to facilitate the process of dissemination.
	•Monitor feedback on how best practices are adapted in other settings, and take required corrective and revision processes.
	•Explore the use of facility based EPR and computerised data reporting in order to improve data quality and better use of information at facility level. Integrate the DHIS with EPR systems by aggregating patient data to monthly summary reports according to the HMIS data requirements and import into the DHIS.
	•Explore the use of hand-held devices, mobile telephones and cellular network for data collection and data transfer to the DHIS.
	•Develop additional research questions

Table 13: HMIS Logical Framework – Activities

8.2 Annex B2 – Description of the DHIS software

Overview of functionality
The DHIS (District Health Information Software) is free and open software which means that it can be used for free and modified by anyone who wishes to do so.

In brief, the DHIS is a flexible software tool for collection, validation, reporting, analysis and presentation of aggregated (statistical, anonymous) data to support health managers at any level. Through the intuitive user interface the DHIS can be quickly adapted and continuously kept updated to meet most needs for data collection and reporting of an HMIS. The DHIS, following a data warehouse approach, allows for integration of various HMIS data sets such as routine information from multiple health programs, population

estimates, equipment, infrastructure, number of personnel, services provided per facility etc. Making use of the integrated database the users can define indicators such as immunization coverage, incidence rates, utilisation rates, and data coverage for monitoring and evaluation purposes. The data and indicators can be analysed and presented using a range of data presentation tools, such as standardised reports, pivot tables and thematic maps (GIS), both offline and online.

Data validation and quality assurance
The DHIS has built-in functionality for data validation to improve the quality of the data being collected;

- **Absolute rules** apply when one value cannot be higher than another. If child attendance is 234, then the total headcount cannot be 225.
- **Statistical rules** are more flexible and are designed to ensure that the ratios between data elements are not transgressed, e.g. children with diarrhoea is correlated with headcount for children under 5 years. If the headcount goes up, one would expect the number of cases of diarrhoea to increase as well in the same proportion. The statistical rule follows the pattern and will identify outliers.
- In addition, the **Min/Max values** in the data collection window will catch typing errors, such as 122 instead of 12.
- Outlier and gap analysis can be run to identify outlier values and gaps in the data collection
- Smaller gaps in reporting can be automatically filled through extrapolation
- The check-it functionality allows for "starring" (marking) of interesting data during data collection that later can be automatically looked up and analysed

DHIS as an integration tool (data warehouse)
Following a data warehouse approach, the DHIS supports many kinds of data such as routine, semi-permanent (population, staff etc.) and survey. These data types can be defined and organised in multiple data sets and collected through either standard or customised (to replicate paper forms) data collection forms. The user has the flexibility to continuously add more datasets without affecting the rest if the system.

At a more technical level, the DHIS can be integrated with other computerised data sources through a standardised XML-based data exchange format or by using ETL (data integration) tools. These procedures require a certain technical capacity.

DHIS for monitoring and evaluation
The DHIS supports the M&E process in many ways, first of all by providing user-defined **indicators** that allow for comparisons of data across health facilities or geographical areas. The indictors are formulas of the type numerator/denominator, and support the use of e.g. target populations as the denominator to calculate immunisation coverage etc. that can be compared across areas. To assess the functioning of the HMIS the DHIS provides e.g. **data coverage indicators** by form, and by health facility or any administrative level, to monitor the completeness and timeliness of the data flow in the organisational hierarchy.

The DHIS supports analysis of data on any organisational level from the health facility to national level and does not aggregate away any details of the data being collected, as is often the case in a paper-bases HMIS. The data presented are adjusted/aggregated to the level of interest of the user so that e.g. a national manager can view regional totals only and not be overwhelmed by the nitty-gritties of the health facility-level. On the other side, a district manager may prefer a more detailed report on health facility-level.

Data flow
Typically, the DHIS is set up as so-called stand-alone installations without any direct network communication between the systems running at each district or regional office. To report data between two installations of the DHIS, e.g. from a district office to a regional office, the software uses XML files that can be sent using either e-mail (if available) or any portable storage device (flash drive, CD etc.). At the receiving end, the data will be automatically imported by the system and updated to include the last month/quarter of data.

Data analysis and presentation (offline and online)
The DHIS supports a range of opportunities for analysing and presenting the data collected and processed;

1) Standardised reports can be defined to replicate the formats of the paper-bases system and automatically be generated for the desired level and period.
2) Excel pivot tables are used for more dynamic data analysis where a manager can easily zoom in and out between the various organisational levels and do cross tabulations to view and compare data across a multiple of dimensions.
3) Various types of charts can be automatically generated from the pivot tables
4) For more visual presentations the DHIS integrates with GIS tools to present the indicators on thematic maps.

Where internet is available these presentations are published online making use of a **web-based data warehouse solution**. The web-based solution also includes the use of dashboards for quick situation analyses and interactive use of charts.

Technical platform
The DHIS comes in different versions, either based on the MS Office platform (MS Access/VB) or web-based java technologies. The software can be installed as offline stand-alone systems or on a central server in a web environment.

Capacity and appropriateness to the context
The DHIS has been successfully implemented for full-scale use (covering all health facilities and all datasets of the HMIS) in Zanzibar over the last two years, and it is being maintained and customised by a local technical team there.

8.3 Annex B3 – Assessing levels of information usage

Table 14: Criteria for Assessing Levels of Information Use – General, All Levels

Level	Broad description	Detailed description of criteria
Level 1	The information system is working according to its specification: timely and accurate data is submitted to the district; district manages data in database, reports to region and feedback to facility. Similar at regional and central levels.	Clearly defined Essential datasets for all compulsory reporting have been defined? Has an information manager been identified? Have all the expected routine reports been submitted? Have feedback reports been issued? User friendly guideline including information handling at that level is available?
Level 2	Summary reports of data produced and disseminated regularly Indicators are being assessed against performance / targets on a regular basis.	Are summary reports available Are indicators graphed? Are indicators discussed in management meetings?
Level 3	Indicators and information are used by managers to inform their action plans. Indicators and information used to document performance in all written reports	Are indicators interpreted and understood? Are problems identified based on available information? Have any problems been addressed, and can these steps be documented, and an improvement shown using indicators and data?

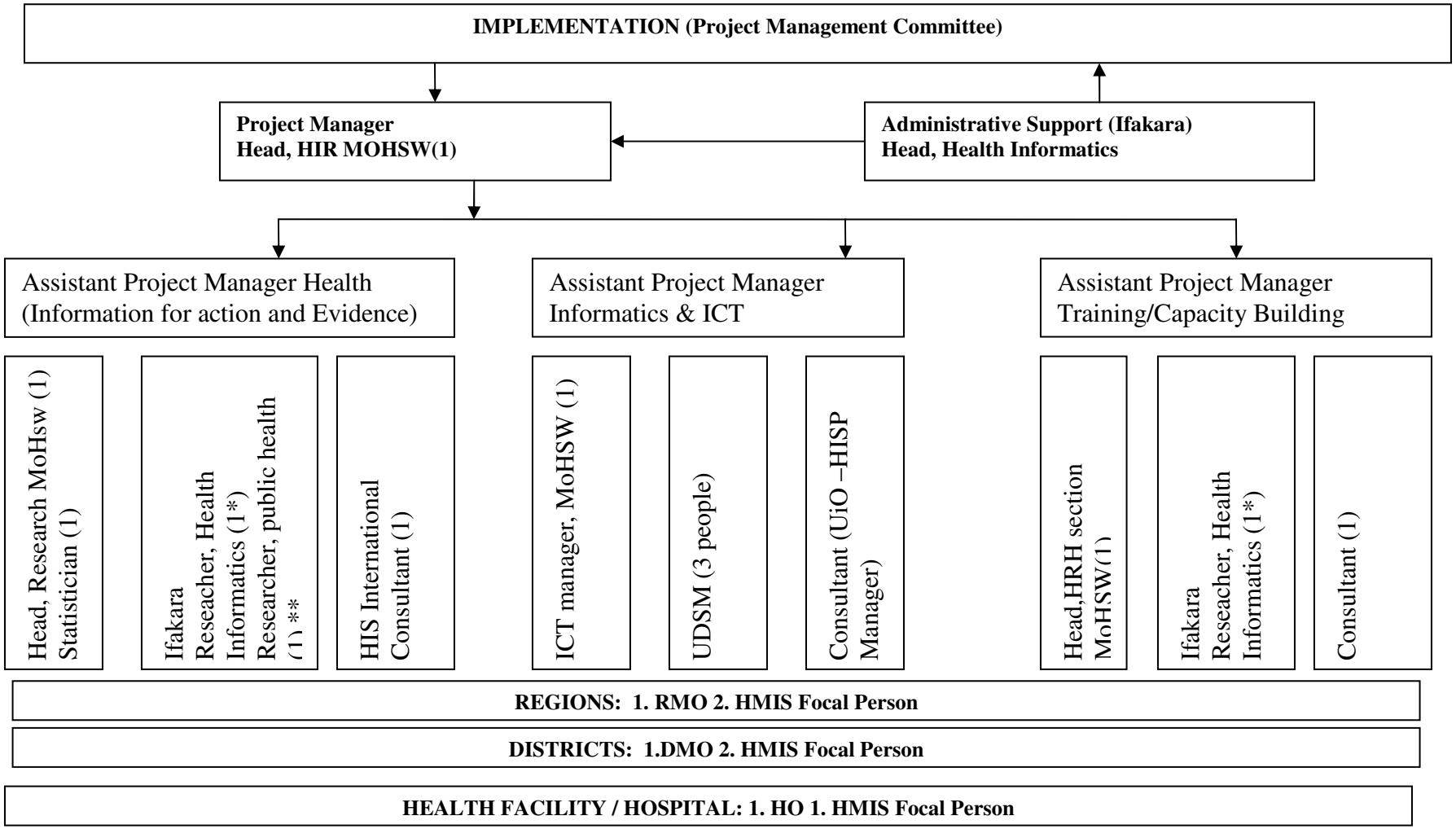
Table 15: Criteria for Assessing Levels of Information Use at Facility levee

Criteria to be met for Facility Level 1:
Criteria 1.1: Facility has an Essential Dataset defined; a clear set of data to be collected, compiled and reported. AND; the needed and specified tools (e.g. registers, forms) are in sufficient stock
Criteria 1.2: Up-to-date and "user friendly" Guideline for collecting, managing, reporting and using information in the facility is available (encompassing all data requirements, such as from different health programs).
Criteria 1.3: The facility has identified an information officer responsible for information management.
Criteria 1.4: The facility has submitted all (100%) of the expected reports in the last year within the period set for the submission of reports.
Criteria 1.5: The facility information manager has validated 80% of the feedback reports from the district (checked, signed, and sent back to district if any errors were noted).
Criteria to be met for Facility Level 2:
Criteria 2.1: Summary report on data collected and reported (from all programs) compiled and made available for staff at least each quarter
Criteria 2.2: At least 4 indicators are graphed for the year and up to date for the year and up to last reported month.
Criteria to be met for Facility Level 3:
Criteria 3.1: At least one problem has been identified and addressed through an action plan, with data and indicators specified for assessing achievements towards targets.
Criteria 3.2: The effect of the action has been monitored using indicators & information from the HMIS and can be shown.
Criteria 3.3: The actions and achievements are documented using data and indicators in a written report to the district, the facility committee, or the annual report.

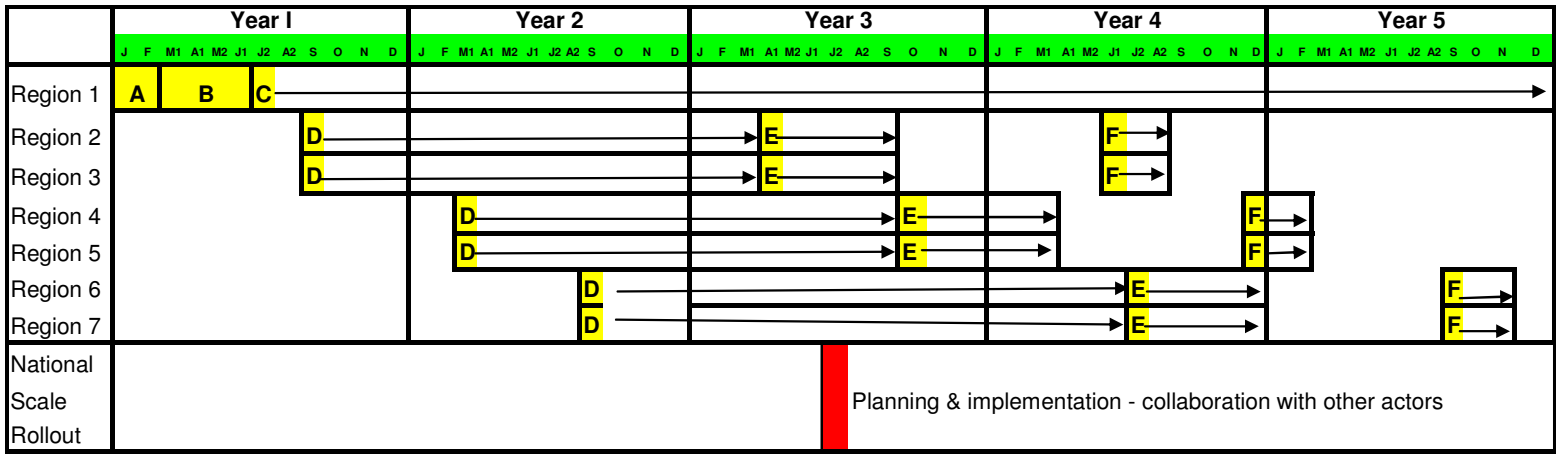
Table 16: Criteria for Assessing Levels of Information Use for District level

Criteria to be met for District Level 1:
Criteria 1.1: District has clearly defined Datasets for which they are responsible to collect, manage and report data.
Criteria 1.2: Information handling (data collection, management and reporting), including all programs, is coordinated and integrated. AND The district has identified an information officer responsible for information management.
Criteria 1.3: All data for which the district is responsible to report is captured and managed in the district database
Criteria 1.4: Up-to-date and "user friendly" Guideline for collecting, managing, reporting and using information in the district is available (encompassing all data requirements, such as from different health programs). A detailed Guideline for managing the district database software is also available.
Criteria 1.5: The district has staff with sufficient skills responsible for managing the computer based district database.
Criteria 1.6: The district database contains 90% of the expected reports from the facilities for the last year. 75% of the reports from the facilities are received within the period set for the submission of reports (for monthly reports; within the 15th the following month).
Criteria 1.7: The district has produced and submitted feedback reports to the facilities within the defined time frames.
Criteria 1.8: The district has a plan for capacity development related to HMIS (at both district and facility levels) and the district database
Criteria to be met for District Level 2:
Criteria 2.1: District monthly/quarterly reports: Summary report on data collected (from all programs) including key indicators compiled and made available for staff and managers at least each quarter
Criteria 2.1: Feedback reports to the facilities (including a summary of data reported and key indicators) and other information from the HMIS actively used in the supervision of the facilities
Criteria 2.2: At least 8 indicators (and at least one for each program) are graphed for the year and up to date for the year and up to last reported month.
Criteria 2.3: At least 1 meeting each quarter designated to evaluate the data elements/ indicators. District meetings with facility representatives routinely using indicators and data from the HMIS assessing and discussing performance
Criteria to be met for District Level 3:
Criteria 3.1: At least four problems have been identified and addressed through an action plan, with data and indicators specified for assessing achievements towards targets.
Criteria 3.2: The effect of the action has been monitored using indicators & information from the HMIS and can be shown.
Criteria 3.3: The actions and achievements are documented using data and indicators in a written report to the district management team and/or in the annual report.

8.4 Annex B4: Project Management Organogram



8.5 Annex B5: Generic Project Implementation Timeline



Key

A	Baseline Assessment: HERA Type plus data collection on ground
B	Design work
C	Implementation and action research
D	Implementation - reaching Level 1 (18 months)
E	Consolidation - reaching Level 2 & 3 (18 months)
F	Monitoring & Evaluation

J	January
F	February
M1	March
A1	April
M2	May
J1	June
J2	July
A2	August
S	September
O	October
N	November
D	December

9 References

Sandiford, P., Annet, H. & Cibulskis, R., (1992): What can information systems do for primary health care? An international perspective, Social Science and Medicine, 34(10), pp. 1077-1087.

Rubona, J. J. (2001): Routine health information systems that operate in Tanzania. In The RHINO workshop on issues and innovation in routine health information in developing countries (pp. 183–193). The Bolger Centre, USA: MEASURE Evaluation.

Mwangu, M. A. (2003): Enhancing District Health Planning and Management in Tanzania: A social political analysis of the role of the Health Management Tanzania Health Research. Doctoral Thesis, University of Dar es Salaam, Tanzania.

Ministry of Health (MoH) (2002): Tanzania Joint Health Technical Review 2002.

Ministry of Health (MoH) (2002b): Tanzania Joint Health Technical Review 2002: Synthesis Report on Joint Technical Review of Key Issues. Ministry of Health, Tanzania. **http://www.sti.ch/fileadmin/user_upload/Pdfs/swap/swap298.pdf**

Heywood, A., & Rohde, J. (2000): Using information for action: A manual for health workers at facility level. Pretoria: The Equity Project.

Health Research for Action (HERA) (2000): HMIS Review 2000

Health Research for Action (HERA) (2003: Technical Review of Health Service Delivery at District Level, Ministry of Health, Tanzania.

Health Research for Action (HERA) (2006): TECHNICAL REVIEW 2006. District Health Services Delivery in Tanzania: Where are we in terms of quantity and quality of health care provision? http://www.districthealthservice.com/cms/upload/ policycat_139_702.pdf?PHPSESSID=fe788731a6bee1a44f15a0a8295bb55f

Braa, J, Hanseth, O, Mohammed, W, Heywood, A, Shaw, V (2007) Developing Health Information Systems in Developing Countries: The Flexible Standards Approach. MIS Quarterly, Vol. 31, Special issue

Braa, J (2005): A data warehouse approach can manage multiple data sets, Bulletin of the World Health Organization, number 8.

Braa J, Monteiro E, Sahay S (2004): Networks of action: sustainable health information systems across developing countries. MIS Quarterly, Vol. 28 No. 3, pp. 337-362.

Braa, J. & B. Blobel (2003): Strategies for developing health information systems in developing countries. In D. Khakhar (Ed.), WITFOR 2003 White Book (pp.175-219), Luxenburg: IFIP Press.

Braa, J. & C. Hedberg (2002): The struggle for district-based health information systems in South Africa. The Information Society, 18, 113-127.