STRATEGIC PLAN FOR THE DEVELOPMENT OF HEALTH INFORMATION SYSTEMS IN GEORGIA

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Introduction

The purpose this document is to outline a strategy for the development of a Health Information System (HIS) in Georgia. The strategy is expected to be used by in-country stakeholders and international development partners to strengthen in a logical and practical way the Health Information Systems (HIS) bringing it up to international standards. If successful the HIS will contribute to evidence-based decision making in health policy area.

The current work on the development of the strategic plan to strengthen HIS has been carried out within the framework of a grant made to Georgia by Health Metrics Network (HMN), which is a global partnership whose mission is to champion and facilitate better health information at country, regional, and global levels.

Curatio International Foundation, a non-for-profit institution with on-ground experience in research and policy advice has been awarded the Grant to assist the Government and non-government stakeholders in the HIS development strategy design.

HMN has created a harmonized framework for HIS development (the HMN Framework) which is designed so that to 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.

Based on the conceptual approach proposed by the HMN, as the first step in health information system strengthening, a broad-based assessment of the country HIS was carried. The assessment focused not only technical aspects of the information system, but also on the health system environment and organization, as well as on the influence of relevant behavioral factors.

The present document consists of several sections:

“Conceptual framework” describes current status of the HIS in Georgia and then helps to understand key principles underpinning the HIS and components of an integrated model of the HIS.

“Description of the strategy” focuses on priority strategy areas and technical approaches used to build up the strategy.

“Strategic goals” describes expected results and interventions necessary to achieve them grouped by priority areas.

“Action plan” provides more detailed description of activities and their timeline.

“Strategy Budget” shows results of costing HIS development: true costs of HIS as well as financial projections are presented and discussed by expenditure categories.

Conceptual framework

Current status of health information system in Georgia

The aforementioned baseline assessment used the HMN Framework as a guide and the HMN Health Information System Situation Analysis Tool. The assessment was conducted on May 4-5, 2006 in Gurjaani, Eastern Georgia. It was carried out as a large national workshop involving all key stakeholders in an interactive self-assessment process.

The table below presents the assessment results by showing the scores of all the assessed items in ascending order. Items that scored below 40% are classified as "not adequate", followed by "present but not adequate" (40-60%), "adequate" (60-80%), and "highly adequate" (80-100%).

#	Domain	Assessment item	%
1	Resources	Policy and Planning	25%
2	Data management	Data management	26%
3	Dissemination and use	Implementation/action	27%
4	Dissemination and use	Resource allocation	32%
5	Resources	HIS institutions, human resources and financing	33%
6	Dissemination and use	Planning & Priority Setting	33%
7	Information products	HIV behavioral risk	33%
8	Dissemination and use	Analysis and Use of Information	35%
9	Data sources	Administrative records	36%
10	Data sources	Health service records	38%
11	Information products	Five additional indicators on chronic diseases	44%
12	Data sources	Health & diseases records	48%
13	Dissemination and use	Policy and Advocacy	48%
14	Data sources	Census	49%
15	Resources	HIS Infrastructure	57%
16	Data sources	Population-based surveys	68%
17	Data sources	Vital statistics	72%
18	Information products	Health system indicators	75%
19	Information products	Mortality indicators	83%
20	Information products	Risk factors indicators	87%
21	Information products	Morbidity indicators	90%

The assessment results (described in more details in a separate report [1]) provided strong foundation to building a more comprehensive HIS development plan, which has been realized in the proposed strategic plan.

[1] Health Information System Assessment in Georgia using HMN methodology. Curatio International Foundation, 2006.

Principles of the Proposed Health Information System

The main strategies

The main strategies and recommendations for strengthening HIS are rooted in the current context, key challenges and key health objectives in Georgia. The main causes of mortality and morbidity in Georgia include diseases of lifestyle (e.g. ischemic heart disease, stroke, hypertension, cancer, diabetes, lung cancer, liver problems) and diseases linked to the environment and/or poverty (e.g. asthma, respiratory infections, trauma, TB). Most of these problems have a clear public health orientation. Standardized prevention and treatment, health education, poverty eradication, and social mobilization are crucial. *Health Management Information Systems, using multiple sources of aggregated and anonymous data from different related sectors in society, are therefore a key component in the struggle to increase efficiency and effectiveness of these programs.*

In order to build sustainable management systems for the delivery of quality health services over the long term, the integrated HIS must take into account the broader health care delivery system in which it will be implemented. A management information system is a system that provides specific information support to the decision-making process at each level of the system to support rational purchasing of services to ensure population health. Thus, the national HIS structure should permit generation of the necessary information for rational decision making at each level of the health system, from the facility to national level.

Approaches to developing Health Information Systems (HIS) in Georgia should be within the framework of National Health System addressing the information needs of routine services management:

- Strengthening primary health care delivery and a basic hospital care in the new context of health care system reforms – i.e., provision of care mostly by private facilities at all levels.
- Strengthening health management and 'good' governance at all levels of the health system, but with a focus on the local levels. Use of data at the level of collection is the best strategy to ensure data quality in the entire system.
- Focus on the essential information needed for health management when developing HIS. Start with limited essential data sets used to calculate the priority indicators, get that system stable and develop it further from there.
- An evolutionary step-by-step strategy involving the users while at the same time developing institutional capacity is the advised strategy towards developing HIS.
- Develop a health information infrastructure integrating, linking, and where possible, networking the various data flows and sub HIS.
- Develop database management and networking tools following a modular open standard approach – work towards platform independent solutions (or using common/shared IT systems and platforms across different institutions and agencies at all levels).
- Develop institutional capacity within the health sector in information management and use.

Components of a Health Information System

A health information system has a set of interrelated components that can be grouped into two categories: information process and HIS management structure. Through the information process, raw data are transformed into information in a "usable" form for management decision-making. The information process can be broken down into the following components: data collection, transmission, processing, analysis, and presentation of information for use in patient care and health services management decisions. To make the information process efficient, HIS management

structure requires that resources are used in such a way that high-quality information is produced in a timely fashion.

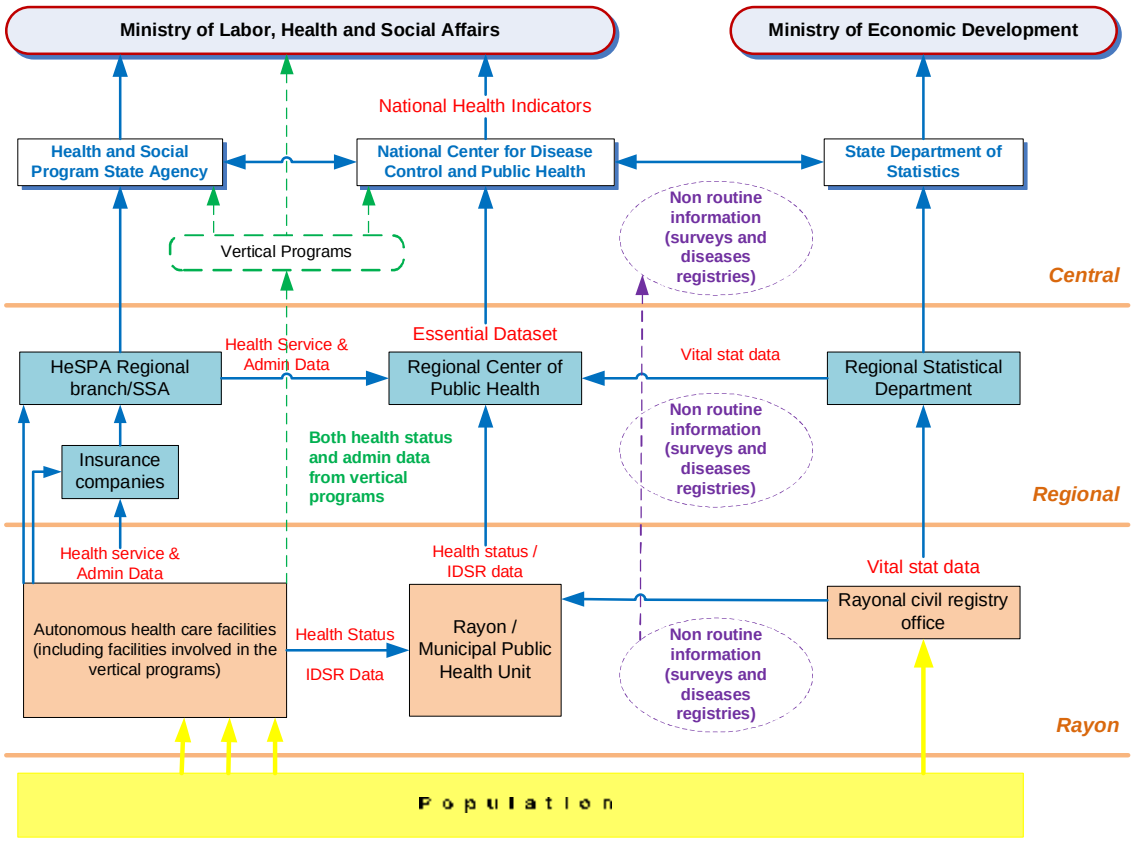
HIS management structure can be broken down further into two components: HIS resources and organizational rules. HIS resources include:

- Personnel (planners, managers, statisticians, epidemiologists, and data collectors)
- Hardware (communication technology, computers, printers, etc.)
- Software (registers, report forms, data processing programs); and
- Financial resources.

Organizational rules ensure efficient use of health information system resources. Illustrative examples are the definition of staff responsibilities, supervisory systems, quality assurance, supply management procedures, and computer maintenance procedures.

Integrated model of HIS

Different models of integrated HIS have been discussed at the main stakeholders workshop. Based on the results of these discussions, the following model is proposed:



1. Health status and IDSR data (covering the whole population) will flow from all autonomous health care facilities to rayon/ municipal public health units. To make this work, it will be required to introduce relevant changes in the existing regulations. Namely, Introduce relevant changes in the legislation (e.g. law on health care, law on public health, and development of “Healthcare Code”). The updated/revised laws and Healthcare Code should consider appropriate sanctions (mostly administrative and financial) for those facilities/ providers not reporting data according to defined rules and standards. In such case,

governmental public health bodies would be able to impose sanctions on facilities/ providers not complying with the rules.

2. Regional CPH will be getting all the data from rayonal PH units (health status and IDSR data), HeSPA regional branches (health services and administrative data), and regional statistics departments (vital statistics data), and will handle all the necessary data for the essential data set, further submitting it to NCDCPH to derive minimum set of national health indicators.

3. Data that are not available from the routine sources will be obtained from population based surveys and diseases registries, overall technical guidance for which will be provided by NCDCPH. At local level, surveys will be managed by regional/rayonal CPH. National NGO's will participate in this process through mainly outreach and data collection.

4. Health care facilities involved into vertical programs may be required to submit similar data to both vertical program management and rayonal PH units. At this stage it seems impossible to avoid such duplication, although efforts must be made to reduce it.

5. All health care facilities contracted by insurance companies may be required to submit similar data to both insurance companies and rayonal PH units. At this stage it seems impossible to avoid duplication, although efforts must be made to reduce it.

Description of the strategy

The priority action areas for the strategic plan

Minimum set of national health indicators

The first step in the design process is to agree on minimum set of national health indicators. There is need in a strategic framework to guide indicator selection. The framework should be consistent with the National Health and Health System Performance Frameworks[2], relate to national health objectives and priorities, clearly define the purpose of the information system and the indicators derived, and maximize stakeholder participation. Indicator development and use should be embedded in management planning and resource allocation. Selection of indicators should build on best practices and local experience, be appropriate for each level, be simple and clear, and be linked to action.

Despite the fact that no program is making adequate use of available information, each may want to include all possible pieces of information in the routine data collection system. All stakeholders should participate and the MoLHSA eventually should officially endorse a limited set of core health sector indicators.

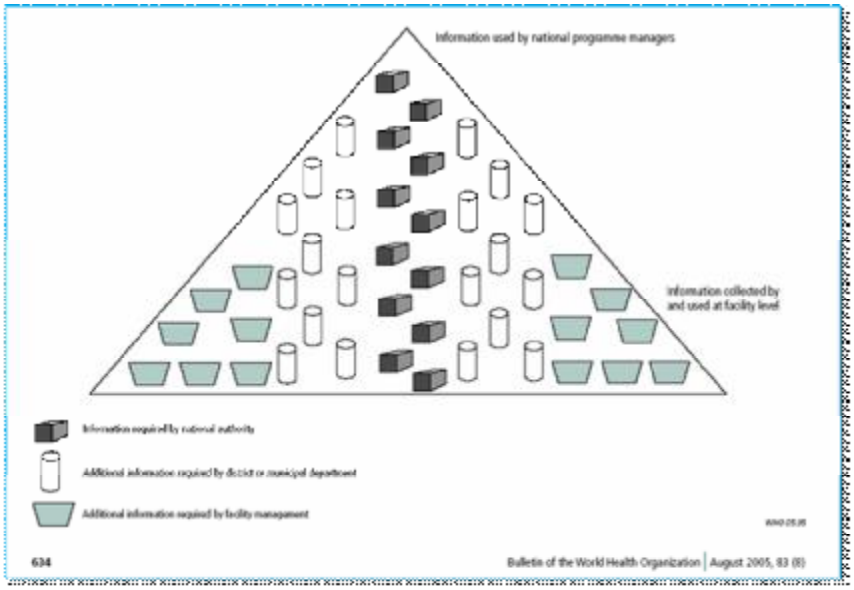
Essential Dataset

An essential data set is one of the key elements of the integrated HIS, which may be defined as a set of the most important data elements, selected from all primary health care facilities, specialized outpatient services (e.g. dental clinics, diagnostic centers, etc), hospitals and vertical programs, that should be reported by health service providers on a routine basis (regardless of their legal and ownership status), with the aim of being able to generate indicators that monitor the provision of health services in an integrated manner.

The creation of an essential data set is based upon two key principles: limiting the routine reporting requirements for primary health care, specialized outpatient care and hospital services as well as vertical programs to a limited set of data elements, enabling the calculation of minimum set of national indicators; and integrating the reporting requirements of various program managers, so that their needs are contained within the set of essential data elements and indicators.

[2] MoLHSA is planning to develop such framework in the nearest future

Figure 1: The hierarchy of information needs



A hierarchy of information needs is determined at the following levels:

1. The MoLHSA determines an essential data set according to minimum set of national health indicators — this is the minimum reporting requirement for all players involved into the chain of health service provision in the country.

2. The next level of management (NCDCPH) adds indicators that they believe they should collect in order to be able to manage their services and programs efficiently.

3. An essential data set is maintained/managed at regional CPH which has adequate resources (computers, network connection, HIS Officer) for that. Essential data are provided from health care facilities through rayonal CPH.

4. The HeSPA, insurance company and vertical program management may add to the essential data set the indicators they believe are important to manage contracted services.

5. A facility may add its own data elements to the data set requested from the MoLHSA, NCDCPH, HeSPA, insurance company and vertical programs. The type of information important for a facility management, and possibly for HeSPA, an insurance company, and vertical program is not necessarily relevant at the national level.

Tools for data collection, processing and reporting

The MoLHSA should provide technical guidance/ recommendations for design of data collection tools at facility level, which should follow the following "Golden Rules":

- Data collection instruments should be as simple as possible;
- Involve users in the design;
- Standardize definitions, procedures, codifications (e.g., according to ICD10) and include them in a user's manual; and
- Create opportunities for training care providers as data collectors and data users.

Some of the aforementioned data collection instruments have been already designed and are being used (e.g. immunization management information system, infectious disease surveillance), however most that are required (e.g. for primary health care) are missing. Thus, the new tools should be developed, whereas revision/optimization of old tools may be needed according to the requirements of the new HIS, namely taking into account minimum set of national health indicators and essential dataset.

Tools recommended to improve management and use of information

Data processing and analysis techniques should be also recommended which should range from simple manual computations to sophisticated computerized processing and analysis methods that transform the data into useful variables. The challenge is to achieve the right mix of computer and manual systems, based on resources available. The large amount of health data, combined with time constraints, make computerized data processing generally the preferred option. Recent developments in computer technology have greatly facilitated data processing and analysis. High-level programming environments permit the creation of user friendly data entry and processing applications. Also, powerful computer equipment has become increasingly affordable (e.g. computer equipment has been provided to every rayonal and regional CPH in the country; such equipment is also available in large hospitals and PHC centers), so that these data processing systems can be used at all levels in Georgia. It is also important that situation with electricity supply has significantly improved in the country.

MoLHSA should design and recommend the following tools to improve data management and information use at facility level:

- Patient case records – child, women, general.
- Facility based registries – registers are to be designed to collect data on predefined essential datasets and minimum indicators.
- Data aggregation and monitoring workbook – e.g. a simple poster-sized wall chart, or a simple workbook, can be introduced at facility level to aggregate data and monitor indicators.
- Annual planning and review tools – this process follows the steps of situation analysis, prioritization, resource allocation and target setting. Standard forms could be introduced to show baseline values, year-end and monthly targets so that the performance level is monitored and necessary actions are taken on time in order to ensure achievement of end targets.

All these tools including registries and forms will be endorsed by the MoLHSA and recommended for the use by facilities and providers. It is believed that all these will be well perceived by private/ autonomous facilities and providers given that it will facilitate data registration and reporting that will be required by the regulations and institutional accountability arrangements (e.g. contracts).

Training

To make sure a proper implementation of the new HIS in the country, the following personnel have to be trained nationwide:

- Regional CPH HIS officers – comprehensive training on the new HIS, namely managing essential data set, monitoring data quality, supportive supervision, etc.
- Regional HeSPA and CPH managers - training on information management and use for policy making.

Thus, it is critically important to develop a plan and secure budget for training and human capacity building interventions for public employees involved in HIS. Opportunities should be created for similar training for insurance company staff and health care facility managers. Again, it is expected

that private/autonomous facilities will be motivated and willing to train their staff so that to better comply with regulations.

Technical approach

Interface between paper and computer

Data registered and collected using paper based tools at the individual health unit, e.g. primary health care centers, hospitals, and hospital wards, are the major sources for the HIS. Instruments for registering daily activities and monthly collation and reporting of this data need to be carefully designed. Data is typically reported upwards in the hierarchy using paper forms and captured in the database, which is located in the regional HeSPA and CPH (probably in private insurance companies too).

If and when the health unit (this is more relevant to large hospitals at regional and central level) introduces an electronic patient record system, much of the patient and activity data may be generated and reported electronically to regional CPH. Such integration between the electronic patient record systems and HIS is a key issue in a flexible longer term strategy for the national HIS development.

Hardware options

Hardware options should involve an inventory of hardware available at the main players (HeSPA, NCDCPH with their regional branches) and comparing it against their operational requirements. Procurement of hardware should be performed in a cost-effective way (perhaps through open bulk-tenders). In estimation of budgets for development of information systems a need for upgrade and servicing should be included [3].

Software options

The future health information system – whether management systems or patient-based systems – in the longer term must be based on

- Optimal use of Free and Open Source Software components – this is particularly important for Georgia, due to the affordability and increased opportunities for national customization and local business development provided by Free and Open Source Software.
- Mechanisms to prevent misuse of patient data by governments (domestic or foreign), business (employers, insurance companies), or criminals (in the case of patient-identifiable data).
- Technical and operational capacity to ensure trouble shooting, user's support, technical maintenance, software support as well as physical security of data through preparing back-up copies, availability of mirror data server, etc.
- It is critically important to ensure consistency and synchronization of software options elaborated by different players in the system.

Confidentiality

One important aspect of health information, and therefore of the systems that relate to health information is confidentiality. This is because the information held may relate to identifiable individuals. Information systems and data flows have to be designed to respect privacy with

[3] Y. Samyshkin. An outline of an overall concept for the hospital/ purchaser management and billing information system.

personal identifier data removed when it is not needed and security precautions in place when it is needed.

Some principles that commonly apply to collecting, holding and using health data are that:

1. Health authorities should justify the collection of personally identifiable information
2. Patients should be given basic information about data practices
3. Data should be held and used in accordance with fair information practices
4. Legally binding privacy and security assurances should attach to identifiable health information with significant penalties for breach of these assurances
5. Disclosure of data should be made only for purposes consistent with the original collection
6. Secondary uses beyond those originally intended by the data collector should be permitted only with informed consent.

GIS

The Georgian MoLHSA may consider linking the computerized health information system database to a digitized map of their health infrastructure and communities in order to better target health interventions. To enhance the use of geographical information systems, it would be necessary for HIS teams to collaborate and exchange information with other arms of government such as ministries of agriculture as well as local government.

Governance

Supportive Supervision

Conducive environment has to be created to improve motivation of all stakeholders to implement HIS effectively. A system should be established to carry out integrated and comprehensive monthly/ quarterly supportive supervision visits from regional to rayon and from rayon to health facility levels (e.g. Regional CPH → rayonal PH unit → healthcare facility→ provider), and the visit format has to be specified in the special guidelines and regulations. Additional supervision visits will be carried out based on reported performance status. Job descriptions of all health and support personnel should be revised accordingly in the light of newly envisaged functions of information collection and use.

Accountability

MoLHSA, HeSPA, NCDCPH are all responsible for holding public servants al lower levels (HeSPA regional branch, regional CPH) accountable for implementing HIS properly. For the lower levels, all players will be held accountable within the framework of contracts (e.g. HeSPA regional branch → insurance company→ healthcare facility→ provider). For this purpose, all stakeholders in the chain have to have the skills and motivation to access information systems and interpret results.

New post of Health Information Officer at regional CPH level

New post should be established for HIS officer at regional CPH level. This person should be charged with the responsibility of coordinating information collection functions; compiling complete health information from internal, external, primary and secondary sources; analyzing, interpreting and storing information in appropriate formats; generating and submitting reports to upper level in different standard formats, and disseminating information/giving feedback to all relevant stakeholders at lower levels.

In-service training for HIS officers and managers

People directly responsible for implementing HIS in HeSPA, NCDPH, and their regional branches (e.g. HIS officer at regional CPH) should receive comprehensive training on all aspects of the new HIS. It would be critically important to improve knowledge and skills of regional managers working in HeSPA regional branches as well as regional CPH in data collection, management and use. Opportunities should be created for similar training for insurance company staff and health care facility managers.

Pre-service training curriculum for health personnel

The basic academic training curriculum has to be revised to create a foundation for an information culture among health personnel right from the outset of their career in the health sector.

Incentives

When the incentive to perform and use of information is low, the data quality can be expected to be equally low. A system of paying an annual premium for reaching specific targets could promote the use of information, and hence the data quality. Budgetary/resource incentives could be offered, as well as non-monetary incentives such as institutional rewards, personal rewards, increased credibility, respect and prestige.

Strategic goals

Outcomes

The key strategic results at OUTCOME level includes:

- Improved HIS performance
- Good quality health information
- Appropriate use of information

Priority areas

The expected results/outputs are organized by three priority areas:

a) Organization/environment improved

b) Technical design improved

c) Behavior changed

Expected results (outputs) by priority area

Four expected results/ outputs are identified for each of these three priority areas:

A. Improved organization/environment
A.1 Network of institutions responsible for HIS at central, regional and rayonal level has been created and strengthened
A.2 Roles and responsibilities of institutions involved in HIS at different levels are clearly defined
A.3 Adequate regulations are in place to ensure effective implementation of HIS in the country
A.4 HIS is adequately budgeted and funded
B. Improved technical design
B.1 Minimum set of national health indicators developed
B.2 Integrated essential data set developed
B.3 Tools for data collection, processing and reporting developed
B.4 Tools for information management and use developed

C. Improved behavior
C.1 Conducive environment to improve motivation of all stakeholders to implement HIS effectively created
C.2 Personnel involved in HIS at different levels are deployed and trained
C.3 Opportunities for pre-service training (under/ post graduate education) in HIS for health personnel have been created
C.4 Quality assurance program has been designed and introduced

Expected result/ output matrix

The special matrix has been presented for each individual result/ output, which specifies objectives, current state, case for change, key activities (inputs), and specific strategies for achieving each specific output.

Priority area A – Organization/ environment	
Output A.1	Network of institutions responsible for HIS at central, regional and rayonal level has been created
Objective – to create a nationwide network of institutions to implement HIS at all levels	
Current state – NCDCPH does not have regional branches, although there is a plan to reorganize existing regional CPH into NCDCPH regional branches with strong public health laboratory capacity and infrastructure (i.e. regional CPH will become subordinate units of NCDCPH). In most rayons, municipal rayonal PH units have been created under local municipalities, however, this process has not finished yet.	
Case for change – the rationale of creating NCDCPH regional units is to have strong country network for effective implementation of public health programs, mainly laboratory based infectious disease surveillance. The NCDCPH regional branches would provide very good basis for institutionalizing and implementing upgraded HIS in the country. Considering administrative structure of the country as well as other factors such as small size of rayons, difficulties with deploying human resources with appropriate analytical technical capacity at rayonal level, it seems reasonable to pool and analyze data at regional level. Furthermore, NCDCPH regional structure would allow to better monitor quality of collected data, and provide technical assistance and on-the-job training to municipal PH units and healthcare facility staff collecting and reporting health data from grass root level. The main task for municipal public health units will be to implement IDSR system – it is critically important to have public health service at local level to ensure timely implementation of response measures in case of infectious disease outbreaks. There role is also collection, quality check and analysis of immunization data. As for their role in implementing HIS, under the proposed model, municipal (rayonal) PH units will be collecting data reports from individual facilities, and further submitting them to regional CPH. Regional CPH, which will become NCDCPH regional branch will be responsible for managing essential data set containing the integrated data from all health care facilities from respective region.	

Key activities (inputs):

A.1.1 Eleven Regional level Public Health Centers created (ten NCDCPH regional branches and Tbilisi PH center

A.1.2 NCDCPH regional branches provided with adequate resources including infrastructure (building), equipment, communication means, transportations means, and human resources needed for implementation of HIS

A.1.3 Fifty five rayonal PH units founded by the local municipalities

A.1.4 Rayonal PH units provided with adequate resources including infrastructure, equipment, communication means, transportations means, and human resources to make sure that necessary data are timely collected and submitted to regional CPH.

Specific strategies

- NCDCPH regional branches are established on the basis of former regional CPH. Hence, they take over the equipment, supplies, materials, etc, that existed in regional CPH. However currently majority of the regional CPH function in the premises of the hospitals, therefore ensure of adequate working space (building) is critical for full-scale functioning of the NCDCPH branches.
- Decision on the number and composition of staff at regional CPH is made by MoLHSA/ NCDCPH
- Municipal PH units are established on the basis of former rayonal CPH. Hence, they take over the infrastructure, equipment, supplies, materials, etc, that existed in rayonal CPH.
- Recommendation on the number and composition of staff at municipal PH units is made by MoLHSA/NCDC for consideration by the local municipality.

Output A.2 Roles and responsibilities of institutions involved in HIS at different levels are defined

Objective – to clearly define the roles and responsibilities of institutions involved in HIS at different levels

Current state – within the current structure of HIS the roles and responsibilities of different players with regard to implementation of HIS are not clearly defined. As soon as national network of institutions responsible for implementing HIS is established, the roles and responsibilities of these institutions should be defined to ensure smooth implementation of HIS at all levels.

Case for change – New national network of HIS institutions can not function effectively without clear definition of roles and responsibilities of individual institutions. All critical players such as healthcare facilities (including PHC facilities and hospitals regardless of their legal and ownership status), rayonal PH units, NCDCPH and its regional branches should be well aware of their roles and responsibilities.

It would be critically important to outline institutional arrangements that are necessary to build and administrate a sustainable and effective HIS in the country. Introduction of “HIS Practice Code” clarifying institutions roles and responsibilities with regard to implementation of HIS could be one of the good options. The HIS practice code will specify what data, in what format, and how often should be reported to municipal public health units and regional centers of public health. HIS practice code should be consistent with “Indicator Passport”, which is described under priority area B and output B.1.

Key activities (inputs)

A.2.1 Roles and responsibilities of all players with regard to implementation of HIS defined

A.2.2 HIS practice code developed, putting the roles and responsibilities of all types of facilities

and public health institutions together

Specific strategies

- Participatory approach by involving professionals from all levels and building consensus among wider group of stakeholders
- HIS practice code to be endorsed by the MoLHSA
- HIS practice code should provide foundation for changes in the existing laws and regulations addressing HIS and guide design of effective implementation mechanism of these laws/ regulations as described under output A.3 (see below).

Output A.3 Adequate regulations are in place to ensure effective implementation of HIS in the country

Objective – to develop regulations to ensure effective implementation of HIS in the country

Current state – there is a lack of adequate legislation ensuring effective implementation of HIS in the country. There are number of laws addressing HIS, however significant improvements/ changes have to be made taking into account the current context of health care system of the country.

A brief overview of the existing laws with special focus on HIS is given below:

a) Law on health care – this law outlines general obligations of health care providers including facilities and MoLHSA with regard to health statistics. Namely, it says that subject of the law on the health care delivery is obliged to provide the MoLHSA with health information according to the established rules. However, the law does not elaborate specifically what are the mechanisms to ensure proper implementation of HIS by central, regional and district level institutions.

b) Law on public health – this law does not say anything specifically on HIS. It addresses only maintenance of the statistics on provision of preventive immunization according to the national immunization calendar and communicable diseases.

c) Law on statistics – this law does not elaborate specifically on Health Information System.

More details on HIS focus of the aforementioned laws are described in HIS mapping study report.[4]

Case for change – there is a prominent need to introduce changes in the existing laws (mainly law on health care and the law on public health) considering the current context of health care system of Georgia. While recognizing the importance of improving the aforementioned laws, the most important initiative would be introduction of effective mechanisms for implementation of these laws in real life. One of the options could be the development of a "Healthcare Code" (similar to "Administrative Code") which should consider relevant sanctions (mostly professional, administrative, and financial) for those providers, facilities and local public health units not reporting data to MoLHSA according to defined rules and standards, i.e. violating "HIS Practice Code". In such case, MoLHSA would be able to impose sanctions on both private and public facilities/ providers not complying with the defined rules, and by doing so improve implementation of HIS significantly.

It is realized that "Healthcare Code" should cover broader range of issues including clinical malpractice, ethical misconduct, breach of confidentiality, etc. Alongside with these issues, inclusion of specific issues related to implementation of HIS according to HIS practice code would definitely make sense in the "Healthcare Code".

[4] National health information system of Georgia; Mapping study; Curatio International Foundation, 2007

Key activities (inputs)

A.3.1 Laws on Healthcare and Public health are revised/ updated so that they better address implementation of HIS in the country

A.3.2 HIS part of Healthcare Code is developed

A.3.3 Updated laws and Healthcare Code are endorsed by MoLHSA and the parliament of Georgia

Specific strategies

- Changes that will be introduced in the laws should ensure accomplishment of the roles and responsibilities of all stakeholders engaged in implementation of HIS at all levels, as will be elaborated "HIS Practice Code"
- As development of the "Healthcare Code" is much bigger effort, development of HIS part of this code may start independently, and facilitate development of other parts of the code
- International technical assistance should be secured to develop Healthcare Code.

Output A.4 HIS is adequately budgeted and funded

Objective – to ensure adequate budget for implementation of improved HIS

Current state – according to recent HIS assessment[5], HIS is not adequately funded in Georgia.

Case for change – building of nationwide network of institutions for implementing HIS will require careful estimation/ projection of all costs that will have to be adequately budgeted and funded to ensure smooth implementation. Costs should be estimated taking into account the new infrastructure, human resources, and activities in order to NCDCPH, its regional branches, and municipal PH units be able to implement improved HIS and produce deliverables as required. Projected budget should be included in the MTEF of the health sector as developed/ endorsed by the government of Georgia.

Key activities (inputs)

A.4.1 Costs (both investment and operational) for improved HIS estimated

A.4.2 Projected budget for the improved HIS developed and incorporated in MTEF of the health sector

A.4.3 Improved HIS is funded according to MTEF

Specific strategies

- Estimating of costs that will have to be covered by healthcare facilities is beyond the scope of this objective, although it is realized that this information is very important for understanding as to what financial implications the new HIS may have at facility level. This is very important factor for facility compliance, in a sense that if too expensive, facilities may be reluctant to cooperate
- It would be very important from practical point of view to segregate investment and operational costs
- Solo practitioners in rural areas, small group practices, and some safety net providers may face significant financial barriers to making necessary investments in information systems. This is an area where government action (e.g., subsidies, credits) may be needed, although the specific form of such action may well vary between localities.

[5] Health Information System Assessment in Georgia using HMN methodology. Curatio International Foundation, 2006

Priority area B – Improved technical design

Output B.1 Minimum set of national health indicators developed

Objective – to develop minimum set of national health indicators

Current state – In Georgia, there are no guidelines or explicit criteria for selection of indicators, the core indicators have not been defined, and each program demands data as they see it [6]. It is also revealed that reporting on existing indicators is irregular and incomplete. At present, discussions are under way to identify national minimum core indicators for national and sub-national levels covering all categories of health indicators.

Case for change – in order to have rational HIS, the country needs minimum set of national health indicators. The first step should be to develop strategic framework to guide indicator selection, which should ideally be consistent with the National Health and Health System Performance Frameworks (do not exist yet in the country), relate to national health objectives and priorities, and clearly define the purpose of the information system and the indicators derived.

In addition to minimum set of national indicators, it would be necessary to a) provide detailed description of each indicator (so called "indicator passport" or "indicator reference sheets") that explains: how indicator is calculated, how and what type of data is collected to calculate the indicator, recommended use of the indicator for decision-making, methodological shortcomings and issues to be considered for the interpretation; and b) describe in detail what is a rationale of using a given indicator, its definition, data source, responsible institution (to collect information and carry out measurement) and frequency of measurement.

Key activities (inputs)

B.1.1 The National Health and health System Performance Frameworks developed

B.1.2 Minimum set of national indicators selected

B.1.3 Indicator passports developed for each selected indicator

B.1.4 Minimum set of national indicators endorsed by MoLHSA

Specific strategies

- Participatory approach by involving all national stakeholders
- Avoid assigning too many indicators so that their measurement becomes unachievable. At the same time, it is risky to rely on a single indicator to measure the significant effects of a particular component. If the data for that one indicator became unavailable for some reason, it would be difficult to document a significant impact on that result. Therefore, some diversification of indicators will be needed.
- While selecting the indicators attention should be paid to availability and quality of data and its sources as well as investment cost that will be needed to improve the data quality that has to be used for particular indicator.

Output B.2 Integrated essential data set developed

Objectives – to develop and institutionalize integrated essential data set

Current state – NCDCPH is not running an integrated essential data warehouse containing data from

[6] Health Information System Assessment in Georgia using HMN methodology. Curatio International Foundation, 2006

all data sources and all key health programs, and does not have a user friendly reporting utility accessible to various user audiences. [7] Similarly, there is no such warehouse (equivalent to national one) at sub-national levels. No metadata dictionary exists which provides common data element definitions as well as specification of data collection method, periodicity, analysis techniques used and possible biases.

Case for change - an essential data set is one of the key elements of the integrated HIS, which contains a set of the most important data elements limiting routine reporting requirements for primary health care and hospital services as well as vertical programs to a limited set of data elements, and enabling the calculation of minimum set of national indicators.

Such data set should be installed firstly at regional level, namely within NCDCPH regional branch, and it should incorporate data from all data sources and all key health programs from respective region. Similarly, such data base will be available at the central level (NCDCPH) containing data from all regions and allowing calculation of national indicators.

Key activities (inputs)

B.2.1 Integrated essential data set for regional and central level designed and installed at NCDCPH and its regional branches

B.2.2 Metadata dictionary developed, providing common data element definitions (numerators and denumerators) as well as specification of data collection method, periodicity, analysis techniques used and possible biases

Specific strategies

- Integration of data from all data sources into one essential data set
- Provision of adequate resources (computers, network connection, Health Information Officer) to regional CPH to maintain/ manage integrated essential dataset
- The HeSPA, insurance company and vertical program management may add to the essential data set the indicators they believe are important to manage contracted services
- A facility may add its own data elements to the data set requested from the MoLHSA, NCDCPH, HeSPA, insurance company and vertical programs
- The type of information important for a facility management, and possibly for HeSPA, an insurance company, and vertical program is not necessarily relevant at the national level.

Output B.3 Tools for data collection, processing and reporting developed

Objectives – to develop tools for data collection, processing and reporting that will be recommended for the use at facility level

Current state - some data collection instruments have been already designed and are being used (e.g. immunization management information system, infectious disease surveillance), however most that are required (e.g. for primary health care) are missing or inadequate.

Case for change – the new tools should be developed to collect all the data that are needed for deriving minimum set of national indicators. Availability of standard tools will help to ensure data quality and consistency across the country. Revision/optimization of old tools may be needed according to the requirements of the new integrated HIS, namely taking into account minimum set of national health indicators and essential dataset.

[7] Health Information System Assessment in Georgia using HMN methodology. Curatio International Foundation, 2006.

Key activities (inputs)

B.3.1 Tools for data collection, processing and reporting at facility level developed

B.3.2 User's manual developed with standard definitions, procedures, and codifications pertinent to data collection, processing and reporting

B.3.3 Tools for data collection, processing and reporting at facility level endorsed by MoLHSA

Specific strategies

- Involve users in the design
- Keep data collection instruments as simple as possible
- Private and public health care organizations should protect the confidentiality of individually identifiable health care information by implementing comprehensive security programs that include employee training, security audits, and well-defined policies regarding access to different types of information.

Output B.4 Tools for information management and use developed

Objectives – to develop tools for information management and use at all levels

Current state - some tools for information management and use have been already designed and are being used (e.g. immunization management information system, infectious disease surveillance), however most that are required are missing.

Case for change – for running an integrated essential data warehouse containing data from all data sources and all key health programs, and for having a user friendly reporting utility accessible to various user audiences, NCDCPH and its regional branches will require provision of appropriate hardware and software programs (for customized data entry, data reporting, standard analysis, calculating indicators, graphical designs for reporting and presentations, etc).

Currently, there is a steady increase in the number of private providers/ healthcare facilities, and this number, given the current policy context, is likely to significantly increase in foreseeable future. It would be logical to think that it should be upon private facility manager's discretion to decide how to analyze the data and how to use information for decision making. However, one should keep in mind that technical capacity of local facility managers (particularly in rural regions) in informed decision making is still low. Hence, they would significantly benefit if such tools for the use at facility level are available.

Key activities (inputs)

B.4.1 Tools for information management and use at NCDCPH and regional CPH level developed (software programs)

B.4.2 Tools for information management and use at facility level developed (software programs for selected large facilities)

B.4.3 Tools for information management and use at facility level developed (paper based)

Specific strategies

- Optimal use of Free and Open Source Software components due to the affordability and increased opportunities for national customization and local business development provided by Free and Open Source Software
- Use of common/shared IT systems and platforms across different institutions and agencies at all levels

- The Georgian MoLHSA may consider linking the computerized health information system database to a digitized map of their health infrastructure and communities in order to better target health interventions.
- The tools for information management and use at facility level should be only recommended (i.e. should not be mandatory) to support creativity of managers in information management and use.

Priority area C – Improved behavior
Output C.1 Conducive environment to improve motivation of all stakeholders to implement HIS effectively created
Objectives – to create conducive environment to improve motivation of all stakeholders to implement HIS effectively at all levels
Current state – motivation of healthcare providers as well as public health professionals to implement HIS is low. MoLHSA does not posses effective mechanisms to hold healthcare facilities and rayonal PH staff accountable for implementing HIS properly. The current context, namely increasing number of private providers and facilities, calls for urgent introduction of such mechanisms to ensure that HIS is implemented effectively.
Case for change - conducive environment has to be created to improve motivation of all stakeholders to implement HIS effectively. This considers establishment of a system of supportive supervision (e.g. integrated and comprehensive monthly/ quarterly supportive supervision visits from regional CPH to rayon PH units and from rayon PH unit to health facility level) and effective accountable mechanism (e.g. contracts between HeSPA and private facilities/ providers properly addressing facility/provider's responsibilities with regard to colleting and reporting health information data). Monetary and non monetary incentives for all stakeholders should be designed and introduced to increase their motivation to implement HIS effectively.
Key activities (inputs) C.1.1 Supportive supervision guidelines focusing on HIS implementation designed C.1.2 Sample contract formats designed focusing on responsibilities of facilities and providers with regard to collecting and reporting health information data (according to HIS Practice Code) C.1.3 Activities related to supportive supervision (e.g. supervisory visits) are adequately budgeted and funded C.1.4 Regional CPH and rayonal PH staff are trained to carry out supportive supervision according to the guidelines
Specific strategies • Supportive supervision guidelines are designed separately for regional CPH staff (to supervise rayonal PH staff) and rayonal PH staff (to supervise healthcare facility staff) • Accountability mechanisms (e.g. contracts) should be elaborated based on "HIS Practice Code" and "Healthcare Code".
Output C.2 Personnel involved into HIS at different levels are deployed and trained
Objectives – to deploy and train the personnel involved in HIS implementation at different levels

Current state - In Georgia, there is no adequate national capacity in core health information sciences to meet health information needs. Designated full time health information officer does not exist at sub-national levels, and there has been limited HIS capacity building activities that have occurred over the past years (statistics, software and database maintenance, epidemiology, etc) [8].

Case for change – in the first place, new post should be established for HIS officer at regional CPH level. This person should be charged with the responsibility of coordinating information collection functions; compiling complete health information from internal, external, primary and secondary sources; analyzing, interpreting and storing information in appropriate formats; generating and submitting reports to upper level in different standard formats, and disseminating information/giving feedback to all relevant stakeholders at lower levels.

People directly responsible for implementing HIS in NCDCPH and its regional branches (HIS officer at regional CPH) should receive comprehensive training on all aspects of the new HIS.

Key activities (inputs)

C.2.1 New post for HIS officer at regional CPH level established

C.2.2 Regional HIS officers deployed

C.2.3 In service training program in HIS designed

C.2.4 Personnel involved into HIS (regional HIS officers alongside with other selected people from NCDCPH, HeSPA, their regional branches, rayonal PH units) trained in integrated essential data set and using metada dictionary

C.2.5 Personnel involved into HIS (regional HIS officers alongside with other selected people from NCDCPH, HeSPA, their regional branches, rayonal PH units) trained in carrying out supportive supervision according to the guidelines

Specific strategies

- Provision of in-service training
- Provision of follow up refresher training courses
- Provision of ongoing technical assistance and on-the-job training through supportive supervision visits

Output C.3 Opportunities for pre-service training (under/ post graduate education) in HIS for health personnel have been created

Objectives – to support creation of pre-service training opportunities in HIS for health personnel

Current state – there are number of universities, medical and public health schools that offer public health training as part of their general medicine, nursing, bachelors of public health, masters of public health, masters of healthcare management, masters of health administration, and other equivalent programs. However, curriculum of these programs does not have strong component on HIS, if at all.

Case for change – existing academic training curriculum has to be revised/ updated to create a foundation for an information culture among health personnel right from the outset of their career in the health sector. Existing bachelors of public health, masters of public health, masters of healthcare management, masters of health administration, and other equivalent programs should be updated so that to meet the requirements of improved HIS in terms of ensuring adequate knowledge and skills of public health professionals who will be joining public health workforce,

[8] Health Information System Assessment in Georgia using HMN methodology. Curatio International Foundation, 2006.

particularly those who will be directly engaged in HIS implementation and use of health information for informed policy making.

Key activities (inputs)

C.3.1 Academic training curriculum for bachelors of public health, masters of public health and other equivalent programs revised so that to reflect the requirements of improved HIS

C.3.2 Academic training curriculum for general medicine and nursing revised so that to support creation of foundation for an information culture

C.3.3 Revised programs are endorsed by the MoLHSA and accredited by the Ministry of Education.

Specific strategies

- Incorporation of the best international standards and approaches in HIS training curriculum
- Involvement of professional associations in the endorsement/ accreditation of programs.
- The training of health care professionals focusing on the use of information technology in clinical settings
- Provision of continuing education programs to train the existing health care workforce in the use of these systems.

Output C.4 Quality assurance program has been designed

Objectives – to develop information quality assurance

Current state – in Georgia, serious problems exist with quality of health data/ health information, which seriously undermines sound decision making.

Case for change - Good quality information underpins sound decision making at every level in the healthcare system and most importantly contributes to the improvement of health care. The prevention and detection and correction of error, is a key goal of Information Quality Assurance (IQA).

IQA is essentially a process cycle that aims to assess performance and deliver improvement. Improvements relate both to the quality of the information but also, as a means of developing and reinforcing an information quality culture, to improved compliance with information quality standards. These standards relate to:

i. The management of Information Quality

ii. The requirements for systems that process information

iii. Organizational processes and working practices

iv. The training and guidance that should be provided to staff

IQA requires the assessment of compliance with information quality standards and an assessment of outcomes in terms of improved information quality. Clearly a generic model of information quality with standards, guidelines and measurement tools is necessary. National standards for the structure, content, definition, and coding of health information should be established to support improvements in information systems.

Key activities (inputs)

C.4.1 Appropriate management structure established within NCDCPH for ensuring information quality is systematically and rigorously addressed

C.4.2 Policies that address collection of data, disclosure of data, validation and audit of data,

	extraction and presentation of data are developed
C.4.3	Data and information quality standards are developed and quality targets set
C.4.4	Activities related to quality assurance program (e.g. field visits) are adequately budgeted and funded

Specific strategies

- Feedback on information quality routinely available to staff at all levels
- Clear accountability arrangements that ensure that staff are held accountable for the work they do
- Support local initiatives to improve information quality
- Information quality should be a key focus of training on HIS

Action plan[9]

Output #	Activities/tasks (what are the specific actions? What work needs to be done?)	Responsibility (who, which organization will do?)	Time table (when, how long?)	Resources needed (monetary, HR, in kind, legislation, etc)
Output A.1 Network of institutions responsible for HIS at central, regional and rayonal level has been created				
A.1.1 Eleven Regional level Public Health Centers created (ten NCDCPH regional branches and Tbilisi PH center	MoLHSA Policy decision TA to draft regulations and functional plans for regional branches		Start: End:	
A.1.2 NCDCPH regional branches provided with adequate resources for implementation of HIS	Identify office space Renovate (build) infrastructure Provide basic set of computer equipment Provide necessary communication means Provide necessary transportation means Deploy needed human resources (including HIS Officer – see C.2.1)		Start: End:	
A.1.3 Fifty five municipal PH units founded by the local municipalities	MoLHSA recommendations to the local authorities on staffing Changes in the budget Law Local municipality policy decision			

[9] Columns "Responsibility", "Time Table" and "Resources Needed" where left empty after the final workshop in the Ministry of Labor, Health and Social Affairs because it was decided to accept the strategy the way it stands now and then develop national program within the Medium-Term Expenditure Framework exercise with clear budget, implementing/responsible agencies and implementation schedule.

Output #	Activities/tasks (what are the specific actions? What work needs to be done?)	Responsibility (who, which organization will do?)	Time table (when, how long?)	Resources needed (monetary, HR, in kind, legislation, etc)
	TA to draft regulations and functional plans for PH units			
A.1.4 Rayonal PH units have been provided with adequate resources to make sure that necessary data are timely collected and submitted to regional CPH	Rent office space Renovate infrastructure Provide basic set of computer equipment Provide necessary communication means Provide necessary transportation means Deploy needed human resources			
Output A.2 Roles and responsibilities of institutions involved in HIS at different levels are defined				
A.2.1 Roles and responsibilities of all players with regard to implementation of HIS defined	TA to define roles and responsibilities of all players with regard to implementation of HIS (can be combined with TA under A.1.1, A.1.3, and A.2.2)			
A.2.2 HIS practice code developed, defining institutional arrangements for all types of facilities and public health institutions to administrate HIS in the country	TA to draft HIS practice code (can be combined with TA under A.1.1, A.1.3, and A.2.1)			
Output A.3 Regulations are in place to ensure effective implementation of HIS in the country				
A.3.1 Laws on Healthcare and Public health are revised/ updated so that they better address implementation of HIS in the country	TA to revise the laws and develop recommendations			

Output #	Activities/tasks (what are the specific actions? What work needs to be done?)	Responsibility (who, which organization will do?)	Time table (when, how long?)	Resources needed (monetary, HR, in kind, legislation, etc)
A.3.2 HIS part of Healthcare Code is developed	TA to draft HIS part of the Healthcare Code			
A.3.3 Updated laws and Healthcare Code are endorsed by MoLHSA and the parliament of Georgia	Policy decision of the MoLHSA and the Parliament of Georgia			
Output A.4 HIS is adequately budgeted and funded				
A.4.1 Costs (both investment and operational) for improved HIS estimated	TA to estimate investment and operational costs using the costing tool developed under the current grant	Will be covered through the current HMN/WHO grant		
A.4.2 Projected budget for the improved HIS developed and incorporated in MTEF of the health sector	MoLHSA policy decision			
A.4.3 Improved HIS is funded according to MTEF	MoLHSA policy decision			
Output B.1 Minimum set of national health indicators developed				
B.1.1 The National Health and Health System Performance Frameworks developed	TA to draft the frameworks (can be combined with TA under B.1.2 and B.1.3)			
B.1.2 Minimum set of national indicators selected	TA to select minimum set of national indicators (can be combined with TA under B.1.1 and B.1.3)			
B.1.3 Indicator passports developed for each selected indicator	TA to develop indicator passports for each selected indicator (can be combined with TA under B.1.1 and B.1.2)			

Output #	Activities/tasks (what are the specific actions? What work needs to be done?)	Responsibility (who, which organization will do?)	Time table (when, how long?)	Resources needed (monetary, HR, in kind, legislation, etc)
B.1.4 Minimum set of national indicators endorsed by MoLHSA	MoLHSA policy decision			
Output B.2 Integrated essential data set developed				
B.2.1 Integrated essential data set for regional and central level designed and installed at NCDCPH and its regional branches	TA to design integrated essential data set format for regional and central level (can be combined with TA under B.2.2)			
B.2.2 Metadata dictionary developed, providing common data element definitions (numerators and denumerators) as well as specification of data collection method, periodicity, analysis techniques used and possible biases	TA to develop metadata dictionary (can be combined with TA under B.2.1)			
Output B.3 Tools for data collection, processing and reporting developed				
B.3.1 Tools for data collection, processing and reporting at facility level developed	TA to develop standard tools for data collection, processing and reporting at facility level (can be combined with TA under B.3.2)			
B.3.2 User's manual developed with standard definitions and procedures pertinent to data collection, processing and reporting	TA to develop user's manual with standard definitions (can be combined with TA under B.3.1)			
B.3.3 Tools for data collection, processing and reporting at facility level endorsed by MoLHSA	MoLHSA policy decision			

Output #	Activities/tasks (what are the specific actions? What work needs to be done?)	Responsibility (who, which organization will do?)	Time table (when, how long?)	Resources needed (monetary, HR, in kind, legislation, etc)
Output B.4 Tools for information management and use developed				
B.4.1 Tools for information management and use at NCDCPH and regional CPH level developed (software programs by using common/shared IT systems and platforms)	TA to develop software programs for information management			
B.4.2 Tools for information management and use at facility level developed (software programs for selected large facilities by using common/shared IT systems and platforms)	TA to develop software programs for selected large facilities			
B.4.3 Tools for information management and use at facility level developed (paper based)	TA to develop paper based tools for information management and use at facility level (can be combined with TA under B.3.1 and B.3.2)			
Output C.1 Conducive environment to improve motivation of all stakeholders to implement HIS effectively created				
C.1.1 Supportive supervision guidelines focusing on HIS implementation designed	TA to design supportive supervision guidelines			
C.1.2 Sample contract formats designed focusing on responsibilities of facilities and providers with regard to collecting and reporting health information data (according to HIS Practice Code)	TA to design sample contracts			
C.1.3 Activities related to supportive supervision (e.g. supervisory visits) are adequately budgeted and funded	Should be considered while estimating operational costs for HIS and should be budgeted accordingly (to be combined with	Will be covered through the current		

Output #	Activities/tasks (what are the specific actions? What work needs to be done?)	Responsibility (who, which organization will do?)	Time table (when, how long?)	Resources needed (monetary, HR, in kind, legislation, etc)
	TA under A.4.1 and A.4.2)	HMN/WHO grant		
Output C.2 Personnel involved into HIS at different levels are deployed and trained				
C.2.1 New post for HIS officer at regional CPH level established	MoLHSA policy decision			
C.2.2 Regional HIS officers deployed	Related costs should be considered while estimating HIS operational costs (to be combined with TA under A.4.1 and A.4.2)			
C.2.3 In service training program in HIS designed	TA to design training curriculum for in service training			
C.2.4 Personnel involved into HIS (regional HIS officers alongside with other selected people from NCDCPH, HeSPA, their regional branches, rayonal PH units) trained in integrated essential data set and using metada dictionary	TA to train NCDCPH and regional CPH designated personnel in running integrated essential data set and using metadata dictionary (can be combined with TA under B.2.2)			
C.2.5 Personnel involved into HIS (regional HIS officers alongside with other selected people from NCDCPH, HeSPA, their regional branches, rayonal PH units) trained in carrying out supportive supervision according to the guidelines	TA to train NCDCPH, HeSPA, their regional branches and rayonal PH staff to carry out supportive supervision according to the guidelines (can be combined with TA under C.1.1)			
Output C.3 Opportunities for pre-service training (under/ post graduate education) in HIS for health personnel have been created				
C.3.1 Academic training curriculum for bachelors of	Ministry of Education policy decision			

Output #	Activities/tasks (what are the specific actions? What work needs to be done?)	Responsibility (who, which organization will do?)	Time table (when, how long?)	Resources needed (monetary, HR, in kind, legislation, etc)
public health, masters of public health and other equivalent programs revised so that to reflect the requirements of improved HIS	(program accreditation)			
C.3.2 Academic training curriculum for general medicine and nursing revised so that to support creation of foundation for an information culture	Ministry of Education policy decision (program accreditation)			
C.3.3 Revised programs are endorsed by the MoLHSA and accredited by the Ministry of Education.	MoLHSA and Ministry of Education policy decision			
Output C.4 Quality assurance program has been designed				
C.4.1 Appropriate management structure established within NCDCPH for ensuring information quality is systematically and rigorously addressed	MoLHSA Policy decision TA to draft regulations and functional plans for QA program management structure (can be combined with TA under C.4.2 and C.4.3) Provide infrastructure Provide computer equipment Provide necessary communication means Provide necessary transportation means Deploy needed human resources			
C.4.2 Policies that address collection of data, disclosure of data, validation and audit of data, extraction and presentation of data are developed	TA to develop policies for validation and audit of data (can be combined with TA under C.4.1 and C.4.3)			

Output #	Activities/tasks (what are the specific actions? What work needs to be done?)	Responsibility (who, which organization will do?)	Time table (when, how long?)	Resources needed (monetary, HR, in kind, legislation, etc)
C.4.3 Data and information quality standards are developed and quality targets set	TA to develop information quality standards and set quality targets (can be combined with TA under C.4.1 and C.4.2)			
C.4.4 Activities related to quality assurance program (e.g. field visits) are adequately budgeted and funded	Related costs should be considered while estimating HIS operational costs (to be combined with TA under A.4.1 and A.4.2)	Will be covered through the current HMN/WHO grant		

Strategy Budget

Methodology

Costs of the strategic plan for the development of health information systems in Georgia were calculated using an excel tool designed for that purpose.

Calculations were made based on inputs necessary to build the system and then to operate it. Therefore, start up and recurrent costs were estimated correspondingly.

Inputs (types and volume/quantity) were supplied to the tool from the strategic plan (namely from the 2nd column of the "Action plan" above). Key assumptions for the investment in human resources, "now-how and assets were drawn from the system description (capacity needs) outlined in sections "Principles of the Proposed Health Information System" and "Description of the strategy".

Two types of results were produced: real costs of the strategic plan ("Strategy Cost") and "Program Budget". Conceptual differences between these result tables are described in detail in the Costing Tool Manual. From practical point of view:

- the former helps stakeholders to visualize better resources in monetary terms that are needed the system to function regardless who bears the expenses (recovers the costs) and how much money is spent from public or other sources.
- "Program Budget" is instrumental for financial planning purposes (public expenditure management/)– it helps to define an amount of public funds to be allocated to the system through conventional budgetary mechanisms.

The tool allows users to define which cost/expenditure categories to be included in the final results (tables) in accordance with their preferences (or budgeting principles) without changing values entered for cost projection. For instance, different types of shared costs such as labor, maintenance & running costs, space rent, utilities and capital costs can be displayed or disregarded in the program budget final table upon users' decisions (i.e. "modeling of cost calculation results").

Budget and cost estimates

Figures presented below as program budget and strategy costs can be considered as a "baseline scenario" in a long array of cost modeling results. They are most likely to be adjusted to expected changes of either unit costs (e.g. salaries of public employees) or volumes (e.g. volume of trainings or quantity of hardware to be installed) at the moment of state budget calculations. Therefore, the estimates provided below are indicative rather final versions of program budget and strategy costs.

The program budget projections covers 5 years from 2008 till 2012. Approximately 1.1 million GEL is needed in year 1st to finance the development and operation of the HIS in Georgia. Start up expenditures (1st year development expenditures) are estimated at 367 thousand GEL: almost 2/3 of this funds are supposed to be spent on a technical assistance for the development of HIS methodologies.

There are no development expenditures factored in the following years in this scenario (because they had not been defined in the action plan yet). However it is expected that some activities schedules in 2008 need to be repeated later (e.g. revision/adjustment of the methodology,

refreshing trainings, etc.) and approximately 15-20% of start up costs will be added every year as development expenditures to the program budget.

Without development expenditures the operational component of the budget varies between 0.8 and 1.3 million in coming 4 years. This variation is due mainly to inflation estimated at 10% in average per annum.

Figure 2: Program Budget

Include shared labor?	Yes	*(Recommended "Yes")*
Include shared maintenance & running costs?	Yes	*(Recommended "Yes")*
Include Space Rent?	No	*(Recommended "No")*
Include Utilities?	Yes	*(Recommended "Yes")*
Include Communication?	No	*(Recommended "No")*
Include Transportation?	No	*(Recommended "No")*
Include shared capital cost	No	*(Recommended "No")*
Present results in local currency?	Yes	*Select "No" if in US$*

Georgia
(in Gel)

	2008	2009	2010	2011	2012	Total
Operational Expenditures						
Labor Costs	613,208	643,508	707,859	778,645	856,509	**3,599,729**
Maintenance and Running Costs	96,899	117,497	142,171	172,027	208,153	**736,747**
Space rent	0	0	0	0	0	**0**
Disposals	1,630	1,080	1,188	1,307	1,438	**6,644**
Utilities	13,042	0	0	0	0	**13,042**
Communication	0	0	0	0	0	**0**
Transportation	0	0	0	0	0	**0**
Publishing	20,400	22,440	27,152	36,140	52,912	**159,045**
Events/presentations	6,000	6,600	7,986	10,629	15,562	**46,778**
Other Operational	0	0	0	0	0	**0**
Postal Service	0	0	0	0	0	**0**
Other	0	0	0	0	0	**0**
Subtotal Operational	**751,178**	**791,126**	**886,357**	**998,749**	**1,134,575**	**4,561,985**
Development expenditures						
Investment in assets	5,520	638	0	0	0	**6,158**
Training of HR	124,090	0	0	0	0	**124,090**
TA for methodology	229,011	0	0	0	0	**130,248**
Subtotal Development	358,621	638	0	0	0	**260,495**
Grand Total	**1,109,799**	**791,763**	**886,357**	**998,749**	**1,134,575**	**4,822,480**

As it is shown in the upper part of the budget, transportation, communication, space rent expenditures as well as shared capital costs are not factored in the budget. It is assumed that the level of integration of the HIS in the national public health organizational and functional arrangement allows saving of these types of expenditures (other way around the HIS doesn't have to pay for accommodations and equipment shared with other functional units of public health services).

Personnel wages constitute the largest portion of the budget (almost 85% of operational expenditures) and amount to 610 thousand GEL in 2008. The underlying assumption is that the HIS budget finances a portion of salaries of public health service or the Ministry employees proportionally to the time they spend on HIS related tasks (so called "shared labor costs"). It means that the wage income of the personnel other than the staff dedicated 100% to HIS derives from different sources (state programs) in accordance with their assignments. However, the Ministry may decide to introduce fixed salaries for public health service employees irrespective of their contribution to HIS or other public health "service lines". In such a case, the shared labor costs

should not be factored (simply by selecting "No" in the tool) and labor costs decrease to 446 thousand (by half) in 2008 and the operational portion shrinks down to 580 thousand GEL.

In case all types of expenditures are selected and included in the budget then it jumps up to 1.7 million GEL in 2008 and increases from 1.3 in 2009 to 1.9 million GEL in 2012.

As to the strategy cost (shown below in Figure 3) if varies between 2.2-3.1 million GEL if shared costs are considered. The fact that it is twice as high as the program budget can be explain by underlying assumptions: the strategy budget considers costs incurred by institutions (health care providers) for the production of primary statistical reports that are not supposed to be financed by state (therefore, are not reflected in the program budget).

Figure 3: Strategy costs

Include shared costs?	Yes	*(Recommended "Yes")*
Present results in local currency?	Yes	*Select "No" if in US$*

Georgia
(in Gel)

Expenses	**2008**	**2009**	**2010**	**2011**	**2012**	**Total**
Labor Costs	973,208	1,039,508	1,143,459	1,257,805	1,383,585	**5,797,565**
Maintenance and Running Costs	102,572	124,499	150,826	182,742	221,440	**782,079**
Space rent	241,812	223,225	245,548	270,102	297,113	**1,277,800**
Disposals	27,180	29,185	32,104	35,314	38,846	**162,629**
Utilities	217,440	233,482	256,830	282,513	310,764	**1,301,028**
Communication	217,596	239,356	266,237	300,347	346,087	**1,369,623**
Transportation	237,960	261,756	292,767	334,330	393,538	**1,520,350**
Publishing	20,400	22,440	27,152	36,140	52,912	**159,045**
Events/presentations	6,000	6,600	7,986	10,629	15,562	**46,778**
Other Operational	0	0	0	0	0	**0**
Depreciation	46,821	53,652	59,017	64,919	71,411	**295,820**
Postal Service	0	0	0	0	0	**0**
Other	0	0	0	0	0	**0**
Training of HR	124,090	0	0	0	0	**124,090**
TA for methodology	229,011	0	0	0	0	**124,090**
Grand Total	**2,444,090**	**2,233,703**	**2,481,926**	**2,774,841**	**3,131,258**	**13,065,818**

Finally, the recurrent costs of the HIS broken down by HIS functional levels and cost categories are shown for illustrative purposes in Figure 4 below.

Figure 4: Recurrent costs of the HIS by functional levels, cots categories and years in GEL

(In Gel)	2008	2009	2010	2011	2012	Total
National	**503,800**	**586,677**	**662,946**	**755,537**	**871,369**	**3,380,328**
Labor Costs	307,470	358,017	393,819	433,201	476,521	**1,969,027**
Maintenance and Running Costs	102,572	124,499	150,826	182,742	221,440	**782,079**
Space rent	21,600	24,552	27,007	29,708	32,679	**135,546**
Disposals	384	436	479	527	580	**2,406**
Utilities	3,072	3,485	3,833	4,217	4,638	**19,245**
Communication	4,020	4,422	5,351	7,122	10,427	**31,341**
Transportation	360	396	479	638	934	**2,807**
Publishing	20,400	22,440	27,152	36,140	52,912	**159,045**
Events/presentations	6,000	6,600	7,986	10,629	15,562	**46,778**
Other Operational	0	0	0	0	0	**0**
Depreciation	37,922	41,830	46,013	50,614	55,676	**232,056**
Regional	**135,619**	**234,747**	**265,820**	**311,290**	**381,691**	**1,329,166**
Labor Costs	62,513	154,069	169,476	186,423	205,066	**777,546**
Maintenance and Running Costs	1,131	1,505	2,003	2,666	3,549	**10,854**
Space rent	8,316	9,148	10,062	11,069	12,175	**50,770**
Disposals	264	290	319	351	387	**1,612**
Utilities	2,112	2,323	2,556	2,811	3,092	**12,894**
Communication	20,328	22,361	27,057	36,012	52,726	**158,483**
Transportation	39,600	43,560	52,708	70,154	102,712	**308,734**
Publishing	0	0	0	0	0	**0**
Events/presentations	0	0	0	0	0	**0**
Other Operational	0	0	0	0	0	**0**
Depreciation	1,355	1,491	1,640	1,804	1,984	**8,274**
District	**750,067**	**642,798**	**709,389**	**783,125**	**864,821**	**3,750,200**
Labor Costs	243,225	131,423	144,565	159,021	174,923	**853,157**
Maintenance and Running Costs	17,366	21,013	25,426	30,765	37,226	**131,795**
Space rent	67,896	31,126	34,238	37,662	41,428	**212,350**
Disposals	2,532	2,059	2,265	2,492	2,741	**12,089**
Utilities	20,256	16,474	18,121	19,933	21,926	**96,710**
Communication	193,248	212,573	233,830	257,213	282,934	**1,179,798**
Transportation	198,000	217,800	239,580	263,538	289,892	**1,208,810**
Publishing	0	0	0	0	0	**0**
Events/presentations	0	0	0	0	0	**0**
Other Operational	0	0	0	0	0	**0**
Depreciation	7,544	10,331	11,364	12,501	13,751	**55,491**
Institutional	**720,000**	**792,000**	**871,200**	**958,320**	**1,054,152**	**4,395,672**
Labor Costs	360,000	396,000	435,600	479,160	527,076	**2,197,836**
Maintenance and Running Costs	0	0	0	0	0	**0**
Space rent	144,000	158,400	174,240	191,664	210,830	**879,134**
Disposals	24,000	26,400	29,040	31,944	35,138	**146,522**
Utilities	192,000	211,200	232,320	255,552	281,107	**1,172,179**
Communication	0	0	0	0	0	**0**
Transportation	0	0	0	0	0	**0**
Publishing	0	0	0	0	0	**0**
Events/presentations	0	0	0	0	0	**0**
Other Operational	0	0	0	0	0	**0**
Depreciation	0	0	0	0	0	**0**
Overall (Annual)	**0**	**0**	**0**	**0**	**0**	**0**
Postal Service	0	0	0	0	0	**0**
Other	0	0	0	0	0	**0**
Grand total	**2,109,486**	**2,256,221**	**2,509,355**	**2,808,272**	**3,172,033**	**12,855,366**

	2008	2009	2010	2011	2012	Total
Labor Costs	973,208	1,039,508	1,143,459	1,257,805	1,383,585	**5,797,565**
Maintenance and Running Costs	121,069	147,017	178,255	216,173	262,215	**924,728**
Space rent	241,812	223,225	245,548	270,102	297,113	**1,277,800**
Disposals	27,180	29,185	32,104	35,314	38,846	**162,629**
Utilities	217,440	233,482	256,830	282,513	310,764	**1,301,028**
Communication	217,596	239,356	266,237	300,347	346,087	**1,369,623**
Transportation	237,960	261,756	292,767	334,330	393,538	**1,520,350**
Publishing	20,400	22,440	27,152	36,140	52,912	**159,045**
Events/presentations	6,000	6,600	7,986	10,629	15,562	**46,778**
Other Operational	0	0	0	0	0	**0**
Depreciation	46,821	53,652	59,017	64,919	71,411	**295,820**
Postal Service	0	0	0	0	0	**0**
Other	0	0	0	0	0	**0**
Grand total	**2,109,486**	**2,256,221**	**2,509,355**	**2,808,272**	**3,172,033**	**12,855,366**