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eHealth in the Kyrgyz Republic

Strategy and Action Plan 2015–2020

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Glossary of terms

Citizens' protection – Measures taken using standards, regulations and legislation to protect consumers/citizens against fraud, abuse or negligence.

Information society – A developing social environment characterized by the global coverage of free flows of knowledge and information in particular in sectors such as education, enterprise, governance, health care and others.

National electronic register – An electronic database of relevant lists on specific issues, often compiled at the district, national or international level, containing information on births, deaths, various diseases such as cancer, diabetes and tuberculosis, and on other issues of medical or epidemiological interest.

Public-private partnership – Partnerships established between government organizations and private institutions for cooperation to attain common goals.

Potential – The skills, knowledge and capacities of an individual, organization or sector to fulfil specific roles or manufacture certain products. In this document, this term refers to the skills and knowledge needed to use information and communications technologies (ICT) to organize and provide health care services.

eHealth standards – Technical and medical specifications developed jointly with many stakeholders using a consensus-based approach to achieve functional compatibility between the various eHealth systems.

Telemedicine – Use of ICT to provide distance medical care.

Electronic patient notes – also called electronic medical notes, are electronic notes (as opposed to notes on paper) detailing a patient's disease history. They include such information as test results, prescribed medication and the patient's general disease history. These can be accessible, using ICT, to authorized health care workers and those treating the patient.

Introduction

The Strategy for eHealth Development in the Kyrgyz Republic (hereafter the Strategy) has been developed with a view to modernizing existing health systems and ensuring coordination for the successful implementation of the National Sustainable Development Strategy 2013–2017 and the National Programme for Health Care Reform ("Den Sooluk"), to improve the quality and accessibility of public health services.

The Strategy sets out the targets, principles and general requirements for establishing an eHealth system, the mechanisms for managing it and the resources required to set it up and maintain it.

The main aim of eHealth is to transition to a more effective, people-centred, open and democratic system that supports health systems management and medical care based on the comprehensive use of information communication technologies (ICT).

Implementation of the Strategy will improve the quality of diagnosis and prevention and will result in the following:

- broad involvement and commitment of stakeholders in the development of the eHealth system;
- availability of automated systems in priority areas for health system development;
- guaranteed public access to good quality medical services;
- introduction of electronic medical records;
- transition to paperless technology;
- accessibility of medical data from anywhere in the country and from any medical organization where a patient has received services;
- greater efficiency of the health workforce owing to time-consuming and routine tasks becoming automatic, and increased reliability of data and timeliness of information services;
- availability of mechanisms and a legal framework for developing and introducing policies, standards and potential technologies for the provision of electronic services; and
- targeted decision-making based on up-to-date, reliable data and indicators from the data store.

To implement the eHealth Strategy, standards will be set and put into effect ensuring a service-oriented structure that guarantees full interoperability between all the information systems involved in supporting health service processes.

Cloud-based data processing centres will be created to provide the computer power necessary for all information systems and services to work.

1. Background for the introduction of eHealth (strategic context)

1.1. Current status of the health care sector in the Kyrgyz Republic

The main characteristics of the health care model being established in the Kyrgyz Republic are a multisectoral approach, the development of infrastructure that meets the population's health care needs and is based on available financial resources, decentralized administration, and increased administrative and financial autonomy for health care institutions. The health care sector has been divided into "providers" and "consumers". The main priorities are developing primary health care, family medicine, free choice of family doctor, and guaranteeing public access to medical services through the State Guarantees Programme. New methods of results-based financing have begun to be implemented.

Primary health care is central to the provision of medical services to the population in the Kyrgyz Republic and is provided by 65 family medicine centres, under which 692 family medical practices operate. There are a further 17 family medical practices registered as independent legal personalities, and there are 1 010 maternity clinics. Around 40 % of the rural population lives within the catchment area of the maternity clinics. There are more than 400 villages with populations ranging from 30–60 to 1000 or more residents, however, which do not have any local medical services.

There are 141 health care organizations in the country that provide hospital care, including 27 family medicine centres. The number of doctors is on average 22.4 per 10 000 population. In rural areas this indicator ranges from 7.3 to 17.3 per 10 000 population, whereas in urban areas it ranges from 45.5 to 13.7 per 10 000 population.

Access to medical services in Kyrgyzstan is guaranteed by the State Guarantees Programme, which has been in place since 2001 and sets out the type, amount and conditions of free of charge and subsidised medical care. Each year, the Government approves the State Guarantees Programme, taking into account the amount of funding allocated from the State budget and compulsory health insurance contributions. The State Guarantees Programme guarantees free basic primary health services for the whole population.

In order to improve the financial and physical accessibility of good quality medicines at primary level throughout the country, a supplementary health insurance programme for the provision of medicines has been set up, which is financed using the capitation standard from compulsory health insurance funds.

Also with a view to improving access to medicines in remote areas given the lack of pharmaceutical staff, extra dispensaries have been opened where health care workers, who are given the appropriate training, have permission to distribute medicines.

1.2. Current status of the use of information and communications technologies in the health care sector

1.2.1. Information systems and their use in health care

During the health care reform, the Ministry of Health received substantial contributions from donors to establish a comprehensive health information system, source technology and begin to use the software needed to establish an integrated health information system (IHIS). The IHIS is designed to ensure continuity in the provision of medical services, a comprehensive methodology for collecting, analysing and storing information on citizens' health status, good quality medical services, provision of medicines and access to a range of remote medical services.

The IHIS comprises the following subsystems, which are at various phases of implementation and development:

- national directory of health care institutions database;
- medical personnel database;
- outpatient care (list of outpatient records);
- automated first aid;
- 1C: automated accounting and reporting;
- birth register;
- diabetes register;
- maternal and newborn death register;
- computerized system for monitoring infectious diseases;
- "Medstat" database for the collection, processing and analysis of statistical information on public health and the work of health care institutions; and
- database of medical technology, etc.

Dividing the health care sector into "providers" and "consumers" of health services and introducing a single payer system for health care funding has given the health system a new financial and organizational structure, which allows for more effective and equitable use of resources.

One of the main functions of the compulsory health insurance fund is to monitor the quality of medical services by conducting a continuous analysis of service quality and studying patient satisfaction through surveys, as well as receiving suggestions and complaints from patients through a telephone hotline run by the fund and its local branches.

The compulsory health insurance fund information system plays a significant role in the fund's work. The information system comprises the following databases:

- cases treated
- State Guarantees Programme
- Pharmacy Benefits Programme
- compulsory health insurance policy
- quality control
- agreement indicators
- telephone hotline.

The compulsory medical insurance fund cooperates with the national social fund to receive monthly electronic personal data about individual citizens (identification number, full name, date of birth, sex) as well as data on employees' insurance contributions. The data from the fund is then used to update health care institutions' databases of individuals entitled to subsidized medical services.

The Ministry of Health is working to develop and integrate health information systems, with a view to establishing a system of personalized medical records and the use of modern eHealth technologies.

The Ministry of Health, with the support of the United Nations Development Programme is currently working to introduce an electronic version of the outpatient medical record.

A pilot project is being conducted among a group of family medicine practices: the Dzhal Sokuluksk District Centre for Family Medicine, the Chuisk Regional Centre for Family Medicine, and the Outpatients' Department of the Ministry of Health National Hospital.

The software package is designed to digitalize the medical, accounting and managerial activities of primary health care institutions with a view to improving access to and timeliness in the delivery of medical services to the population.

The Ministry of Health is also setting up a birth register (a separate database for births), which contains personalized data on newborns and parents throughout the country. The National Medical Information Centre under the Ministry of Health and the State "Infosystem" under the Ministry of Finance are currently working together to integrate their databases on newborn and infant mortality with the National Registration Service database on births and deaths.

The Ministry of Health is also developing interactive electronic training for medical specialists. In that regard, distance-learning courses for professional and development for health workers have been set up by the State Medical Institute.

In order to foster international cooperation and exchanges of experience, efforts are being made to establish links with leading foreign medical centres.

In March 2013 the Kyrgyz Scientific and Academic Computer Network held a teleconference between representatives of Tajikistan, Kazakhstan, Kyrgyzstan and the Republic of Korea to discuss the launch and development of telemedicine technology, and the organization of distance-learning

courses for professional training and development for doctors. Areas for further cooperation were also discussed.

eHealth has many useful functions, which can be divided into two main categories: administrative functions and clinical applications. Much has already been done in the Kyrgyz Republic in terms of the use of ICT for improving administration by establishing necessary databases and instructions for their use. Databases are an essential component of the Ministry of Health National Information System and work in that regard should be continued. With regard to clinical applications, much less work has been done so far, which is why particular attention will be paid in future to the use of various eHealth applications in medical practice.

1.2.2. Problems with the use of ICT

Various different information systems and databases are currently being used within the activities of the Ministry of Health. These contain significant amounts of information about health care, which is primarily collected manually. This means there is the potential for significant human error. Previously established information systems have quite a narrow focus; they perform separate, unrelated functions and are not integrated into the integrated health care management system. Integrating these systems into the IHIS will significantly improve their effectiveness, and give the Ministry of Health the full picture of all processes under way.

In summary, the following problems have been noted:

- existing information systems and databases support different data formats and are not compatible for integration at the required level;
- lack of an integrated infrastructure for the collection, storage, transfer and use of electronic information on public health care;
- no possibility to correlate, collate or analyse the data from the various information systems to obtain comprehensive, reliable and up-to-date information about the state of the health care sector;
- considerable duplication of information owing to the lack of a mechanism for data exchanges between information systems;
- high turnover of ICT personnel owing to low wages;
- low level of qualification among ICT personnel at the regional level.
- Insufficient coverage and lack of reliability of broadband access to telecommunications networks at the regional level; and
- most existing systems are outdated, physically and in terms of performance of both hardware and software.

1.3. Strategic approach to health system development, targets and priority areas of work

The National Programme for Health Care Reform (“Den Sooluk”) 2012–2016, was approved by the Government as a means of establishing the necessary conditions to protect and enhance public health in general and the health of each individual, irrespective of gender or social status.

The Programme was established on the basis of continuous reforms over previous years as well as taking into account the current socio-political situation.

The strategic approach to implementing the Den Sooluk Programme has been based on developing a sustainable link between actions and their influence on public health indicators and on three main interconnected principles that are based on the foundations laid during the previous reform:

a) anticipated improvement in public health indicators;

b) key services required to achieve the anticipated improvement in public health indicators; and

c) identifying and removing barriers within the health system that hinder coverage of key services and in so doing hamper the achievement of the anticipated improvement in public health indicators.

1.3.1. Anticipated improvement in public health indicators

The Den Sooluk Programme's main point of departure is to boost functions and activities through specific and anticipated improvements in public health indicators in the following priority areas:

- cardiovascular diseases
- maternal and child health protection
- tuberculosis
- HIV.

1.3.2. Key services

Key services have been identified for each of the priority areas, which must be provided to populations in need if the Programme's anticipated outcomes are to be achieved and public health indicators improved.

Those key services include services at the community level and individual, evidence-based medical services and the relevant institutional activities required to provide them.

1.3.3. Identification and removal of barriers within the health system

In order to strengthen the health system through the Den Sooluk Programme, barriers to the coverage of key medical services will be identified and removed, and health care indicators will be improved.

Systemic barriers have been identified in the key priority areas and grouped according to the main functions of the health system: provision of services, financing, resource generation, and administration. Although some of the barriers identified within the health system were programme specific, most were the same for all priority areas.

2. National eHealth vision

2.1. eHealth targets and functions

The strategic aim of eHealth is cooperation for the for implementing the Den Sooluk Programme and Kyrgyzstan's national sustainable development programme in order to increase the quality and accessibility of medical services and introduce personalized health care accounts for citizens through the broad use of ICT.

eHealth implementation should guarantee the establishment of an effective, accessible, open and sustainable health care system, with early diagnosis, effective, patient-centred care, and modern solutions at its centre.

The key to launching eHealth is to establish the IHIS, which will allow complex functions to be performed in the following areas:

- establishing a reliable, flexible and accessible infrastructure and a fully interoperable national information system, which is service-oriented and cloud-based;
- increasing the effectiveness of health care administration, and monitoring compliance with national guarantees on the scope and quality of health care provision;
- increasing the accessibility, quality and continuity of medical care by enhancing information technology support;

- introducing and developing telemedicine technology;
- increasing workforce capacity and ensuring the conditions for uninterrupted professional development in the sphere of health care; and
- creating public electronic resources to increase the individual's access to information about their health, improve public awareness with regard to healthy lifestyle, disease prevention, accessing medical care, and quality of services provided by medical institutions.

eHealth and the establishment of the IHIS should contribute to the successful implementation of all priority areas of the Den Sooluk Programme and the provision of new services, as well as improving the quality of existing services.

2.2. Mission and principles

The eHealth mission is to establish the necessary conditions for upholding the constitutional rights and guarantees of the citizens of the Kyrgyz Republic with regard to health protection and timely and safe access to good quality medical services.

eHealth should be based on the following principles:

- interoperability (compatibility) between the medical information systems of all health care organizations;
- guaranteed information security and personal data protection in accordance with the law;
- centralized management of the development, launch and maintenance of information systems through a unified technology policy taking account of international standards on medical information systems as adapted to national circumstances; and
- high speed and secure access for health care institutions to interoperable eHealth systems and the national health care repository, which contains good quality statistical, analytical and financial data.

2.3. Anticipated outcomes and impacts of eHealth

Implementation of the Strategy will increase the quality of prevention and diagnostics and will lead to the following outcomes:

- broad engagement and commitment of stakeholders in health system development;
- digital systems for priority areas for the development of the health system;
- introduction of electronic medical records for patients;
- accessibility of medical data from any part of the country and any medical organization where a patient has been treated;
- necessary mechanisms and regulatory framework for developing and bringing into practice policies, standards and potential technologies for the provision of electronic services; and
- administrative decision-making based on up-to-date, reliable data and indicators from data stores.

The activities undertaken to enhance the health system should have the following impacts:

For citizens (patients):

- Personalized medical services and continuity of care in outpatient facilities and inpatient medical institutions, throughout the life course.
- Increased access to highly qualified medical care.
- Guaranteed quality of care, not just in hospitals and clinics, but also at home and at work.
- Means for citizens to electronically store, update and submit information about their health and any reactions to medication or medical treatments.
- Access for citizens to their private medical data, in line with the law and legal standards in force.
- Accessibility of all personal medical data, irrespective of the time or place of data entry.

For the health workforce:
- Access to specialized clinical knowledge bases, scientific research, publications and databases.
- Good quality distance learning for basic and continuous training.
- Remote conferences and patient consultations.

For health care organizations:
- Personalized accounts of medical services and spending, primarily of expensive medical equipment and medication.
- Enhanced prevention and diagnostic activities at all levels of medical care.
- More effective medical care owing to improved quality of diagnostics and more informed medical decision-making.
- More effective health workforce owing to the digitalization of time-consuming and routine tasks, increased reliability of data and timeliness of information services.
- Reduction in the time that health care workers spend on paperwork through preliminary electronic data processing and a reduction in the number of accounting and reporting forms used in health care institutions.
- Possibility of receiving reliable statistical data by processing primary information presented in electronic format.

For businesses (commercial organizations):
- Development of new products and services: electronic health records, information systems and registers.
- Wide-reaching and cost-effective marketing of products and services.

For administrative bodies and the Government:
- Improved efficiency and quality of decision-making and reduced administrative costs owing to the creation of relevant information and analytical systems.
- Establishment (development) of public health monitoring systems.
- Increased reliability and timeliness in the assessment of the quality of care provided by medical institutions
- Justified allocation of financial and human resources to deal with the most urgent public health issues.
- Justification of the organization's priority areas and treatment and prevention activities, including monitoring using specific disease classification forms.

2.4. Key services and activities in priority areas for developing the health system through the Den Sooluk Programme

2.4.1. Cardiovascular diseases

The introduction of eHealth will provide an opportunity to substantially improve medical services for patients with cardiovascular diseases. A consultation centre needs to be established to conduct planned and emergency cardiology telemedicine consultations, which would ensure timely medical care, under the aegis of the National Cardiology and Therapy Centre or a hospital cardiology department, which will be in contact with health care organizations via existing fixed and mobile telecommunications lines.

The consultation centre's main function will be to provide round the clock telecardiology consultations, comprising: patient briefings, ECG registration, ECG transmission using the telemedicine system, provision of supplementary patient information to specialists, transmission of specialists' recommendations, and logging of consultations.

Telemonitoring will have several positive outcomes:
- speeding up decision-making for doctors and ensuring the swift provision of medical care;

- lowering spending on regular monitoring for cardiovascular patients; and
- introducing distance learning for health care workers in remote centres to provide training in modern cardiology diagnostics and evidence-based use of effective medications.

In order to ensure effective monitoring of the quality of patient care and efficient planning for the purchase of medical supplies, work to develop these databases, as well as to complete the registers of cases of diabetes, acute myocardial infarction and stroke, must continue.

2.4.2. Maternal and newborn health

One of the eHealth priorities is to consider setting up a consultation centre for monitoring, diagnostics and consultations on issues to do with maternal and child protection, which will enable important information on the health of pregnant women and their children to be accessed in a timely manner so that continuity of prenatal and postnatal care can be provided.

The introduction of a country-wide register of births and infant deaths will not only enable more precise data to be collected on newborn and infant mortality, but will also reduce the amount of work time spent by health care workers on filling out paperwork and will facilitate comprehensive analyses of the quality of medical services for newborns and infants aged up to one year. Completion of the joint initiative of the Ministry of Health and the State Registration Service to create an automated information system for online registration of births and deaths, which could ultimately be integrated into the national birth and populations registers, would improve data reliability and reduce the amount of time required to create and update databases.

Efforts to develop and use the register of pregnancies must continue in order to increase the number of pregnant women registered and improve the quality of medical services they receive, in order to prevent maternal mortality, and facilitate a more detailed analysis of the various causes of complications during pregnancy and subsequent complications during birth and postpartum, as well as perinatal, infant and maternal mortality.

Further efforts are also needed to enhance and implement databases on routine child immunization with regular monitoring and integration into other information systems.

2.4.3. Tuberculosis

Information systems must be further enhanced and broadened to establish a unified register of tuberculosis patients in the Kyrgyz Republic in order to ensure continuous monitoring of tuberculosis patient care and the effective use of technology, treatment methods, and reporting on and monitoring the effective use of medical supplies.

The register will contain detailed information about patients, from their diagnosis report to the end of their treatment, which will facilitate better monitoring of the epidemiological situation in the country, and more effective prevention and treatment, as well as streamlining spending on these activities.

To make treatment more effective, modern mobile decision-making could be used, such as the use of simple information systems using personal mobile telephones to remind patients to take their medication, since adherence is the key to effective treatment.

2.4.4. HIV

Efforts must be made to develop and implement digital surveillance systems, integrated into the IHIS, to monitor HIV cases with a view to guaranteeing timely access to essential information about people living with HIV and providing them with support for informed decision-making, as well as evaluating activities to improve their quality of life through treatment, care and support.

The information system for digital HIV monitoring should fulfil the following functions:

- plan treatment, care and support activities for people living with HIV

- report on and evaluate assistance to people living with HIV
- ensure timely access to information;
- reduce medical error
- improve quality of health information
- improve prevention
- ensure effective use of medications
- ensure timely monitoring of indictors for the implementation of the national programme to stabilize the HIV epidemic in the Kyrgyz Republic, 2012–2016.

In order to prevent and minimize the risks of HIV transmission through blood transfusions, steps must be taken to digitalize blood services, including blood donation, laboratory blood testing and quality control, and blood processing.

The introduction of information systems will enable potential donors to be checked using databases from health care organizations, such as the AIDS Centre, the Department for Disease Prevention and National Epidemiological Surveillance, centres for dermatology and venereology and other health care institutions.

2.5. Surmounting systemic barriers through health system strengthening

2.5.1. Public health (socioeconomic perspective)

The social side of prevention for protecting and enhancing public health includes medical, sanitary, hygiene and socioeconomic aspects. The establishment of a system for disease prevention and the elimination of risk factors is the State's number one socioeconomic and medical priority.

A programme for the computerized tracking of infectious diseases is being implemented to ensure timely monitoring of infectious and parasitic diseases. The programme requires further development.

A website to promote healthy living and raise public awareness about the harmful effects of habits such as tobacco smoking, alcohol consumption and drug use must be set up in order to promote the benefits of a healthy lifestyle among the citizens of the Kyrgyz Republic.

2.5.2. Provision of personalized medical services

Telemonitoring using eHealth technology affords great opportunities for the use of personalized medical services, particularly for patients with chronic diseases. Telemonitoring uses biometric analysis for monitoring, evaluation and prognosis: the patient uses a variety of sensors and electrical signals that represent various physiological processes, transmitting them to a central information repository for analysis by a specialist physician and a subsequent decision on the type of care to be provided.

Various telemonitoring systems have been developed and are being used successfully in several countries. The most common are for monitoring diabetes patients and women experiencing various complications during pregnancy.

Personalized databases need to be further developed, enhanced, integrated, implemented and maintained in order to create a system of personalized reporting and improve the quality of public health services (electronic medical records and electronic patient medical history).

In order to set up a system of personalized records and improve the quality of public health services, steps must be taken to further expand the functions, range and integration of existing information systems (databases on major funding sources, first aid points, cases treated, the Pharmacy Benefits Programme) to create and implement complex medical statistics systems covering the main processes of all health care institutions, including primary health care institutions, in-patient facilities, clinics and first aid points.

2.5.3. Financing

Regarding the management of financial resources at the national level, the Ministry of Health is responsible for the administration of five programmes: (i) governance and administration; (ii) provision of personalized medical services; (iii) public health; (iv) high cost, high technology medical care; and (v) medical training. The compulsory health insurance fund and local administrative authorities will be jointly responsible for the administration of three programmes: (i) State Guarantees Programme for the provision of health care to citizens of the Kyrgyz Republic; (ii) Supplementary compulsory health insurance programme; and (iii) planning, management and administration.

Health information systems must be enhanced in order to support funding mechanisms that aim to improve the quality and effectiveness of health care.

Payments for hospital services are made on a programmatic basis according to cases treated. Through the Den Sooluk Programme, ways of funding hospital activities will be improved, including through strengthening strategic planning, procurement and a revision of the agreement between the compulsory health insurance fund and health care institutions. Existing information systems for the payment of in-patient care will be used to encourage service providers to optimize the structure of in-patient services, avoid unnecessary hospitalization, and develop technologies to replace the need for hospitalization.

Payment for primary health care is also made according to the database of registered population. Per capita payments without a periodic revision to improve the system of payment for medical services/ payment on the basis of services provided, is, however, becoming ineffective. The implementation of a combined system for payment for primary health care through combining the per capita payments with results-based financing will enable the quality and effectiveness of primary health care services to be improved.

A computerized system of accounting and reporting has been introduced in health care institutions in order to reduce fiduciary risk, enhance the capacity of health care service providers and ensure transparency in the movement of all health care funds. Since 2008, computer equipment has been purchased and 1C:Accounting licensed software has been installed. Accountants have been trained and are beginning to use the system. That said, the implementation process has faced some obstacles, which are gradually being overcome. In a joint effort with the State Treasury and the Ministry of Finance, for example, thought is being given to how to further develop the strategy for digitalizing accounting reports for health care institutions, taking into consideration the current implementation of the State Treasury's information system.

Furthermore, work has begun to strengthen internal audit and monitoring services. The Den Sooluk Programme includes plans to develop auditing through a comprehensive system for the management of internal audit information, which will enable methods to be respected and guarantee coherence between the internal audit services of the Ministry of Health and the compulsory health insurance fund. The system will also enable the work of internal auditors to be consolidated in a single database for analysis and subsequent decision-making.

2.5.4. Resource development

The quality and accessibility of medical services, availability of medicines and the provision of medical supplies are being improved by centralizing and reducing duplication in the digital and telecommunications infrastructure, increasing accuracy in planning, and allocating health system care capacity and resources through a comprehensive health care information space.

2.5.4.1. Developing a comprehensive and sustainable policy for human resources management in health care

Human resources are a crucial factor in innovative development and the health sector in Kyrgyzstan therefore needs a comprehensive human resources management system.

The solution should include digitalization and increasing the efficiency of several human resources management functions:

1. Attracting, recruiting and preparing the workforce:
    a. establish a consolidated database of vacancies and candidates for continuous use and evaluation;
    b. monitor all stages of recruitment and receive reports on the efficiency of the selection process and how to improve it; and
    c. develop programmes for preparing new staff and monitoring that process, how long it takes, any problem areas, etc.
2. Professional training:
    a. create a transparent system for planning and budgeting for professional training;
    b. create a distance learning and examination system, with capacity for independent development and importing pre-prepared courses and tests; and
    c. evaluate the results and effectiveness of training.
3. Professional development and the candidate pool:
    a. set up and monitor the implementation of development plans;
    b. set up staff pools for various specific aims; and
    c. look for and recruit personnel among the existing workforce using various criteria, including level of competence, and work- and study-related achievements.
4. Capacity assessment and management:
    a. take account of each health care worker's capacities (professional, intellectual, situational and social);
    b. assess the relevance of workers' capacities and assign new capacities;
    c. identify capacities that require development, whether among individual workers, groups or divisions; and
    d. automate the staff certification process.
5. Assess and manage workforce efficiency:
    a. maintain a set of targets; and
    b. automate the evaluation of how those targets are being met.

2.5.4.2. Medicine policy

In order to provide access to information on the circulation of medical products and to improve transparency and openness, a comprehensive medicine information system must be set up, covering all aspects of medicine provision from product registration to sale and use. This system would be accessible to authorized and other users. It would allow authorized users with the relevant access to track each batch of medicines either arriving in the country or manufactured in the country, so that at any point it is possible to find out online whereabouts a particular batch of medicines or part thereof is located.

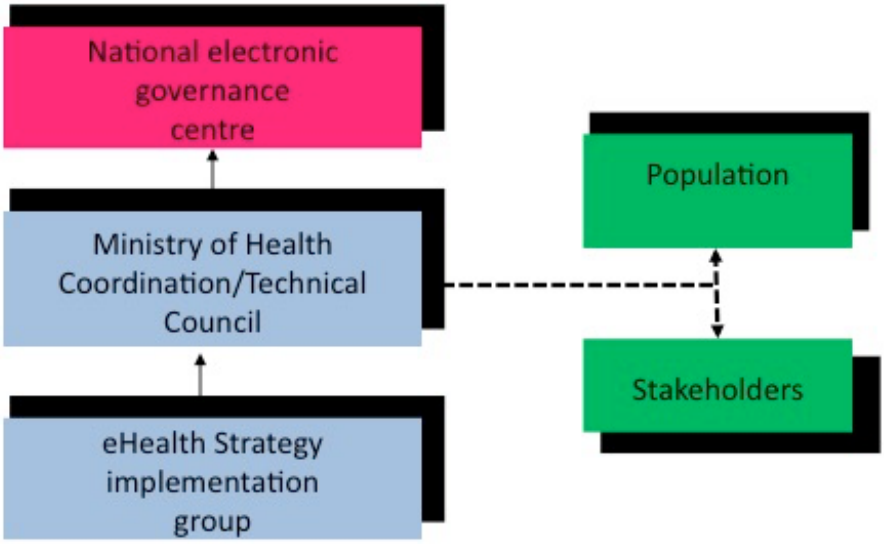
3. Principles for establishing eHealth

Below is a set of recommendations, which must be taken into account when developing the finalized version of the IHIS.

3.1. Governance and implementation mechanisms

The recommended model for managing the implementation of the present strategy is based on the principles of unified leadership and accountability to all stakeholders.

Diagram 1. Governance mechanism



The Electronic Governance Centre of the ICT Council will be the Strategy's main administrative body.

The Ministry of Health Coordinating/Technical Council (Policy Council) will be responsible for implementing the Strategy.

	Electronic Governance Centre	**Coordinating Council**	**Implementation groups**
Planning	Support	Implementation	
Implementation	Support	Support	Implementation
Monitoring		Implementation	
Change management	Support	Support	Implementation

3.2. Strategy and investment

The eHealth Strategy will be implemented as part of the Den Sooluk National Programme for Health Care Reform, which will continue to use the sector-wide approach that proved effective during implementation of the "Manas Taalimi" health care reform programme, through which development partners provide financial support for the national budget together with parallel funding programmes for health. Both of these funding sources constitute essential and complementary contributions to financing the Den Sooluk Programme/sector-wide approach, and are essential to the Programme's success.

Two financial flows are maintained within the Den Sooluk Programme: the Ministry of Health and the compulsory health insurance fund.

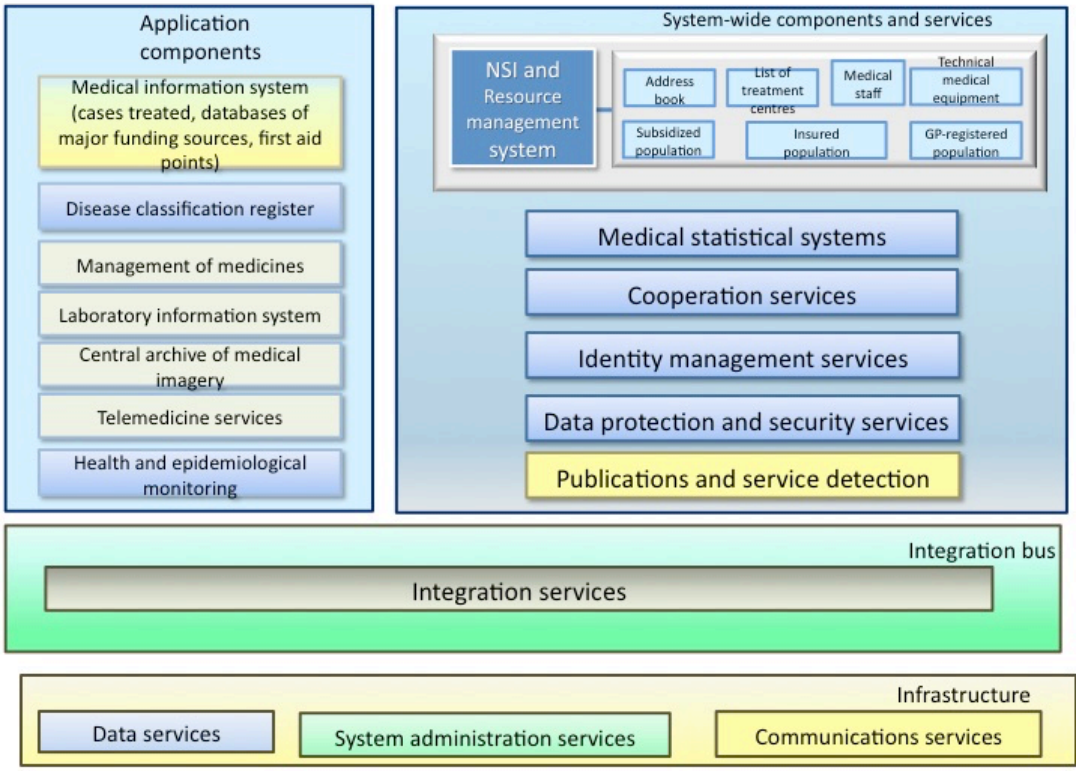
Funding from development partners is directed to building infrastructure, purchasing equipment and supplies, procurement of information technology, payment for consultation and information services, capacity building for medical personnel, as well as other activities required to implement the Den Sooluk Programme and improve the quality of medical care and public health as a whole.

Joint funding sources to cover programme expenses are distributed in line with the work plan.

3.3. Services and applications

The general structure for eHealth comprises a segment of centralized, system-wide components, a segment of application components, an integration bus and infrastructure services for the comprehensive health information space.

Diagram 2. eHealth structure



The segment on application components and services includes existing and future information systems providing IT support functions for health care administration and information sharing with citizens, and enables the following interconnected functions to be fulfilled:

- developing and implementing a system of personalized medical records, which will enable basic clinical information to be kept throughout the patient's lifetime and to be shared between doctors;
- implementing complex clinically integrated systems for meeting the general requirements of physicians and broader primary health care teams;
- providing opportunities to manage patient flows in all clinics providing care for critically ill patients, including reserving beds for planned hospitalization cases;

- providing health care workers with round the clock access to information from patients' medical records;
- issuing standard care schemes taking account of the patient's personal data; and
- issuing electronic prescriptions, etc.

These functions are crucial elements of the Strategy, which must be the basis for defining the key steps to be taken. They will be analyzed and revised in the light of any changes to the requirements or the technological and financial means of meeting them.

Clinical applications in the IHIS should be established and developed through the universal application of electronic medical records as the basic programme product, bringing together information from a range of information systems from health care institutions at various different levels.

Electronic medical records should contain an exhaustive, structured overview of general personal, clinical, biometric, social, economic, financial, insurance and other information about the patient, and document the medical services he or she receives.

The main aims of introducing electronic medical records are to provide continuity and quality of care, as well as modern prevention and other activities to guarantee the health of each individual by documenting and keeping the relevant medical information and transmitting it in a timely manner to the appropriate health care workers.

The introduction of electronic medical records aims to ensure that:
- information about patient health is accessible anywhere in the country;
- information is not contradictory and is fully accessible;
- information is received in a timely manner;
- information is presented in a convenient, structured manner, in line with the accepted format for filling out medical documents;
- information can be interpreted into various languages; and
- information is active, i.e. that it supports automated decision-making.

A comprehensive health data repository needs to be established to provide centralized storage of medical and non-medical health data, including each individual's electronic medical record.

The repository will be a source of information for making registries of individual diseases. Furthermore, the repository will aggregate and store the information used for administrative and financial decision-making, and to develop national health statistics. The structure and content of electronic medical records need to be standardized, and the data used for national statistics and administrative and financial decision-making must be analyzed and standardized in order to identify the selection of data that should be included in the repository.

Electronic medical records1 are being actively used all over the world. Implementation in the Kyrgyz Republic therefore needs to be done using international ICT standards for eHealth,

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patient1**Definitions***:

Electronic Medical Record (EMR) – is an electronic document containing information about the patient, which is created, filled in and used by medical staff in health care institutions.

Electronic Health Record (EHR) – is an electronic document containing information about the patient, which is created in line with nationally accepted interoperability (compatibility) standards, and is filled in and used by medical staff in the various health care institutions where the patient is being treated.

Electronic Personal Health Record (PHR) is an electronic document controlled by the patient, containing his or her medical history, which is created in line with nationally accepted interoperability (compatibility) standards, and can be completed from a variety of sources of medical information, such as the various medical institutions treating the patient.

including information security standards, using international experiences in implementing and using those ICT products as a starting point to minimize the risk of incompatibility between those systems caused by inadequate adherence to international standards (such as the experience in the United Kingdom, Canada and the United States of America). Developing the IHIS using compatible eHealth ICT products (electronic medical records, etc.) will enable the Kyrgyz Republic to exchange medical data with other countries and thus directly support the WHO policy on eHealth standardization and interoperability2.

It is particularly important to note that when developing the technical specifications for the IHIS using electronic medical records, users (doctors, nurses, laboratory and pharmacy staff, etc.) must be engaged as early on in the process as possible to ensure that the information system properly reflects and supports their work with patients and the information flows from health care institutions. This should be done using the general plan (structure) for the IHIS, with the gradual implementation of the system's individual modules. The first module to be implemented, for example, could be the module on electronic patient registration and waiting lists for consultations with specialists for pregnant women, since maternal and child health protection is one of the Den Sooluk Programme's four priority areas. Implementation of the registration module could be started on a pilot project basis in Bishkek and in maternity clinics.

Along with the use of electronic medical records as the primary product for eHealth, for eHealth to be sustainable, laboratories, pharmacies, epidemiological services and other specialized health care institutions must transfer to an electronic mode of working. This means implementing – and integrating into the IHIS and information systems for x-ray facilities and special diagnostics departments using high-accuracy medical equipment (ultrasound, MRI).

When purchasing diagnostic equipment (ultrasound, MRI, ECG), laboratory and other equipment, it should be borne in mind that this equipment, which is manufactured by leading foreign companies, generally contains electronic medical record modules for generating and recording test results. When purchasing this equipment checks should be conducted with regard to the application of international compatibility standards in these modules and their potential compatibility with the primary ICT products in the IHIS for the electronic transfer of information between systems.

Setting up the IHIS using electronic medical records will enable telemedicine technologies to be used and distance teleconsultations to be conducted.

Also, for the IHIS to function properly, services must be implemented under the centralized system-wide components and services segment to ensure that the same identifiers and qualifiers are used for everyone taking part in eHealth.

The centralized system-wide components and services segment comprises system-wide software, the resource management system, the unified health data repository, and system-wide technological services needed for information-sharing and data protection.

The resource management system is an information system for registering health service providers and collecting data on technical economic indicators and health care institutions' material resources, and maintaining the register of health service workers, including information about workforce movement, training and retraining.

Medical statistics systems using analysis and reporting should provide:

- a universal information store for verified data from a variety of sources;

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*National Alliance for Health Information Technology. Report to the Office of the National Coordinator for Health Information Technology – Defining Key Health Information Technology Terms, April 28, 2008. Washington DC, USA

[2]eHealth standardization and interoperability. World Health Assembly Resolution WHA66.24 (agenda item 17.5, 27 May 2013).

- monitoring and analysis of how the health system is functioning, taking account of the specific issues associated with the provision of medical services;
- monitoring of data on health sector services, analysis of the distribution of health sector services by region and comparison between services according to selected criteria;
- medical passports and consolidated sets of indicators on demographic and medical development at the national and regional levels;
- monitoring health care programme and project implementation;
- evaluation and in-depth analysis of the use of financial resources in the health system and its correlation with social and economic development indicators;
- financial forecasting for health at the national and regional levels, based on different possible variations in the development of the health system and economic development scenarios;
- planning for the rational use of resources to meet the needs of the population with regard to health services;
- analysis of the effectiveness of prevention activities and quality of care based on the average length of stay of a patient in a health care institution, statistics on returns to hospital and other indicators; and
- preparation of analytical reporting for various internal and external users.

3.4. Technical structure and infrastructure

The health sector currently uses health information systems developed using client-server desktop applications and in all health care institutions users work from their workstations with systems on a local network.

Reports and other data collected during the reporting period are sent regularly from the local to the regional or national levels by telecommunications channels or using USB or other information storage devices.

Given recent trends in information infrastructure development, digitalizing State organizations for the subsequent development of health sector information systems will require an updated IT infrastructure and the establishment of a modern, flexible enabling environment with a centralized structure.

That enabling environment should provide the following services:
- Infrastructure for the sustainable management of the eHealth environment;
- Identity management system;
- Integration platform for exchanges of information.

The Ministry of Health's failover modular data processing and storage centre should be the primary element of the enabling environment infrastructure. The compulsory health insurance fund should house the back-up data processing and storage centre.

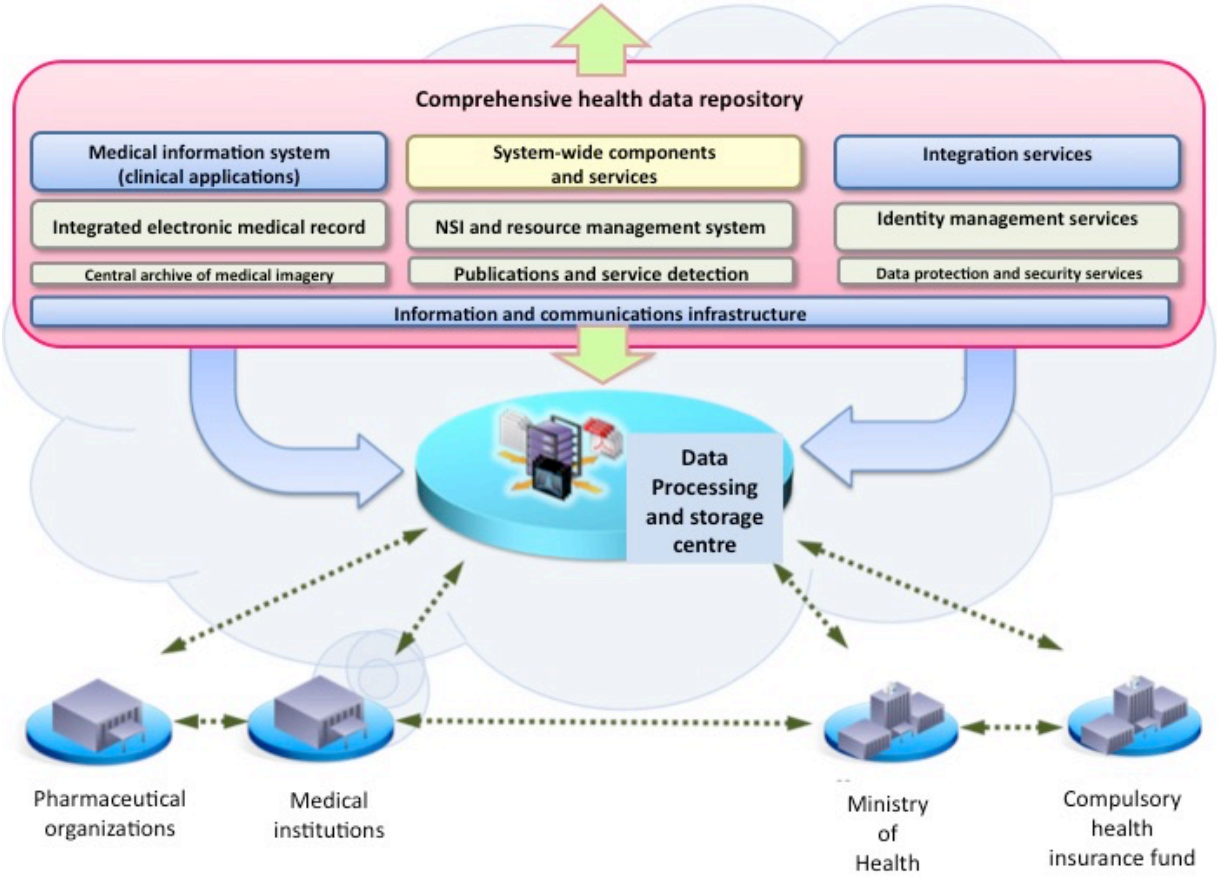
There should be the possibility to implement a single, centralized system for network management and network security within the data processing and storage centre, and a core unified, multiservice, departmental (corporate) health care network should be set up to provide health care institutions with the following types of service: IP telephony, videoconference links and protected high-speed Internet access.

The widespread application of telemedicine technologies and eHealth requires a telemedicine network to be established through a multiservice departmental network, and for health care organizations to be provided with modern, digital equipment for instrumental examinations (x-ray, ultrasound, tomography), which allows for the storage, transfer and processing of digital images.

By developing and expanding the multiservice, departmental health network and including health care institutions in the high-speed broadband network, all (or most) of the main functions

will be fulfilled on the eHealth cloud in the central data processing and storage centre. This will be a gradual process, with health care organizations transferring on by one from a client-server structure to a cloud-based structure.

Diagram 3. Technical structure



This structure requires that the data processing and storage centre and the connection be backed up so that the work of health care organizations is not interrupted in the event of a failure.

The database management system, which will be able to save the integrated electronic medical record as well as analytical repositories, will be an important element of the eHealth platform.

3.5. Standards and compatibility of system solutions (interoperability)

3.5.1. Standardization and ensuring the interoperability of information systems

To create a personalized medical services account, a significant amount of work needs to be done to standardize and unify health information systems, introduce electronic medical records, transfer to standard information reporting formats, such as the international HL7 standards, as well as other recommended international standards.

A single standards system needs to be introduced and all information resources included in it, to ensure compatibility between specialized software and databases. Compatibility or interoperability is the ability of different information systems and software to transmit, exchange and use data in a reliable and effective way, allowing for the accurate reproduction of data content between sender and the recipient or participants in a data exchange. Pursuant to World Health Assembly Resolution WHA66.25 (Item 17.5 on the World Health Assembly Agenda on 27 May

2013) on eHealth standardization and interoperability, WHO called on its Member States to coordinate the use of ICT using international standards, which would in turn require coordinating donor assistance provided by countries in the field of ICT and eHealth.

A single information space also needs to be established, based on citizens' personal identification numbers (PIN), the data exchange system and cooperation between health care institutions. Cooperation is essential so that all information on the provision of medical care to a specific individual is accessible in a protected, depersonalized format, from anywhere in the country.

In order to ensure compatibility of medical information systems and information system security, efforts must be made to develop systems of standards and regulations for eHealth, setting out the requirements for, among others:

- the composition and structure of information on the provision of health services, health status and health service resources; and
- the organization of storage, processing and transmission of information, protection of personal data, identification of health system stakeholders, information sharing between medical apparatus and information systems, and systems for the use of electronic medical records.

In the context of developing a system for personalized medical service reporting, all medical institutions must become computerized. All data about each patient must be brought together in his or her electronic medical record, and a system for exchanging medical information between health care institutions must be established.

Standard format requirements for exchanging information, such as HL7, should be met, and for the transmission of x-rays and other images, international standards should be used, such as DICOM, and electronic medical history records should be kept. Electronic medical history records should be replaced by electronic medical records, which include information about outpatient visits and treatment in clinics.

The ICT infrastructure necessary for electronic medical records requires that international standards be applied in the following areas:

1. data standards (data dictionaries, classifications);
2. information standards (data presentation models);
3. data transfer standards (document, annex, e-mail, etc.);
4. identifier standards (biometrics, workforce register, institution register, etc.);
5. confidentiality and data protection standards (access, pseudo-identifiers, etc.);
6. information system functional standards (updating, verification, storage, disposal and analysis of data, etc.); and
7. medical clinical standards (protocols for prevention, diagnosis and care, etc).

The issues with electronic medical records have still not been resolved. Differences between international standards, which often contradict each other, even when coming from the same developer (such as HL7 versions 2 and 3), as well as the failure of several European projects (such as in the United Kingdom), show that the issues with electronic medical records are still far from being overcome. This is an issue affected by the particularities of the situation in each country and is closely linked with the specificities of the health system in a given country. It is therefore difficult to talk about exchanges of experience between countries. Each country must, however, make an effort to rectify the situation, using general principles, as well as taking the particularities of the country's specific situation into account.

The recommended international interoperability standards for eHealth for the priority areas of the Den Sooluk Programme are described in the Annex to this document.

3.5.2. Guaranteeing information security

An important particularity of medical information is its critical nature from the perspectives of confidentiality, integrity and availability. Citizens' right to confidentiality with regard to information about requests for medical assistance, diagnoses, and any other information to do with their treatment and care is protected under the Public Health Protection Act (Act No. 6 of 9 January 2005).

Protection of the rights and freedoms of the individual in the use of information of a personal nature and the protection of that information are guaranteed under the Personal Information Act (Act No. 58 of 14 April 2008).

The data processed in the IHIS will include personal information and information subject to medical confidentiality.

Furthermore, the IHIS database may contain essential information on which a person's life may depend. It is therefore crucial that when the IHIS is created, the integrity of the database must be guaranteed along with means of tracking the system's condition and security.

The legislative framework for the protection of personal data is in place in the Kyrgyz Republic, but within the health sector security policies need to be developed and adherence to data protection principles must be guaranteed with the help of legal sanctions and other means of protection.

In this regard, particular attention must be paid to guaranteeing the security of information in the IHIS, using the following monitoring mechanisms:

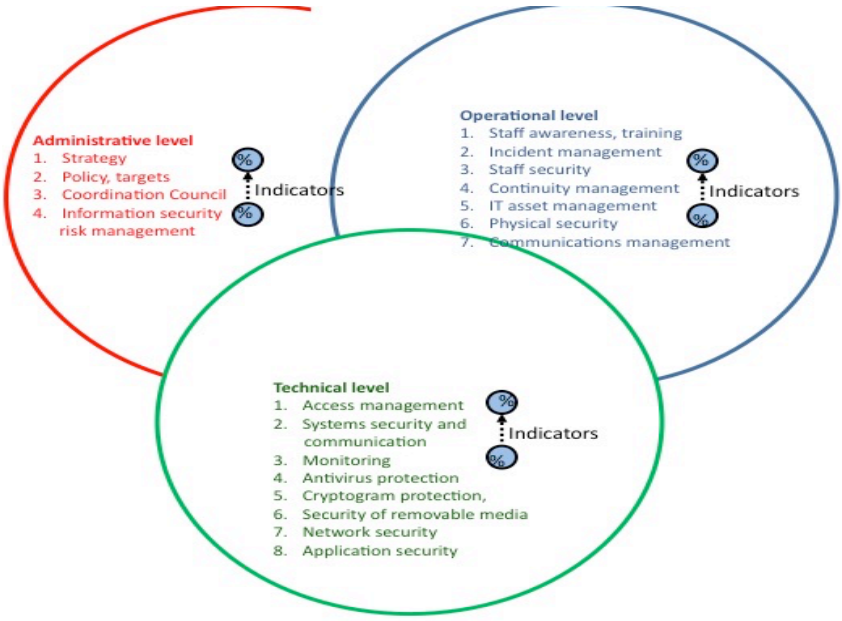
- a legislative framework for data protection with a view to enabling the exchange and joint use of medical information;
- security policies in order to ensure compliance with data protection principles, backed up by legal sanctions;
- management of user access and access of applied systems and services to the various data fragments, protecting information against unauthorized access, as well as protecting against the loss or corruption of data; and
- a system for the use of electronic signatures.

Structure of the information security management system

The Ministry of Health information security management system should be built on the following three axes:

- administrative
- operational
- technical.

Diagram 4. Information security management system



3.6. Legislative framework (legal standards)

Developing legislation and regulations is a key factor for the success of eHealth.

The first priorities should be to regulate issues to do with computerized processing of patients' personal data, introduce primary medical documentation and medical archives in electronic format, transfer to electronic health paperwork, and ensure information security when using electronic health documents. The scope and methods of holding telemedicine consultations and organizing conferences should be enhanced, including through the use of mobile technologies.

In order to fulfil the functions described in the Strategy, work must be done in the following areas:

- development and implementation of a legislative foundation for using electronic medical documentation instead of traditional paper copies;
- establishment of an appropriate legal framework regulating the exchange of electronic medical documents, confidentiality and data protection;
- development of an appropriate legal framework for upholding and protecting the constitutional rights of citizens and judicial personalities in the provision of the most sought after electronic services;
- harmonization of domestic legislation with international practice;
- definition of the organizational and legal aspects of using electronic digital signatures, including the conditions and means of their use, including in interdepartmental cooperation;
- development and implementation of a unified policy and technical standards to define the process of interdepartmental exchanges of data and electronic cooperation; and
- development of mechanisms for implementing existing legislation (existing legislative acts passed by the Government of the Kyrgyz Republic).

A legislative framework on electronic communication, digitalization and ICT, including several regulations, has been developed gradually over time in the Kyrgyz Republic.

When developing the electronic management strategy, the legislative framework was evaluated from the perspective of international experience (European Union, Kazakhstan, Russian Federation).

The above shows that the necessary legislative framework for the effective implementation of electronic services and administration is already in place, and includes laws, presidential decrees and government orders.

The existing legal framework is not, however, sufficiently developed: there is no clearly formulated comprehensive policy and technical standards, which should define the process for interdepartmental exchanges of data and electronic cooperation, including in open format.

In order to implement eHealth, further work is therefore needed to develop the legal framework, including by enacting legislation that applies to all ministries and departments (Public Health Act, Personal Information Act, Act on Access to Information Held by the Government and Local Authorities, the Electronic Documentation and Electronic Digital Signature Act).

Legislation needs to be drafted to reflect the following issues:
- the definition of eHealth;
- the definition of the various rights and responsibilities of those involved in implementing eHealth and using its outcomes;
- respect for the confidential nature of medical data and eHealth processes;
- regulation of data access and patient agreement with regard to data use by other health service stakeholders (health workforce, etc.);
- conditions for conducting an eHealth audit; and
- certification/licensing conditions.

The eHealth regulation process will be conducted along the following axes:
- amending and improving existing legislation;
- drafting standards and regulations;
- harmonizing institutional structures and administrative processes; and
- auditing and monitoring compliance with legal standards.

3.7. Professional training

There is a general deficit of health care workers, in particular specialists. The continuous professional development system requires a lot of high-level attention from the Ministry of Health.

Human resources and ICT skills are crucial elements of innovative development, particularly with regard to ICT. In this regard, broad use of ICT will have significant social and economic consequences.

Moving towards the use of ICT in the health sector will stimulate innovative development, improve the quality of medical services, increase labour capacity, reduce expenses, give rise to new types of economic activity and improve quality of life.

The Strategy defines two areas for the development of ICT knowledge and skills:

1. health care workers;
2. the public.

In order to further develop training and practical skills for health care workers, education programmes and training seminars need to be set up.

Education programmes can be organized as electronic, distance and combined study.

For training programmes to be conducted, the following needs to be done:
- design study courses and education programmes;
- ensure course administration (access to study materials, tests and exercises); and
- monitor training results and statistics.

Distance courses for interactive study can include methods such as forums, walls, chats, video transmissions and messages.

Video conferencing is now being used successfully for training. Taking part in training used to require workers to travel. Now, training is being conducted through video conferencing, where the trainer is in one city, and the study group is in another. After a short while getting used to it, the differences with traditional methods of training are now barely noticeable, and there is one great advantage – all classes can be recorded and watched again offline. Furthermore, all video conferencing technology-equipped rooms have a big screen and are therefore appropriately equipped for giving presentations.

3.8. Possible risks and how to minimize them

The table below sets out several of the main risks that could arise during the implementation of the Strategy.

Type of risk	Category	Probability	Measures to eliminate the risk and minimize its consequences
1.Lack of political will to support implementation of the Strategy	Political	High	A government decree is required.
2. Lack of understanding among the management of health care institutions of the usefulness of the IHIS	Administrative	High	Meetings and seminars should be held. Outreach work. Increase the responsibility of health care institution managers with regard to the introduction and use of ICT through the adoption of indicators on ICT use in managerial staff contracts.
3.Insufficient budgetary funding to implement the Strategy	Economic	High	Decisions of the Parliament and the Government on budget distribution for the use of ICT in health care institutions through separate budget lines. Attracting extra-budgetary funding sources, international banks and donors.
4.High turnover of IT specialists	Administrative	Medium	Revise remuneration systems by applying a multiplying coefficient, revising the wage category and classification, etc.
5.Lack of awareness of eHealth among the health workforce	Administrative	High	Use medical training institutions to develop specialists' ICT capacities.

6. Lack of interest among donors and international banks in supporting eHealth	Political	High	Outreach work with donors at the Government level and developing projects that have a social attraction.
7.Inability to quickly draft the legislative framework for the provision of distance medical consultations	Legal, administrative	Medium	Quality drafting of laws and their timely adoption.
8.Lack of a definitive version of several international standards on eHealth	Technical	High	Establishment of a group of experts on eHealth standards within the Ministry of Health. Make a list of standards required for the IHIS. Identify the standards that are deficient and the organizations in which those standards are drafted. Delegate a representative to participate in the work of those organizations.
9. Difficulties getting all Ministry of Health organizations connected to an Internet network	Economic, technical	Medium	Use, where possible, both fixed and mobile telecommunications networks. Encourage the adoption of a government decision on the provision of Internet services to medical institutions at a reduced rate.

4. Recommendations

1. The successful implementation of eHealth medical services depends on three main factors: government support, availability of technological platforms, and training for administrative and medical personnel.

2. The development of the IHIS multiservice corporate information network, with the Ministry of Health data processing and storage centre, should be expedited.

3. The data processing and storage centre, is the core element of the IHIS. The transport part of the IHIS network should be based on the national electronic governance network, taking account of the requirements for the reliable transfer of medical information.

4. Particular attention should be paid to expediting the launch of the Ministry of Health IHIS, which will be the technical platform for eHealth medical services.

5. The IHIS should be a flexible, digital system, able to adapt to the changing targets and functions of the health sector and the possibility of introducing new, good quality indicators and research subjects.

6. Preparations should be made to establish a Ministry of Health information channel that meets international standards; discussions should be held with the Ministry of Transport and Communications and data transfer system operators. The standards, technical requirements and specifications for IT equipment and basic software should be discussed. Consideration should be given to the possibility of providing low cost or free of charge Internet services for the IHIS, as a potential contribution from Internet providers to the improvement of public health services.

7. It should be noted that the introduction of the IHIS will afford a great opportunity to provide eHealth and telemedicine services. This will in fact be one of the most important uses of information systems with respect to improving health service quality for the whole population, irrespective of where people live. Along with health service provision, the use of telemedicine will permit distance consultations, professional training and development, awareness-raising activities for healthy living, and dissemination of academic research.

8. A detailed implementation plan for the IHIS needs to be developed, and regular courses should be run for medical and technical staff.

9. Given the considerable amount of work and capital investment to establish the IHIS, its implementation should be gradual, taking account of the availability of resources, and ensuring that all the project's requirements are met. Regions and individual health care institutions can join the information system as and when they are ready.

10. The Ministry of Health information portal must be completed.

11. In developing the IHIS, consideration should be given to the considerable potential opportunities afforded by the extensive coverage of the mobile telephone system (mHealth).

12. In order to ensure compatibility between existing medical information systems and their integration into the IHIS, efforts must be made to use the system of standards and regulations for digitalization of health care, which include regulations on:

- the composition and structure of information on the provision of medical services, health status and health care resources; and
- the organization of storage, processing and transmission of information, protection of personal data, identification of health system stakeholders, information sharing between medical apparatus and information systems, and systems for the use of electronic medical records.

13. A comprehensive study programme for administrative staff and health care workers should be developed as a matter of urgency, with various levels of study and covering not only doctors but also nursing staff. Nurses should be able to be qualified to work with new medical equipment and provide doctors with information necessary for consultations and decision-making.

14. The IHIS has considerable potential for distance learning (eLearning), which will considerably reduce spending on organizing and holding seminars. This is important for all aspects of the Den Sooluk Programme. It will no longer be necessary to invite participants to Bishkek and take them away from work to attend seminars.

15. A centre for distance medical consultations should be established in Bishkek.

16. The centre for distance medical consultations should be expanded to include a project for telemonitoring patients with chronic diseases, using mobile eHealth technology. This would enable

telemedicine services to be provided to patients with diabetes, tuberculosis and other diseases, and pregnant women and children.

5. Implementation phases

Given the considerable amount of work and capital invested, the eHealth system should be implemented gradually, taking account of the availability of resources and available and ensuring that all the project's requirements are met.

Preparatory phase	2015-2016	Develop the IHIS project and implementation plan, taking account of international standards. Participation in the work of the National Electronic Administration Centre to coordinate IHIS integration into the eGovernance systems and structure. Preparation of several eHealth pilot projects.
Intermediate phase	2016-2017	Review existing databases from the perspective of international standards and compatibility requirements. Set a purchasing plan for equipment and software. Coordinate activities to develop a new legislative framework for eHealth and set up the basic services required to support the IHIS in the broader context of eGovernance. At this stage, it will be worth putting together a package of proposed amendments to existing legislation and proposals for new draft legislation on public health services and prevention. Key documents should be drafted on standardization and cross-system interoperability (compatibility) for establishing an effective system of interdepartmental cooperation with regard to technical, organizational, legal and information-related aspects. Several eHealth pilot projects will be implemented.
Implementation phase	From 2018	The data processing and storage centre will be established. Essential legislation will be enacted and general infrastructural, platform and programme services (including at the pilot stage) will be put into practice. The basic registries will be completed and existing databases combined for the deployment of priority electronic medical services, as planned in the "Den Sooluk" Programme. Training for staff using the IHIS. Planning for the further development of the IHIS for the period 2018–2020.

Conclusion

Discussing the eHealth Strategy with members of the working group confirmed the necessity and importance of setting up a health management information system for all components of the Den Sooluk Programme. The IHIS should not just be viewed as a system for automating the collection and processing of data at all levels of health service provision, although undoubtedly that is one of its important functions. The establishment and implementation of the system to fulfil administrative functions, and its many clinical and training applications, will:

- improve the performance of administrative decisions by digitalizing the monitoring and analysis functions of health care management at all levels;
- improve the effective use of health care resources;
- manage the system for professional training and retraining, and ensure the equitable distribution of training;

- oversee the distribution and spending of funds;
- lower administrative spending by reducing the number of workers while increasing the quality and complexity of work done;
- establish a personalized database reflecting the health status of the publication and the activities of health care institutions;
- increase the relevance of statistical information, streamline information flows and avoid duplication in the collection of information; and
- provide a wide range of medical stall with access to remote sources of information related to their sphere of activity, which will increase their professional training.

Of course if all these positive outcomes are to be achieved, time and a lot of hard work must be invested to train staff at all levels to work with the IHIS. One of the great particularities of information systems is the possibility to gradually introduce and implement subsystems for specific functions. This flexibility enables the potential and possibilities of the IHIS to be strengthened gradually.

Flexibility also relates to the establishment of infrastructure. Individual regions and districts can be gradually included in the IHIS according to the availability of resources and infrastructure. It is, however, particularly important that from the very start of the process a set of guidelines for setting up an IHIS should be established and put into practice, along with a set of technical specifications for the system. These two documents should contain a description of all the technical and medical standards and instructions required to establish an integrated information system. They should describe in detail the individual components (modules) that will comprise the IHIS.

Action Plan for the Implementation of the eHealth Strategy in the Kyrgyz Republic, 2015 – 2020

Activity	Anticipated outcome	Implementation period	Actor	Funding source
1.1. Design eHealth architecture on the basis of national eGovernance IT/ICT architecture	The integrated health information system (IHIS) project, together with the data processing and storage centre, will combine and correct existing databases using newly acquired information technologies.	2015–2016	Department for Coordination and Reform Implementation under the Ministry of Health (DCRI), Compulsory Health Insurance Fund (CHIF) and National Medical Information Centre (NMIC)	Budget
1.2. Prepare a list of international technical and standards required for developing the IHIS project.	Information system compatibility	2015–2017	DCRI, CHIF, NMIC, development partners	Budget, SWAp-2, parallel funding
1.3. Develop information systems models for the various health care institutions	Defined content, format, transfer channels and target recipients for electronic services. List of State services, due for priority digitalization of common services	2015–2016	DCRI, Department for Medical Care and Medicine Policy (DMCMP), CHIF, NMIC	Budget, SWAp-2, parallel funding
1.4. develop, implement, support and monitor system-wide components and services for	General infrastructural, platform and programme services brought into use,	2015–2017	DCRI, CHIF, NMIC, development	Budget, SWAp-2, parallel funding

electronic service implementation	including: (а) a secure gateway for interdepartmental electronic cooperation/exchanges of data or information, (б) data processing centres, (в) possible electronic authentication and identification, monitoring access - use of email systems and electronic document management systems		partners	
1.5. Make data processing centres operational	Acquisition of legal status Provision of supplies, technical equipment and staff Establishment of a protected area for the exchange of data between health care organizations	2016–2018	DCRI, Ministry of Health Department for Financial Policy, judicial sector, CHIF, partners	Budget, SWAp-2, parallel funding
2.1. Audit of information systems to check compliance with international standards and compatibility with the IHIS.	Activities defined for the unification and integration of health information systems.	2015–2016	DCRI, CHIF, NMIC	Budget
2.2. Develop recommendations on the use of internationally accepted classifications, guidelines and registers of effective information system administration.	Comparable indicators defined for data analysis. Compatibility of information systems.	2015–2017	DCRI, DMCMP, CHIF, NMIC	Budget, parallel funding

2.3. Select a standard for electronic medical records and adapt it for use in the Kyrgyz Republic.	Adherence to good international principles.	2015–2016	DCRI, DMCMP, CHIF, NMIC	Budget, parallel funding
2.4. Monitor outcomes of the work of international organizations and participate in their working meetings on electronic medical records.	Remaining up to date on the latest developments in the field of electronic medical record implementation.	2015–2017	DCRI, DMCMP, CHIF, NMIC, development partners	Parallel funding
2.5. Develop and adapt the base module for the electronic medical record for implementing an integrated, complex, modular health information system.	Integrated health information system established, providing an electronic work system for pharmacies, laboratories, special diagnostics departments, and various other health services.	2015–2018	DCRI, DMCMP, CHIF, NMIC, development partners	Budget, SWAp-2, parallel funding
2.6. Set up an electronic registry and gradual implementation of electronic patient notes for patients receiving medical care (electronic queuing).	Automated patient care process established. Increased transparency in the work of health care institutions. Centralized database for patient care established, for presenting information in a format that is easy to process and use.	2015–2019	DCRI, DMCMP, CHIF, NMIC, health care institutions	Budget, SWAp-2, parallel funding
2.7. Establish a national medicines database	Electronic medicine procurement system implemented to ensure effective and transparent purchasing of medicines and medical equipment in all health care institutions. Improved cooperation, transparency in the provision of medicines and regulation of the handling of medicines and medical equipment.	2015–2018	DCRI, DMCMP, CHIF, Department for medicines and medical technology (DMMT), NMIC, development partners	Budget, SWAp-2, parallel funding

2.8. Develop, enhance and implement personalized databases (registers)	Transition to targeted funding for medicines, in which resources are allocated to specific patients.	2015–2018	DCRI, DMCMP, CHIF, NMIC, health care institutions	Budget, SWAp-2, parallel funding
2.9. Develop projects for the provision of telemedicine services use of mobile health technologies (mHealth)	Technical and economic justification developed for the establishment of a centre for distance medical consultations in line with the priorities of the "Den Sooluk" Programme (cardiology, diabetes, tuberculosis, maternal and child health, etc.). Planned scheme for the establishment and location of distance telemedicine points.	2015–2016	DCRI, DMCMP, development partners	Budget, SWAp-2, parallel funding
2.10. Establish a network of telemedicine points and distance consultation centres	Telemedicine and diagnosis services provided.	2016–2020	DCRI, DMCMP, development partners	Budget, SWAp-2, parallel funding
2.11. Use of medical statistics systems with analysis and reporting instruments	Monitoring and analysis of health system functioning, taking account of the specific aspects of health service provision. Planning the efficient use of resources to meet public health service needs. Analytical reporting for the various internal and external service users.	2015–2018	DCRI, CHIF, NMIC	Budget, parallel funding
2.12. Establish accessible electronic resources to increase public access to information about eHealth	Increased public awareness and enhanced culture of using information. Broad involvement and engagement of stakeholders in health system development.	2016–2018	DCRI, DMCMP, organizations for health protection, CHIF, NMIC	Budget, parallel funding

3.1. Draft new legislation and/or amend existing legislation	Proposals prepared for optimizing the legislative framework for ensuring that electronic services are provided in line with established requirements for the protection of information, including high-level protection of personal data, and for the possible introduction of various types of electronic signature through technologically neutral legislation.	2016–2018	DCRI, DMCMP, judicial sector, development partners and stakeholders	Budget, parallel funding
3.2. Adopting a legislative framework for the provision of medical services.	High level of protection of personal data, possible introduction of various types of electronic signature through technologically neutral legislation	2016–2020	DCRI, DMCMP, judicial sector, development partners and stakeholder organizations	Budget, parallel funding
4.1. Create a comprehensive register of medical and pharmaceutical staff	Monitoring the qualifications of health care workers and pharmacists in the continuous training system for certification in medical and pharmaceutical activities.	2015–2017	Department for Human Resources and Medical Education (DHRME), DCRI, NMIC, Kyrgyz State Medical University (KSMI)	Budget
4.2. Develop a multiphase study programme for health care workers on the use of eHealth technology in medical practice.	Study programmes developed for various categories of IHIS users. Inclusion of course on the digitalization of public health in the curricula of medical colleges.	2015–2016	DHRME, NMIC, Kyrgyz State Medical Academy (KSMA), KSMI, development	Budget, parallel funding

			partners	
4.3. Develop a system of distance learning for doctors and other health care workers	Availability of good quality education irrespective of location. Equal access to educational resources.	2015–2017	DHRME, NMIC, KSMA, KSMI, development partners	Budget, SWAp-2, parallel funding
5.1. Establish a mechanism for implementing the Strategy	Plans developed and approved for all bodies to support the implementation of the Strategy. Recommendations drafted on reporting on the implementation of those plans.	2015	DCRI, CHIF	Budget
5.2. Identify the structures responsible for technical implementation	Technical operator for eHealth infrastructure identified.	2015	DCRI, CHIF, NMIC	Not required
5.3. Monitor eHealth development	Activities monitored in line with indicators and action plans.	2015–2017	DCRI, CHIF, NMIC	Budget, parallel funding

Annex

International eHealth interoperability standards for the priority areas of the Den Sooluk Programme, 2012–2016

These standards* are being developed by Integrating the Healthcare Enterprise (IHE) (**http://ihe.net/About_IHE/**) in the following areas (**http://ihe.net/IHE_Domains/**):

Anatomic Pathology
Cardiology
Dental
Endoscopy
Eye Care
IT Infrastructure
Laboratory
Patient Care Coordination
Patient Care Device
Pharmacy
Quality, Research and Public Health
Radiation Oncology
Radiology

*All existing documentation on standards is written in English and needs to be translated into Russian (and other languages), which is a considerable task.

INTEROPERABILITY STANDARDS FOR PRIORITY AREAS
Cardiovascular diseases (Cardiology)
Cardiology Technical Framework (http://ihe.net/Technical_Frameworks/#cardiology) Comments and implementer feedback on all documents can be submitted at Cardiology Public Comments. **Current Technical Framework - Revision 5.0** *August 29, 2013* *Copyright © 2013: IHE International, Inc.* *Final Text* ○ Volume 1 (CARD TF-1): Integration Profiles ○ Volume 2 (CARD TF-2): Transactions ○ ECG List XML Schema and Examples (zip)

Supplements for Trial Implementation

The IHE Cardiology Technical Committee invites organizations to begin development work based on the following supplements to the IHE Cardiology Technical Framework. These trial implementation profiles are eligible for testing at subsequent IHE Connectathons.

- Cardiac Imaging Report Content (CIRC) - Published 2011-07-01
- Cath Report Content (CRC) - Revised 2013-10-11
- Displayable Reports (DRPT) - Revised 2013-08-29
- Evidence Documents Profile Cardiology Domain Options: Stress Testing and CT/MR Angiography (ED) - Revised 2013-08-29
- Electrophysiology Implant/Explant Report Content (EPRC-IE) - Published 2014-04-30

Sample EPRC-IE CDA Document (XML)

Image-Enabled Office (IEO) - Revised 2013-08-29
Intravascular Imaging Option for Cath Workflow - Published 2013-05-21
Resting ECG Workflow (REWF) - Revised 2013-08-29
Stress Testing Workflow (STRESS) - Revised 2013-08-29

Cardiology White Papers

Cardiology Data Handling - Published 2007-06-08

Maternal and child health

Patient Care Coordination Technical Framework (http://ihe.net/Technical_Frameworks/#pcc)

Comments and implementer feedback on all documents can be submitted PCC Public Comments

Current Technical Framework - Revision 9.0

2013-10-04

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- Volume 1 (PCC TF-1): Integration Profiles
- Volume 2 (PCC TF-2): Transactions and Content Modules

These volumes provide specification of the following profiles:

- Cross Enterprise Sharing of Medical Summaries Integration Profile (XDS-MS), including Medical Summary Document Content (MS) specification
- Emergency Department Referral (EDR)
- Exchange of Personal Health Record Content (XPHR
- Immunization Content (IC) - incorporated into the TF 2013-10-04

Brief descriptions of these profiles are available here.

Supplements for Trial Implementation

The IHE Patient Care Coordination Technical Committee invites organizations to begin development work based on the following supplements to the PCC Technical Framework. These trial implementation profiles are eligible for testing at subsequent IHE Connectathons.

- Antepartum Profiles (includes the following profiles) - Revised 2011-09-09
  - Antepartum Education (APE)
  - Antepartum Laboratory (APL)

- Antepartum History and Physical (APHP)
- Antepartum Summary (APS)

CDA Content Modules Supplement - Revised 2013-10-04
Labor and Delivery Profiles (includes the following profiles) - Revised 2013-10-04

- Labor and Delivery History and Physical (LDHP)
- Labor and Delivery Summary (LDS)
- Maternal Discharge Summary (MDS)

Newborn Discharge Summary (NDS) - Revised 2011-09-09
Perinatal Workflow (PW) - Published 2010-08-30
Postpartum Visit Summary (PPVS) - Revised 2011-09-09
Early Hearing Detection and Intervention Workflow Definition (EHDI-WD) - Published 2013-10-04

Quality, Research and Public Health Technical Framework
(http://ihe.net/Technical_Frameworks/#qrph)

Comments and implementer feedback on all documents can be submitted at QRPH Public Comments.

Current Technical Framework - Revision 0.1

September 2, 2011
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Trial Implementation

- Volume 1 (QRPH TF-1): Integration Profiles
- Volume 2 (QRPH TF-2): Transactions and Content Modules

Supplements for Trial Implementation

The IHE Quality, Research and Public Health Technical Committee invites organizations to begin development work based on the following supplements to the Trial Implementation QRPH Technical Framework. These trial implementation profiles will be available for testing at subsequent IHE Connectathons.

- Birth and Fetal Death Reporting (BFDR) - Revised 2013-09-13
- Newborn Admission Notification Information (NANI) - Published 2012-08-27

Vital Records Death Reporting (VRDR) - Published 2013-09-13
Early Hearing Detection and Intervention Workflow Definition (EHDI-WD) - Published 2013-10-04

Quality, Research and Public Health White Papers

The IHE Quality, Research and Public Health Technical Committee has published the following white papers.

Newborn Screening (NBS) - Published 2009-09-01

Tuberculosis
Public Health Data Standards Consortium (PHDSC). Clinical Document Architecture (CDA) for Public Health. Tuberculosis Wiki Pages: https://wiki.phdsc.org/index.php/CDA-Template_Tuberculosis (*To access this information, please register with PHDSC Wiki Pages in English.*)

Tuberculosis Case Report

Tuberculosis - Data Definitions xls - 05-21-12
Tuberculosis - User Story Case Report Sample (XML File) (JPG Image)
Tuberculosis - Implementation Guide pdf 12-06/29
Tuberculosis - Developer Implementation Guide pdf 12-06/29
Tuberculosis - HL7 SDWG/PHER-PHCR IG R2 Change Request

Tuberculosis - Mycobacterium tuberculosis - Lab Report

Tuberculosis Lab Report - Data Definitions (XLS) - 3/4/13
Tuberculosis Lab Report - XML File - 3/4/13
Tuberculosis Lab Report - Human Readable Format - 3/4/13
Tuberculosis Lab Report - Lab HL7 2.5.1 Message - 3/4/13
Tuberculosis - Sample CDA Lab Report - (XML File) (JPG Image)

These standards on presenting tuberculosis data for the register of tuberculosis cases [Tuberculosis - User Story Case Report Sample (XML File) (JPG Image) and Tuberculosis - Sample CDA Lab Report - (XML File) (JPG Image)] are based on the standards below:

Health Level Seven (HL7). Clinical Document Architecture (CDA) Release 2. URL: http://www.hl7.org/implement/standards/product_brief.cfm?product_id=7

HL7/ASTM Implementation Guide for CDA® R2 -Continuity of Care Document (CCD®) Release 1. URL: http://www.hl7.org/implement/standards/product_brief.cfm?product_id=6

HL7 Implementation Guide for CDA® R2: Public Health Case Reports (US Realm). URL: http://www.hl7.org/implement/standards/product_brief.cfm?product_id=34

HL7 Version 2.5.1 Implementation Guide: Electronic Laboratory Reporting to Public Health, Release 2 (US Realm). URL: http://www.hl7.org/implement/standards/product_brief.cfm?product_id=329

HIV

Health Level Seven (HL7). Clinical Document Architecture (CDA) Release 2. URL: http://www.hl7.org/implement/standards/product_brief.cfm?product_id=7

HL7/ASTM Implementation Guide for CDA® R2 -Continuity of Care Document (CCD®) Release 1. URL: http://www.hl7.org/implement/standards/product_brief.cfm?product_id=6

HL7 Implementation Guide for CDA® R2: Public Health Case Reports (US Realm). URL: http://www.hl7.org/implement/standards/product_brief.cfm?product_id=34

Data exchange and information security standards

IT Infrastructure Technical Framework (http://ihe.net/Technical_Frameworks/#IT)

Comments and implementer feedback on all documents can be submitted at ITI Public Comments.

Current Technical Framework - Revision 10.0
September 27, 2013
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Final Text

- Volume 1 (ITI TF-1): Integration Profiles (rev 10.1 added 2013-10-25)
- Vol. 2: Transactions - Volume 2 is divided into three separate sub-volumes:
  - Volume 2a (ITI TF-2a): Transactions ITI-I through ITI-28. These transactions are used in the following profiles CT, PSA, EUA, PIX, RID, XDS, ATNA, PDQ, PWP, NAV
  - Volume 2b: (ITI TF-2b): Transactions (cont'd) ITI-29 through ITI-64. These transactions are used in the following profiles PAM, XDM, XUA, XDS, XCA, PIX V3, MPQ
  - Volume 2x (ITI TF-2x): Appendices A through W and Glossary

Volume 3 (ITI TF-3): Contains Section 4 Cross-Transaction Specifications and Section 5 IHE Content Specifications

These volumes provide specification of the following profiles:

Audit Trail and Node Authentication (ATNA)
Basic Patient Privacy Consents (BPPC)
Consistent Time (CT)
Cross-Community Access (XCA)
Cross-Enterprise Document Media Interchange (XDM)
Cross-Enterprise Document Reliable Interchange (XDR)
Cross-Enterprise Document Sharing (XDS.b)
Cross-Enterprise Sharing of Scanned Documents (XDS-SD)
Cross-Enterprise User Assertion (XUA)
Enterprise User Authentication (EUA)
Multi-Patient Queries (MPQ)
Patient Administration Management (PAM)
Patient Demographic Query HL7 V3 (PDQ V3)
Patient Demographics Query
Patient Identifier Cross-Referencing (PIX)
Patient Identifier Cross-Reference HL7 V3 (PIX V3)
Patient Synchronized Applications (PSA)
Personnel White Pages (PWP)
Retrieve Form for Data Capture (RFD) - moved to the TF 2012-08-31
Retrieve Information for Display (RID)
Sharing Value Sets (SVS) - moved to the TF 2013-09-27

Brief descriptions of these profiles are available here.

Please Note: The following supplements were integrated into revision 10 of the Technical Framework Volumes:

Cross-Enterprise User Assertion - Attribute Extension (XUA++)
Document Sharing Metadata Volume 3, Section 4 Redocumentation
Support for Metadata - Limited Document Sources

Supplements for Trial Implementation

The IHE IT Infrastructure Technical Committee invites organizations to begin development work based on the following supplements to the IT Infrastructure Technical Framework. These trial implementation profiles are eligible for testing at subsequent IHE Connectathons.

Care Services Discovery (CSD) - Published 2013-09-20
Cross-Community Fetch (XCF) - Revised 2013-10-25
Cross-Community Patient Discovery (XCPD) - Revised 2012-08-31
Cross-Enterprise Document Workflow (XDW) - Revised 2013-09-20
Delayed Document Assembly - Revised 2013-10-25
Document Digital Signature (DSG) - Revised 2009-08-10
Document Encryption (DEN) - Published 2011-08-19
Document Metadata Subscription (DSUB) - Revised 2013-09-20
Healthcare Provider Directory (HPD) - Revised 2013-09-20
Internet User Authorization (IUA) - Published 2013-09-20
Mobile access to Health Documents (MHD) - Revised 2013-09-20
Notification of Document Availability (NAV) - Deprecated 2013-09-27
On-Demand Documents - Revised 2013-10-25
XAD-PID Change Management (XPID) - Published 2011-08-19
XDS Metadata Update - Revised 2013-10-25

IT Infrastructure User Handbooks

User handbooks provide advice, examples and considerations for the use of IHE ITI profiles.

Cookbook: Preparing the IHE Profile Security Section - Revised 2008-11-10
De-Identification - Revised 2014-06-06
Algorithm Mapping Spreadsheet (for use with De-Identification Handbook) - Revised 2014-06-06
Template for XDS Affinity Domain Deployment Planning - Revised 2008-12-02

IT Infrastructure White Papers

The IHE IT Infrastructure Technical Committee has published the following white papers. These white papers facilitate the use of existing IHE ITI profiles or scope the need for future profiles.

Access Control - Published 2009-09-28
A Service-Oriented Architecture (SOA) View of IHE Profiles - Published 2009-09-28
Health Information Exchange: Enabling Document Sharing Using IHE Profiles - Published 2012-01-24