

eHealth strategy and implementation activities in Bulgaria

Report in the framework of the eHealth ERA project

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eHealth ERA

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European e-Health Research Area

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Country Report: *Bulgaria*

1 Executive Summary

In the last 3-4 years the Information and Communication Technology (ICT) sector in Bulgaria has been rapidly developing and the country is now close to the average European Union (EU) indicators.

Information society development

- Internet penetration – 30% of population (March 2005): double growth since 2003.
- Internet Service Providers (ISPs) – free of licensing, average price for ADSL connection – 12-15 euro.
- Market segment with future potential – supply of wide range of new services, good “price-quality” offers for the consumer (cable Internet).
- 1.8 billion euro investment in ICT sector in 2005.

Bulgarian IT Industry

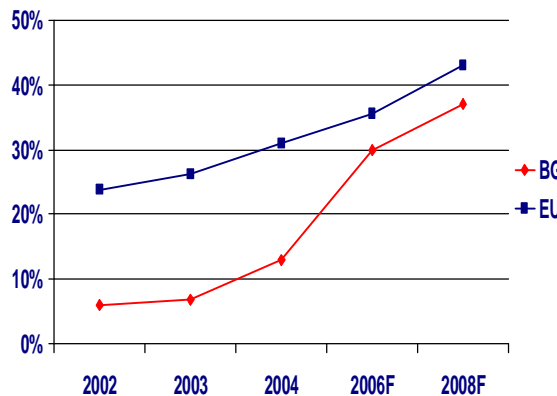
- Over 1,000 small and medium sized IT enterprises.
- Traditions (35 years of experience) in the area.
- Very well developed educational system in electronics, engineering and computer sciences.
- Over 100 ICT companies certified under the ISO 9000.
- 15 companies certified under the ISO 14000.
- 80% of Bulgarian software companies’ revenues result from contracts with European and US partners.
- Bulgarian IT companies successfully complete EU projects in consortiums with European IT companies.

High Tech success story – more and more large IT companies are establishing R&D centres in Bulgaria

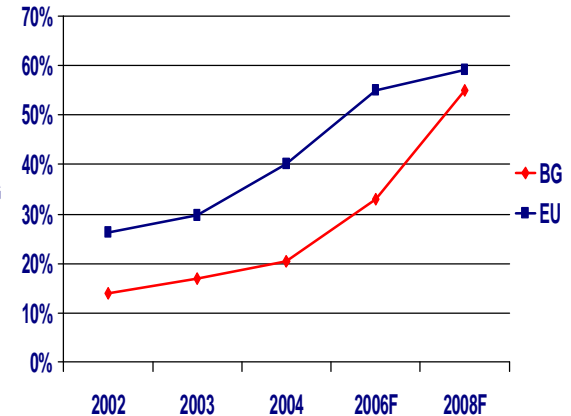
- SAP Labs - 180 people in the Sofia office.
- Huawei Technologies – Research and Development centre and a professional training centre establishment in 2005.
- Tumbleweed Communications – a leading provider of enterprise solutions in the areas of anti-spam, anti-virus, e-mail filtering, and e-mail encryption - currently employs approximately 60 people.
- AMI Semiconductor - Sofia Design Centre is developing and supporting mixed-signal integrated circuits for automotive, industrial and consumer applications.

- EPIQ Group - electronic assembly, module assembly, development and manufacture of plastic injection moulds & factory automation equipment, 12,500 sq m production area, 1,000 employees.

PC Penetration, % of population



Internet Penetration, % of population



Source: State Agency for Information Technologies and Communications

ICT in healthcare

- The information and communication structure of the National Health Insurance Fund (NHIF) has been set up - modern Virtual Private Network (VPN), which includes the central headquarters and the 28 regional health insurance funds.
- Already developed major registers of medical service providers: general practitioners, dentists and specialists, laboratories, pharmacies, hospitals, register of compulsory health insured persons with general practitioners.
- 90% of general practitioners, 100% of laboratories report electronically (but not yet online) and from the middle of 2007 on all hospitals will do likewise.
- The processing of the claims of all medical service providers has been automated.

Major weaknesses in the introduction of ICT in healthcare

- The software applications are developed separately and are not integrated.
- The existing databases do not allow easy reports generation.
- Most of the applications cannot integrate online claims submission from the medical service providers.
- Lack of common access management policy.

Major indicators for the introduction of ICT in healthcare

- 84% of General Practitioners in Bulgaria use PC's and 90% of them report to the National Health Insurance fund electronically.
- 19% of General Practitioners have access to the Internet in their offices. In comparison, 78% of General Practitioners in the EU have Internet access.

- 56.3% of General Practitioners maintain electronic data about their patients, but only a bit of the health information is kept in a health file.
- By the end of 2007 all medical services providers are expected to report electronically.

Most important initiatives and projects, supporting eHealth development, which started in 2006

- **Strategy for the Introduction of Electronic Healthcare in Bulgaria.** The major goal of the Strategy is to transform the healthcare system so that it becomes convenient for citizens through the planned intensive introduction of ICT.
- **Integrated information system of the National Health Insurance Fund** – web-based, receives, processes, checks and validates claims of medical service providers; produces manager and financial verifications; maintains the registers, required by the system.
- **Integrated information system for hospitals** – automates the processes of preparing claims to the National Health Insurance Fund.
- **Health Card pilot project**, which will model and test basic electronic health services: issuing and implementation of electronic prescriptions; patient, general practitioners and pharmacists identification system; National Insurance Institute, National Health Insurance fund and healthcare institutions information channels.

Other, not directly linked projects, which support the provision of eHealth services

- **New eGovernance Law** – single provision and multiple usage of customer data; introducing an obligation for administrations to communicate electronically; setting standards for interoperability
- **Establishment of centralised information structures** - National e-services portal: customers do not need to know who offers which services; centralised services for the identification of citizens and businesses; centralised e-payment; unified inter-departmental exchange of e-documents; full online description of all administrative services; all administrative forms on-line.
- **Establishment of regional information structures** - template of a local government portal – integration with local services; template of a municipality portal – integration with municipal services.

2 Healthcare system overview

Structure of healthcare in Bulgaria – basic data

- Personal care physicians: 4619.
- Medical Centres (MCs): 370.
- Specialists working in Diagnostical Consultative Centres (DCCs) and MC is 73% of the total number of employees in the specialised pre-hospital assistance. The total number of specialists in the pre-hospital assistance 7161.
- State hospitals - 300. In 2004 were licensed 43 private hospitals.

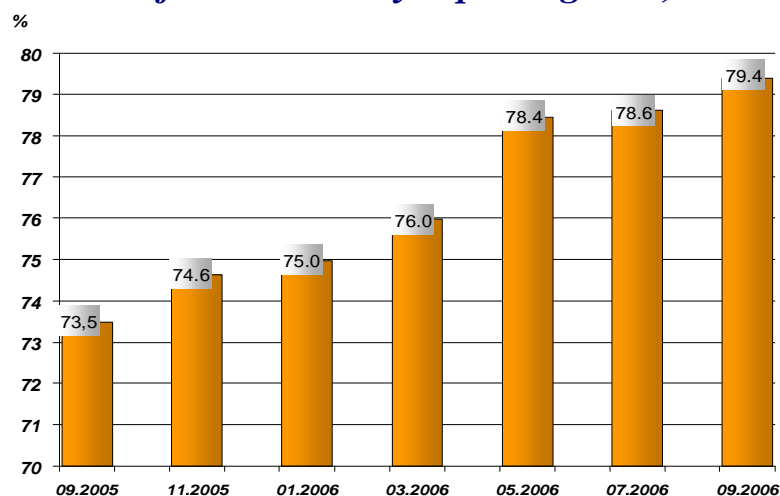
Following trends are observed: the provision of population with physicians and dentists is the same as in EU countries (after May 2004), there is a big difference concerning the provision with nurses per 100 000 people, which in the EU countries is two times more.

The total amount of medical assistance providers (individual and group practices) currently is about 15 000. In the next 2-3 years it is expected to grow up to 16500. Except the GPs, with computers are equipped only laboratories and pharmacies. Most hospitals possess computer and communication equipment.

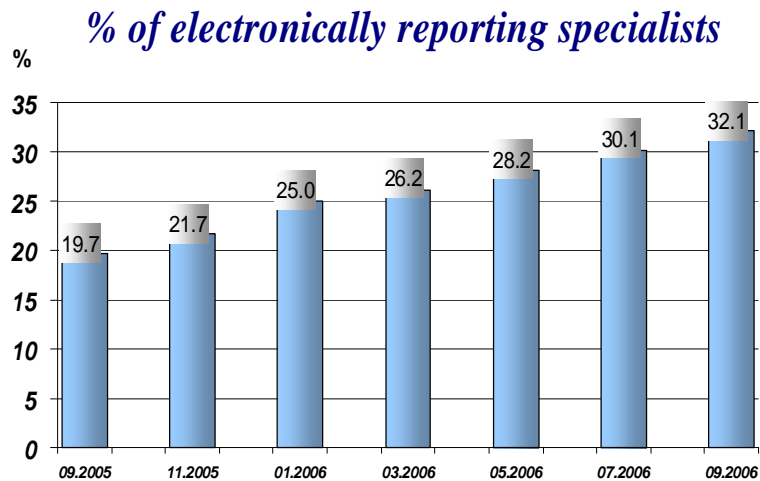
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% of electronically reporting GPs,



Source: National Health Insurance Fund



Source: National Health Insurance Fund

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3 Strategic eHealth plans and policy measures

3.1 National and regional eHealth policy

Key players, responsible for the eHealth development in Bulgaria

- **Ministry of Healthcare** – policy maker
- **National Health Insurance Fund** – responsible for the financing of health-related activities in the country, according to a National Framework Contract. It disposes of the largest and most adequate database, registers and software applications for the management, financing and control of medical proceedings in the country – GPs, hospitals, ambulances, pharmacies and medicine providers.
- **National Centre of Health Informatics** – a public health body related to the Ministry of Health.
- **Electronic Health Foundation Bulgaria** – NGO, initiator and organizer of eHealth-related projects.
- **Professional organizations** of the healthcare specialists.
- **Medical assistance providers** – physicians, dentists, hospitals and other medical institutions.
- **Producers, distributors** of medications, medical materials and devices.
- **Pharmacies and sanitary shops.**
- **Organizations external for the system** - National Insurance Institute, National Statistical Institute, Police, medical, dental and pharmaceutical faculties, governmental and nongovernmental organizations, foundations and others.
- **Patients.**
- **ICT companies** involved in the building and support of different e-health units.

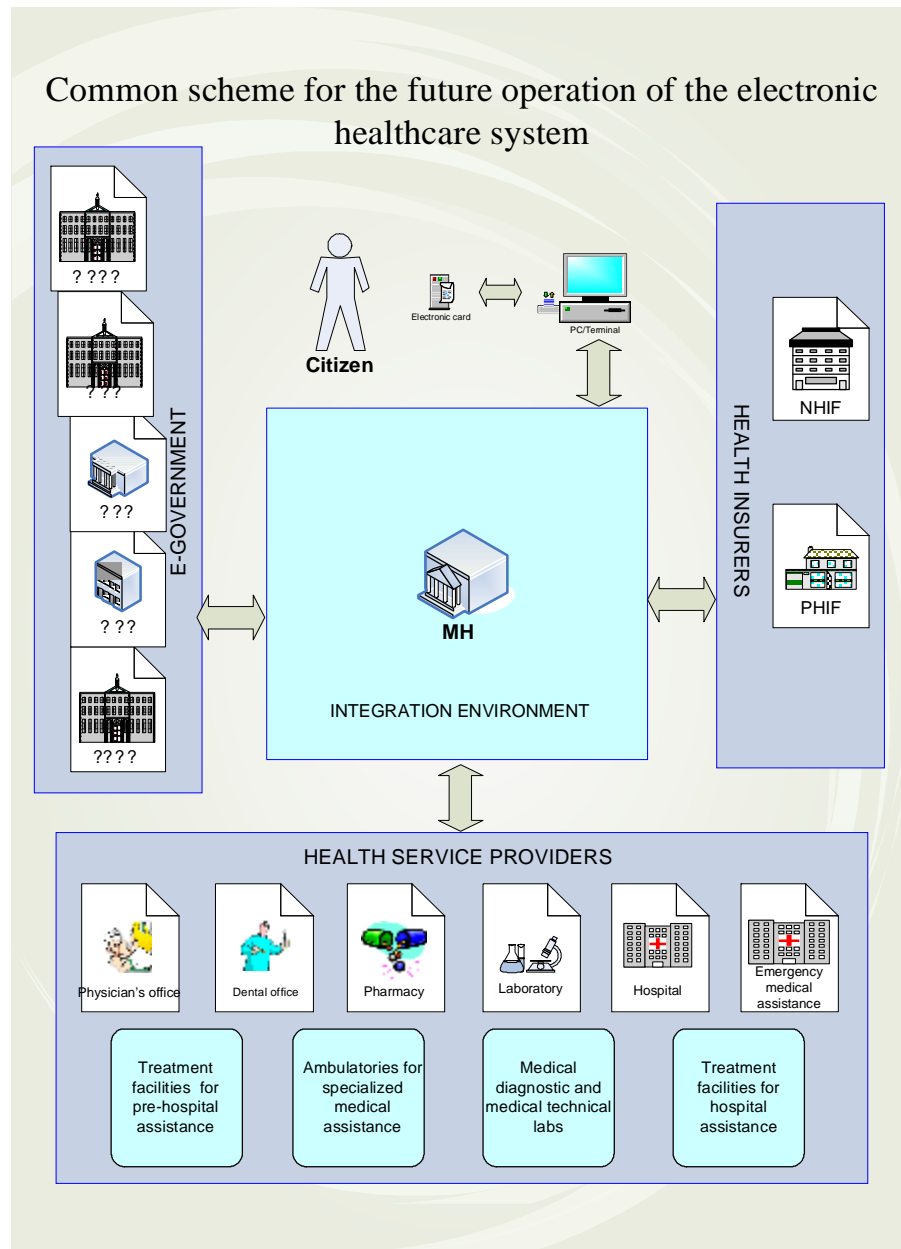
eHealth Roadmap

The Strategy for implementation of electronic healthcare in Bulgaria was developed in the mid of 2006 and has been submitted for approval by the Council of Ministers.

The main goal of the strategy is:

Improvement in the health status and quality of life of Bulgarian citizens, by providing equal access to advanced, effective health services of high quality, through the utilization of new and existing technological means, in accordance with the evolving necessities and increased mobility of population.

The final goal of the Strategy for Electronic Healthcare is to establish an information structure that will allow the introduction of citizen-oriented health services.



For realization of the strategy have to be fulfilled the following operational goals:

- Improving the quality of health services for the citizens
- Orientation of the healthcare model fully towards the end user - the citizen
- Providing full and objective information for all medical and financial activities
- Providing more complete medical information to the healthcare specialists. This will lead to more effective treatment and respectively to shorter treatment terms as well as to higher working capacity of the people in productive age.
- Creation and usage of telemedical infrastructures. This will improve the process of diagnostics and treatment and respectively will lower the consumed costs.
- Possibility for effective communication between health specialists. This will lead to improvement of their qualification and to more effective prevention and treatment activities.

- Facilitating the access to health information. This will increase the medical awareness of people and respectively the effectiveness of preventive medicine will raise, this way the risk for different diseases will drop.
- Engaging nongovernmental organizations and the IT sector for realization of the strategy. They will develop and implement the information systems in the health sector and will take care for the update and the correct operation of the developed systems (on the principles of "outsourcing" and "public-private partnerships"). This way the attention of the participants in the health system will stay focused on the essential medical activities and the performance of the nonessential tasks will be transferred to IT companies.
- Development of integration information environment The availability of integration information environment ensures operationally compatible automated exchange of information and data between all system levels.

Strategy includes the following measures that will ensure the realization of its main goal:

1. Building an integrated information system for information exchange between the healthcare staff (treatment, educational, scientific, financial and administrative units)

- building the necessary infrastructure for normal operation of the healthcare system – networks, connectors and others;
- implementation of electronic health cards;
- implementation of software applications for complex information processing in real time, including: electronic redirections, e-prescription, lab data and other tests
- building complex and integrated with each other, as well as with external applications, hospital information systems;
- creation of complete electronic patient medical record;
- establishing an appropriate base for development of telemedical projects.

2. Standardization and information security

The development of information system in any area is preceded by structuring and unification of the processed information through:

- implementation of national health-information standards;
- development of a model of the national health-information network
- developing requirements for compatibility of the healthcare information systems;
- implementing security policies of the information systems in healthcare.
- access to the personal electronic health record through electronic smart-cards, encrypted forms for data exchange

3. Awareness and education

- Delivering web-based services in real time;
- Delivering information to the people electronically by realization of the following portals:

- ü providing information on different ways of treatment; rights, obligations between insured persons and the health service providers, ways of reimbursement and degree of reimbursement
- ü health education;
- ü health prophylaxis;
- Implementation of electronic systems for qualification and continuous learning for the healthcare specialists;
- Development of systems for decision taking support for the health specialists and exchange of clinical information;
- Providing public registers for health facilities and people providing health services, health insurance funds, pharmacies and others.

3.2 Investment and Reimbursement framework

The implementation of the strategy requires the financing of simultaneously developing IT projects. This way the integrity of eHealth solutions should be ensured. The possible financial sources are:

- Budget funds
- Structure funds
- European support programs for the development of information society and eHealth.

The investment structure, introduced below, is the financial framework that the implementation of the Strategy for the introduction of eHealth is going to adhere to. The temporal frame is recommended and could be subject to alteration.

In 1000 Bulgarian Leva (BGN)

Activities	2007	2008	2009	Expected results
1. Computerization	10 500	1 500		Computerization of the whole healthcare system – including – all medical assistance providers – about 15 000 PCs and peripheral devices for them
2. Building information systems				Implementation and installation of software products for all medical assistance providers including pharmacies
2.1 Building information systems for the medical assistance providers (except for the hospitals)	2 500			
2.2 Building hospital information systems				Integrating hospital information systems in 160 hospitals
2.3 Building an information system for the Ministry of health and a Data warehouse for accumulating and processing	1 850	1 400		

the received data from all system levels	525			Developed and working system of MH, with a real ability for effective planning and management of all other organizations in the healthcare sector
3. Building an effective communication system - combining the information systems of all participants in the healthcare sector	17 500	6 400		Building networks between all parties engaged in the healthcare sector and providing them with the necessary Internet access
4. Building a telemedicine infrastructure and a real development of projects for remote-access treatment	7 150	4 300	5 600	The gradual development of telemedical platform connecting the leading medical centres in the country with a large number of small practices, including ones situated in distant areas without developed economical infrastructure, is expected.
5. Introduction of electronic cards in healthcare	16 800	13 500	9 600	Delivering card-readers, implementing systems for authorization and data protection, for prescription management, treatment recording and others. Implementing servers for administration of medical and administrative information, implementation of communicational devices for data transfer.
6. Building centres for collecting and storing health information (electronic health record)	4 250	2 400	1 350	Building information centres (banks) for storage and administration of the collected medical information for the entire population.
7. Training for the healthcare employees	6 800	3 750	3 000	Completing the process for ICT training of the healthcare employees and formation of enduring awareness for the usage of modern technologies in all healthcare areas.
8. Building access portals to the different information systems and intermediate centres.	2 100	2 450	3 200	Creating effective access portals for patients' access to any needed healthcare information and the provided services.
TOTAL investments by years (in thousand BGN)	69 975	35 700	22 750	

4 eHealth deployment status

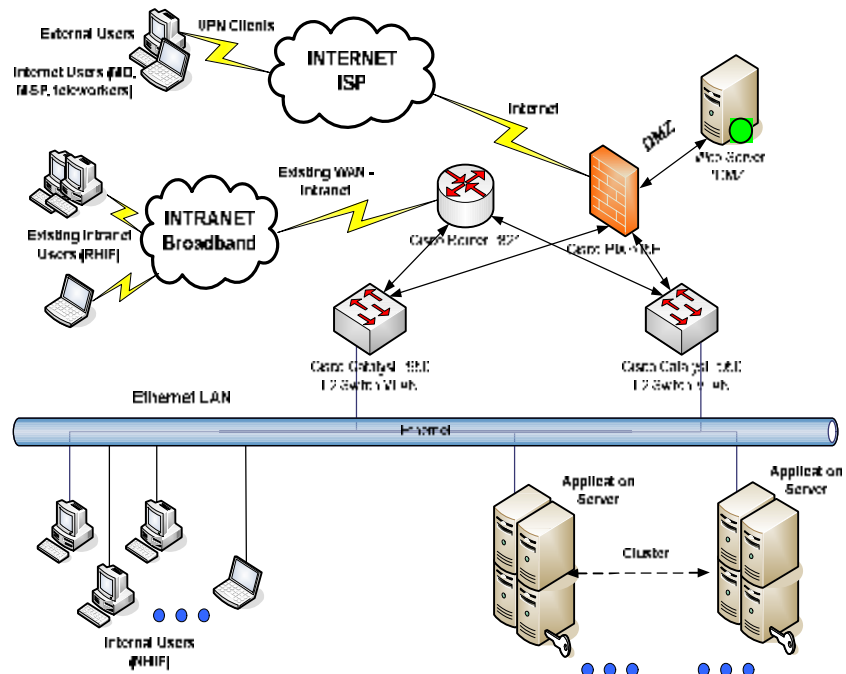
An inseparable part of the aforementioned Strategy for implementation of electronic healthcare in Bulgaria is the 2007-2013 Action Plan. The Plan's working version has been developed in the end of 2006 and its final version is expected in April 2007. Based on the performed analysis and a study on the experience of other countries, several priority basic projects have been defined. A crucial part of the Action Plan is the establishment of an adequate **business model and legal** regulation in the healthcare sector. The most important issues which have to be addressed by the legal regulations are the following:

- **Revision of the specific legal regulation** of healthcare, which will allow the usage of information and communication technologies and enable the transition from the "paper" to the electronic world.
- **Definition of particular rules** providing high and overall information protection.
- **Creation of a common regulation** (establishing of standards and special rules in the healthcare area).

4.1 eHealth infrastructure

Basic data:

1. The basic information structure for the development of eHealth is the established VPN of the NHIF.



2. NHIF also holds the basic registers of medical service providers: general practitioners, dentists and specialists, laboratories, pharmacies, hospitals, register of compulsory health insured persons with general practitioners.

3. All hospitals are provided with broadband Internet access.

4. A small part of GPs have acquired Internet access – 35%, while just 10% of them exchange data among them.
5. About 65% of GPs maintain electronic records of their patients.

4.1.1 Legal and regulatory framework (overview and discussion)

The most important issues which have to be addressed by the legal regulations are the following:

1. A proofreading and revision of the specific legal regulation of the healthcare, which will allow the usage of information and communication technologies and enable the transition from the "paper" to the electronic world with the subsequent validity of issued actions and documents, is needed. The general law for electronic document and signature actually was the first step in this direction, but its application field remained restricted in the cases when the special laws contained a particular regulation for the usage of paper documents. The regulation for the healthcare area is such an example.
2. Defining particular rules providing high and overall information protection. In healthcare this information is especially sensitive. In Bulgaria there is a regulation about personal data protection, but there are no legal standards concerning the security by information transfer, neither concerning its storage, access and archiving. For healthcare the state needs to establish a special policy on a sub-law level.
3. The third most important step is the creation of a common regulation. The establishing of standards and special rules in the healthcare area, could not provide efficiency without adequate common rules regulating the security and the information exchanged within the administration sphere as a whole. We need to have a legal basis for the formalization of the inscriptions in different registers, for the establishment of common technological standards for information and document exchange in the administration, common policy for delivering administrative services to persons and common policy for document and information exchange between the different administration structures.
4. The legal regulation has to define adequately the obligations of each participant in the health system, defined by the business model. The obligatory health insurance, the interrelations between the different parties in the health insurance process, the volume and access rights to the health-insurance information, as well as any obligations for its disposition have to be legally regulated.

4.2 eHealth applications and services

The projects, listed below, are to be started in 2007. Since their technical parameters have not yet been fully defined, the concepts, lying in their implementation are described. The eHealth cards project is an exception, since its practical application starts at the end of January 2007.

4.2.1 Electronic Health Records

Building centres for collection and storage of health information (electronic health file)

The medical health information needs to come from all possible system levels, the access to it has to be regulated according to the European conventions for access to qualified (in this case

health) information and the national law for qualified (personal) information.

For building such centres, first the source of health information has to be identified. Our suggestion is such centre or centres to be built as intermediate points for data collection, as the data coming in the centre can be resent to any of the mentioned structures, that are engaged in e-health: Ministry of Health, NHIF and private HIFs (including international ones), professional organizations of the employed in healthcare, medical assistance providers – physicians, dentists, hospitals and other medical institutions, producers, distributors of medicines and medical materials and devices, pharmacies, sanitary shops, external for the system organizations, medical, dental and pharmaceutical faculties, governmental and non-governmental organizations, foundations, national services, Ministry of Interior, patients, and others.

The accumulated information has to be structured and organized in the database in such a way that the different sections - administrative, passport, medical and financial should be logically split and this way free access from anyone to the personal data stored in the centre would be rendered impossible.

It is also planned to store information needed in emergency, life-threatening states of the patients. This information will contain a medical part: chronic diseases (diabetes, aneurisms, high blood pressure and others), allergies, medications, immunizations, blood group and blood transfusion, operations, family history and others.

The administrative part is also very important and will contain contacts of treating physicians, specialists - any health officer engaged with the particular patient. This information could be accessed not only by emergency units, but also by other organizations, as the check for data access is done by special procedures, that prove the needed permissions.

Structuring the information:

The data, that should be administered in the described centres will be organized according to the principles for creating electronic health files, as the fundament for building the database will be the electronic patient's record.

Data access:

The data in the centres would be accessed (also by the patients) through a specific portal or using special card readers and secured encrypted connection to NHN. The respective users will have read and write access to a predefined information level, using special mechanisms for protection of the delivered information.

The advantages of creating intermediate centres for health information collection and storage are the following:

- Availability of detailed and full health information for each patient (citizen of RB). Similar information cannot be taken from NHIF or other health insurance funds – because they store a smaller volume of medical information and it is only about the insured persons.
- Availability of accessible information relevant for emergency cases;
- Possibilities for direct use and implementation of electronic health cards – because of using the same protocols for data transfer and access, as well as a similar information structure of the type - health file;
- Availability of accessible health information 24 hours a day, which at the same time is secured and protected from unauthorized access.

4.2.2 Health Cards

Introducing electronic cards in healthcare

A basic and very important factor for completing the healthcare reform is the introduction of electronic health cards for patients and doctors that will contain medical and administrative information, the definition of which will be set in accordance with European experience.

The examples from the developed countries with the smart cards and the electronic patient's cards are very recent. Using such a technology, each patient with a card carries along his history of health services and interventions, which enables him to receive health assistance on any place connected to the health network. The availability of full and specific information for the respective patient considerably enhances the accuracy by evaluating his state, reduces the possible mistakes and allows preventive care.

Main data that have to be stored, accessed and processed through the electronic health cards, according to European best practices are:

- Administrative data - including passport data of the patient, patient's photo, gender, insurance status, financial coverage;
- Medical data – information, concerning emergency medical assistance, blood group, allergies, risk factors, medications, vaccinations, implants available, electronically issued prescriptions, past and current illnesses, transplantations, data for the pregnant women, living will of the patient concerning organ donation.
- Introduction of electronic health cards must be performed sequentially for the different types of users. By introducing the electronic health cards we have also planned to develop specific projects for providing the necessary hardware and software components for the reading devices.

In the end of 2006 we developed a pilot project for the introduction of eHealth cards. The project includes the following basic components.

Electronic cards:

- Electronic professional cards of GPs and pharmacists;
- Electronic health cards of patients.

Specialized software:

- Specialized software for GPs for identification, electronic prescriptions, etc.
- Specialized software for pharmacists for identification and the processing of Electronic prescriptions.
- Databases and applications, processing electronic prescriptions, patients lists of GPs, and information about NHIF contract partners.

Specialized hardware:

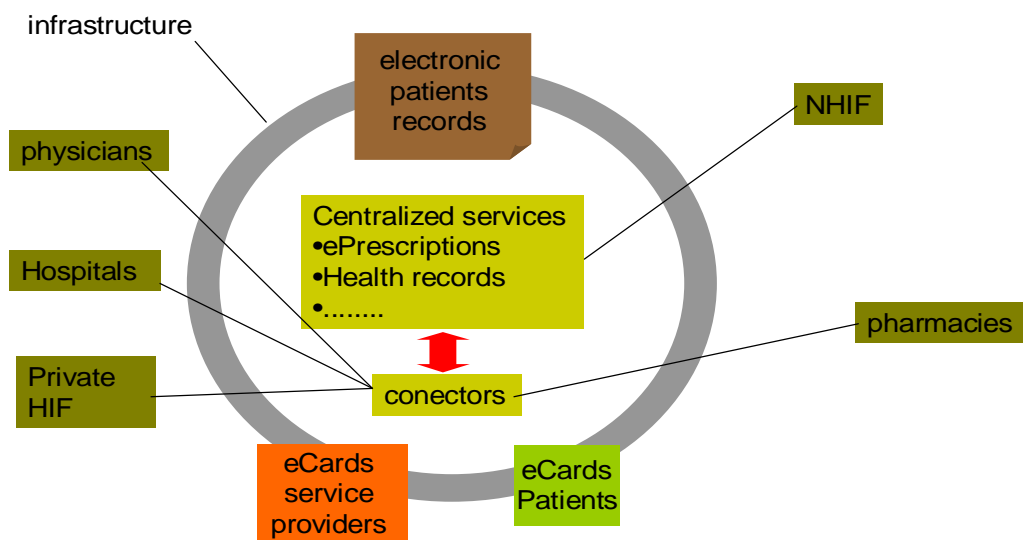
- Card readers, communication devices. Communication devices provide the means for encryption of information and apply existing protection and data transfer standards (including XML, HL7).

The pilot project is set to include 7 GPs, 5 pharmacies and 1,000 patients.

Summary of the business model

In the event of a patient visiting their GP, both of them identify themselves through their electronic cards. The health insurance status of the patient, his belonging to the patients list, etc., are verified. In case of validation, the doctor resumes his/her medical work, entering the required information. On the basis of the reached diagnosis, the doctor would be able to generate an electronic prescription, which then would be stored in a server. The prescription would be stored and kept in the patient's health card until the moment of its realization.

The patient would visit a pharmacy that can apply such an identification procedure. The action is reflected in the electronic prescriptions server, where its status is changed to "executed" or the like, it is registered in the pharmacist's software program and is deleted from the patient's electronic health card.



4.2.3 Health Portals

Building access portals for the different information systems and intermediate centres

The proposed strategy plans the development of health portals that facilitate the access to the health information. For this purpose it is needed to fully guarantee the protection of the personal health information from unauthorized access. This regulation will be created in accordance with the European legal norms for security and privacy, as well as with special rules for access to personal information (including health data). The places in the system, which will provide access to the health data (also to the patients') are planned to be – the intermediate centres for collecting and storing health information. This means, that in order to allow access to the respective data, these centres should periodically receive (and send) information from all other healthcare system units.

Main functionality principles of the portals will be the following:

- Making maximum usage of the available resources in order to provide fast access of the patients (or other system users) to the necessary information;
- reducing costs through direct matching of user's needs with the necessary information - thanks to the good internal integration of data in the system;

- providing infrastructure, that is flexible and fast and can satisfy the most unusual user necessities and market requirements;
- protecting the information of the portal from unauthorized access;
- the portal represents a next-generation desktop solution, that enables access to e-business applications through the web, independently from the available user devices;
- the portal allows access from one user's point to many and different applications. No matter what the data format is and where the information is physically located – the portal aggregates it and delivers it to the user.
- The portal technology allows language selection and provides for a more organized, fast and effective access to the needed information.

4.2.4 Telemedicine services

Building a telemedicine infrastructure and real development of projects for remote access treatment

The importance of staff qualification for the quality of medical services in the healthcare area is constantly rising. The development of e-health makes the solution of these problems possible. By implementation of telemedicine infrastructure the distance and the lack of direct contact between doctors and patients will no longer pose a problem (which is absolutely necessary for achieving good results from the treatment process).

On the contrary - it becomes possible to perform consulting not only from many distant areas within a country, but, based on contract agreements, it is possible to establish an international connection between physicians, or physicians and patients.

The advantages of the implementation of telemedicine solutions in healthcare are the following:

- higher accessibility – each patient will have the chance to be treated by the best specialists in the respective area;
- higher effectiveness of the health assistance – better and stable results are achieved concerning the improvement of the patients' health status;
- better economical effect - the amount of hospital-stay and the days for ambulatory treatment get lower, then the amount of active labour days for each patient is rising – that lifts the gain for the employers and influences positively the economical growth of the country as a whole. That also will bring lower treatment costs for the health insurers.

Steps to realization of the mentioned projects:

- building reliable internet connection between the single system objects;
- using modern medical appliances;
- implementing devices, that connect to the medical appliances and process the obtained data in standardized digital form;
- implementing special devices, called connectors, that accept the obtained digital signals and send them to a specially built centre;

- building a centre that receives and records the received data, after that redirects them to a respective specialist or resends the data from the specialist to the peripheral points of the system;
- using reliable means and encryption algorithms, that guarantee data security and privacy of the data and protect them from external and unauthorized access.

The realization of telemedical projects is to work on the principle of continuous expansion of the system span. This means to start with a pilot project that includes one or several hospitals and their related infrastructures and, from this point on, to enlarge the system in different stages, until it becomes a national one, covering all belonging infrastructures.

Naturally, the building of advanced telemedicine infrastructure to a great extent is dependent on the overall communicational infrastructure in the healthcare sector.

Up to the present moment, several projects in the area of telemedicine, concerned with separate telemedical components, have been completed.

Telecentres Project:

- Includes 10 towns and/or villages in the Septemvri parish
- Enables blood pressure measurement from a distance and online consultations with GPs and cardiologists.