MINISTRY of HEALTH SR

Strategic targets of *e*Health - key tool of public governance informatization in frame of healthcare in Slovakia

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1. Strategic summary

Government of Slovak Republic in awareness of importance of healthcare informatization, emphasized in its program declaration:

„Government shall assure legal and institutional terms for implementation of informational and communication systems, that will essentially help promoting quality, cost effectivity, and time availability of services. In this range government shall support the project of healthcare informatization, and gradually implements targets of national eHealth strategy. "

For fulfilling these intentions the Ministry of Health SR (MoH SR) was laid by resolution of the Government dated 26.3.2008 to submit this strategic document. The document arises from the vision of modern healthcare based on public funds.

> **Vision of a modern healthcare**
>
> **By provision of qualitative, modern, available, and cost effective health services to promote health quality of citizens, and achieve growth of their satisfaction with the health system funded from public sources.**

*e*Health vision is coherent with the vision of modern healthcare:

> **eHealth vision**
>
> **By means of modern informational and communication technologies to support quality improvement and effectivity of all provided health services, reduce errors and duplicities, administrative burden of healthcare and patients, increase citizen satisfaction with the health system funded from public sources. To enable creation of new forms of provided health services, and provide participating parties with relevant information for decision making and monitoring activities in requested time and quality.**

Implementation of *e*Health vision supports implementation of modern healthcare vision, program declaration of the Government, contributes to fulfilling of citizen expectations in range of improving healthcare quality provision, in range of promoting effectivity of public health system, and increasing of healthcare service availability for citizens.

*e*Health vision shall be fulfilled by means of achieving four strategic targets:

> **Strategic targets of eHealth**
>
> ✓ **Creation of legal, normative and architectonic eHealth frame**
> ✓ **Creation of safe infrastructure for realization of vision and mission of eHealth**
> ✓ **Informatization of processes and services in system of healthcare from public sources**
> ✓ **Support of new processes and forms of healthcare and health services**

Working out strategic targets is mentioned in Chap. 3

Achieving strategic targets of *e*Health shall contribute to satisfaction of all participants of healthcare provision system. Summary of main assets is mentioned in the following table:

The citizen gains	✓ **Higher quality of provided healthcare** ✓ Possibility to communicate electronically with system of healthcare provision from public sources ✓ Overview of provided services, related costs, and health services options in concern ✓ health documentation: continual availability, confidentiality, integrity and loss protection shall be secured by an authorized subject ✓ reduction of time and administrative idle periods ✓ reduction of examination duplicities ✓ increase in quality of received health services by reduction of diagnostic and treatment errors, by increase of diagnostic quality and monitoring of the whole treatment course ✓ easily accessible baseline for decision on one's health status, selection of healthcare provider, and drug preference
More effective healthcare	✓ reduction of administrative costs ✓ increase of targeted disease prevention level ✓ cost reduction by elimination of examination duplicities, reporting imaginary outputs, wrong prescription ✓ reduction of secondary costs of healthcare as a result of error reduction in diagnosis, prescription, and treatment ✓ reduction of corrupt behavior in healthcare
Healthcare providers gain	✓ their IS shall be plugged to the basic registries, and effectively used ✓ reduction of administrative costs ✓ standards shall be defined for electronic identificator, formats for creation and storage of records, and communication with next subjects in healthcare ✓ particular IS (ambulatory, economic, managerial, hospital, pharmacy, specialized) on the level of outpatient unit and hospital shall be fully interoperable, able to intercommunicate in defined formats ✓ communication with next subjects shall take course in secured electronic form ✓ electronic prescription simplifies and makes the whole process transparent
Health insurances gain	✓ cost reduction by eliminating duplicities, decreasing errors, and shortening periods for partial activities ✓ cost reduction of administrative operations ✓ defined electronic patient identificator and provider identificator ✓ data for near on-line monitoring of performed health outputs ✓ communication with care providers in secured electronic form ✓ more effective communication with care providers shall take place
Quality of healthcare surveillance shall improve	✓ surveillance over healthcare shall have tools for proactive monitoring ✓ HSA gains tools for rapid and relevant decisions from audit records ✓ Integrating and analytic function of HSA in relation with health insurances shall be reinforced with aim to unhide negative impacts on healthcare funding

SWOT analysis as a scope is mentioned in Annex 1

For implementation of strategic targets of *e*Health it is necessary to assure funding by using of structural funds of EU, financial means of state budget, and other sources.

Estimated range of costs for implementation of Health for the period **2009 - 2013** is **7,6 mld. Sk**, cca. 252,4 mil. €

The frame of financial coverage is mentioned in chapter 6.

Submitted strategic document is an important step of MoH SR to successfully continue in process of informatization of healthcare funded from public sources by means of eHealth program.

This strategic document is in concordance with following strategic documents of EU:

- *„i2010 – a European Information Society for Growth and Employment",*
- *„eHealth – making healthcare better for European citizens: An action plan for European Health Area",*
- *„Decision No 1350/2007/EC of the European Parliament and the Council",* which establishes the second action program of the Community in range of health (2008-2013).

as well as strategic documents of SR in the area of concern:

- *„National strategic reference frame of Slovak Republic for years 2007 – 2013",*
- *„Concept of state health policy of SR",*
- *„Strategy of public governance informatization",*
- *„National concept of public governance informatization".*

Fulfilling of strategic *e*Health targets shall be monitored by means of following qualitative and quantitative indicators being defined in frame of following documents.

2. Introduction

Systems of healthcare EU – new challenges
Healthcare systems in EU despite indisputable results in range of reducing of mortality and morbidity, prolongation of average age, and improving quality of services face several new challenges. It concerns the growing financial demands of the sector caused by ageing of the European population, growth of demands and expectations of citizens of particular countries towards healthcare, or extension of the gap between possibilities of medicine and real available healthcare, personal provision of healthcare, pressure on quality growth of provided services, or assuring mobility of healthcare in range of EÚ. These challenges cope with Slovak Republic and its healthcare.

Action programs of the Community in range of health are the basic documents for the new tasks in health area. The second action program for the years 2008-2013 is currently in force (*Decision No 1350/2007/EC of the European Parliament and the Council*). Program actions should support prevention of serious diseases, and contribute to reduction of their incidence together with morbidity and mortality of those which cause these diseases. Main goals of the program are improving health assurance of citizens, health promotion including reduction of health inequities, creation and dissemination of information and knowledge in the area of health.

_e_Health as an answer to new challenges
One of the suitable approaches to face challenges in system of healthcare is informatization of processes in frame of the whole healthcare. Informatization of processes in frame of the whole healthcare is called *e*Health in this document. *e*Health hides in itself a potential to contribute to quality improvement, cost effectivity, time availability and mobility of health services, and consequently to support new forms of healthcare provision, which would not be possible without deployment of informational and communication technologies (later only ICT). Examples from advanced countries show that already partial suitable implementations of *e*Health lead to remarkable savings in system of healthcare provision, reduce errors, and administrative burden of health professionals, support growth of service availability for citizens, and thus increase the citizen satisfaction. Investments to eHealth have around four years of return.

Program declaration of the Government of Slovak Republic
Government of Slovak Republic gives big importance to development of healthcare informatization, which is expressed in the Program declaration: *„The Government assures legal and institutional terms for execution of informational and communicational systems that shall help to significantly improve quality, cost effectivity and time availability of services. The Government shall support project of healthcare informatization in this range, and gradually to implement targets of national eHealth strategy."*

Annex to National reforming program of Slovak Republic for years 2006-2008 (DkNPR)

Annex to National reforming program represents further task working-out in priority domains of national Lisbon strategy in light of intentions of Slovak Government, where in connection with s *e*Health it is stated (chapter 2.3.3 Informatization of healthcare - *e*Health):

„Informatization of healthcare shall help to increase effectivity, and bring added value of healthcare by eliminating duplicities, or redundant diagnostics and therapeutic interventions, by support of continual care, improving communication between health industry and broad access to health knowledge and evidence based medicine.". „National health information system and services together with organizational changes as well as development of new skills may significantly contribute to care quality, and effectivity and productivity of health sector". Document emphasizes importance of standardization, development and implementation of *e*Health application, and roles of MoH SR and National Health Information Centre (later only NHIC) in whole process.

National strategic referential frame of Slovak Republic for years 2007 – 2013 (NSRR)
It represents a referential tool for preparation of funds. It sets national priorities that shall be cofinanced from structural funds and Cohesion Fund in program period 2007 - 2013 in connection with Strategic directives of the Community about cohesion. Informatization of healthcare is mentioned as well.

Chapter 3.3.2.4, is citing healthcare:
„Long-term lack of health infrastructure is caused by wrong technical status, ageing of the material-technical base, and worn-out of health equipment. Assessment of investment rate to health infrastructure with usage of actual indicator „rate of creation of gross fixed capital to GDP the level of healthcare in SR in years 2000 to 2006 fluctuated between 7,8 % to 15,2 % (significant undercapitalization). Developing economies show value of 25 %."

This document contains also SWOT analysis with defined this weak points: *"Long-term undercapitalization of healthcare providers, and resulting z insufficient level of material– technical infrastructure of health facilities with unfavorable regional impact",* and *„wrong technical status of national health infrastructure including low rate of ICT deployment in services provided by health professionals".* One of the mentioned threats is *„Lack of financial sources for general complex restructuralization of healthcare provider network.*

Main factors of development are *„Access and standard unification of diagnostic and treatment steps with EU"* and   *„Equalization of paper and electronic communication between public administration, citizens and entrepreneurs".*

In frame of operational program Health (later only OPH) it is mentioned: *„Operational program Health implements a specific priority in goal of Convergence 1.4 Modernization of health infrastructure in frame of the regional priority 1. Infrastructure and regional availability".*

Concept of the state health policy SR
This policy establishes strategic development directions of healthcare in SR, emphasizes importance of complex approach with preference of diagnostic, equity of access to healthcare, quality improvement. It demands implementation of criteria for progress measuring (including creation of Informational health system). In chapter *„Informational health system"* there is demands fulfilling following priorities of *e*Health: improvement of citizen healthcare, increase of effectivity of means deployed in healthcare sector, and building of modern healthcare informatics.

List of used acronyms for above mentioned and other documents, vocabulary of terms are placed in attachment 3.

3. Strategic *e*Health targets and specification of content

For fulfilling vision and mission of *e*Health up to 2013 with outline to 2018 there are (based on scope mentioned in chapter 4) strategic targets defined that involve in detail specified partial goals as follows:

C1: Creation of legal, normative and architectonic *e*Health frame.
C2: Creation of secured infrastructure for realization of *e*Health vision and mission.
C3: Informatization of processes and services in system of healthcare from public sources.
C4: Support of new processes and forms of health services and healthcare y means of *e*Health.

Based on approval of these strategic targets the MoH SR works out a Program of *e*Health implementation in Slovakia that shall create system frame of building and implementing appropriate infrastructure and informational systems.

Particular strategic targets are in detail specified and materialized in following partial targets:

C1: Creation of legal, normative and architectonic eHealth frame

- To harmonize legal process and process of norm creation with the norm creating and standardization processor for *e*Health in frame of EÚ with national standardization processes,
- To assure legal adaptations and changes necessary for fulfilling mission and vision of *e*Health in line with the process of e-Government implementation,
- To define, approve and implement binding standards for necessary technical infrastructure, interoperability, health informatics and statistics in line with norms and standards of EU and SR,
- To work out a process-functional analysis of healthcare in respect of *e*Health demands, to identify processes with greatest informatization benefits, to identify and classify risks, avoidable by means of *e*Health,
- To work out a high level process model of health services provision from public sources in actual status and final status,
- To work out a high level architectonic *e*Health proposal based on a high level process model in line with the goal e-Government architecture.

Realization of necessary legal measures is a necessary precondition for achieving strategic *e*Health targets, because eHealth is directly or indirectly touching several acts in governance of MoH SR, and other legal norms.

Standardization of technical infrastructure shall be necessary for successful implementation of all components of *e*Health, interoperability of used informational systems (SOA principles, Web Services, XML, ...), adoption of some coherent standards (HL7, SNOMED, HISA, ...) and provision of unification of already existing EHR forms.

Process-functional analysis of healthcare has a role to describe healthcare processes with a continual functionality of services being informatized. Outputs of such analysis are necessary for further proposal of *e*Health process model and architectonic *e*Health solution, which shall be in line with global e-Government architecture.

C2: Creation of secured infrastructure for realization of eHealth vision, mission, and targets of eHealth

- To create a network infrastructure with full integration of informational security and high availability for provision of communication among all healthcare providers,
- To create infrastructure for identification, authentication and authorization of receivers and providers of healthcare by means of electronic token (e.g. chip card),
- To create infrastructure for production and storage of highly accessible electronic patient records, and for exchange of health information in range of SR,
- To create a platform infrastructure for all *e*Health components (including National health information system NHIS and National health portal NHP),
- To create infrastructure for secured backup and archiving of electronic data created in system of healthcare provision with a guaranty of integrity and availability,
- To support the process of health record migration from actual paper form to electronic form EHR (electronic health record).

Secured infrastructure shall be achieved by completing the network infrastructure, building infrastructure for identification, authentication and authorization, management of access and next security attributes, and creating infrastructure for health information exchange. Aim of completed network infrastructure is to equip the providers with necessary hardware, networking and software devices to enable their mutual communication.

Related security policy, practices and procedures of particular activities, training /skills of users, administrators, monitoring of security and interventions in case of incidents are unavoidable part of secured infrastructure.

There is an intention to conceptualize the infrastructure to be ready for usage of electronic signature. This is possible by means of PKI infrastructure, which can be created internally or externally. The question of unified identificator based on particular token and related technology shall be solved in line with the concept of unified citizen identificator in SR.

Infrastructure for highly accessible and secured electronic patient records shall be achieved by:

- building of secured highly accessible data storage or by deployment of unified storage in range of National concept of public administration informatization
- establishing Access to records for providers of healthcare and patients
- enabling Exchange of these data among particular systems

Building of infrastructure shall be in line with Edict on standards for information systems of public governance.

Effective usage of sources at building of *e*Health is achievable by selection of appropriate platform infrastructure and its multiple usage at creating applications and services. One of the important aspects of his platform is effectivity in support of new and changing processes, services, applications, and effectivity of operation provision.

Aim of backup system is to secure high accessibility of data for healthcare provision also in case of serious violation of system, and thus to secure continuity of operations. Main role of the archiving system is to enable so called *"data forgetting"* in productive information systems (by saving those data in archive system) with a possibility of repeated availability of hose data in future (e.g. for needs of inspection of provided health outputs).

Migration process shall act in the following three phases:
- parallel paper and electronic newly created documentation
- elimination of paper form of newly created documentation
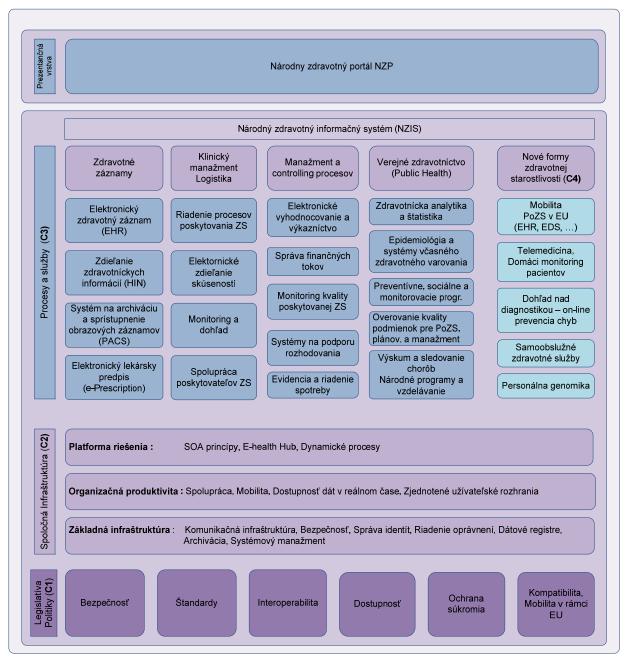- digitalization of necessary parts of historical paper documentation

Creation o secured infrastructure for materialization of vision, mission and strategic targets of *e*Health shall be in line with the approved National concept of public governance informatization with aim to keep accordance with e-Government architecture, support system interoperability, unified Access management, eID, archiving, and other functional attributes.

C3: Informatization of processes and services in system of healthcare from public sources

- to create NHIS including integration of National Health Information Centre, Health Surveillance Authority, Public Health Office, National Transfusion Service, health insurances into NHIS and offering functionality of:
  - processing and Exchange of health records in electronic form (basic registries, EHR, EDS, data for urgent medicine, PACS, ePrescription),
  - systems for clinical management and logistics (management of health cases, sharing of experience, monitoring and supervision, mutuality of HCPs),
  - management and controlling of processes (assessment, reporting, financial flow management, systems for decision support),
  - error free data collection on patients on the site where the information arises,
  - public health (national health programs, epidemiology, vaccination, statistics, system of early warning, monitoring systems for health risk assessment),
  - agenda of MoH SR and subordinate bodies,
  - enabling interoperability, communication or integration with other IS of public governance that is not of a health origin.

- To create a presentation layer of *e*Health in a form of NHP, and offer services:
  - for receivers of healthcare (outline of prescribed drugs, and provided health outputs, information on HCP and health insurance, booking visits at a physician)
  - for citizens to offer common available medical information and information from the range of public health
  - for donors (requirement of NTS)
  - for professional public (valid legislation, standards, recommendations, professional events)
  - for HCPs (presentation of offered services, eventually ePrescription)
  - for health insurances (presentation of offered services)
  - for public health (information on its activities)

NHIC shall offer services to citizens and other actors in healthcare processes. Informatization of these processes and services shall consequently cover agendas of MoH SR, NHIC, HSA, and PHO. This concept of building NHIS shall create good preconditions for completing information systems of HCPs and their intercommunication with other subjects in healthcare.

Following applications, processes and services with common infrastructure set on standards supporting interoperability are regarded as a basis together with a common Access point to information by means of corporate presentation layer created by the National Health Portal. Interoperability is closely bound with requirements on standards not only on the infrastructural, but also application level. Scope for provision of interoperability is a set of standards for public governance.

Processing of C3 target together with above presented scheme originates from the model of healthcare provision mentioned in Annex 2.

Additional information to the scheme:

Health records in electronic form

Electronic Health Record (EHR) represents in natural language and in electronic form driven structured set of records about health status of the patient. Its subset is data for emergency cases (EDS), of a key importance in availability for urgent medicine. These records are by means of secured network made available to competent persons at provision of healthcare. For improving quality of diagnostic methods outputs from diagnostic devices in electronic form are part of EHR (CT, MRI, PET, USG, …). They are saved and made available by means of PACS system. ePrescription together with EHR are able to eliminate cases of wrong drug administration, and offer effectivity of drug policy. Current outpatient systems use various EHR forms, which shall be unified.

Clinical management and logistics

Important role is to implement processes and services for:
- Management of healthcare provision processes
- Electronic sharing of logistic information for improvement of healthcare provision
- Mutuality of subjects participating in healthcare

Management and process controlling

Role of these processes is to offer applications and services for:
- Electronic assessment and reporting
- Management of financial flows
- Monitoring of provided healthcare quality
- Tracking and management of purchased material and services consumption at HCPs

Public Health

Following services and applications have to be provided and integrated to fulfill the mission of public health:
- health analytic and statistic, monitoring for assessment of health risks
- Research and observing of diseases – National programs and education
- Epidemiology and systems of early warning
- State governance of health protection, preventive programs
- Validation of healthcare quality terms, planning and management

NHP

Shall present a unified site (interface) in network internet for Access to health information for layman and professional public including actors of healthcare. NHP shall cope with relevant standards of accessibility and functionality, whereas the functionality could be split to following parts:
- Website of NHP shall make information available by means of authenticated interactive web interface to all actors of public healthcare.
- Interfaces of NHP represent a set of web services, available through e-Government services of NHIS made available by a transmission by a subject of state governance and self governance as well as by e-Government portal.

Informatization of processes and services in system of healthcare must be implemented in line with the approved National concept of public governance informatization, whereas NHIS shall be linked to information systems outside health sector, and shall use basic registries and related common modules, and cope with other requirements defined in National concept of public governance informatization in range of relationship between *e*Health and e-Government, which is stated in.

C4: Support of new processes and forms of healthcare
- mobility: to assure international availability of patient data, mobility of healthcare, and join the European system of electronic support of cross border healthcare provision ,
- self-service forms of healthcare,
- telemedicine (diagnostic, monitoring, therapy) including teleprescription – prescribing drugs on a distance,
- on-line monitoring: to limit possibility of wrong decisions at diagnostic, at drug prescribing and treatment steps by monitoring of ePrescription and surveillance upon healthcare provision
- personal genomics – individualized medicine based on scan of genetic information.

Support and definition of new processes and forms of healthcare is important already today to consider requirements of newly prepared processes and services at proposals for standards, infrastructure and information systems to better use financial sources.

Operative tasks

An important foreign conclusion from *e*Health deployment says that the key <u>for success</u> is **a balanced rate between innovation speed** (immediate launch) **and careful** (continue in small steps), with respect to existing experience of successful and unsuccessful efforts in other countries. It means that it is necessary not only to determine strategic targets, but also to identify <u>such operative steps, which become crucial for successful acceleration of eHealth Program already in 2009,</u> and reduce the risk of failures in implementation phase. In accordance with determined strategic targets (mainly C1 – Creating of legal and normative *e*Health frame) we suggest to perform the following operative tasks as soon as possible:

- **To work out a Feasibility study on implementation projects of *e*Health Program.**
- **To process a high level process analysis and process model.**
- **To create an architectonic framework, data infrastructure and set up short term priorities of eHealth Program.**
- **To identify legal preconditions of *e*Health Program implementation.**

4. Scopes for performing strategic targets of *e*Health

Suggested strategic targets of *e*Health arise from legal framework, requirements and visions of SR and EU related to informatization of public governance and healthcare. They take in respect the existing technical infrastructure and organizational provision of healthcare informatization. Main scopes are defined in following approved documents.

4.1. Strategy of public governance informatization (SPGI)

SPGI defined a vision, strategic targets and directions for e-Government v SR up to 2013 including managing structure, implementation plan, and financial framework.

To achieve these visions 4 main goals were defined to become a framework at specification of strategic *e*Health targets:

- To increase satisfaction of citizens, entrepreneurs and other public with public governance
- Electronization of public governance processes
- To increase output and efficacy of public governance
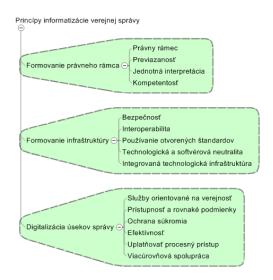- To increase authority of public governance

The Constitution of SR says that state bodies may act only in range of competence and manner given by law. Process of informatization of public governance has to be a managed process, closely bind with forming of legal frame, and needs implementation into processes of informatization. This concerns also informatization of healthcare system. A synergic usage of structural funds of EÚ and sources of the state budget shall assure implementation of challenging steps and largest IT projects in the history of SR.

4.2. National concept of public governance informatization (NCPGI)

SPGI is followed by NCPGI, which in details Works out strategic targets of public governance informatization.

- creates framework of public governance informatization
- defines principles of public governance informatization
- defines architecture of integrated information system of public governance (later ISPG)
- describes a conceptual approach, which should be followed by ISPG managers formally responsible in governance units informatization
- defines the frame of priorities, which launch the process of effective informatization of public governance

For proposal and classification of *e*Health strategic targets inspiring principles are defined in NCPGI:

Princípy informatizácie verejnej správy

Formovanie právneho rámca
- Právny rámec
- Previazanosť
- Jednotná interpretácia
- Kompetentosť

Formovanie infraštruktúry
- Bezpečnosť
- Interoperabilita
- Používanie otvorených štandardov
- Technologická a softvérová neutralita
- Integrovaná technologická infraštruktúra

Digitalizácia úsekov správy
- Služby orientované na verejnosť
- Prístupnosť a rovnaké podmienky
- Ochrana súkromia
- Efektívnosť
- Uplatňovať procesný prístup
- Viacúrovňová spolupráca

Requirements of NCPGI shall be provided and implemented by creation of NHIS in accordance with architecture of integrated ISPG defined in NCPGI.

NHIS shall be performed in line with defined and approved rules, standards of data Exchange, and with utilizing technological and communication infrastructure. Implementation of NHIS shall be conditioned by necessary legal changes with stress to optimalization of processes. NHIS shall consist of mutually linked autonomic information systems using basic architectonic components defined in NCPGI, with respect to fact that healthcare provision from public sources is relatively independent and specific area covered by NCPGI only partially.

4.3. Requirements and framework of healthcare informatization in EU

Legal framework adjusting healthcare informatization offers a regulation of member state cooperation in three areas – research, strategy, and application of electronic healthcare.

There are three general directorates within European Commission dealing with healthcare informatization.

A document describing employment of ICT in healthcare is COM (2004) 356 final „*e-Health – making healthcare better for European citizens: An action plan for a European e-Health Area*". It addresses requirements for creation of user friendly and interoperable information systems in healthcare.

Framework Program (FP) represents a main tool of support for *European Research Area* (*ERA*).in area of research and development. Since 1. 1. 2007 the *Seventh Framework Program (FP7)* is in force.

Most important documents in area of strategy:

- *„i2010 – a European Information Society for Growth and Employment"* is a document describing calls and directions of informatic society up to 2010. Document was adopted in 2005.
- *„e-Health – making healthcare better for European citizens: An action plan for European e-Health area"* is a document adopted in 2004, and contains ideas described in the forgoing document for healthcare area.

Strategic framework of EU, i2010 – European Information Society for Growth and Employment supports opened, innovative and competitive digital economy, and is a key element of renewed Lisbon partnership for Growth and employment, which builds integrated approach to the policies of audiovisual media information society in EU. To achieve these priorities the strategy of i2010 joins actions of regulation, actions of political coordination, and support by financial tools on the level of the Community.

Policy Support Program of Information and Communication Technologies (ICT PSP) in Framework Program for Competitiveness and Innovation (CIP) represents one of the main financial tools of i2010 strategies. Aim of the ICT PSP is to stimulate innovations and competitiveness by means of broad implementation and best utilization of ICT by citizens, governments, and companies. Main obstacles of broad and better usage of ICT in areas as healthcare, inclusion, public governance are unavailability of ICT services, insufficient interoperability of solutions in various member states together with atomization of solution market based on ICT. ICT PSP helps to overcome the obstacles restricting development of information society for all by supporting targets of i2010 strategy. It helps to develop markets with innovative solutions based on ICT mainly in area of public interest. In the period of 2007 – 2013 the program ICT PSP is bind to program eTen (finished in 2006), which supported application of electronic services, including services of electronic healthcare into economic practice. Exact topical orientation of ICT PSP in particular years is published in the working program of the particular year.

4.4. Institutional provision

Organizational and institutional provision of national and international cooperation at healthcare informatization in SR shall be secured by:

- MoH SR by means of following bodies: Board of Minister for informatics and statistics, eHealth Committee of MoH SR (eHealth coordination centre in SR), Section of Informatics MoH SR (OI MoH SR).
- NHIC as a subordinate body of OI MoH SR by means of existing organizational structure of national centres:
  - o National Centre for Healthcare Informatization (NCHI, acronym *"eHealth Competence Center"*),
  - o National Centre for Standards of Information System in Healthcare (NCSISH),
  - o National Centre for Health Statistics (NCHS),
  - o Slovak Medical Library (SILK) as a National Centre for Provision of Medical and Health Information (NCPMHI).

eHealth working groups include creators and users of eHealth solutions, health professionals, industry etc. Expert groups are next component, which shall be a part of international expert groupings (such as HL7, subsidiary of ProRec etc.).

Compliance of above mentioned structures shall secure taking over and implementation of relevant international standards into Slovak healthcare (e.g.. ISO TC215, CEN TC251, SNOMED, HISA, DICOM). A coordination of international mutuality in field of eHealth and transfer of best practices in healthcare informatization from member states shall be secured as well.

4.5. Infrastructure

„Concept of healthcare information system development" released by MoH SR in December 2005 defines the information system of healthcare (HSI) as follows:

„Information system for healthcare is created by health information systems and their operators, and by binding standards for health informatics and statistics. Health information systems are sets of software, hardware and other tools dedicated for tracking, controlling,, processing and provision of data concerning healthcare. Binding standards are tools of comparability, ICT, structures and formats of data interfaces, structure, quality, time and way of data tracking and providing, and next standardized rules and guidelines."

In reference to the given definition, HSI is created by:

- Information systems of health sector
- Elements of technical organizational structure supporting performance of the mentioned information systems
- Integrating interfaces among information systems in range of health sector
- Integrating interfaces with information systems cooperating with the system environment of health sector

Based on this classification HSI is distinguished in following domains:

I.   NHIS
II.   NHP
III.   Technical organizational infrastructure of HSI
IV.   **Integration of NHIS with neighborhood**

Infrastructure shall be developed in line with Edict on standards and systems of public governance

5. Organizational provision of strategic *e*Health target implementation

5.1. Structure of organizational provision

Achieving of strategic *e*Health targets shall be realized in form of „ Implementation of *e*Health Program in SR - IeHP". This form is suggested because it represents an issue of multisector character, having impact on several horizontal and vertical levels linked together. Program management is proposed as three-level with strategic, tactical, and operative levels.

Implementation program of such range and importance has to be managed strictly following rules of program management in a break-down of independent but mutually bind projects, to assure:

- interim validation and updating goals and priorities of the program,
- time schedule and continuity of solution,
- matching with the financial frame,
- achievement of requested solution targets based on clear implementation plan
- quality of particular subsystems in solution, and created units,
- harmony with requirements and visions of SR and EU in relationship with informatization of public governance and healthcare.

Program shall be driven by MoH SR, through the Section for Informatics and next institutes and bodies established for it:

- Board of Minister for informatics and statistics
- eHealth Committee at Board of Minister for informatics and statistics
- NHIC (organization subordinate to MoH SR).
- Organizational structures of particular informatization projects.

Expertise and technical support at managing of IeHP shall be provided by a system integrator and suppliers for particular projects to assure a unified line with approved strategic targets of *e*Health. Main parts of the management structure for eHealth implementation shall be:

Monitoring board

- It is a covering and controlling body of the program. Its duties are interim and ex post assessment, as well as ex ante assessment of suggested *e*Health projects. ***Role of the Monitoring board shall be performed by Board of Minister for informatics and statistics***

Steering board

Represents the top level of program management. Its mandate is to approve strategic program components (main goals, key measures, and solution of crucial problems), approve program status, concepts, and budgets of particular eHealth projects prepared according to program targets. In case of need it approves next program structures after proposal of the Chair, e.g. expert and consulting teams, ad hoc committees, etc. ***Role of the Steering board shall be performed by the eHealth Committee of MoH SR.***

Program board

Represents an executive body of the program, is responsible for project preparation, coordinates the preparation and performance, processes fundaments and interim assessment of the program, an ex post assessment report. Members of the Board are national coordinator, Program leader, leaders of particular projects and administrative program management. Roles of technical provision of the Program board shall be performed by National centre of healthcare informatization, which is a part of NHIC.

Project teams

Subordinates to Program board, responsible for performance of the project. They have own leaders, permanent and temporary members. Team members are from the public governance area and from the participating private. They are responsible for fulfilling tasks by project plans, they escalate open issues to Program board.

From the process aspect the following framework for implementation of concrete projects is in accordance with methods of PMI and Prince 2, considering *e*Health specification and legislation of SR.

5.2. *eHealth Implementation Framework for projects in Program*
Voluntary steps are typed in italic

Activity	**Responsible subject**
1) Project intention	MoH SR
2) Concordance	MoH SR

  a) Concordance with strategic eHealth targets.
  b) Logical continuity with other eHealth projects
  c) Concordance with related legislation of SR
  d) Concordance with standards of SR and EU

3) Validation	
a) *Feasibility Study*	consultant (external / internal)
b) Proof of concept	consultant (external / internal)
4) Procurement	
a) Means of financing	MoH SR / MF SR
b) Form of procurement	MoH SR
c) Assignment	MoH SR
d) Procurement	office of subject
e) Selection	office of subject
5) Project	

a) Project framework plan.   supplier
b) Project detailed plan.   supplier

   i)   Acceptance criteria.
   ii) Technical specification.
   iii) Security chapter of the project

c) Financial coverage of the project   office of subject
   (investment, running costs)
d) Concordance assessment   office of subject

6) Implementation   supplier

a) Proof of concept correctness
b) Risk analysis
c) Pilot project
d) Evaluation of pilot project
e) Preparation of large scale deployment
f) Large scale deployment of new solution
g) Test performance, approval   supplier / MoH SR

7) Performance

a) Migration plan
b) Parallel operation of existing and new solution
c) Data migration from old to new solution
d) Transition to exclusive new eHealth solution
i) Limited migration of historical data

6. Framework of financial provision for implementation of strategic *e*Health targets

6.1. *Proposal for financial provision*

To achieve strategic *e*Health targets, similarly as in other EU member states, it requires large and focused investments. These investments have to be merged from multiple sources, as they represent solution of social problems with impact on citizens of SR. On the other hand the society and the citizen expect that the benefits achieved by eHealth implementation shall be in balance with costs incurred.

6.1.1. Cost break-down of particular targets

In the structure by strategic targets from chapter 3 the following estimation of costs is estimated:

C1 - Creating legal, normative an architectonic *e*Health framework represents **5 %** of estimated costs. This target contains efforts related mainly to functional and process analysis of healthcare, normative and legal preparation, process model, and eHealth architecture.

C2 - Creating secured infrastructure for realization of *e*Health vision and mission represents **40 %** of estimated costs. It is a group of tasks associated with securing communication, technologic, safety and data infrastructure of eHealth.

C3 - Informatization of processes and services in system of healthcare funded from public sources represents **47 %** of estimated costs. In range of this volume building of NHP and NHIS is calculated.

C4 - Support of new processes and forms of health services and healthcare through *e*Health, aimed to solve needs of integration of NHIS with IS of EU space in period 2008 - 2013 shall cover only certain preliminary and partial projects representing **8 %** of estimated costs. Real costs are estimated after completing of NHIS and implementation of expert systems and telemedicine.

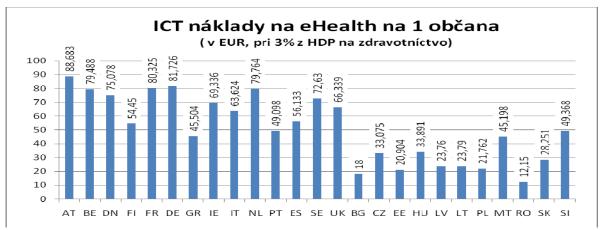### 6.1.2. Projection of financial demands of *e*Health program

Projection scope:

Planned costs on *e*Health in other EU countries arise from fact, that *e*Health costs create a certain part of cost on whole healthcare.

According to the rate of *e*Health development the countries are sorted in three groups:

  a) starting *e*Health implementation with 1,5 % from costs on whole healthcare,
  b) developing *e*Health with 1,8 - 2 % % from costs on whole healthcare,
  c) intensive *e*Health usage with 2,5 - 3 % % from costs on whole healthcare.

Situation in SR compared with other EU countries, and its relative position is captured in the following comparative - „*benchmarking*" chart:

General data sources for chart and eHealth budget:
   Eurostat, WHO, OECD, www.financing-ehealth.eu

   http://www.financing-ehealth.eu/downloads/documents/Financing_eHealth_D1_3_concept_and_context_web.pdf

The chart shows costs on ICT in healthcare (eHealth) in EU calculated per 1 citizen.
Method of chart setup:

   a)   GDP of particular countries (source Eurostat) in €
   b)   % of GDP, given for healthcare and calculate in €
   c)   Take 3 % for *e*Health.
   d)   Result is divided by the population.

This chart determines the upper limit of investment to eHealth at rapid convergence process, amount includes the private sector.

Projection of eHealth costs in SR

 The following cost calculation arises from conservative presumption:

   a)   The starting amount doesn't take the total cost of healthcare, but only costs spent by health insurances on purchasing healthcare from public sources. They represented 83 mld. SK 2007 in comparison with 100 mld costs for whole healthcare.
   b)   Dynamics of nominal healthcare cost growth is 5 %, which is less than estimated growth of citizen incomes in SR.
   c)   SR is ranking among the countries with launching *e*Health till 2013, although eHealth started in 2006, when projects with low financial burden were in place.

The submitted budget proposal isn't aiming to achieve a rapid convergence process related to advanced EU countries in the field of *e*Health, but to eliminate hanging behind them.

Amount for HCP: expected costs for healthcare provided from public sources.

Projected period: 2009-2013

Years	2007	2008	2009	2010	2011	2012	2013
Amount for HCP v in mld Sk	83	87,15	91,50	96,08	100,89	105,93	111,22
% on eHealth			1,4	1,5	1,5	1,5	1,6
Amount for eHealth in mld Sk			1,281	1,441	1,513	1,589	1,780

Total projected amount for eHealth in period 2009 – 2013 is 7,604 mld. Sk (cca. 252,4 mil. €).

For comparison here a version for convergence to advanced countries in a horisont 10 - 15 years.

Years	2007	2008	2009	2010	2011	2012	2013
Amount for HCP v in mld Sk	83	87,15	91,50	96,08	100,89	105,93	111,22
% on eHealth			1,6	1,8	2	2,1	2,2
Amount for eHealth in mld Sk			1,464	1,730	2,018	2,225	2,448

Convergence model is calculated with 9,883 mld. Sk (cca. 326,4 mil. €) for *e*Health in period 2009 – 2013.

6.1.3. Return of the nested investments

Except of citizen benefit *e*Health implementation significantly reduces costs in system of healthcare provision. Therefore a good return of investment is expected.

According to a study of economic impact funded by EC, Directorate General Information Society and Media, ICT for Health Unit, from 2006 the expected period of return is maximum **four years** to achieve consolidated state budget (annual costs and annual outcomes are balanced). **Five years** is a presumed period for achieving cumulative returns (cumulative costs and outcomes become equal).

Source: http://ec.europa.eu/dgs/information_society

6.1.4 Cost projection for years 2008 - 2010

Projection of costs for given years is derived from the amount given in chap. 6.1.2., break-down of costs to particular targets is by chap. 6.1.1. Starting presumption of planning from the time frame is that by 30.9.2008 the range of *e*Health Program funding shall be clear, and yet in 2008 the key **operative / analytic tasks** shall be performed.

Year 2008
In 2008 it is necessary to solve operative tasks of analytic character, and which are starting points for provision of whole program. They are:
- To work out a Feasibility study on implementation projects of *e*Health Program.
- To process a high level process analysis and process model.
- To create an architectonic framework, data infrastructure and set up short term priorities of eHealth Program.
- To identify legal preconditions of *e*Health Program implementation.

Projected costs for provision of mentioned operative tasks are in amount of 64 mil. Sk.

Year 2009
In 2009 it is necessary to perform remaining analytic works remaining under the target C1, significantly implement infrastructure of HIN (Health Information Network) under the target C2, and under the target C3 implement NHP (National Health Portal), and launch implementation works on NHIS (National Health Information System). Because the infrastructure is inevitable for applications, in 2009 the investment in infrastructure shall be higher than in program equipment.

Investments in this range demand a multisource funding with use of sources as defined in chap. 6.2. Amount estimated for 2009 around 1.4 mld. Sk is calculated based on price relations valid for projects of such range and knowledge of informatization status in health sector. Given estimation shall be adjusted after conclusions from feasibility study.

Year 2010
In 2010 the target C1 shall be almost fulfilled, time demanding legal activities shall remain. The core of HIN shall be completed, infrastructure for target C2, and operation of NHP should be fully functional. The range of implementation on application level should be significantly extended therefore in fulfilling of target C3 the largest rate of investment should occur. Works on C4 are not considered yet.

These investments also require a multisource funding with usage of sources defined in chap. 6.2. Estimated amount for 2010 around 1.6 mld. Sk is calculated based on ratio of work range 2009 and 2010, based on price relations valid for projects of such range and knowledge of informatization status in health sector. Given estimation shall be also adjusted after conclusions from feasibility study.

6.2. Possible sources of financing *e*Health implementation

Considering estimated costs it is clear that searching of a **multisource model** shall be necessary, where beside state budget and EU contribution looking for other sources shall be needed.

I. *State budget*

Financial sources allocated for public governance informatization from the state budget are necessary for harmonization of developing and operating information systems with systems of public governance, and principles defined in National concept of public governance informatization, i.e. with basic components of integrated information system of public governance. It concerns usage of data from fundamental registries and code lists, sharing common modules of Central portal of public governance in frame of electronic services provision, information provision to other IS of public administration, as well as provision of health information in frame of basic access components. While *e*Health applications shall be a part of public governance IS, and National concept of public governance informatization defined an indicative time frame (year 2013) for fulfilling of strategic vision, the preparation of state budget has to consider the aspect of eHealth vision fulfillment, and allocate relevant financial sources in frame of approved limits of public governance budget.

II. *Operational program Informatization of society (OPIS)*

This operational program approved by EC and Government of SR states targets and split of the sources from EU funds for years 2007 - 2013. OPIS activities funded from ERDF are linked to funding of complementary activities from ESF, which achieves a synergic effect of contributions. Intervention linkage from ERDF and ESF means that OPIS interventions aim to create material conditions by offering educational, social, **health and other services,** and ESF interventions focus on quality and content of those services. OP Health supports informatization of healthcare providers, and specific applications associated with s *e*Health. *e*Health system presumes cooperation of systems at healthcare providers. **eHealth applications shall be part of public governance IS, therefore a close coordination with OPIS shall be necessary.**

OPIS is focused on creation of technologic, application and process environment for introduction of effective electronic services offered by public governance, and increasing of their availability by means of broadband connection. In frame of this OP **conditions for interconnection of internal IS among healthcare providers and next executive actors of health system** (insurances, pharmacies...) shall be created, **to enable integration through NHP a NHIS into Central portal of public administration and system of electronic services offered by public governance.** Information systems and applications associated with *e*Health shall become part of public governance IS architecture, therefore a close coordination of OPIS with OP Health shall be necessary.

Measures of OPIS priority axis 1 shall be followed by projects of introduction of extended e-Government services, and their plug-in to central portal **in field of healthcare provider informatization**, which shall be supported by OP Health, and follow *e*Health services.

III. *Funding from outcomes of implementation*

Description of investment return, mentioned in chap. 6.1.3 creates a space for financial model of reallocated sources utilization that were saved in particular items of healthcare costs. Volume of savings is estimated as 5 % from volume of funds spent on healthcare after full implementation of eHealth Program.

IV. *Other sources*

Other sources necessary for provision of main *e*Health targets may be created by sources from various grants, financial mechanisms, and international institutions (e.g. World Bank), private investments (type PPP).

One of the possibilities of financial tools on level of European Community by means of communitarian programs of EU focused on area of ICT. It is possible to gain financial sources from EU funds for financing research (FP7) for years 2007 to 2013. Under the program „Partnership" the research support is offered to projects of international cooperation in topic Health, where beside others, issue of public health is in solution. There are no contracts closed for provision of these sources so far, it is expected to do so after 2010.

Annex 1 – High level SWOT analysis for eHealth

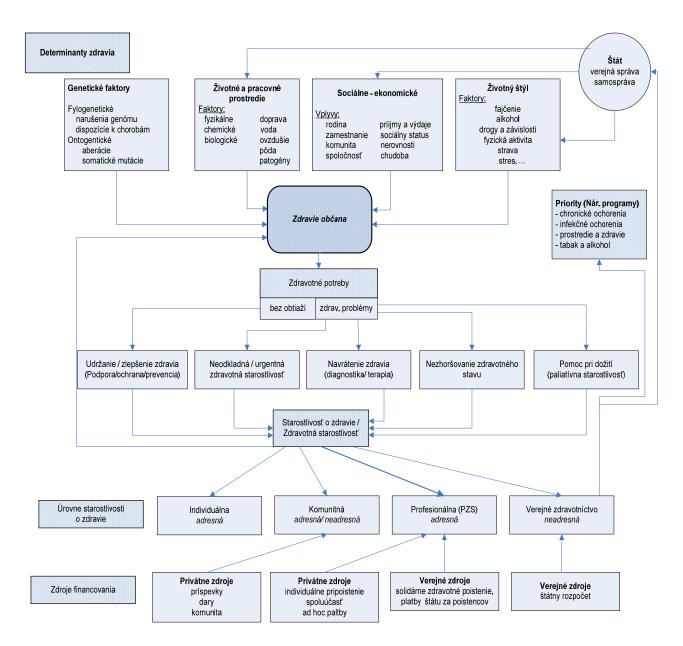| Strengths of eHealth	Weaknesses of eHealth
- Support of Government SR - Support of MoH SR - Good availability and quality of internet. - Interest in IT in healthcare. - High number of infrastructure, HW and SW suppliers. - Appropriate price level of affordable HW and SW. - Completed first phase of building hospital IS. - Informatization of all units of GP – collection of health data from all citizens - Introduction of modern hospital IS. - Existence of health registries.	- Skepticism of health public towards eHealth based on current results. - Lack of successful pilot applications of eHealth. - Minimum up-to-date investment to eHealth. - Failing of up-to-date plans and tasks of eHealth. - Insufficient legal support. - Low rate of Internet connection in outpatient units. - Missing secured infrastructure. - Missing eHealth standards (for EHR, EDS, ..) - Limited interoperability of systems.
Opportunities of eHealth	**Threats for eHealth**
- Cost reduction by increased effectivity, eliminated duplicities, errors and their impacts. - Cost reduction by data insertion to system where data (digital) image is created. - Increased interest of citizens about their health. - Increased information rate of all actors of healthcare provision through NHP. - Effective pressure of public health on prevention of diseases. - Skip generation of older health systems and implement latest technologies. - Increased attractivity of healthcare provision in SR also for other EU citizens resulting in gaining extra sources. - Active inclusion to EU initiatives in eHealth. - Possibility to use EU funds for eHealth. - Mobility of healthcare in SR and EU. - Introduction of electronic identificators for patients and health professionals. - Possibility to offer new health services. - Possibility to create an updated picture of health status in real time. - Uploading patient data in real time on the site of first contact enables monitoring of all actors participating in proposed data model. - Possibility to improve prevention, diagnostics and treatment, more successful care at life threatening events and epidemies. - Overcome biases of current understanding of saving sources to maximize outcomes for health status of population in defined financial framework.	- Lack of adequate financial coverage for eHealth infrastructure and projects. - Wrong proposed infrastructure. - Ineffective finance usage in eHealth. - Underestimation of legal and standardization process. - Underestimation of data collection importance in the new infrastructure of GP - Incompleteness of eHealth architecture and data model in infrastructure of GP. - Insufficient level of personal data protection. - Lack of sources for IS of healthcare providers. - Limited interoperability of healthcare IS in SR as a result of missing standards. - Limited interoperability of healthcare IS with EU as a result of missing EU standards. - Reduced effectivity of certain activities as a result of their inconsistent informatization. - Dehumanization of healthcare. - Unsatisfied excessive expectations of public from eHealth. - Risk of corruption at subjects participating in allocation and using sources dedicated for eHealth.

Annex 2 - Model of citizen healthcare

Model is meant as high level, presented in graphic form with following detailed description of key components, and relations among them.

Determinanty zdravia

Štát
verejná správa
samospráva

Genetické faktory

Fylogenetické
narušenia genómu
dispozície k chorobám
Ontogentické
aberácie
somatické mutácie

Životné a pracovné prostredie
Faktory:
fyzikálne   doprava
chemické   voda
biologické   ovzdušie
               pôda
               patogény

Sociálne - ekonomické

Vplyvy:
rodina   príjmy a výdaje
zamestnanie   sociálny status
komunita   nerovnosti
spoločnosť   chudoba

Životný štýl
Faktory:
fajčenie
alkohol
drogy a závislosti
fyzická aktivita
strava
stres, ...

Priority (Nár. programy)
- chronické ochorenia
- infekčné ochorenia
- prostredie a zdravie
- tabak a alkohol

Zdravie občana

Zdravotné potreby

bez obtiaží | zdrav. problémy

Udržanie / zlepšenie zdravia
(Podpora/ochrana/prevencia)

Neodkladná / urgentná
zdravotná starostlivosť

Navrátenie zdravia
(diagnostika/ terapia)

Nezhoršovanie zdravotného
stavu

Pomoc pri dožití
(paliatívna starostlivosť)

Starostlivosť o zdravie /
Zdravotná starostlivosť

Úrovne starostlivosti o zdravie

Individuálna
adresná

Komunitná
adresná/ neadresná

Profesionálna (PZS)
adresná

Verejné zdravotníctvo
neadresná

Zdroje financovania

Privátne zdroje
príspevky
dary
komunita

Privátne zdroje
individuálne pripoistenie
spoluúčasť
ad hoc paltby

Verejné zdroje
solidárne zdravotné poistenie,
platby štátu za poistencov

Verejné zdroje
štátny rozpočet

a) Health and its determinants

Health

✓ Health is a fundamental activum which should be promoted by healthcare and eHealth on the individual level – citizen, and collective level – society as such: public health.

✓ Several definitions of the expression „health" exist. This term is blurred, it is hard to capture and describe without clear borders.

✓ For purposes of *e*Health coming out from legal and process aspects we understand „health" as a status of organism, where in frame of medically available examination method there is no identifiable diagnosis and no subjective complications.

Violence of this definition is only in random cases, where the diagnosis is not understood by the medical staff.

✓ Under term „top health" we understand a status of organism, which is healthy and on the top of its physical and mental powers, without subjective complications (age around 20 – 25). Demands of healthcare receivers are expressed in growth of requirements on age extension, where the health is near to status of „top health".

✓ Under term „ideal health" we understand top health of physically, emotionally and mentally most capable individuals in population. Demands of healthcare receivers are expressed in growth of requirements on health outputs that would move their health to „ideal health".

Health determinants

✓ Health is influenced by several factors identified as health determinants.

✓ Some factors are external and not directly affect able, which is life and occupational environment. State has legal tools for improvement of life and occupational environment.

✓ Next determinants are partially affect able by the citizen – economic and social factors. State plays an important role at creating favorable economic environment, covering social risks, and limiting of poverty.

✓ Internal hardly influenced health determinants are genetic factors. They concern inherited change of genome (phylogenetic level) or not inherited change of genome (ontogenetic level).

✓ Mostly influenced determinants by citizen are in life style. It is notable, that on a contrary to above mentioned determinants with positive evolution, life style is a worsening determinant, such as mass epidemies of overweight and obesity or a growing range of mental problems.

This evolution is a result of neglecting primary care, whereas the role of general practician in education of patients to a healthy life style is very important. Recovered importance of educational role of a physician of the first contact is one of the ways to influence the abovementioned health determinant and herewith a way to permanent cost reduction in healthcare. Influence of public health is the other way.

b) Health needs and healthcare

Health risks

✓ Health determinants directly or indirectly transform to threats, risks and impacts, which are categorized – e.g. acute / chronic, internal / external, physical / chemical / biological ...

✓ Time span of health threats starts in prenatal phase on level of sperm and egg, continued by fertile egg, embryo, newborn, child, adult, elderly, ...

✓ Health threat violates health, and is expressed in form of direct impacts (e.g. reduced output, work incapacity, partial invalidity, full invalidity, death), or indirect impacts (e.g. financial losses, loss of social status).

✓ Every health violence has a subject side and object symptoms, which may be hardly identifiable at the current level of knowledge.

Health needs

✓ Violence and possible violence's create health needs. This may be understood as a reasonable requirement for preventive, curative, or rehabilitative care resulting from existing or perceived health disorder (Ivan Gladkij at all., Management in healthcare, Computer Press 2003).

✓ According to the Vocabulary of medical terminology WHO, health needs are defined as scientifically determined health insufficiencies requiring preventive and curative intervention.

✓ Health needs appear also without subject complications, however more frequently in case of health problems.
✓ In status without subject complications the patient seeks prevention, or measures heading to „top" or „ideal health" – provision and attendance of citizens at preventive GP visits are an example. Risk profiles for chronic diseases are identified, and the citizen is recommended for suitable adjustment of life style. Fitness and wellness are a suitable addition to a healthy life style.
✓ In case of health problems there is a number of health needs, and according to them associated healthcare is being provided.

Healthcare

✓ Healthcare is a set of je working activities performed by health professionals, including provision of medicines, appliances, and diet nutrition with aim to extend life of a person, increase life quality, and healthy evolution of future generations; healthcare includes prevention, dispensarization, diagnostics, treatment, biomedical research, nursing care, and midwifery.
✓ Urgent healthcare is a separate category, where the needs of a citizen are highly prioritized and acute.
✓ Urgent healthcare is a healthcare performed on a person at a sudden change of health status directly threatening his life, causing sudden and intolerable pain or sudden changes in behavior threatening himself or his neighborhood.
✓ Assistance at birth giving is also a urgent care. A part of urgent care is transport to health facility, transport between health facilities, and urgent transport of organ donors, tissues and cells assigned for transplantation performed by providers of rescue service.
✓ Palliative care for patients in terminal status, where the issue is to decent accomplishing with pain relief is between health and social services.

c) Care for health of citizens in SR

Level of healthcare for citizens

First level of healthcare (individual) is performed on level of particular citizen, and his relatives.
 ✓ It concerns avoiding of physical threats, self-treatment of small injuries, and healthy life style.
 ✓ Development potential of the first level is in field of prevention through healthy life style.
 ✓ Paradoxically in advanced countries a recession of first level is visible as obesity, lack of physical activity, smoking, alcohol, and drugs.
 ✓ This care is addressed.

Second level of healthcare is performed on level of integrated communitarian health and social care. It involves various forms of citizen mutuality, street workers, health clubs, sporting associations, charities, homeless shelters, activities of social communitarian workers aimed at prevention against drugs and street criminality, GPs, nurses, psychologists, physiatrists, pharmacists Red Cross workers... they all are integrated in one health – social network based on common communitarian space, and are not paid from the solidary health insurance.

Third level of healthcare (professional) is based on job split with professions and structure addressed to citizens. It includes healthcare provision – e.g. urgent, ambulatory, hospital, specialized, and health services.

Donation of blood, or organs is a particular category positioned between second and third level. From a donor side it an act of communitarian level, however the performance of donation and distribution is a specialized action assured by the third level.

Fourth level of healthcare (public) is performed unaddressed, on the level of public health. It involves management of environmental, epidemiologic risks and their health impacts, statistical evaluation and assessment of determinants, advancing actions for influencing determinants by the state. As the topic of public health exceeds the possibilities of local subjects, it is generally performed on level of public governance and self governance. Offices of public health are a significant component.

State service to citizen

One of the expected state services is support to satisfying of the fundamental needs – need for health and healthcare. The citizen expects direct help from the state mainly in third and fourth levels, and mediation on the second level.

Third level represents an organization of a functional system of healthcare provision. Selection of a system is apolitical issue, although from a medical aspect various systems could be effective.

Slovak Republic similarly too many advanced countries has a system of healthcare provision based on mandatory solidary health insurance with optional individual extra insurance and ad hoc individual payment, with supervision of public administration and self governance upon public health based on tax incomes from obliged persons.

Management of health risks and funding of healthcare
Health risks belong to the most important social risks, and the citizen feels the need to manage this risk for himself and his relatives.

Possible forms of reaction on risk:
- ✓ acceptance,
- ✓ reducing probability of health threat onset (prevention),
- ✓ reducing possible impacts in case of health threat onset (receiving healthcare),

Funding of third form of risk reaction has several models, most frequent as follows:
- ✓ ad hoc individual reimbursement of healthcare from common income, savings, loan, contribution of family and community,
- ✓ ad hoc help from public governance or self governance,
- ✓ individual health insurance (outputs balanced with inputs) – risk transfer to insurance company,
- ✓ solidary health insurance (unequal inputs, equal outputs) – risk transfer to insurance company,
- ✓ Public healthcare paid from citizen taxes.

Health system functionality and citizen health from the state aspect

Structure of healthcare functionality concerning eHealth building from the state aspect:

   I. addressed part
   II. nonaddressed part
   III. mediation part

Addressed part:
        <u>First level</u> of healthcare (individual)
        <u>Third level</u> of healthcare - professional (in system with public sources, on private basis)
                urgent, ambulatory, hospital, specialized, balneology
        monitoring of healthcare provision

Nonaddressed part:
        <u>Fourth level</u> of healthcare (public health)
        Supporting system of public governance and self governance bodies
             MoH SR, NHIC, HSA, ...
        system of health education, research, and culture

Mediation part:
        <u>Second level</u> of healthcare - integrated health and social care in community, organization
        of donation, not the act itself

Referring to *e*Health definitions, majority of actions is in area of addressed part – healthcare provision, followed by nonaddressed area of supporting systems.

d) Simple model of healthcare provision from public sources

Core of addressed care in SR is he **care provided in system of care provision from public sources**

Assignment of fundamental entities in a simple standard model
1. Receiver of healthcare (ReHC)
2. Provider of healthcare (HCP)
3. Provided healthcare (PrHC) / health output.
4. Supplying environment – distribution chain for drugs/pharmacies, retailers of appliances, disposable material , external labs
5. Health insurances (HI)
6. Person in charge (to pay health insurance - state, self-employed, employee, employer)
7. Insuree (to related health insurance)
8. Health Surveillance Authority (HSA)
9. Other related bodies of public governance and self governance(SK)
10. Surrounding (suppliers, EU, banks, ...)
11. Other healthcare subjects (e.g. NTS, university)

Simplified process of outpatient treatment of an insuree

Verbal description of HCP: X.Y. a SR citizen, insured. X.Y. visits his GP because of high temperature. He was examined, diagnosis was set and medicines prescribed. X.Y. collected his medicines in a pharmacy. He takes medicines, and is not in working incapacity.

Presumptions in model:
- ReHC is a resident insured in HI.
- ReHC paid his duty to HI.
- ReHC is on a record of his GP.
- GP has a contract with related HI.
- GP is not exceeding his contractual framework.
- GP handles PrHC within his unit.

Main processes in the model

Direct processes of a PrHC:
1) ReHC identified his concerns and a health need arose.
2) ReHC requires PrHC at a HCP (outpatient unit, emergency room).
3) HCP performs care to ReHC and prescribes medicines.
4) ReHC collects medicines in a pharmacy.
5) ReHC after treatment visits the GP.

Supporting processes of PrHC:
6) HCP checks, if the ReHC is insured in his contractual HI.
7) HCP records the PrHC.
8) HCP creates a record in the patient documentation.
9) HCP sends required reports on PrHC to HI, SK, and surrounding.
10) State supervises the healthcare provision.

Financial processes:
11) HCP reports outputs to the related HI.
12) Supplier invoices medicines for HI.
13) HI evaluates eligibility of reported costs.
14) HI pays eligible costs to the HCP.
15) HI pays per capita rate for the insuree.
16) HI pays supplier cost for dispensed medicines.
17) Person in charge to ReHC (state, ReHC, employer) pays the insurance duty to HI.
18) HI receives insurance from the person in charge.
19) HI enforces delayed payments from the persons in charge.

Example of risk identification in model, and their possible eHealth solutions
1) ReHC identified his health concerns.
   a) ReHC is over valuating his concerns.
   b) ReHC is under valuating his concerns.
   c) ReHC cannot assess the seriousness of his concerns *(NHP provides help)*
   d) ReHC does not know what to do. *(NHP provides help)*
2) ReHC requires PrHC at a HCP (outpatient unit, emergency room):
   a) ReHC has a problem with HCP availability – how to get to HCP.
   b) ReHC has a problem with working hour information. *(NHP provides help)*
   c) ReHC has a problem with given working hours.
   d) ReHC has a problem with a long waiting time at the HCP. *(physical waiting shall be reduced by booking through NHP)*
   e) ReHC is not handled the same day *(solution by booking through NHP)*

f) HCP does not have a contract with the HI of the ReHC *(ReHC to check through NHP)*

3) HCP provides care and prescribes medicines.
   a) HCP has not enough information to set the diagnosis (*use NHIS, EHR*)
   b) HCP leaves out certain examinations. *(monitoring system can identify)*
   c) HCP sets a wrong diagnosis *(monitoring system can identify)*
   d) HCP prescribes a wrong medicine, e.g. because of contraindication with other already prescribed agents *(ePrescription monitoring can identify)*
   e) HCP prescribes a hardly available medicine. *(ePrescription system to identify availability)*
   f) HCP prescribes an expensive medicine at existence of cheaper equivalents *(ePrescription system can identify)*
   g) HCP exploited limits from HI *(on line communication and solution through IS HI)*
   h) HCP performed surplus health outputs *(monitoring system of HI can identify)*
   i) HCP reported fake health outputs. *(authorization system of eHealth can eliminate).*

4) ReHC collects the medicines.
   a) ReHC does not know where is the nearest opened pharmacy *(identifiable through HI kiosk, or at the HCP).*
   b) ReHC does not know which pharmacy keeps a random medicine *(ePrescription system identifies medicine available).*
   c) Pharmacist offers alternatives to ReHC, which ReHC cannot judge *(identifiable through HI).*

Annex 3 – Used terms and acronyms

Vocabulary of used terms

Authentication	Part of the log in process of an entitled user to an information system, where the entitled user proves he is that user with the log in name.
Authorization	Part of the log in process of an entitled user to an information system, where the entitled user selects one of the roles, being permitted within the system.
Secured infrastructure	This expression i used to describe a large informatic infrastructure in a form of complex network including internet, with implemented clear rules for protection of transferred data. Level of protection has a required height.
process controlling	It is a managing activity, which based on controlling feedback assures that the processes were performed in line with their definition, or a modification occurred (wanted or unwanted).
CT	Computer Tomography. Diagnostic method, where the outcome is a group of images representing set of human body slices in defined site. Intensity of x-ray beams passing through the human body is detected. Beam source and the detector move in a circle trajectory around the patient body. On a contrary to classical x-ray image, the final image from CT is calculated as a matrix operation. Folk expression is ce-te.
Electronic identificator	It is one of functional features, by default possessed by tokens. Function „electronic identificator" is used in process of identification of an entitled user of information system.
electronic token	special electronic tool of small size (chip card, touchless card, USB token, etc.), containing processor and memory, able to communicate with IS, and carries apart from other an information usable in process of identification and authentication of entitled user of the IS
ePrescription	Electronized form of issuing medicine prescription remaining in IS eventually in a central registry saved in electronic form.
Format	It is a communication interface among different IS deployed in healthcare. These interfaces are defined by standards (e.g. HL7).
Identification	Part of the log in process of an entitled user to an information system,, where the entitled user announces to the system, under what name shall he work in the system.
interoperable, interoperability	A feature of different IS able to mutually communicate through communication interfaces defined by standards (e.g. HL7).
unified identificator	An exact type of electronic identificator, used uniformly for identification of entitled user. An electronic token is usually a carrier, with graphic solution serving parallel for standard (visible by reading) or combined(bar code) person identification (e.g. electronic ID).
MRI	Magnetic resonance imaging. Diagnostic method, where the outcome is a group of images representing set of human body slices in defined site. The method works based on magnetic resonance of electrons, and the final image is mathematically calculated similarly to CT.
near on – line monitoring	It is a process of monitoring IS aiming to unhide (near – online = almost immediately) its disorder and notify the IS manager.

PACS	IS for support of radiologic examination, creating an archive of final images from diagnostic devices in electronic form, enabling their later searching, sending, communication with clinical IS, and having next features.
paradigm	Fundamental idea construction, about veracity is not discussed. Above that construction regarded automatically as truthful next visions and opinions are built coming out from fact, that paradigm is truth.
PET	Positron emitting tomography. Next from the advanced diagnostic methods based on sophisticated methods identifying positron presence in a human body. On a contrary to CT or MRI we are able to distinguish, which tissues are growing or not. Color separation is in use, final image is also calculated mathematically. Often used in combination with CT or MRI.
PKI infrastructure	It is an IS for special purposes having various hierarchies and serves mainly for validation of digital certificates (ready to use for digital signing of electronic document), and has many other functions.
platform infrastructure	It is a view on informational infrastructure explaining on what hardware platforms (HP, IBM, Sun, Cisco,...) or which operating systems (Microsoft Windows, Unix, Linux, ...) is the informational infrastructure built.
Presentation layer eHealth	It is a part of information systems creating eHealth which from the functional scope are responsible for displaying processed data on monitors or printers or other end devices of a similar type.
registry	Special IS of a very narrow focus managing a group database of associated data(e.g. valve registry).
SWOT analysis	Analysis of strength points, weaknesses, opportunities and threats of a concrete project.
USG	UltraSonoGraphy – diagnostic method using ultrasound for imaging of tissues. Folk's expression is sono.
High level process model	It is a model of running processes using a high rate of abstraction.

List of used acronyms

DkNPR	Addition to National reforming program of Slovak Republic
EDS	emergency data set
EHR	electronic health record
EU	European Union
HIN	Health Information Network
HISA	Health Informatics Service Architecture
ICT	Information and communication technologies
IS	Information system, systems
ISPG	Information system of Public Governance
MoH SR	Ministry of Health Slovak Republic
NHIC	National Health Information Centre
NCPGI	National Concept of Public Governance Informatization
NSFSR	National Strategic Framework of Slovak Republic
NTS	National Transfusion Service
NHIS	National Health Information System
NHP	National Health Portal
OI MoH SR	Section FOR Informatics MoH SR
OPIS	Operation Program of Society Informatization
OPH	Operational Program Health
Pr HC	Healthcare provided
PPP	(private - public partnership
ReHC	Receiver of healthcare
HCP	Healthcare provider
SPGI	Strategy of public governance informatization
SOA	Software Open Architecture
HSA	Healthcare Surveillance Authority
PHO	Public Health Office
GES	Guaranteed electronic signature
HI	Health insurance companies