



**Centrum Systemów Informacyjnych**  
Ochrony Zdrowia



Electronic Platform for Collection, Analysis  
and Sharing of digital Medical Records

**Summary of the Feasibility Study**  
**European Union Institutions section**

Summary of Feasibility Study of the project:

Electronic Platform for Collection, Analysis and Sharing of digital Medical Records

European Union Institutions section

Version EU 1.0 EN

Warsaw, December 17<sup>th</sup>, 2009

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The present summary of the Feasibility Study of "Electronic Platform for Collection, Analysis and Sharing of Digital Medical Records" project was prepared for the Centre of Health Information Systems by the consortium of companies:

- ▶ Ernst & Young Business Advisory spółka z ograniczoną odpowiedzialnością i Wspólnicy sp. k. – consortium leader
- ▶ Ernst & Young Corporate Finance sp. z o.o.
- ▶ EuroSoft sp. z o.o.
- ▶ International Management Services sp. z o.o.
- ▶ ORTI K. Boś, P. P. Przybyła, J. Rycerz sp. j.
- ▶ Gilon Business Insight Ltd.

as an execution of contracts No. 24/08 and No. 11/2009 between Centre of Health Information Systems and the Consortium of above listed companies.

# 1 Table of contents

1	Table of contents	3
2	Introduction	4
2.1	Basic information on the Beneficiary	6
3	The genesis and environment of the Project	7
3.1	The genesis of the Project	7
3.2	Description of features and experience of the entity implementing the Project	9
3.3	The Environment of the Project	9
3.4	The healthcare information system in Poland	13
4	The goal of the Project	16
4.1	The detailed objectives of the Project	17
4.2	Cohesion of goals of the Project with the goals of strategic documents	19
4.3	The influence of the Project on horizontal policies of the EU	21
5	The concept of the Project	25
5.1	Key processes related to the Project	25
5.2	Functionalities of implemented solutions	26
5.3	Elements of solution architecture	33
5.4	Relation to information systems implemented within frames of other projects	33
5.5	Project implementation options	35
6	Project benefits and costs	38
6.1	Benefits	38
6.2	Costs	45
6.3	Summary	50
7	Project implementation	51
7.1	Project execution plan	51
7.2	Project organizational structure	55
7.3	Risk analysis	56
7.4	Cooperation with key stakeholders	59
7.5	Legal conditions for Project implementation	60
8	Project implementation indicators	61
9	Summary of the Project feasibility	66
10	Definitions	68
11	Acronyms explanation	70

## 2 Introduction

This document is a summary of the Feasibility Study of “Electronic Platform for Collection, Analysis and Sharing of digital Medical Records” project, further referred to as the Project. It contains the most important general information describing the Project, summary of the concept of its implementation and feasibility. Detailed information is included in the Feasibility Study of the Project.

The “Electronic Platform for Collection, Analysis and Sharing of digital Medical Records” project is the answer to weaknesses of the information system in Polish healthcare. The genesis of the Project is presented in detail in chapter 3.

The Project concerns the development of a modern healthcare information system in Poland. Due to a large number of entities involved, the Polish healthcare system is very complex. In order to ensure that healthcare services are provided to about 38 million recipients, dozens of thousands of healthcare institutions (from basic healthcare institutions to large voivodeship hospitals) and over 10 thousand pharmacies are operating, together with occupational self-governments and institutions for coordinating, supervising, funding and insuring. The Project aims to allow data exchange between the mentioned entities.

The goal of the Project is to allow collection, sharing and analysis of digital medical records. Its implementation is a key element of the informatization of the Polish healthcare system and an essential contributor to the creation of a modern information system for healthcare services. The goal of the Project as well as reasons for its implementation is presented in detail in chapter 4.

The concept behind the Project, described in chapter 5. of this summary, anticipates that the implementation of the system will allow to collect electronic information concerning patients’ health. The data will be recorded in the place of its origin – the healthcare institution<sup>1</sup>.

As a result of the Project, doctors, with patients permission, will be able to use the collected data for treating their patients. Based on the personal medical records, depersonalized collective data will be created, basing on which, it will be possible to conduct different kinds of analysis, in order to prepare healthcare systems policy by the Ministry of Health, as well as execute tasks of other key public institutions, such as the National Health Fund (NFZ). Furthermore, through access to information on possible emergencies, caused, for example, by pandemic, the mentioned institutions will be able to react sooner.

The scope of the Project includes elements that are additionally supporting processes which are operating between payer and service providers and between payer and pharmacies. It is related to flexible approach to organization of the healthcare resources system. The approach assumes, among others, a larger number of payers operating (currently this role is fulfilled mostly by the National Health Fund<sup>2</sup>).

Implementation of the Project will reduce the patients’ burden related to administrative processes operating in the healthcare system and it will improve those processes. Such effects will be achieved by implementing services such as electronic prescription, electronic sick leave, electronic referral and electronic appointment scheduling.

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<sup>1</sup> Local systems belonging to service providers and other entities are not included in the scope of the Project.

<sup>2</sup> Other institutions being public payers in the healthcare system are for example: Ministry of Health, Ministry of National Defence, Ministry of the Interior and Administration, Ministry of Treasury.

Summary of social benefits resulting from implementation of the Project is described in chapter 6. Economic benefits, that were possible to be estimated, are expected to exceed PLN 2.8 billion annually<sup>3</sup>. The given amount includes only the effects, for evaluation of which there are widely recognized methodologies, and which estimation is possible based on available data and forecasts for the Project. There is a number of other benefits which despite the fact that they are not quantifiable, are important arguments for the implementation of the Project. Similar projects, implemented in other countries, indicate that such benefits can be very advantageous.

Implementation of the Project requires bearing investment outlays, which are described in section 6.2.2. During the Feasibility Study development phase, the investment outlays were estimated to reach PLN 712.6 million<sup>4</sup>. The costs will be covered by:

- ▶ European Regional Development Fund within Operational Programme 'Innovative Economy' (7. priority axis) in the amount of PLN 575.3 million,
- ▶ public funds in the amount of PLN 137.3 million.

Maintenance of the solutions, implemented within frames of the Project, will require bearing replacement outlays, starting from 2015 (around PLN 75.5 million between 2015 and 2023) and operating costs, starting from 2007 (amounting to around PLN 110.3 million between 2007 and 2014 and around PLN 539.9 million between 2015 and 2023). These expenses will be covered by state budget funds.

The scope of the Project includes neither computerization of healthcare facilities, nor adopting information systems used by service providers or other entities that will be using the implemented solutions.

The Project is implemented by Centre of Health Information Systems (Beneficiary), budget unit of Ministry of Health. Issues concerning project plan and description of implementation are described in chapter 7.

The need for implementing the Project comes from the European Union guideline concerning information society establishment and implementing electronic healthcare services, as well as from State Informatization Plan. Indicators for Project assessment are described in chapter 8.

The Project is scheduled for implementation between 2009 and 2014 (the implementation has to be finished before the end of September 2014). Such time frame comes from subsidiary contract signed by the Beneficiary, as well as from the constraints, imposed on projects co-financed from funds of Operational Programme 'Innovative Economy'.

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<sup>3</sup> From 2017, i.e. after finishing the investment phase and the initial period of the Project's stabilization, during which the system will collect data and its users will gain experience in using the implemented solutions.

<sup>4</sup> In 2007, the investment outlays were initially estimated to Reach EUR 200 million (source: „Base Document PIOZ”, CSIOZ 2007) for the purpose of signing the Project for the list of key Project of Operational Programme Innovative Economy

## 2.1 Basic information on the Beneficiary

The Beneficiary of the Project is a unit of the Ministry of Health - Centre of Health Information Systems (CSIOZ). The table below shows information about CSIOZ.

**Table 1** Basic information about CSIOZ

<b>Beneficiary:</b>	Centre of Health Information Systems
<b>VAT Identification Number (NIP):</b>	525-15-75-309
<b>Polish National Business Registry (REGON):</b>	001377706
<b>Address:</b>	Dubois 5a 00-184 Warsaw
<b>Tel.:</b>	+ 48 (22) 597-09-27
<b>Fax:</b>	+ 48 (22) 597-09-37
<b>E-mail:</b>	biuro@csioz.gov.pl
<b>Director:</b>	MD, PhD. Leszek Sikorski

The Director of CSIOZ is responsible for coordinating work related to the implementation of the Project.

Centre of Health Information Systems was established on August 1, 2000 as a result of transforming Centre of Organizing and Economics of Healthcare into a new organizational unit.

The Director of CSIOZ is a II. degree administrator of state funds (unit within the public funds system).

# 3 The genesis and environment of the Project

## 3.1 The genesis of the Project

The long-term programme of social-economic reforms, accepted by the European Council in 2000, known as the Lisbon Strategy, defined the priorities in the range of developing the information society in the European Union. The reforms were further developed in the information society development plans included in the announcements of the European Commission, such as: eEurope 2002<sup>5</sup>, eEurope 2005<sup>6</sup> and i2010<sup>7</sup>, and also in other documents.

One of the elements of building the information society is the e-Health, i.e. the use of ICT in the healthcare sector. It was reflected in the document “eEurope 2005 Information Society for All”, passed at the European Union summit in Seville, which, among others, obligated the member states to develop electronic services, including e-Health.

The detailed plan of actions, within the range of e-Health for 2004 – 2010, was defined in the announcement of the European Commission of April 30, 2004<sup>8</sup>. It obliges the member states to undertake the following actions:

- ▶ the improvement of information and knowledge on domestic healthcare and health insurances in the area of the whole Community,
- ▶ the promotion of e-Health in association with increased professional mobility in the area of the European Union,
- ▶ the necessity of introducing electronic healthcare services, such as: teleconsulting, e-prescriptions, e-referral, telemonitoring and telecare,
- ▶ the initiation of electronic health insurance systems.

Previously, the Programme of Community Actions, in the range of Public Healthcare, set the goal<sup>9</sup> including the collection, processing and data analysis in order to monitor public health effectively and to gain information which will enable, among others, the establishment of appropriate strategies, policies and actions aiming at gaining a high level of healthcare services.

The discussed European Union guidelines are also taken into account in the domestic regulations connected to the building of the information society, particularly to:

- ▶ Act of February 17, 2005 on the informatization of entities implementing public programmes (Dziennik Ustaw (Journal of Laws) No. 64, item 565, as amended).

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<sup>5</sup> “eEurope 2002 An Information Society For All”, Brussels, June 14<sup>th</sup>, 2000.

<sup>6</sup> “eEurope 2005 An information society for all”, Brussels, May 28<sup>th</sup>, 2002.

<sup>7</sup> “i2010 – “A European information society for growth and employment”, Brussels, June 1<sup>st</sup>, 2005.

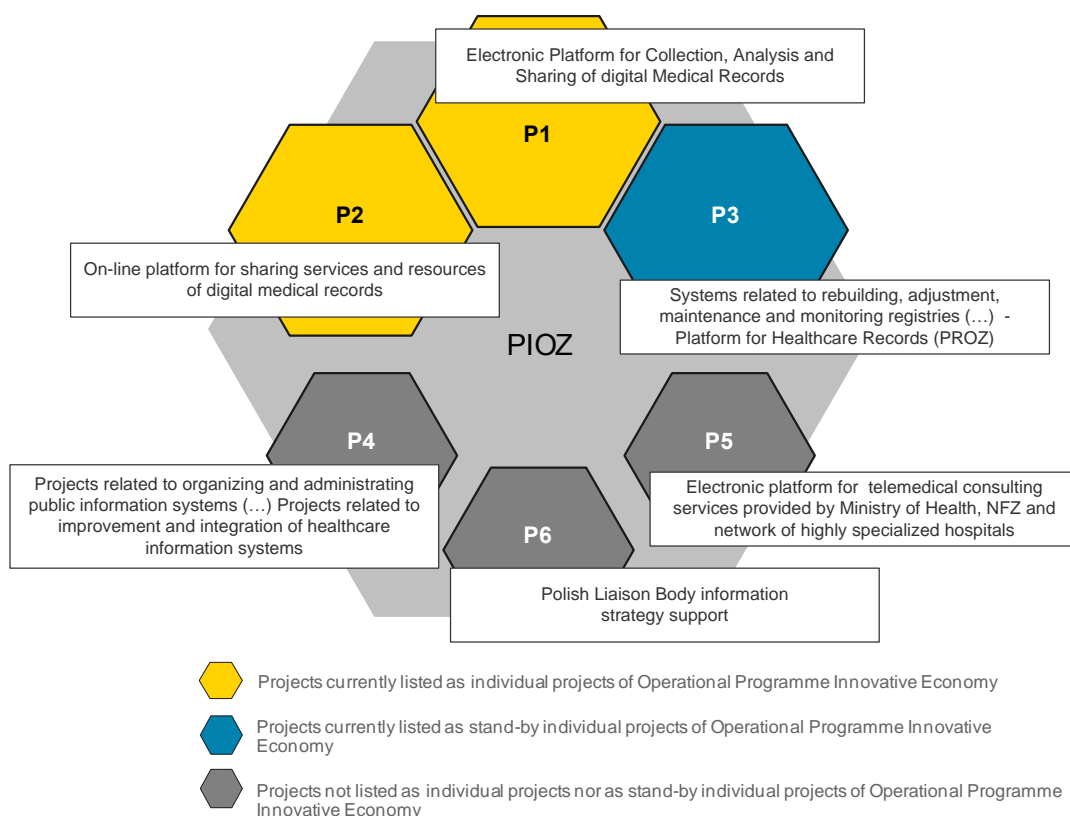
<sup>8</sup> “e-Health – making healthcare better for European citizens: An action plan for a European e-Health Area”. Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and Committee of the Regions. Brussels, April 30<sup>th</sup> 2004 COM (2004)356 final.

<sup>9</sup> The decision 1786/2002/WE of the European Parliament and the Council of September 23<sup>rd</sup>, 2002.

- ▶ the Government Order on “State Informatization Plan for 2007 - 2010”,
- ▶ “The Strategy for the Development of the Information Society in Poland until 2013”, accepted by the Council of Ministers, which emphasizes the Healthcare IT Implementation Programme as one of the key tasks, ensuring the advancement of one of the goals of the strategy.

The abovementioned European Union guidelines and domestic regulations constituted the basis for preparing the concept of the discussed Project. The concept of the Project, as part of the Healthcare IT Implementation Programme, was created in 2007 by the Centre of Health Information Systems (CSIOZ). The original concept assumed the initiation of six projects aimed at healthcare sector informatization as part of CSIOZ in Poland. The first three of them are now being implemented or planned for implementation, including the project “Electronic Platform for Collection, Analysis and Sharing of digital Medical Records”.

**Figure 1** Implemented and planned CSIOZ



Source: Self study based on Base Document PIOZ.

The information systems, introduced as part of the Project, will closely cooperate with the solutions implemented as the part of the “Platform for sharing services and resources of digital medical records with on-line business” project (P2), with, intended for implementation, project “Systems related to rebuilding, adjustment, maintenance and monitoring of records and other resources of healthcare, by public institutions including state and local government administration” (P3). Moreover, the solutions implemented as part of the Project, will take advantage of the products of other projects connected to making the electronic services of public administration available, particularly the projects “pl.ID – Polish ID card” and „ePUAP 2”, conducted by the Ministry of the Interior and Administration.

The initiatives, with goals similar to those of the Project and of Healthcare IT Implementation Programme, are conducted by the European Union member

states. Many of the goals were taken into account in sub-chapter 7.1.6 of Feasibility Study, describing healthcare in the area of the European Union.

The Genesis of the Project was more widely presented in sub-chapter 5.1 of the Feasibility Study.

## 3.2 Description of features and experience of the entity implementing the Project

The Beneficiary of the Project is the Centre of Health Information Systems as the unit of the Minister of Health. The subject of the Project will remain in the ownership of the Beneficiary for the whole period of analysis undertaken, as the part of Feasibility Study preparation.

The Centre of Health Information Systems (CSIOZ) acts as the mediator, of the second degree, for the Operational Programme Infrastructure and Environment (7. priority axis). It also has rich experience in implementation of projects co-financed by the European Union, they are in particular:

- ▶ e-RZOS "Platform for sharing services and resources of digital medical records with on-line business";  
Complex computer system for the registration of entities in the healthcare;
- ▶ The implementation and control over the European standards implementation for the ICT systems in healthcare;  
The contract encompasses the preparation of medical IT standards, the implementation of guidelines for e-Health, development of the guidelines for domestic HealthNet networks;
- ▶ The purchase of the software application - modules of patients' movement, pharmacy and accompanying services for hospitals;
- ▶ The programme of model screening of breast and cervical cancer in Poland;  
The piloting, implementation and evaluation of the new programmes for health promotion;
- ▶ „HPG” – Homogenous Patient Groups  
The preparation of a set of HPGs used by the Health Care Management Office as the basis for the purchase of medical services from hospitals;
- ▶ CLEAR  
The implementation of telerehabilitation based on telemedical technologies.

## 3.3 The Environment of the Project

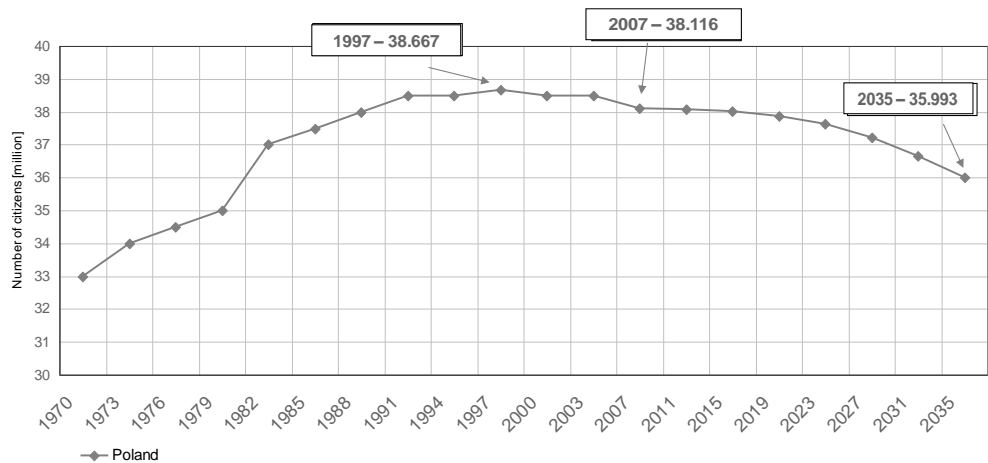
The project "Electronic Platform for Collection, Analysis and Sharing of digital Medical Records" refers to healthcare informatization in Poland. The hereby chapter presents the selected aspects of the Polish healthcare system in order to picture the context and environment of the Project.

This sub-chapter constitutes the summary of the social-economic analysis presented in chapter 7 of the Feasibility Study.

### 3.3.1 The state of health of the Polish citizens

The number of Polish citizens at the end of 2007 equalled 38.116 millions<sup>10</sup>. According to the prognosis of the Central Statistics Office, the number of people in Poland will steadily decrease in the upcoming years. The consequence of this demographic process is the ageing of the population. It forces the necessity to adjust the healthcare system to the medical needs of the society. Following the prognosis of the Central Statistics Office, the number of people in Poland in 2035 will be around 35.993 million<sup>11</sup>.

**Figure 2** The number of people in Poland in the years 1970 - 2007 and the prognosis for 2008 – 2035 (in millions)



Source: Source: Information for Polish Sejm about healthcare condition, Warsaw, May 31<sup>st</sup>, 2006, Population forecast for years: 2008 – 2035, GUS.

The prognosis of GUS indicates that after 2010 there will be the dynamic growth in the number of people aged 65 and older in the population. This phenomenon will be better visible in cities than in the country.

The population ageing process refers to the whole European Union. The worst demographic situation, taking into account the age structure of people aged 65 and older, takes place in the Western and Southern Europe (Italy, Germany, Belgium), where the size of this group of people in 2007 constituted around 20% of the population. In Poland, the people aged 65 and more, constituted around 14% of the society in 2007.

The European Union, in order to provide a comparable information on subjects concerning health of the European citizens, has prepared uniform health indexes<sup>12</sup> for the health information (e.g. lifestyle and other health factors), diseases (e.g. frequency of occurrence and the way of monitoring chronic, serious or rare diseases) and the healthcare system (e.g. the access to it, its quality, personnel, profitability), to enable making comparisons between the member states.

According to the indexes, an average lifetime is the most important measure of the population's state of health indicated by the European Union. In 2008, in Poland, an average lifetime for men was 70.96 years and for women – 79.74. The data shows that men in Poland live on average almost 9 years shorter than women. Similar situation takes place in most European countries. However, one has to

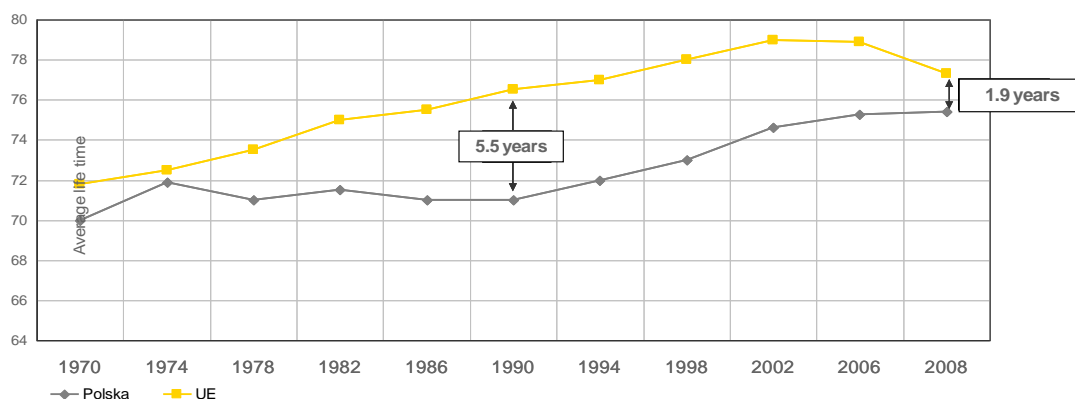
<sup>10</sup> „The small statistical yearbook of Poland in 2008”, GUS.

<sup>11</sup> „The population forecast for 2008 – 2035”, GUS.

<sup>12</sup> [http://ec.europa.eu/health/ph\\_information/dissemination/echi/echi\\_en.htm](http://ec.europa.eu/health/ph_information/dissemination/echi/echi_en.htm).

emphasize that an average lifetime of Poles in 2008 was approximately 2 years shorter than the lifetime of other EU inhabitants (the disparities are pictured in the chart below).

**Figure 3** An average lifetime of Poles and the EU citizens in the period of 1970 - 2008



Source: Eurostat and CIA Word Factbook 2008.

Cancer has been the main reason of deaths in Poland and the whole Europe in the recent years. In Western Europe, cancer death rate is estimated for 160 deaths per 100 thousand people. In Poland, the rate is higher - 200 deaths per 100 thousand people.

The number of patients that survived, with a diagnosed cancer, is the measurement of quality of health system functioning, taking into account: the availability of doctors, correctness of diagnosis, possibilities of treatment and the quality of the prevention (screening). The lack of the last factor may cause patients, with serious diseases, to see doctors, when it is already too late to undertake any effective treatment (the situation is present in Poland).

Another disease with a high death rate in Poland is heart disease. Other diseases have the death rates comparable to the EU countries - 15.

### 3.3.2 The healthcare system

The system of universal, social health insurance was introduced in Poland on January 1, 1999 (so called budgetary system had functioned before 1999). Altogether with the introduction of the healthcare system reform, the Minister of Health, and local governments (communes, poviats and the voievodships) were obliged to be in charge of the operation of healthcare system. In 1999, entities of local governments took over from the public administration, the duties of creating healthcare units, concurrently becoming founders for most of the healthcare units.

After 2003, further changes were implemented into healthcare system. On April 1<sup>st</sup>, 2003, 17 health insurance funds were replaced by the National Health Fund. The National Health Fund is now the main payer in the public system of healthcare services. The provision of healthcare services and the refunds of drugs, through the utilization of money coming from the general, obligatory health insurance, are its most important responsibilities.

The Polish healthcare system consists of three levels of providing healthcare services, i.e., basic healthcare, outpatients' healthcare and stationary healthcare. Public and private entities are the providers of healthcare services at each of three levels. They operate as healthcare units and medical practices.

### 3.3.3 The healthcare funding

Financial resources for healthcare come from two sources: public and private. The bigger part of the financial outlays is mostly incurred by the state, which is obliged to protect its citizens and provide them with basic healthcare. However, the form and the amount of financial expenditures on healthcare depend on many factors, including, among others, the domestic economic situation, social policy, the economic system and the amount of generated GDP.

Poland belongs to countries with a low level of GDP per capita in comparison to the EU average. The estimated value of GDP per capita, in Poland in 2008, was of about 45% lower (about EUR 13.8 thousand per capita) than an average GDP in other EU countries (about EUR 25 thousand per capita), placing Poland at 24. position among 27 EU countries<sup>13</sup>.

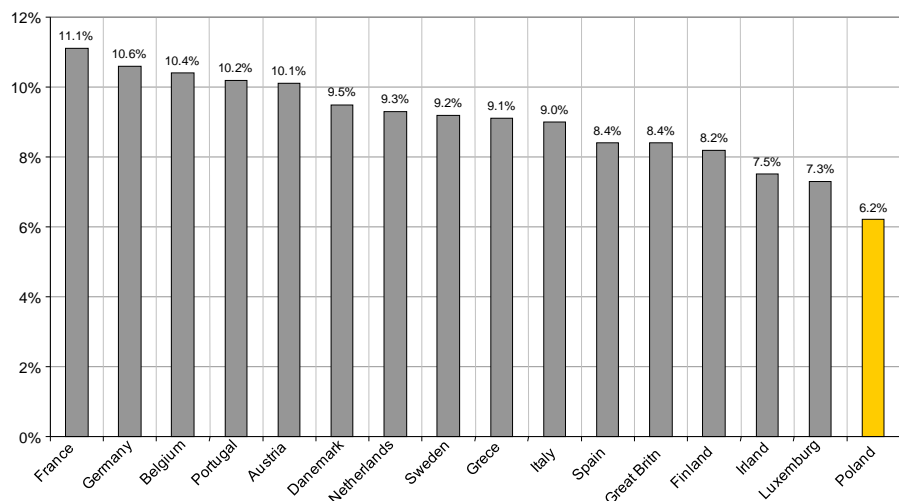
Therefore, taking into account the amount of total expenditures on healthcare, Poland stays behind, not only the Western Europe countries, but also behind the neighbour countries from the same region, in which both the level of expenditures and the dynamics of their growth are higher.

Public expenditures on healthcare in 2007 constituted PLN 53.54 billion, and private expenditures – PLN 22.03 billion<sup>14</sup>. The biggest part in the funding of public healthcare has the National Health Fund which funds almost 90% of healthcare services.

The financial resources coming from the general health insurance fees, managed by the National Health Fund, determine the main source healthcare costs financing. The income from the fees constituted PLN 48.1 billion in 2008. The cost of the fee has stayed unchanged at the level of 9% since January 1, 2007 (previously, it had increased systematically from 7.5% in 2000).

The chart below presents the level of GDP expenditures on healthcare in Poland against a background of other EU countries-15.

**Figure 4** The expenditures on health as the % of GDP in EU countries - 15 and in Poland in 2006



Source: OECD Health Data 2008, Version: June 2008.

<sup>13</sup> Eurostat (<http://ec.europa.eu/eurostat/>).

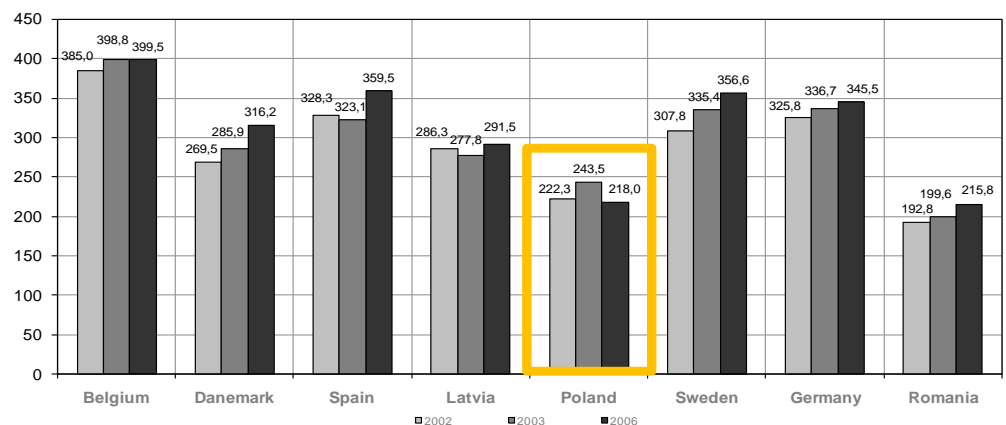
<sup>14</sup> The announcement of the President of the Central Statistical Office of June 22<sup>nd</sup>, 2009 concerning the National Health Account for 2007. [www.stat.gov.pl/gus/5840\\_6534\\_PLK\\_HTML.htm](http://www.stat.gov.pl/gus/5840_6534_PLK_HTML.htm)

### 3.3.4 Human capital

The number of authorized doctors in Poland, is over 126 thousand, with the number of nurses -reaching 273 thousand in 2007<sup>15</sup>.

Polish human capital, in the range of practicing doctors, are of about 20% lower than in the EU countries -15, as presented in the chart below.

**Figure 5** The number of practicing doctors for 100,000 citizens in Poland and in the selected EU countries in 2000, 2003, 2006



Source: Eurostat (Online Database).

## 3.4 The healthcare information system in Poland

### 3.4.1 The current state of healthcare information system

The model of information solutions, currently operating in the healthcare system, does not determine a well-ordered, functional, informational and technical arrangement and the relations between particular elements of the infrastructure are weak and insufficient or do not exist at all<sup>16</sup>. A similar diagnosis, concerning the information system of this sector, was included in the document of the Ministry of the Interior and Administration<sup>17</sup>. According to the documents, the information infrastructure in the healthcare sector was shaped in such way, that it constitutes the collection of autonomous IT systems with the domineering role of their possessors<sup>18</sup>.

The lack of possibility of multiple usage of the collected records by external entities is the element of the system. The autonomy of the systems and the diversified span of the collected records cause inability to set credible data in the range of analysis of the operational field of the healthcare sector.

<sup>15</sup> Statistical Bulletin of the Ministry of Health, 2008.

<sup>16</sup> „The Basic Document of the Program”, CSIOZ, Warsaw, December 2007.

<sup>17</sup> „The modern information infrastructure as the basis for cheap and friendly civil country” The Ministry of the Interior and Administration, Warsaw, August 2005.

<sup>18</sup> „The IT and the Polish case, i.e., how they tried to reform the country without good IT and what are the results” Fuglewicz P., Milosz M., “Information management in turbulent times” PTI, Katowice, 2000.

Moreover, what requires a special emphasis, are the current regulations which exclude collection and analysis of data on operations of the entities, functioning in the healthcare system, but not gaining refunds from public funds. Due to this, most of the analysis, because of the extended private sector, depend on the survey data.

The important element, featuring the present state of healthcare informatization, is the sector diversification, which, in most cases, leads to the lack of possibility of data exchange between healthcare and other economy sectors.

#### **IT systems of the National Health Fund**

Main information systems, operated in the healthcare sector, are the solutions of the National Health Fund (at the level of the central office and the voivodeship departments). The National Health Fund finances medical services provided by the contractors to recipients on the basis of the signed contracts. The payments, for medical services to contractors, are realized by the National Health Fund on the grounds of the cyclically transferred digital statistical and accounting data. These reports are sent in an open XML format via announcements in the structure defined by the regulations of the Ministry of Health and by the president of the National Health Fund.

All service providers, bound by contracts with the National Health Fund, as well as all the pharmacies, are obligated to send the statistical and accounting reports. The reports are sent cyclically. All these entities have the necessary IT infrastructure, including the Internet connection.

The statistical and accounting data have been collected in a uniform format by the National Health Fund since 2004.

### **3.4.2 The needs of the healthcare information system in Poland**

So far, the healthcare sector informatization has been based on creating many autonomous, non-cooperating ICT systems which functionalities are usually focused on one organizational entity or a selected segment of healthcare sector. While designing such systems, one takes into account the main needs of their business owners, while the needs and abilities of other participants of the administrative procedures, including not only the citizens and companies, but also other offices and entities of the public sector, are scarcely considered or omitted. An example may be the autonomously working systems of the National Health Fund (voivodeship departments and the central office) which are not integrated with the systems of The Polish Chamber of Physicians and Dentists, CSIOZ, the Ministry of the Interior and Administration, the Ministry of Finance and the Central Statistical Office.

The abovementioned problems are connected with important, challenges (described below), the Polish healthcare system must face.

#### **A study of the general concept of information infrastructure in healthcare and the strategy of its realization**

The lack of a strategic model of information infrastructure is the source of part of the problems, mentioned at the beginning of the chapter, characteristic for the Polish healthcare information system. The study and implementation of the information infrastructure concept for healthcare ought to be supported by the creation of the strategy of the concept realization as the document of legal force.

#### **Sharing information resources**

One of the problems of the healthcare system is the limited access to the existing information resources. Making these resources available will allow many entities to use a particular range of information from one source. It will also allow these

entities to lower the burden connected to obtaining information and to increase of credibility of the processed information.

In particular, many doctors will be able to more effectively share patients' medical record, collected, also in other healthcare centres, during previous stages of treatment.

### **Providing interoperability**

Providing interoperability allows IT systems, created for the needs of only one entity, to cooperate with the systems used by other entities. The interoperability of IT systems will allow cooperation during the operation of processes, such as: prescribing and filling a prescription and drug refunding, which engage the person authorized for prescribing (a doctor acting for the contractor), a pharmacy filling a prescription, and the payer refunding the drug purchase.

### **Lowering the burden connected administrative processes operation**

Administrative processes, in which a patient takes part, are usually based on using paper documents. Among others, it refers to the purchase of drugs (prescription), making an appointment with a doctor - medical specialist (a doctor's medical certificate) or receiving a doctor's leave (a doctor's medical certificate). The usage of paper documents is connected to the burdens for patients resulting from the necessity to mediate in communication between the entities participating in the process. In addition, paper documentation is characterized by low availability, especially for patients. The digitalization of administrative processes will allow the omission of ineffectiveness and lowering the burdens.

### **Considering the needs of users**

The information needs of independent healthcare entities are hindered by a great number of such entities and their complexity. The initiatives, leading to the informatization of the sector, demand meeting the needs of service and information users by including them in the Project activities, especially in the process of defining the requirements and testing the implemented solutions.

The Project is an answer to the needs of the Polish information system in healthcare. The realization of the Project will significantly influence the integration of information solutions in the healthcare sector and will contribute to the building of a modern healthcare information system. The implemented IT systems will meet the abovementioned needs concerning availability of records and interoperability. They enable digitalization of a part of administrative processes in the healthcare. The conformity with the needs of users will be provided by the cooperation between the Beneficiary and the key stakeholders of the Project.

## 4 The goal of the Project

The goal of the Project is the development of an electronic platform of public services in the range of healthcare, allowing the bodies of public administration, including government administration and local governments' administration, entrepreneurs (such as: healthcare units, pharmacies, medical and nursing practices) and citizens to collect, analyze and share digital medical records.

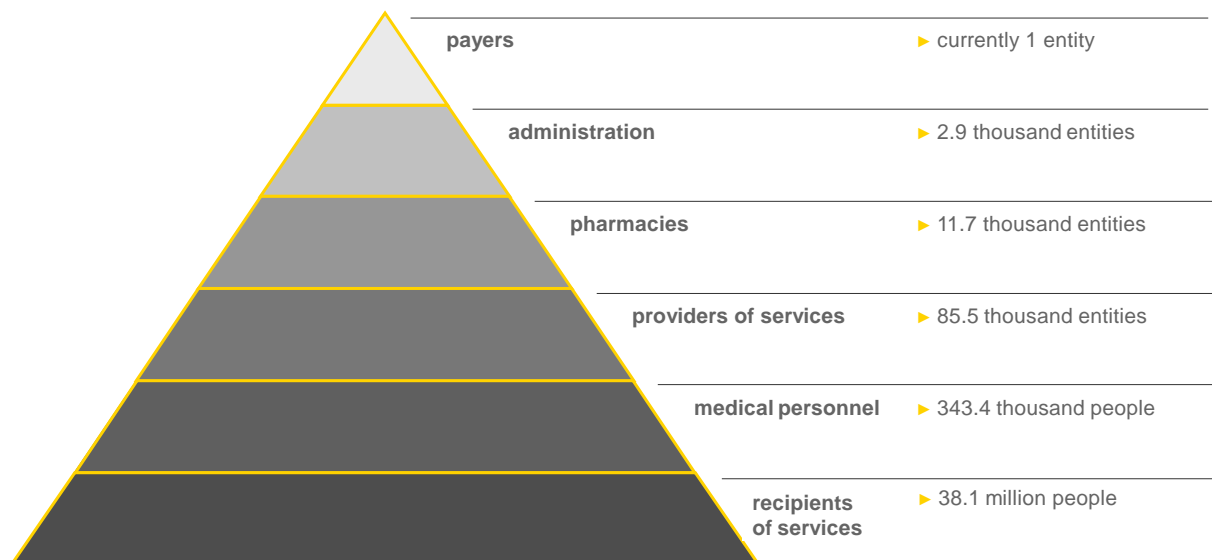
Supporting healthcare in Poland is the mission of the project. It is assumed that the implementation of the Project will serve the citizens by:

- ▶ securing their safety and health,
- ▶ promoting health in order to ensure welfare and social solidarity,
- ▶ spreading information on health.

6 groups of final recipients, also called - stakeholders, were determined for the Project. They are:

- ▶ clients (patients),
- ▶ medical personnel,
- ▶ contractors,
- ▶ pharmacies,
- ▶ the payer (payers),
- ▶ public administration.

**Figure 6** Final recipients of the Project



Source: Self study based on GUS data: „Basic data regarding healthcare in 2007”, Warsaw, 2008.

The division of final recipients of the Project was performed on the basis of the analysis of the scope and ways of relations between the effects of the Project.

The implementation of the Project is a key element of the informatization of the healthcare sector, and concurrently, it is the key element of the informatization of the whole area of public administration, realized according to the regulations of the

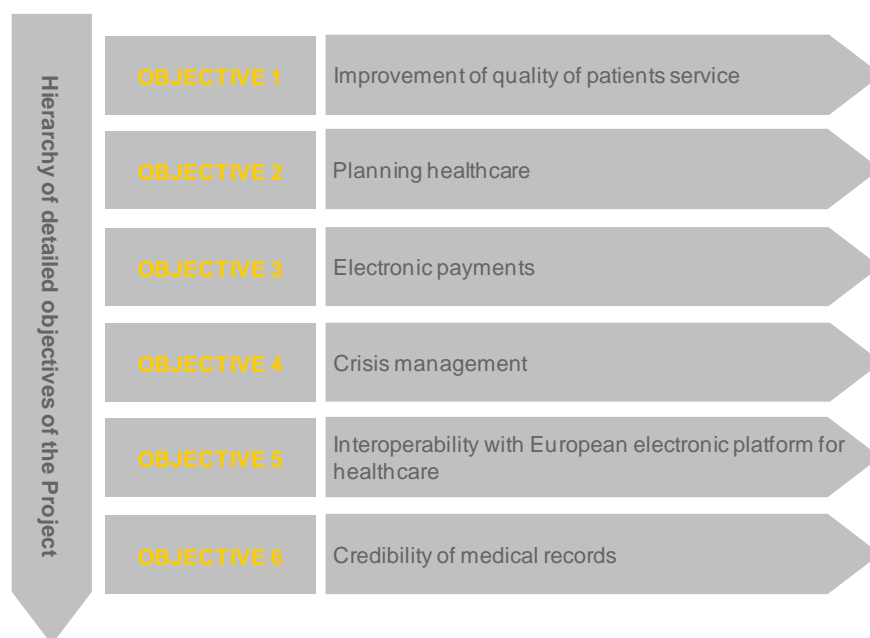
Act of February 17, 2005 on informatization of operations performed by the entities realizing public assignments<sup>19</sup>.

Moreover, the implementation of the Project is of strategic importance for the development of the information society supported by the Operational Programme 'Innovative Economy' 2007 – 2013.

## 4.1 The detailed objectives of the Project

The realization of the main goal of the Project, allowing many entities to collect, analyze, and share digital medical records, will contribute to the advancement of 6 detailed goals presented in the drawing below.

**Figure 7** Hierarchy of the detailed goals of the Project



Source: Self study.

The abovementioned detailed goals were shortly described in the following sub-chapters.

### **Improvement of the quality of servicing patients**

The improvement of servicing patients is the most important goal of the Project. It will be connected to:

- ▶ the improvement quality of health services through the improvement of quality of and access to the information on a patient's health state and their medical records,
- ▶ facilitating service of patients by enabling realization of electronic services such as: electronic prescription, electronic referrals or electronic sick leaves.

What is more, the raise of patients' awareness in the range of healthcare and the prevention by the use of the ICT.

<sup>19</sup> Dziennik Ustaw (Journal of Laws) No. 64, item 565 and from 2006 No. 12, item 65.

### **Healthcare planning**

The implementation of the Project is aimed at making credible information, necessary for effective healthcare planning, available for the public administration. As a result of the Project, the public administration will be able to undertake complex analysis of cashflows and statistical analysis in a healthcare sector on the basis of a wide range of credible information.

The realization of the Project will also constitute the support for effective control over healthcare units by the public administration.

### **Electronic settlements**

The improvement of the realization of electronic settlements for medical services and filled prescriptions (e-prescriptions) is the following goal of the Project. It will enable faster and easier settlements between contractors and pharmacies and the payer through the usage of an e-invoice and electronic signature.

### **Crisis management**

The next goal of the Project is to make the public entities able to monitor healthcare sector systematically in the context of crisis events and public security. As the result of the Project, the entities will receive the possibility to gain information allowing them to monitor and react to threats that occur in progress.

### **Providing interoperability with the European electronic platforms in the range of healthcare**

Sharing information on medical records, on the basis of homogenous standards, at home and the exchange of such information with the systems of other European countries constitute the goals of the Project.

The goal will be realized following the assumptions of the EU policy on the provision of interoperability of healthcare systems. Electronic systems of healthcare are to cooperate in such a way that the EU citizens are provided with freedom in relocation, with concurrent secured access to their medical data in the area of the whole Community<sup>20,21</sup>.

The realization of this goal will constitute a supportive element for the e-Health initiatives, undertaken by the European Commission, facilitating medical help for travellers to other countries and people living abroad<sup>22</sup>.

### **Provision of medical records credibility**

Establishment of the IT solutions, enabling collection and processing credible medical records, available for further application, prevention and treatment of a patient, for financial settlements, healthcare planning and crisis management constitutes the goal of the Project.

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<sup>20</sup> "e-Health – making healthcare better for European citizens: An action plan for a European e-Health Area". The announcement of the European Commission to the EU Parliament, European Council, European Economic-Social Committee and the Committees of Regions, COM (2004)356 final version, Brussels, April 30, 2004.

<sup>21</sup> Commission recommendation on cross-border interoperability of electronic health record systems, The announcement of EU Commission, Brussels, July 2, 2008.

<sup>22</sup> The initiatives of e-health facilitating health support to travelers to other countries and living abroad, IP/08/1075, Brussels, July 2, 2008.

## 4.2 Cohesion of goals of the Project with the goals of strategic documents

### **The compliance of the Project goals with the regulations of the 7. priority axis**

The Project was prepared in compliance with the rules of gaining support in the range of the 7. priority axis "Information society – construction of electronic administration" (PO IG), 2007 - 2013. The main aim of the 7. priority axis is the improvement of the conditions of running a business by widening the access to the information resources of public administration and public services in a digital form for citizens and entrepreneurs (in that case: widening the access of healthcare services). The Project was placed in "The list of individual projects for the Operational Programme 'Innovative Economy' for 2007-2013"<sup>23</sup>.

### **Compliance of the goals of the Project with the regulations of the State Informatization Plan**

The detailed public assignments coming under informatization have been identified in the range of the Computerization Plan for the State for 2007-2010<sup>24</sup>. At least two of them take into account the assignments which are realized as a part of the Project – they are the following services of the public administration electronically available:

- ▶ The process of making an appointment with a doctor;
- ▶ The process of conveying health statistical data to the Ministry of Health.

### **Compliance with the strategies at the central and regional level**

The Project follows the rest of the projects of PO IG, placed in the list of individual projects. In particular, the subject project is compatible with the following projects, which are realized in the area of the whole country:

- ▶ pl.ID – Polish ID card,
- ▶ ePUAP 2,
- ▶ polish national IT network for the use of the alarm number "112",
- ▶ Central Register and Information of Entrepreneurs,
- ▶ the Platform of Electronic Services for the clients of the Social Insurance Institution,
- ▶ the platform for sharing services and resources of digital medical records with on-line business (P2).

And the project intended for realization by the Centre of Health Information Systems (placed in the reserve list of the individual projects of Operational Programme):

- ▶ the systems connected to the re-construction, adjustment, maintenance and monitoring of registers and other resources of healthcare by the public administration and regional administration – The Platform for Healthcare Registers (PROZ) (P3).

The co-relation with the strategy at the central level means the cohesion with the following central programmes:

- ▶ The Operational Programme Human Resources as the part of the Priority 1 "Employment and social integration" and the Priority "Good management", in the scope of which the assignments raising the standards of the services,

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<sup>23</sup> The list of individual projects for Operational Programme Innovative Economy for 2007-2013 – updated July 2009.

<sup>24</sup> The Order of the Council of Ministers of March 28, 2007 on State Informatization Plan for 2007-2010, Dziennik Ustaw (Journal of Laws) from 2007 No. 61 item 415).

provided by the public sector in favor of entrepreneurs, thanks to the use of the modern ICTs in the labour market institutions, are realized.

- The Operational Programme 'Innovative Economy' as the part of the Priority 7 "Information Society – Increasing the Innovativeness of the Economy".

At the regional level, the Regional Operational Program (ROP) constitutes the point of reference for the Project.

### **Compliance with the special and social strategies**

The Project follows the goal No.1 of the National Strategic Reference Frames<sup>25</sup>, which is "Improvement of public institutions quality of functioning and expansion of partnership mechanisms". It assumes strengthening the abilities of public institutions through informatization of public services and the business environment, among others, through the establishment of e-Government services. It concurrently realizes the guideline 1.2.3 SWW<sup>26</sup> „Promotion of information society for all", 1.3.4 SWW „Administrative abilities" and the guideline 9 ZPW<sup>27</sup> "Facilitation of spreading the ICT and the establishment of common information society". It corresponds with the goal of the "Strategy for the State Development"<sup>28</sup>, which promotes the development of information society and electronic services. The Project is also placed in the Computerization Plan for the State for 2007 – 2013.

The Project constitutes the key element for realizing the EU strategy in the range of development of the information society, including implementation and e-Health spreading, i.e., the complex informatization of a healthcare sector, increasing the effectiveness of its operation, beneficial for patients and the budgets of particular countries.

The advancement of the assumed goals will constitute practical fulfilment of European Union's initiatives in the scope of information society, as well as e-Health, included particularly in the Lisbon Strategy, the plan eEurope 2005 Information Society for All, the programme European Information Society 2010, the programme of the Community Actions for Public healthcare and the plan „Action plan for a European e-Health Area".

The realization of the Project complies also with the following programs:

- The Operational Program for using financial resources as part of the Financial Mechanism of the European Economic Area and Norwegian Financial Mechanism<sup>29</sup>, among others, in the range of the priority "The healthcare and the care for a child";

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<sup>25</sup>National Strategic Reference Frames 2007-2013 supporting the economic growth and employment, National Cohesion Strategy, The Ministry of Regional Development, Warsaw, May 2007.

<sup>26</sup>The decision of the Council of October 6, 2006 on the strategic guidelines of the Community for cohesion (2006/702/WE).

<sup>27</sup>The Integrated Package of Guidelines for the Growth and Employment 2005-2008, COM(2005) 141 final, April 12, 2005 and the Integrated Guidelines on the Economic Growth and Employment for 2008-2010 encompassing the Order of the Commission on general guidelines for the economic policy of the member states and the Community (in accordance with the Article 99 of the European Community Treaty) and the Decision of the Council concerning the guidelines on the employment policy of the member states (in accordance with the Article 128 of the European Community Treaty).

<sup>28</sup> The Strategy for the State Development for 2007 – 2015, the Ministry of Regional Development, Warsaw, November 2006.

<sup>29</sup> Approved by the Council of Ministers on July 26, 2005, as amended on November 14, 2006 and 22 June 2007.

- ▶ Swiss-Polish Cooperation Programme<sup>30</sup>, in the thematic range of The Healthcare, taking into account: the promotion of healthy lifestyle and prevention against infectious diseases at the state level and in the area of geographical concentration, and the improvement of basic healthcare services and social security services in the peripheral and marginalized areas covered by the geographic concentration, with the preference toward a multi-sector program attitude;
- ▶ The 7. Frame Programme as the part of the detailed program “Cooperation”<sup>31</sup> in the range of researches and technological development in the thematic area of: Health, and in particular, optimizing the healthcare services to the European citizens;
- ▶ The programmes supported by the Minister of Science and Higher Education<sup>32</sup>, including “The programme of IT infrastructure development for 2007-2013”, as the part of: the Cooperation with other government departments in the range of educational initiatives concerning the implementation of modern communication and information technologies, e-Education, e-Health, etc;
- ▶ The 2. Community Programme of Actions in the scope of Health for 2008-2013<sup>33</sup>. The goals of the programme are: the improvement of the citizens’ health security, health promotion, and the reduction of inequalities in the range of health, and the generation and spreading of information and knowledge on health.

## 4.3 The influence of the Project on horizontal policies of the EU

### **Cohesion with the policy of maintaining equality of chances between women and men**

The horizontal policy of the EU, in the range of equal chances, consists of the following elements:

- ▶ provision of equal level and access to information for all people (nobody is in favor, willingness, ambitions and abilities of particular people decide on the reachable goals),
- ▶ provision of conditions in which the people reach the same, expected effects with the use of the same required effort; and
- ▶ equal access to social welfare.

In accordance with the abovementioned policy, the subject of the Project promotes following the rule of equal chances. In particular, the applicant, during the design process, took into account the guidelines which are additionally placed in the following documents:

- ▶ The European Union Founding Treaty (1992/C 224),
- ▶ Racial Equality Directive (2000/43/WE),
- ▶ Employment Equality Directive (2000/78/WE),

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<sup>30</sup> Initiated on the strength of the frame agreement, Bern December 20, 2007.

<sup>31</sup> On the basis of the Decision 1982/2006/WE of the European Parliament and the European Council concerning the establishment of the 7. Frame Program in the range of researches and technological development and demonstrations (2007 – 2013).

<sup>32</sup> Warsaw, the Ministry of Education, June 28, 2007.

<sup>33</sup> Approved on the strength of the Decision of the European Parliament and the Council No. 1350/2007/WE of October 23, 2007.

- ▶ Directive on the Equality of the Access to Goods and Services (2004/113/WE),
- ▶ The European Chart of *Basic Rights* (2007/C 303).

The Project does not assume any diversifications, exclusions or limitations in reference to gender which could cause a limitation or prevention of one of the genders from granting or using the product of the Project equally with the other person during its realization.

Moreover, the Project will positively influence the policy of gender equality by widening the access to a healthcare system for the society, regardless of their gender, place of living, social status or age. The Project will influence the promotion of the policy of equal chances, among others, in the following areas:

- ▶ equal access to the knowledge in the range of healthcare and health prevention through the usage of the information and communication technologies,
- ▶ equal access to IT devices which improve life conditions and social communication.

#### **Prevention of discrimination, in reference to a disability, gender or age**

The Project will contribute to a widening of access to the healthcare system for the society, regardless of disability, gender, age, place of living or social status. Patients will have access to medical services of the highest quality and effectively allocated depending on the real demand.

The Project will influence the promotion of the policy of equal chances, in the following areas:

- ▶ a common and constant access to the information on medical records by all patients, regardless of their place of stay, with the use of proper rules of the privacy policy,
- ▶ an equal access to the knowledge on healthcare and prevention with the use of information and communication technologies,
- ▶ an equal access to IT devices improving the conditions of life, social communication and allowing a better usage of rules of democracy,
- ▶ facilitation of access to decisive information and procedures of a public sector via Internet for all citizens – the realization of one of the goals of the initiative – “The information society for all”,
- ▶ equal access to medical information, for example on drugs, hospitals, specialist medical services,
- ▶ equal access to the rules of using healthcare services, on the basis of the European Community rules, with the indication of the rights and responsibilities of an insured person – the realization of one of the pillars of the EU, i.e., the freedom of workers' mobility.

In particular, the expected results of the Project do not assume singling out the engaged social groups, on the basis of such criteria as: a disability, gender or age, which makes and can make actions of discrimination toward the abovementioned groups, impossible.

#### **Provision of access for the disabled**

No stage of the Project could show any barriers for the disabled to access the information platform and e-Health services, as well.

The IT services of the Project will be designed in such a way that their technical specifications will ensure access for all authorized users. The limitations of access to the products of the Project will only result from the authorizations for the particular groups of users arising from the legal regulations and/or those given by the administrator.

The products of the Project do not assume the identification function for the users interested in the services due to their disability.

It is worth emphasizing, that the possible problem to be faced by the disabled while using websites, will be appropriately addressed and considered at the products design and implementation stages. It is essential due to provision of equal access to the information concerning health, published at the government sites. The implemented solutions will consider friendliness of the products especially for the blind<sup>34</sup> who constitute the group which requires the most specialized facilities. This refers especially to the solutions which can possibly prevent proper functioning of specialized translators due to, e.g., pulling out the menu which requires the use of the mouse, or the lack of alternative signatures under the graphics.

In order to eliminate solutions, which can be disadvantageous for the disabled, one has to consider the guidelines of the EU, included in the document "Web Content Accessibility Guidelines (WCAG) 2.0"<sup>35</sup> while realizing the Project. It is expected that they will be finally required from all of the projects realized with the use of the EU resources.

Summarizing, there is no risk of limitation of access to the IT platform for the disabled, now and in the future.

**Consideration of the rules of sustainable development and promotion of the goal, at the level of the EU Community, which is the protection and improvement of the quality of the natural environment, are determined in the Article 6 of the EU Community Treaty**

Taking into consideration the subject character of the Project, mainly consisting of the preparation of the software and purchase of the hardware, one can explicitly state that the Project does not falls under the evaluation of influence on the natural environment. The abovementioned statement results from the fact that the realization of the Project will not cause threats to the environment at the stage of the implementation or operation.

Concurrently, it is important that the implementation of the Project and the realization of its goals will positively influence the natural environment.

Positive effects may become visible while implementing the functionality of the Project in many entities which realize administrative processes connected to healthcare. These processes, in general, consist of processing much of the paper documentation which constitutes the basis for communication between the companies and public entities in the healthcare sector. That way, the benefit for the environment arising from the Project will be the decrease in the amount of paper used and the cost minimizing the administrative service connected to the processing of paper documentation in healthcare units.

The purchase of the ICT equipment will oblige the Centre of Health Information Systems to its future utilization following the regulations of the environmental protection, including the regulations on recycling.

Part of the equipment being used, will include personal data, which are limited in respect to their sharing and processing by the Act of August 29, 1997 on personal data protection<sup>36</sup>. If the abovementioned situation occurs, in accordance with the Article 36. 1. of the Act on personal data protection, the data administrator is required to use technical and organizational means, to ensure protection of the processed data, adequately to the threat and the category of protected data. Especially, the administrator should protect data so that it is not shared with unauthorized persons, taken over by unauthorized persons, processed infringing the Act, and the changed, damaged or removed.

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<sup>34</sup> <http://egov.pl/index.php?option=content&task=view&id=2110&Itemid=62>

<sup>35</sup> <http://www.w3.org/TR/2008/REC-WCAG20-20081211/>

<sup>36</sup> Dziennik Ustaw (Journal of Laws) of 1997, No. 133, item 883, as amended.

In addition, the cohesion with the environmental policies will be guaranteed by the tender offers conducted in compliance with the guidelines included at the website of the Public Procurement Office in the part concerning so called "green public procurement"<sup>37</sup>. The green public procurement stands for the policy in the range of which public entities attach the ecological criteria and/or requirements to the process of purchase (of the procedures of granting public procurement) and search for the solutions which limit the negative influence of products/services on the environment and take into account the whole cycle of a product life, influencing the development and promotion of environmental technologies.

The research done by the Öko-Institut (The Institute of the Applied Ecology) and ICLEI (The Local Governments for the Sustainable Development) on commission of the European Commission, summarized in the document "Costs and Benefits of Green Public Procurement in Europe (Case studies)"<sup>38</sup>, prove the importance of "green public procurement" in the processes of placing tender offers. The Public Procurement Office provides also a multitude of documents and guidelines concerning the use of the "green public procurement" practices<sup>39</sup>.

### **The evaluation of favoring the development of information society**

Favoring the development of the information society constitutes a special aspect of the subject Project. The realization of the hereby Project assumes the promotion and use of the ICT, which are one of the foundations of the information society, described below, through the allocation of financial resources supporting the development of the ICT in Poland.

The policy of building information society is based on four foundation pillars, which are reflected in the primary law regulations:

- ▶ the telecommunication policy, which legal basis is created by:
  - Article 95 of the European Community Treaty, on the grounds of which the Council undertakes the harmonization;
  - Article 81 and 82 of the European Community Treaty, thanks to which the European Commission can open the markets and provide appropriate competitiveness; and
  - Article 47 and 55 of the European Community Treaty, which ensure the freedom of establishing companies and providing services in the area of the Community;
- ▶ Support toward the development of the ICT on the basis of the article 163–172 of the European Community Treaty referring to the researches and development;
- ▶ Any actions favoring creation of necessary conditions of the EU industry competitiveness, following the article 157 of the European Community Treaty;
- ▶ The promotion of trans-european networks in telecommunications, energy and transportation sectors, in accordance with the article 154–156 of the European Community Treaty<sup>40</sup>.

The implementation of the Project will contribute to the fulfilment of the EU requirements by Poland in reference to building information society in the area of healthcare.

The Project complies also with the priorities included in the State Informatization Plan – The Order of the Council of Ministers of March 28, 2007 on the State Informatization Plan 2007-2010.

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<sup>37</sup> <http://www.uzp.gov.pl/zagadnienia-merytoryczne/zielone-zamowienia>

<sup>38</sup> [http://ec.europa.eu/environment/gpp/pdf/eu\\_recommendations\\_3.pdf](http://ec.europa.eu/environment/gpp/pdf/eu_recommendations_3.pdf)

<sup>39</sup> <http://www.uzp.gov.pl/zagadnienia-merytoryczne/zielone-zamowienia>

<sup>40</sup> "The European Union policy in the range of building information society", Borkowski F. "Poland in Europe" 2(46), 2004.

# 5 The concept of the Project

This chapter contains a summary of the solutions concept, which will be implemented within frames of the Project. It includes description of the main features of these solutions, an overview of the scope of data processing and basic decisions related to information systems architecture. Detailed concept containing description of the architecture is contained in chapter 9 of the Feasibility Study.

## 5.1 Key processes related to the Project

Information processes raised by the Project, can be grouped by their relation to:

- ▶ planning of health services,
- ▶ providing health services,
- ▶ monitoring and reporting on the provision of health services,
- ▶ publishing health services information.

Different groups of processes are described below.

### **Planning health services**

The area of planning health services includes processes related to the development of health services security plans, in particular, providing financial resources, as well as development and conduction of National Health Programme and national health plans. Responsibility for many processes in this group lies with by the Ministry of Health.

### **Providing health services**

The area of providing health services includes processes related to the recording of medical records, starting with medical examination, through medical diagnosis, stays in a health institution (hospitalization, health spa, hospice, etc.), health institution release, prescriptions handling, ending with the end of treatment. Implementation of health services is mainly a process of treatment of a patient.

Furthermore, this area includes processes related to the billing of provided health services, prescriptions and payments (invoicing, reporting made by providers of health services, reporting on issued drugs and prescription). As part of the billing process, processes associated with verification of reported information and issued drugs, are implemented.

### **Monitoring and reporting**

The area of monitoring and reporting includes processes related to providing information to government, local government and other entities. Based on the reporting data, analytical processes and simulations are also conducted. This area also includes processes associated with executing tasks related to the preparation and analysis of statistics, based on which, key decisions on health policy in Poland are made.

### **Publication of information**

The area of publishing information includes processes related to the transferring and sharing of information, in particular, information on healthcare institutions, queues of waiting patients, concluded contracts for health services and the availability of health services. In this area, the information gained from the implementation of previous processes (e.g. from the area of monitoring and reporting) is used.

## 5.2 Functionalities of implemented solutions

Elements of the solution concepts are described basing on healthcare information processes divided into groups described above.

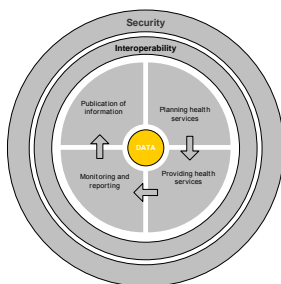
**Figure 8** Approach to presenting of the solution concept



Source: Self study.

Regardless of the described functionalities of the solution, to achieve flexible approach to the organization of healthcare resources system, the solution will provide flexibility and openness, meaning easy extension and adaptation to changing needs.

### 5.2.1 Data



In order to develop functionalities supporting the implementation of the described groups of processes, it is necessary to ensure an adequate range of data. The data will be collected basing on functionalities supporting the health service processes from implementation group, described in section 5.2.3 below.

Range of data being processed within frames of the implemented solution, is divided into two main groups - data on the patient and other data.

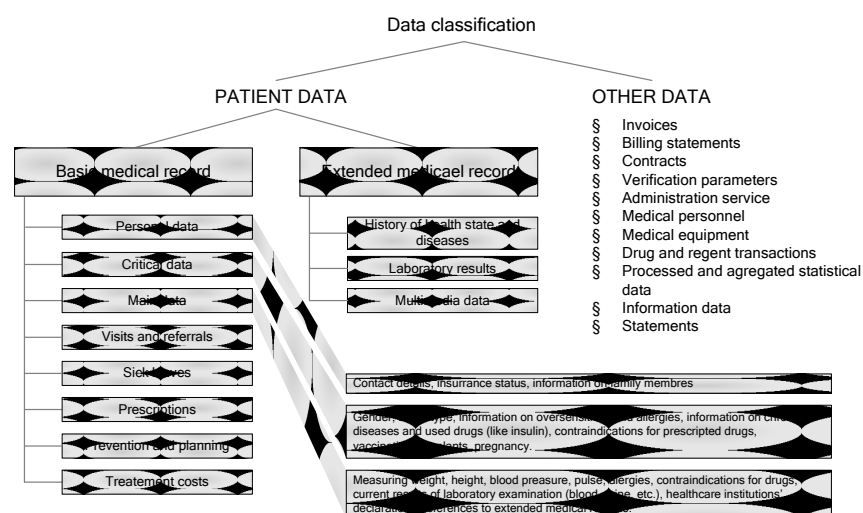
Patient data are characterized by a linkage to a specific patient. It includes:

- ▶ master data - such as contact details, insurance data, the most important medical data and data related to the implementation of administrative processes (prescriptions, medical referrals, sick leaves, medical expenses, etc.),
- ▶ extended data - such as the full record of health and diseases, the results of medical examination.

Other data include – in the accepted classification – data unrelated to a specific patient, in particular billing and statistical data, data related to healthcare resources (medical personnel, medical equipment) and other supporting data.

The proposed classification of data is illustrated in the diagram below. Detailed descriptions of the particular groups of data are contained in section 9.4.4 of the Feasibility Study.

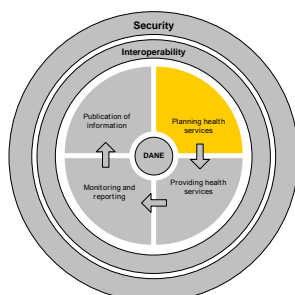
**Figure 9** The data classification, processed by the implemented solution



Source: Self study.

Presented classification of data is independent on classification of medical records types contained in the Minister of Health regulation of December 21<sup>st</sup>, 2006 on the types and extent of medical records in healthcare institutions, and how it is processed – Dziennik Ustaw (Journal of Laws) of 2006. No. 247, item 1819, as amended). Classification contained in this regulation applies to medical records, which may consist of medical data defined in accordance to the proposed data classification.

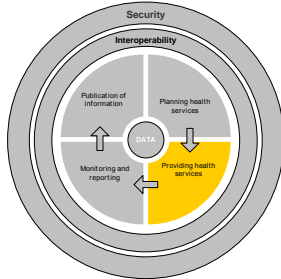
## 5.2.2 Planning health services



Effective planning of health services requires analysis of financial and statistical flows in healthcare. On the basis of reliable data concerning these flows, it is possible to identify the demand for medical services in healthcare and more effective planning of their implementation. Implementation of the Project will enable conducting of ongoing analysis of medical records for planning of health services. For their implementation it is necessary to provide reliable medical records and tools for their analysis.

Essential medical records will be collected to support processes related to the implementation of health services. Implemented solution will provide tools necessary to conduct the analysis of financial and statistical flows.

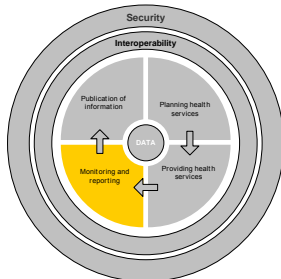
### 5.2.3 Providing health services



Processes in the group of providing health services are the most important group of processes, which will be supported by solution implemented within frames of the Project. Functionalities, available for this area will include:

- ▶ recording (input) the patient medical data in conjunction with the billing information on the service,
- ▶ providing health status of patients data to the medical personnel, including fast access to data in emergency situations and ensuring the security of the data,
- ▶ allowing electronic prescriptions service - so-called e-prescription,
- ▶ enabling electronic referral service - so-called e-referral,
- ▶ enabling electronic handling of sick leaves,
- ▶ enabling electronic appointments scheduling,
- ▶ improvement of billing processes between the service provider and the payer (billing of provided health services) and between a pharmacy and the payer (drug refund),
- ▶ collecting data necessary to provide functionalities related to sharing medical data, conducting analysis related to support of processes in the area of planning of medical services and the development of statistics and reports related to the support of processes in the area of monitoring and reporting.

### 5.2.4 Monitoring and reporting



In the area of monitoring and reporting group of processes, the Project will provide tools to support crisis management by providing information enabling ongoing monitoring of the situation in healthcare and responding to threats. At the same time, through the sharing of appropriately processed, reliable data collected to support the implementation of health service processes, it will be possible to support the implementation of reporting processes, which the service provider and the payer are currently responsible for, particularly processes related to statistical reporting to GUS.

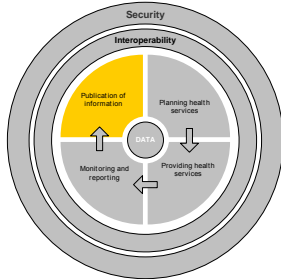
The following functionalities related to healthcare monitoring will be available in the implemented solution:

- ▶ monitoring for the purpose of crisis management will determine the measures and alarm levels in the area of defined medical records occurrence such as diseases, and on this basis to detect risks and warn about them,
- ▶ monitoring trade of medical products will provide information related to medicinal products trade,
- ▶ monitoring the availability of services will provide information about the waiting time for certain medical services.
- ▶ monitoring of medical personnel trainings will provide information related to mandatory medical personnel training and the level of training of providers' medical personnel.

Furthermore, as part of the implemented solution, data will be collected to generate series of reports that currently must be made by service providers and the National Health Fund for such entities, as: Ministry of Health, Statistical Offices and Public Health Centres.

It should be emphasized that responsibility for the accuracy and quality of data remain on the side of those transferring the data.

## 5.2.5 Publishing of health services information

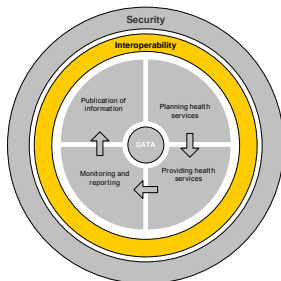


The solution implemented within frames of the Project will enable the recipients to review own medical record. Additionally, it will provide information related to administrative processes, such as prescriptions and orders of assisting and orthopaedic products, referrals and scheduled appointments, sick leaves, past and future medical examinations, past and future vaccinations. Also, general information concerning healthcare will be available, which information is addressed to all participants of the healthcare system or their particular groups (recipients, medical personnel, service providers, etc.). These information may include:

- ▶ news on healthcare - health risks, current projects, etc.
- ▶ information on available health services, including a list of services provided by different service providers and the estimated waiting time for medical opinion or examination,
- ▶ information on obligations concerning healthcare (including for example employers'),
- ▶ guides about preventive care.

The Project may also allow access to historical data on treatment episodes of patients of public healthcare system in Poland. Detailed billing information on the treatment of patients is collected by the NFZ in a uniform format starting with the year 2003. The condition for its implementation, is the consensus and commitment of the NFZ and a reconciliation of the principles and scope of the NFZ data transfer and sharing.

## 5.2.6 Interoperability



The characteristic features of information systems supporting the functioning of healthcare in the European Union and worldwide, is the multiplicity and heterogeneity, resulting from the number of entities involved in this sector and their significant autonomy. These systems are used in diverse environments, such as healthcare institutions of all sizes, pharmacies, healthcare planning institutions, supervising and controlling institutions, insurers, etc. Tens of thousands systems support the functioning of healthcare in medium-sized developed country<sup>41</sup>.

In order to ensure the availability of high quality healthcare services, a cooperation of most of these systems is required. It allows improvement of the processes carried out by more than one entity (starting with the treatment, which often involves many visits of the patient in different institutions, ceasing with prescription filling) and enables remote services (telemedicine).

In many countries, Service Oriented Architecture (SOA) was identified as the solution that meets all of the above criteria. In this kind of architecture the various system functionalities are developed and shared as interoperable services, which are further grouped and used to support business processes. Examples of SOA applications in healthcare in Canada and Denmark are presented in the Feasibility Study.

Architecture of solution implemented within frames of the Project will be compatible with SOA. A key element of service oriented architecture is the infrastructure that allows data exchanging between different information systems, supporting business processes.

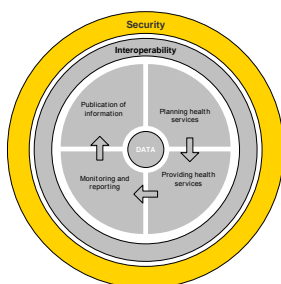
Implementing solutions in service oriented architecture is an important point supporting interoperability of healthcare information systems. At the same time,

<sup>41</sup> Canada – source: "EHRs Blueprint an interoperable EHR framework, Infoway Architecture Update Presentation", Canada Health Infoway, March 2006.

aspects of interoperability will be included at all stages of this Project, in particular by:

- ▶ following the technological neutrality principle,
- ▶ implementing solutions based on open technology
- ▶ introducing regulations which force the usage of accepted standards,
- ▶ separation of tasks which implementation by a single contractor could lead to attempts of "closing" the solutions (interoperability constraints) by the contractor.

## 5.2.7 Security



Security is one of the key factors of success of the whole endeavour. Ensuring an adequate level of security is required to gain the confidence of patients and medical personnel in the implemented solutions. To meet this challenge, a comprehensive and coherent security system will be developed, which will be adapted to the specifics of the health sector and take into account both legal requirements and best practices in this field.

Holistic approach means developing security system at the level of concept, strategy and security policy (organization and processes layer), as well as the particular security component level (technological layer). In particular, the security system must be designed so as to minimize the risk of losing:

- ▶ integrity of data - where the data processed in the subsystems are modified in an unauthorized or accidental way, this includes the protection of data transmitted between systems,
- ▶ confidentiality of data - where the collected data (in particular, medical record) will be made available to unauthorized people,
- ▶ availability of solution - where the implemented solution will not be ready to be use upon request, within the prescribed time, by an authorized entity or its performance fails to meet the requirements.

The functionalities of the implemented solutions, presented in previous chapters, must be implemented in line with ensuring data security, thus maintaining the security attributes listed above (integrity, confidentiality, availability).

The main elements of the security concept, which was presented in details in the Feasibility Study in chapter 9 are described below.

### Ensuring the reliability of data

Reliability of collected medical records will be ensured through:

- ▶ authorization of medical services implementation by the customer and the personnel of medical providers,
- ▶ preliminary validation and verification at the stage of medical records recording - to verify their accuracy and, in the case of services covered by the payer funding, compliance with the contract,
- ▶ review of recorded medical records parameterized by payers,
- ▶ fraud detection in the medical records recording.

Various mechanisms ensuring the reliability of the data are presented in detailed in the Feasibility Study. Authorization of medical services is discussed below.

### Authorization for providing health services

Solution implemented within frames of the Project will ensure authorization of provided health services, by both medical personnel providing such service and, the recipient for whom it was provided. The recipient will confirm at least the fact of a specific service reception in a particular institution. Authorization will be based

on reliable, providing non-repudiation mechanism of authentication (the authentication mechanism is described below).

Authorization of medical services which is performed by two independent persons, will be the primary mechanism for ensuring the reliability of collected medical records.

#### **Authentication mechanism for authorizing access to medical records, and medical services authorization mechanisms**

As a result of the Project (and related project P2 – part related to the elements of security and privacy management subsystem) a user authentication mechanism will be used, based on the use of qualified electronic signatures, ensuring a secure authorization for both access to medical records and secure authorization of health services.

Currently, a widespread use of certified electronic signatures in terms of the number of people using such a signature is very limited. It is associated with high costs of obtaining qualified electronic signature and the complexity level of the procedure of obtaining a certificate. People who own qualified electronic signature will have the opportunity to use it, to authenticate themselves in the system. It is assumed that the development of the usage of electronic signatures will result from the introduction of electronic identity cards. This will allow including of all adult citizens in the authentication mechanism, based on electronic signatures.

#### **Ensuring confidentiality of data**

In order to ensure a high level of confidentiality of medical records, it is assumed that authorization of access to the data will be performed by the service recipient every time. Authorization ensures that access to medical records will be granted only to the recipient, whose data are being considered, and the medical personnel authorized by the recipient.

Exception to the rule of access authorisation by the patients, may be emergency situations. In such cases, the authorized medical personnel will have access to a limited set of medical records, without authorization from the patient. Such situations will be recorded and monitored using a fraud detection system, and the customer should always be informed about an occurrence of such a situation

#### **Ensuring the availability**

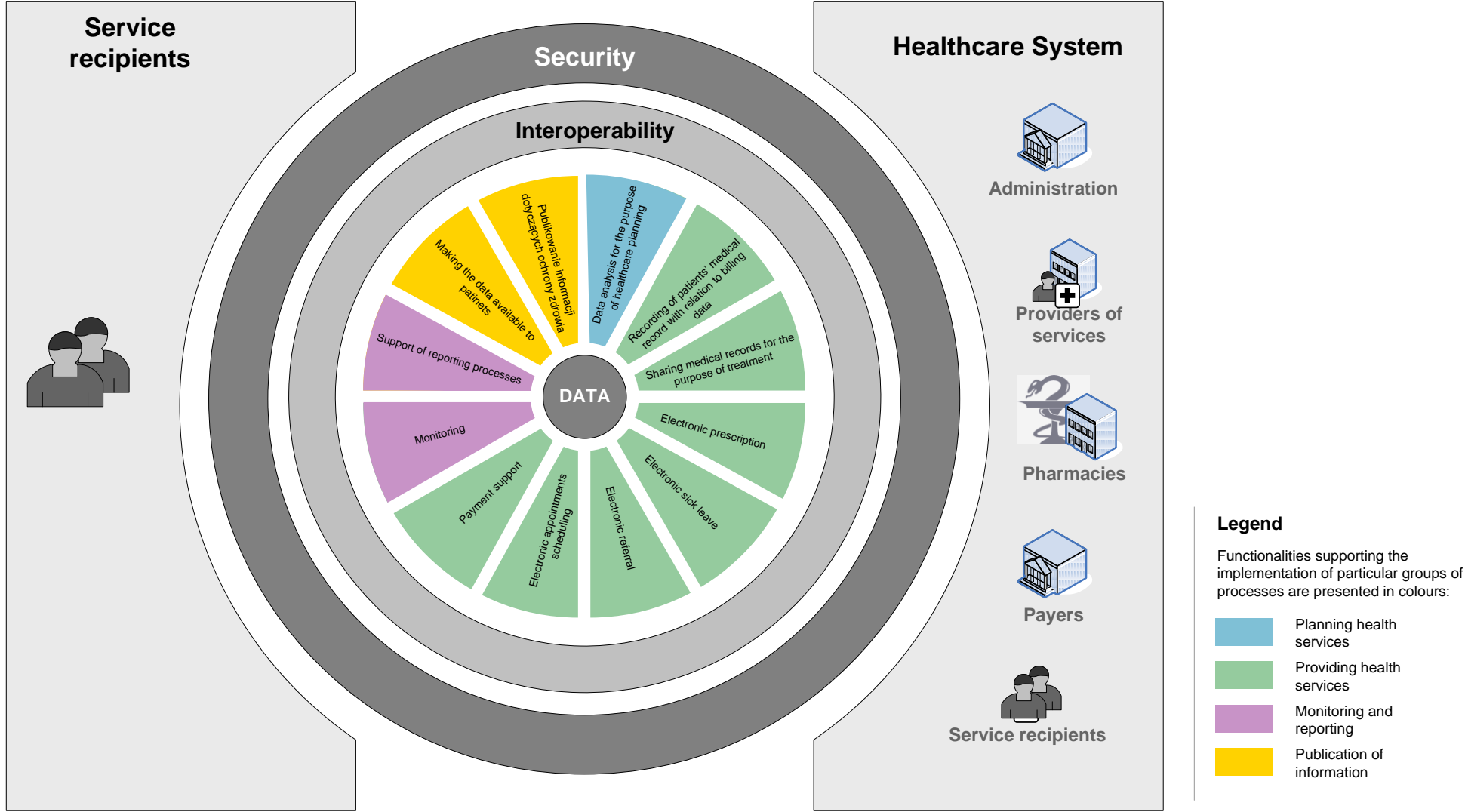
Solution implemented within the frames of the Project will support the critical healthcare processes. Availability of features, such as recording of medical records, sharing personal medical records and electronic prescriptions handling, is essential for achieving the objectives of the Project.

In order to ensure continuous availability of the solution implemented within the frames of the Project, and implementing the concept of its security, a redundant infrastructure must be provided and two separate data centres must be created. In case of failure of one data centre, critical functionality will be maintained by the other one.

### **5.2.8 Conceptual model of the implemented solution**

Next page presents a conceptual model of the implemented solution. Key features of the supported groups of processes are highlighted.

**Figure 10** Conceptual model of the implemented solutions, including functionalities supporting particular groups of processes



Source: Self study.

## 5.3 Elements of solution architecture

The described functionalities will be implemented in line with information systems covering many classes of software. These include:

- ▶ portal solutions that provide end users with system functionalities via graphical interface on the websites,
- ▶ transactional systems responsible for processing data in order to support individual groups of processes,
- ▶ analytical systems that enable conducting analyses and statistics based on the processed aggregated data,
- ▶ databases and data warehouses that collect the data processed by the transaction and analytical systems,
- ▶ integration solutions that enable cooperation of individual components of the system by ensuring flexibility and scalability.

The individual information systems that are products of the Project are briefly described in chapter 8. Full description is contained in the Feasibility Study.

## 5.4 Relation to information systems implemented within frames of other projects

The project “Electronic Platform for Collection, Analysis and Sharing of digital Medical Records” is connected to many other IT projects implemented in Poland.

The most important ones are:

- ▶ P2 project - implemented by CSIOZ within the Healthcare IT Implementation Programme, and P3 project, planned to be implemented,
- ▶ projects carried out by other government entities, concerning development of government administration electronic services, in particular “pl.ID – Polish ID card” and “ePUAP 2” projects, implemented by Ministry of the Interior and Administration,
- ▶ regional projects implemented by local administration, relating to informatization of the healthcare sector.

Additionally, the Project is related to projects planned for implementation by key stakeholders, e.g.:

- ▶ project of electronic cards implementation for people under 18 and over 65 years<sup>42</sup>, carried out by National Health Fund,
- ▶ informatization of Healthcare Institutions.

### **Relations to projects undertaken and planned for implementation by CSIOZ within the Healthcare IT Implementation Programme**

The objective of the Project is collecting, analyzing and sharing of medical records. Collection of these data requires access to consistent and reliable recorded data, including data on participants of the healthcare information processes and relations between them. Ensuring availability of consistent and

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<sup>42</sup> Source: JASPERS Action Completion Note of August 31, 2009.

reliable registration data is the subject of P2 and P3 projects, planned to be implemented by CSIOZ within the Healthcare IT Implementation Programme.

Moreover, within the P2 project, the elements of security and privacy management subsystem, can be used by solutions implemented within the Project. In order to ensure cost effectiveness of both projects, it is assumed that the solution implemented within the frames of the Project will use elements of management and security subsystem implemented within frames of the P2 project.

In order to make the implementation of the Project independent in the works' execution date, related to the adjustment of entity's medical records, there will be tools implemented within the Project that consolidates data. This will allow minimum usage of data gathered in entity's medical records.

### **Relations with other government projects for development of public administrative electronic services**

In order to maintain consistency with planned by the Ministry of the Interior and Administration, model of public administrative electronic services, the solutions implemented within frames of the Project will be integrated with the ePUAP platform. From the perspective of the solution implemented within the frames of the Project the essential services, planned to be available under ePUAP, are the following:

- ▶ Security services, used to enable citizens to use mechanisms of ePUAP identification and authentication in order to log into an electronic platform for data collection, analysis and sharing of digital medical records. At the same time, users will be able to use authentication mechanisms provided by the solution, implemented within the frames of the Project (excluding ePUAP);
- ▶ Registration broker services, enabling retrieval of data (at least some of them) from public records (ePUAP platform assumptions relate to making available the PESEL, KEP, KRS, REGON, TERYT records).

Ministry of the Interior and Administration carries out the „pl.ID – Polish ID card” project, within which, an electronic identity card is to be implemented. According to information provided by the Ministry of the Interior and Administration, the issuing new card is planned for 2011<sup>43</sup>. The electronic identity card will contain an integrated circuit storing master data of its holder – including PESEL number and electronic signature. This will ensure a secure authentication of every citizen using the identity card<sup>44</sup>.

The Project will be connected with the „pl.ID – Polish ID card” and will include the use of electronic identity cards for purposes of identification and authentication of users. This will allow realization of assumptions regarding the use of electronic signatures and secure authorization of the transaction, at the same time contributing to:

- ▶ the increase of identity cards' functionalities available to the public, by allowing their usage to a greater extent,
- ▶ the exclusion of additional costs, which would be incurred by issuing extra electronic medical cards offering functionalities, provided by the implemented electronic identity cards.

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<sup>43</sup> „pl.ID project description”, MSWiA.

<sup>44</sup> „Modern ICT solutions for Polish citizens”, Witold Drozd, Undersecretary of State in the Ministry of the Interior and Administration. Zakopane, June 26, 2008.

### Relations with regional projects

Supplement to the Project and other projects planned and implemented by CSIOZ within frames of Healthcare IT Implementation Programme, are regional initiatives aimed to develop electronic healthcare services, in particular voivodeships. They are mostly planned by boards of voivodeships and involve obtaining funds from Regional Operational Programs for years 2007 – 2013.

Most of the regional projects focus on two fundamental issues:

- ▶ Development of regional platforms for e-Health;
- ▶ Informatization and/or upgrading ICT infrastructure for healthcare institutions in the region.

Modernization of the ICT infrastructure for healthcare institutions is essential for enabling achievement of the Project's objectives. The costs associated with it were considered as external costs of the Project. The regional projects within this scope, complement and support the Project.

Development of regional platform for e-Health should be executed in cooperation with CSIOZ in order to ensure consistency of implemented solutions with Electronic Platform for Collection, Analysis and Sharing of digital medical records.

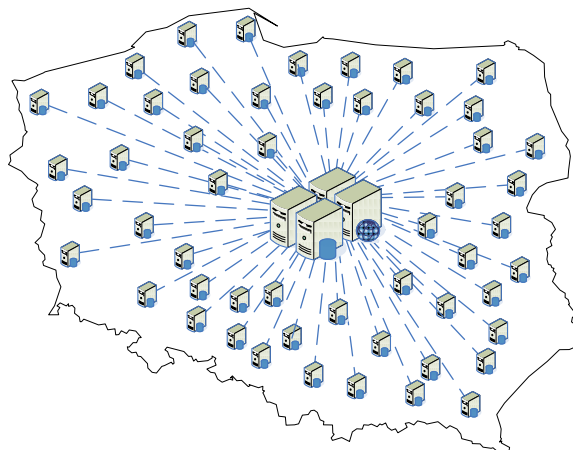
## 5.5 Project implementation options

As a result of analysis of the Project implementation options, included in the Feasibility Study, two different approaches to the implementation of the Project were suggested: – option W1 and W2. The basis for their differentiation is the method of storing and sharing the extended medical record. The extended medical record may be stored in the place of their origin, or in the regional databases of Healthcare Information System. Depending on the adopted model, various entities will be responsible for collecting and sharing extended medical records with the patients and there will be different sources of funding of the development and maintenance of extended medical databases.

### 5.5.1 Description of Project implementation options

It is assumed, in option W1, that basic medical record will be stored centrally, within the implemented solution and it will be made available to eligible parties (including the user, to which they relate and medical personnel). Extended medical record, such as laboratory results and photos, will be stored locally in the extended medical record databases. In order to enable data sharing, the entities holding the data should store it in the standardized format, record it in the solution implemented within the Project and provide mechanisms for standard data sharing.

**Figure 11** Local databases of extended medical record



Source: Self study.

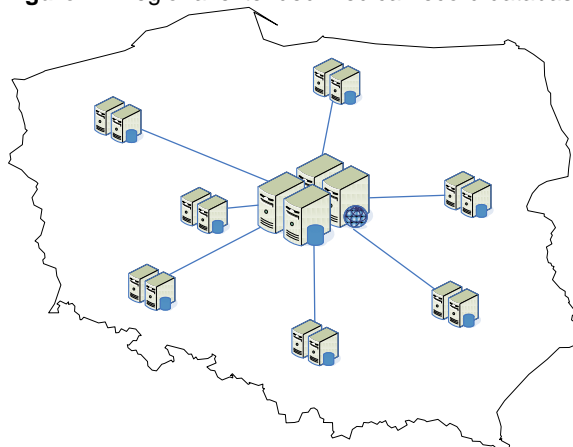
Approach to the organization of medical record databases, similar to proposed in option W1, has been applied in solutions for electronic healthcare in Germany, Denmark, Estonia and Great Britain.

In option W2, development of regional extended medical record databases, gathering patients' medical records was assumed.

Providers, operating in particular regions, will send medical records to the regional database, where they will be collected and shared. Regional databases for extended medical record will be connected with the central system of the implemented solution by dedicated WAN.

It was assumed, that there will be 7 regional extended medical record databases, due to organizational and technological reasons.

**Figure 12** Regional extended medical record databases



Source: Self study.

Approach to the organization of medical databases, similar to the proposed in option W2, was implemented in the solutions for electronic healthcare in the Czech Republic and Turkey.

## 5.5.2 Summary of Project implementation options analysis

As a part of the economic analysis, included in the Feasibility Study, the economic effectiveness ratios were calculated for the project investment options W1 and W2:

- ▶ economic net present value of investments (ENPV)
- ▶ economic internal rate of return on investment (EIRR),
- ▶ economic efficiency indicator (ratio benefit / cost) (B / C).

The results of the analysis are summarized below.

**Table 2** Economic efficiency indicators of investment options

Project option	Return on investment indicator		
	ENPV	EIRR	B/C
<b>Option W1</b>	<b>PLN 34 177 849 thousands</b>	<b>69.94%</b>	<b>19.23</b>
Option W2	PLN 33 963 668 thousands	68.48%	18.02

Source: Self study, based on financial model included in the Feasibility Study.

Values of the presented indicators suggest, that the implementation of the Project is beneficial from a social point of view on the investment, for both options. Indicator of benefit / cost (B / C), as well as other indicators of economic efficiency, present the advantage of W1 option, therefore, in accordance with the guide<sup>45</sup> lines, W1 option is indicated for implementation.

The Feasibility Study includes an analysis of Project options according to the following criteria: cost, implementation time, and risks. The results of this additional analysis confirm the selection of W1 option as the best possible Project implementation variant, as illustrated in the table below.

**Table 3** Results of analysis of options, according to the selected criteria

Project option	Chosen criteria		
	Sum of costs and expenses <sup>46</sup>	Implementation time	Average risk assessment <sup>47</sup>
<b>Option W1</b>	<b>PLN 1 425 280</b>	<b>66 months</b>	<b>4.15</b>
Option W2	PLN 1 571 774	67 months	4.54

Source: Self study.

<sup>45</sup> "Manual for preparation of feasibility study of IT projects implemented within frames of 7. priority axis".

<sup>46</sup> Compared to the total investments, reconstruction investments and operational costs associated with implementation of the Project for both investment options.

<sup>47</sup> Compared basing on 41 identified threats, which likelihood and impact is assessed for each option (scale of risk assessment from 1 to 9). The table shows average ratings (lower value means a less risky option).

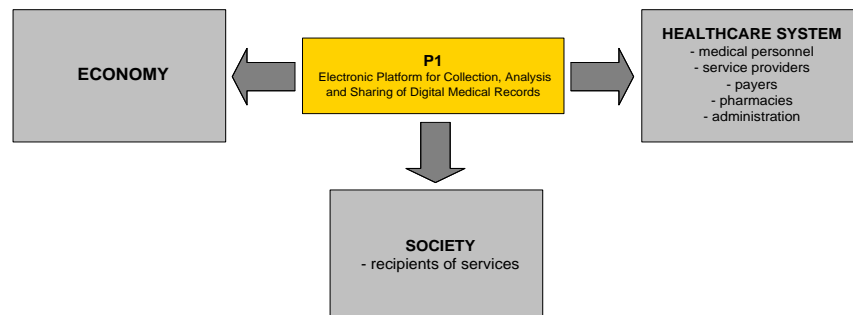
## 6 Project benefits and costs

This chapter presents the key benefits and costs related to Project execution. First of all (6.1) benefits resulting from the introduction of IT solutions implemented under the Project are described, including perspectives of various stakeholders groups (6.1.2). Furthermore, as a part of financial analysis, quantifiable benefits were estimated (6.1.3). In sub-chapter 6.2 main cost categories were identified and values estimated. The last sub-chapter (6.3) includes a summary of the benefits and costs analysis conducted.

### 6.1 Benefits

The informatization Project under analysis is a complex solution for the whole healthcare system, thus it shall impact the whole population participating in treatment processes, both directly and indirectly. It will also constitute a significant component of healthcare, bringing about positive influence for people not directly utilizing healthcare services at a given moment (Figure 13).

**Figure 13** Project implementation impact on various stakeholder groups



Source: Self study.

It was assumed that finally all service providers together with the payer (payers) will be included in the system. Thanks to efficiency increases on the part of service providers we can expect informatization impact to be tangible for all **recipients of services**.

Beneficiaries will be **healthcare units** (e.g. lower data processing and archive costs), **payers** (e.g. thanks to detailed statistics on services funded) as well as the **public administration** (e.g. reduced labour on administrative tasks), **pharmacies** (e.g. due to savings arising from the usage of e-prescriptions) and the **medical personnel** (e.g. reduced risk of doctors' mistakes thanks to full and trustworthy information regarding the patient). The project will also contribute to enhancing diagnostic function efficiency and impact the treatment process itself both in short-term perspective, e.g. through more efficient provision of services to recipients and queue management, and in the long-term perspective, thanks to providing opportunities for strategic decision making based on statistical data aggregated in the system.

Furthermore, the Project may have positive impact on the **economy**. Healthcare informatization will contribute to e-economy sector reinforcement that will, in turn, foster the development of new workplaces. Execution of this task will also boost competition levels in sectors of the economy related to the information society.

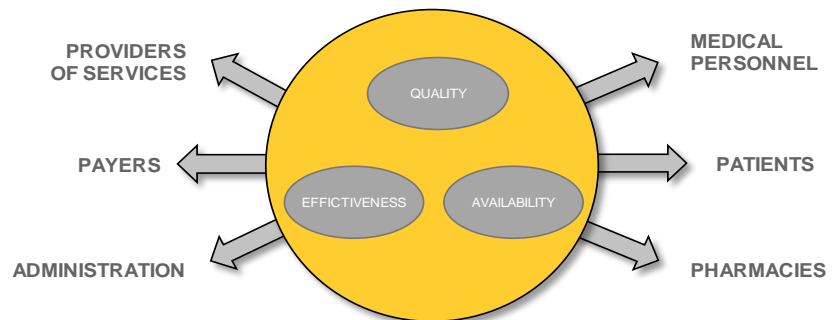
### 6.1.1 Benefit analysis approach

The economical analysis was performed taking into account the perspectives of six Project stakeholders' groups that will benefit directly from the Project's execution. The groups are defined in chapter 4.

Potential benefits were estimated in three categories (in accordance with guidelines included in the „*eHealth is Worth it* [...]”<sup>48</sup> document):

- ▶ quality – easy and convenient solutions resulting in the reduction of error rates,
- ▶ accessibility – extent of system utilization calculated based on transaction volume growth,
- ▶ efficiency – efficiency improvement measured through single unit 's cost reduction.

**Figure 14** Effect assessment categories for stakeholders



Source: Self study.

The Feasibility Study employs two approaches to benefit analysis. The first approach portrays benefits using a qualitative approach, as results of Project implementation (6.1.2). Despite the lack of quantification, such benefits determine significant arguments for the implementation of the described system. The second benefit analysis component is the economic analysis with some results from section 6.1.2 estimated monetarily using various methods to quantify non-material effects (6.1.3).

### 6.1.2 Project results

Project execution will bring about a series of results significant from the socio-economic point of view. Main Project results are covered in subsequent sub-chapters.

#### 6.1.2.1 Providing information concerning healthcare

Project execution will make the patients and medical staff more conscious with regard to the accessibility and levels of services provided within the healthcare system. This will enhance awareness of prophylaxis and treatment of certain diseases, rules governing usage of the healthcare system resources and healthy lifestyle promotion that can considerably improve health levels across the society.

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<sup>48</sup> “eHealth is Worth it - The economic benefits of implemented eHealth solutions at ten European sites”. Stroetmann K., Jones T., Dobrev A., Stroetmann V.

#### 6.1.2.2 Providing medical personnel with access to patients' digital medical records

Enabling medical staff to access digital medical records will directly improve the quality of services provided to patients. Project execution will foster improvement, among other issues, of communication and data exchange quality between the patient and the doctor, obtaining complex knowledge on patient's medical status by the doctor, lowering costs related to the usage of paper documents.

#### 6.1.2.3 Providing digital data on medical events to patients

Providing patients with access to digital medical documentation will make such information more accessible to service users, at the same time reducing duties related to administrative system management. This mainly relates to time savings.

#### 6.1.2.4 Providing service recipient with electronic history of medical conditions, performed treatment procedures, referrals, prescriptions, sick leaves, vaccination plans and recommendations

Thanks to Project implementation all information on medical services provided to patients as well as carried through referrals, prescriptions, vaccinations and test results will be stored in a single place and available via the Internet within short time, regardless of the patient's place of stay.

#### 6.1.2.5 Providing information enabling current risk monitoring and counteracting

By means of IT solutions implemented under the Project, public entities will have instant access to information on potential risks to citizens' health (pandemics, epidemics, nosocomial infections).

#### 6.1.2.6 Authorized medical records

Trustworthiness of data on medical records gathered in the IT system will be ensured by means of authorization by medical personnel and by the patient combined with verification by the payer. Trustworthiness of medical records constitutes the basis of such data utilization in the treatment process as well as enables the creation of credible statistical data for preparation of necessary analytical reports in the healthcare planning and management process and in rational decision-making processes by healthcare system participants.

#### 6.1.2.7 Providing interoperability

Solutions implemented under the Project will enable the provision of data on medical events based on uniform standards in the EU<sup>49,50</sup> and the Ministry of the Interior and Administration. Thanks to that, the services provided by the implemented solution will be utilized by external IT systems compatible with the indicated standards.

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<sup>49</sup> "e-Health – making healthcare better for European citizens: An action plan for a European e-Health Area". EC communication to the European Parliament, Council of Europe, European Socio-Economic Committee and Regions, COM (2004)356 final version, Brussels, April 30, 2004.

<sup>50</sup> Commission recommendation on cross-border interoperability of electronic health record systems, EU communication, Brussels, July 2, 2008

#### **6.1.2.8 Enabling digital prescription filling**

Project execution will enable doctors to fill prescriptions in a digital form. This will foster efficiency increase on drug prescriptions, reduce form purchase costs and rationalize the prescription distribution process for pharmacies. Furthermore, patients will not have to remember to carry prescriptions with them, losing a prescription will not be possible and prescription errors or illegibility problems will be minimized. Additionally, prescription filling will also be possible for authorized medical staff without the need for the patient to a medical facility. The functioning of digital prescription system will also reduce the risks of forging manually filled prescriptions.

#### **6.1.2.9 Enabling on-line consultation bookings**

The IT solutions implemented under Project execution will enable patients to book consultations with their doctors on-line. This service will be limited to service providers that will provide this option. Finally, it should encompass all the providers' services based on contract with the payer. Electronic booking system will be an auxiliary system and not one replacing the currently used booking schemes.

#### **6.1.2.10 Enabling electronic invoice processing**

Under the Project, an electronic invoice template will be developed. The implemented solution will foster more efficient settlements between service providers, pharmacies and the payer (payers) by means of digital invoices (e-invoices). Digital invoice transmission will also provide the reduction of administrative and accounting services demanded by the healthcare unit.

Book-keeping, storage and data provision for financial authorities for the abovementioned invoices will not be supported by the implemented solution, but rather remain the responsibility of service providers and pharmacies.

#### **6.1.2.11 Providing digital resources on medical records, ensuring uniform and homogenous standards**

Under the Project, uniform and homogenous standards will be designed with regard to medical record input and storage (medical services will be identified and described based on the following dictionaries: ICD-9, ICD-10, ICF, ICHI, ATC, SNOMED). This will facilitate alignment and analysis of data coming from various units, as well as facilitate data exchange between systems (interoperability).

#### **6.1.2.12 Providing fast access to digital medical records in urgent cases**

IT solution implementation under the Project will enable paramedics to quickly access patient's medical data (e.g. blood type, allergies) in situations of direct life threat.

#### **6.1.2.13 Enabling up-to-date analysis of medical records**

Enabling up-to-date analysis on medical services provided will enable, among other things, the monitoring of current trends in morbidity, regional treatment efficiency, creation of medical service demand forecasts, verification of financing assigned by the payer and the Ministry of Health for individual medical services and current allotment of financing staying at the disposal of the payer and the Ministry of Health.

#### 6.1.2.14 Facilitating digital maintenance of medical service provision settlements

Thanks to the IT solution implemented (registration of data necessary for settlements), the service provider will be able to smoothly prepare digital settlement documentation for medical services provided under contract with the payer without the need to send separate statistical reports to the payer.

#### 6.1.2.15 Facilitating electronic handling of drug refunds

Facilitating electronic handling of drug refunds will allow time savings in settlements between pharmacies and the payer. Performing current settlements having beneficial influence on pharmacies' financial standing, will reduce unnecessary administrative procedures and efficiently detect abuse cases in prescription writing and filling.
























































#### 6.1.2.16 Enabling electronic sick leave processing

Thanks to utilization of digital sick leaves, the necessity of service providers sending paper sick leave forms to the Social Insurance Institution will be eliminated. This will help reduce costs related to the purchase of sick leave forms and their transportation. Furthermore, enabling digital sick leave processing will raise Social Insurance Institution inspection levels and reduce forgery risks on manually filled sick leaves.

As the planned solutions are unique, multiple additional benefits can be expected apart from the ones listed above. The Project results list is not complete also because new functionalities might be added based on the solutions introduced, thus enhancing information exchange capabilities in accordance with stakeholders' suggestions and needs.

The following page presents a table illustrating relationships between Project results and its detailed goals as well as impact of the results onto individual stakeholder groups.

**Table 4** Project results and stakeholder group assignments

MAIN OBJECTIVE	SPECIFIC OBJECTIVES	RESULTS	STAKEHOLDERS					
			 Service recipients	 Medical personnel	 Providers of services	 Payers	 Pharmacies	 Administration
Enabling collection, analysis and sharing of digital medical records by public institutions, state and self-government administration, enterprises and citizens	Quality improvement of patient service	Providing information concerning health						
		Providing medical personnel with electronic data concerning patients condition						
		Providing patients with electronic medical records						
		Providing recipients of services with electronic records of medical history, received services, referrals, prescriptions, sick leaves, vaccination plans, orders						
		Allowing electronic prescription filling						
		Allowing electronic reception						
		Providing immediate access to medical record in case of emergency						
		Allowing electronic servicing of sick leaves						
	Planning healthcare	Allowing current analysis of medical record						
	Electronic payments	Allowing electronic invoicing						
		Improvement of electronic payments for medical services						
		Allowing electronic service of drug refunding						
	Crisis management	Providing information allowing current monitoring of threats and reacting to it						
	Interoperability with european electronic platforms for healthcare	Assuring interoperability						
		Providing digital resources concerning medical records, following uniform and homogeneous rules						
	Credibility of medical records	Authorized medical records						

Source: Self study.

### 6.1.3 Social benefits as portrayed by the economic analysis results

An economic analysis of the venture was prepared for the Feasibility Study. It was completed in accordance with guidelines included in the document „Guide to cost-benefit analysis of investment projects” prepared by the EC for structural funds, the Cohesion Fund and pre-accession funds (version of June 16<sup>th</sup>, 2008). In accordance with the guidelines, the economic analysis was prepared from a broad socio-economic point of view.

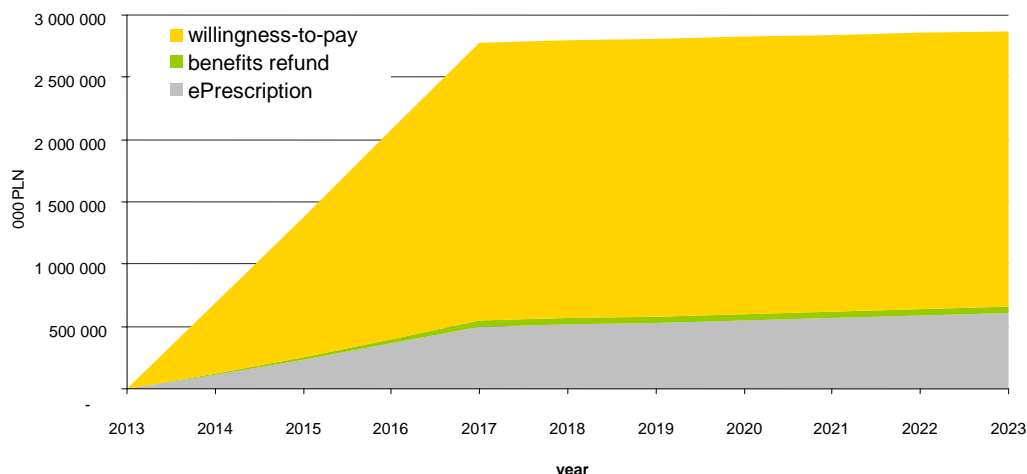
It was assumed for the economic analysis that the reference period common for the financial and economic parts is 15 years from the date of submission of financing applications, which includes years 2009-2023. The period analyzed is broader and also includes Project preparation stage taking into account costs sustained prior to submitting the financing application.

Economic benefit estimate was prepared using three methods:

- ▶ **Willingness-to-pay (WTP) method** – readiness to bear costs of the introduced solution. The method was applied to estimate benefits to service providers. This approach included a survey that asked 1000 respondents about a value they would be willing to pay monthly in order to participate in a system with results similar to the ones expected from the Project. The average weighted value indicated in the answers and related to the average Polish citizens was PLN 4.90. Assuming that until 2017 full economic benefits from Project execution will emerge, their value estimated by means of the willingness-to-pay method will be on a constant level of about PLN 2.2 billion annually (in the period 2017-2023). For the years 2014-2016 it was assumed, that 25%, 50% and 75% of service providers, respectively, will receive economic benefits from Project execution.
- ▶ **Benchmarking method** – this method was utilized to estimate benefits for service providers and pharmacies arising from the use of e-prescriptions. Quantification was performed on the basis of estimated doctors' and pharmacists' working time savings and reduction of the estimated unit cost of a prescription. Aggregated annual economic benefits due to working time reduction in the period from 2014 to 2023, discounted as of January 1, 2009, results in a value of PLN 2 518 803 thousand.
- ▶ **Estimates of financial benefits** resulting from facilitating information exchange that has an effect on improving service recipients' financing efficiency. The method was used to estimate the benefits for service providers. The total value, discounted as of January 1, 2009, was estimated for PLN 241 662 thousand.

Figure 15 presents the qualitative change that will emerge in the healthcare system thanks to Project introductions. Following an intermediary period with the implemented solution used to store data and the personnel undergoing training on software usage, economic benefits will stabilize on a level of over PLN 2.8 billion annually. The major part of the benefits should be explained by high innovation level of the implemented solution and its countrywide scope (the Project does not restrict the targeted audience size, as all the service providers will be able to use it, including the private ones).

**Figure 15** Social benefits in years 2013-2023



Source: Self study based on data from the economical-financial model for the Feasibility Study.

**One needs to remember that the benefit structure discussed pertains only to quantifiable effects** (ones for which there was a methodology enabling reliable value assessment).

## 6.2 Costs

In order to execute the Project and obtain the benefits described above, some costs, that can be classified to fit in four groups, have to be borne:

- ▶ Investment outlays – expenditures sustained in the investment stage of the Project related directly to its execution;
- ▶ Replacement outlays – expenditures necessary to replace fixed assets and non-material and legal assets acquired and produced during Project execution; replacement outlays enable maintenance of the infrastructure created throughout the Project in uncompromised condition in the long term;
- ▶ Operational costs – expenditures related to maintenance of the implemented systems borne over the course of the Project execution and following its completion;
- ▶ External costs – expenditures that need to be sustained in order to obtain benefits related to Project execution, that however are not directly linked to the Beneficiary nor the Project;

The assumptions described below were taken to estimate expenditures related to Project execution, while the following sub-chapters present individual cost categories and their estimated values.

### 6.2.1 Assumptions taken for providing cost estimates

Listed below, are the selected assumptions taken in order to estimate expenditures related to Project execution. Full description of assumptions is contained in the Feasibility Study.

#### 6.2.1.1 Application software outlay estimation method

A COCOMO II method was used to estimate development costs for individual applications included in the system. This method enables the assessment of work intensity of applications and is independent from the type of application/system for which the estimate is prepared. COCOMO II requires a single basic parameter to be determined that describes the number of logical instructions included in the code that are necessary to implement the forecasted functionality. Over the course of works and based on general functional requirements included in the Basic Programme Document, requirements presented in the draft of the act on information system in healthcare and forecasted functionalities for applications included in the Platform, code line number ranges that were determined for applications to be developed under the Project, with each application assigned to an appropriate class as a result. In the next step, teams were assigned for classes that were defined to develop applications in given classes and work-intensity for each class was determined, that in turn provided the estimation of outlays that need to be sustained to develop the applications.

#### 6.2.1.2 System infrastructure outlay estimation method

In order to define quantitative and efficiency assumptions for the system, statistical data published by the National Health Fund, Central Statistical Office and the Ministry of Health was used. On this basis, system user numbers and stored data volume were estimated. Quantitative assumptions estimated based on statistical data and combined with the assumptions as to parameters such as system response time, number of simultaneous accesses, number of transactions per second or server utilization level resulted in defined requirements as to infrastructure efficiency and capacity. The defined efficiency and capacity requirements in turn were used to determine basic requirements as to configuration of individual infrastructure elements and to assess outlays necessary to acquire the required infrastructure and appropriate licenses.

#### 6.2.1.3 System infrastructure outlays

The IT infrastructure includes an assumption on using hosting services available on the market (when talking about basic system servers) as well as collocation services (in case of non-standard IT infrastructure components that are not to be rented but rather purchased by the Centre of Health Information Systems). IT infrastructure components owned by the Centre of Health Information Systems will be replaced every four years.

Infrastructure elements assigned for prototyping purposes will constitute a property of the Centre of Health Information Systems. As this part of infrastructure is not to be used in the target system, such infrastructure shall not be replaced - following prototyping completion it can be reused as a testing and development environment or a data recovery laboratory and an additional auxiliary centre.

### 6.2.2 Investment outlays

Investment outlays are assumed to be sustained over the years 2007-2014. Investment outlays include:

- ▶ preparation of the Project (including analysis and consulting services, tender preparation and execution), management of the Project (including additional Centre of Health Information Systems personnel related to Project execution and external consulting) and auditing,
- ▶ infrastructure and license purchases,
- ▶ system creation and development,
- ▶ trainings,

- Project solutions' promotion.

Detailed split of investment outlays into individual years is provided in a summarizing table in sub-chapter **Error! Reference source not found..**

### 6.2.3 Replacement outlays

The financial analysis includes replacement outlays necessary for functioning of individual system components. Replacement outlays will be bared after the completion of Project implementation in 2015. As a part of the analysis, replacement outlays to be bared in the years 2015-2023 were estimated.

Periodical replacement of purchased infrastructure components is forecasted, in particular tape libraries and disc matrices.

Detailed replacement costs for individual years are presented in a summarizing table in section 6.2.6**Error! Reference source not found..**

### 6.2.4 Operational costs

Both over the course of Project execution and following its completion, the Beneficiary shall bear operational costs related to maintenance of systems created during Project implementation.

For the needs of the financial analysis, the following Beneficiary expenditures generated by the Project and constituting its operational costs were taken into account:

- costs of management (preparation and execution of tenders related to system maintenance and replacement outlays),
- server room maintenance,
- system support,
- application maintenance and development.

Detailed operational cost split into individual years is presented in a table summarizing sub-chapter **Error! Reference source not found..**

### 6.2.5 External costs

As the cost and benefit analysis researches Project impact from a perspective surpassing sheer financial analysis, it also includes additional costs related to Project implementation.

The notion of external costs is used in the broad sense as all cost relationships resulting from Project execution that guarantee obtaining the benefits on the level discussed in the Feasibility Study.

It is worth mentioning that the assessment, as well as the economic benefit assessment, is based on the statement that even though they do not determine cash flows directly related to the Beneficiary and the Project, sustaining them is necessary to obtain benefits on an appropriate level or is a consequence of Project implementation.

Three basic groups of external costs were established:

- costs of adapting existing IT systems of healthcare units to match Project requirements,
- costs of developing part of the administrative system executed under the project „Platform for sharing services and resources of digital medical records with on-line business" (P2),

- cost of the adaptation of some entity records.

External costs are presented in a summarizing table in sub-chapter 6.2.6.

## 6.2.6 Costs summary

The following page provides tables summarizing costs related to Project estimates under the financial and economic analysis.

**Table 5** provides expenditures related to Project execution and maintenance of solutions implemented under the project, that is investment outlays, replacement outlays and operational costs. Those were estimated under the financial analysis prepared.

**Table 6** provides external Project-related costs that were estimated under the economic analysis prepared.

**Table 5** Expenditures as resulting from the financial analysis

Type of expenditure	Investment stage (2007 – 2014)	Maintenance stage (2015 – )
<b>Investment outlays</b>		
	Total in years 2007-2014	
Project preparation and management, auditing	PLN 61.2 million	
Infrastructure and license purchases	PLN 132.6 million	
System development and implementation	PLN 486.7 million	
Prototypes	PLN 10.3 million	
Health Information System project and design, creation and implementation of the Service Bus and Administration System	PLN 87.6 million	
Design, creation and implementation of the Portal	PLN 125.7 million	
Design, creation and implementation of the Medical Data Collection System, Auxiliary Expanded Medical Data Base, Register Maintenance System, Verification System, Settlement Assistance System	PLN 174.7 million	
Design, creation and implementation of the Data Warehouse, Abuse Detection System	PLN 88.5 million	
Training	PLN 21.8 million	
Promotion	PLN 10.3 million	
<b>TOTAL</b>	<b>PLN 712.6 million</b>	
<b>Replacement outlays*</b>		
		Total in years 2015-2023
<b>TOTAL</b>		<b>PLN 75.5 million</b>
<b>Operating costs</b>		
	Total in years 2009-2014	Total in years 2015-2023
<b>TOTAL</b>	<b>PLN 110.3 million</b>	<b>PLN 539.9 million</b>
		Total in the year 2015
<b>TOTAL in the first full year of the maintenance stage</b>		<b>PLN 51.4 million</b>

**Table 6** External costs as resulting from the financial analysis estimate

<b>External costs **</b>	
Cost of adapting the existing IT systems in healthcare units to suit Project requirements	PLN 1156.0 million
Costs of creating part of the administrative system that is executed under the project "Platform for sharing services and resources of digital medical records with on-line business" (P2)	PLN 30.1 million
Cost of adapting part of the subject registers	PLN 12.9 million
<b>TOTAL</b>	<b>PLN 1199.0 million</b>

**Key assumptions (full list of assumptions included in the Feasibility Study):**

Mathematical rounding rule was used in the table. As the convention applied calls for displaying financial values in millions of PLN, the totals and/or partial totals in tables might not be exact arithmetic sums.

All values displayed in the tables are gross values.

Financial analysis was carried out in nominal prices, that is current prices (inclusive of inflation).

**Explanations:**

\*Replacement outlays shall be borne in four year cycles, e.g. for years 2015-2018 the outlays amount to PLN 37.4 million.

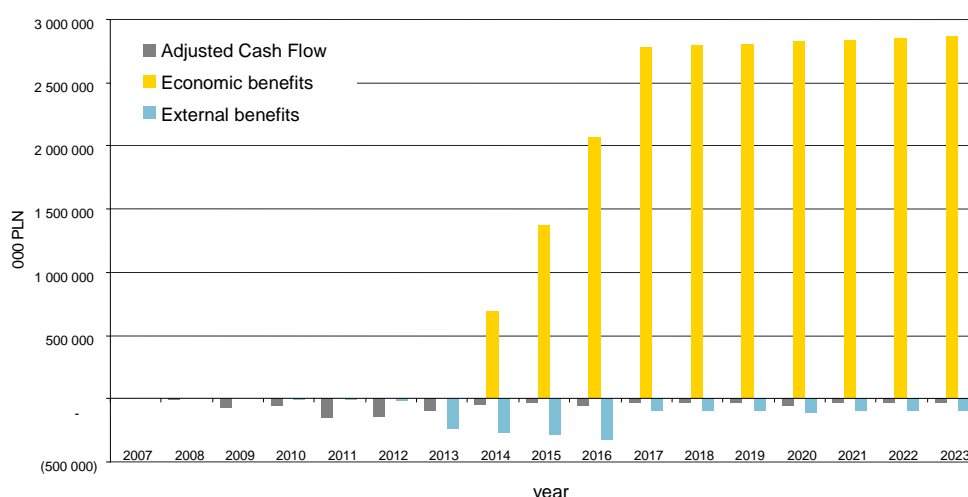
\*\*External costs in real prices discounted for January 1<sup>st</sup>, 2009.

## 6.3 Summary

The overall goal of infrastructural investments in healthcare is prolonging the lifetime expectancy and improving its quality. In the context of significant social impacts, Project execution will generate a series of socio-economic effects aiming at arriving at the abovementioned goal.

Thanks to the economic analysis performed, quantifying potential benefits and costs of the executed Project, it is doubtless that socio-economic benefits are incomparable to costs that need to be sustained. It is worth reminding here that quantification was only performed for effect categories for which universally accepted estimate methodologies exist and enable processing data and forecasts available for the Project.

**Figure 16** Net cash flows, economic benefits and external costs for the years 2007-2023 adjusted to the needs of financial analysis



Source: Self study based on data from financial model for the Feasibility Study.

**Figure 16** exhibits graphically the scale of economic benefits related to the Project – the estimated benefits are several times higher than the costs that need to be sustained (inclusive of all types of costs listed in sub-chapter 6.2). This is a result, in particular, of high estimates on the introduced solutions by future service recipients (the willingness-to-pay method).

Moreover, the economic efficiency ratio (B/C) was estimated for the whole venture. The ratio that compares discounted benefits to total discounted costs generated throughout the project timeframe was calculated to be 19.23. This means that Project execution is beneficial from the social point of view.

**Overall, the Project will meet the social need of improved healthcare system functioning efficiency that will in turn translate into higher availability of medical services and better level of customer services provided to patients. Finally, a fundamental impact on healthcare system in Poland as well as on the societal health levels will be recorded.**

# 7 Project implementation

This chapter presents issues related to Project implementation. It describes the general approach to implementation stages together with general works schedule (7.1). Sub-chapter 7.2 presents risk analysis for the Project including key risk descriptions together with possible risk responses. Issues related to cooperation with stakeholders during Project implementation were also covered (7.4). Moreover, a legal analysis (7.5) indicates legislative changes that are necessary for Project implementation and its proper functioning.

## 7.1 Project execution plan

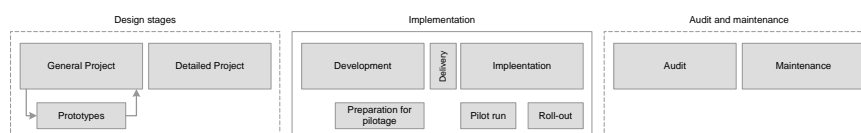
This sub-chapter presents the general Project implementation plan. It was divided into three main stages:

- design stage,
- implementation,
- auditing and maintenance.

The Project includes at least 29 planned tender processes with a total gross value of PLN 670 997 thousand in the years 2009-2014<sup>51</sup>. Potential necessity to go through with more public procurement processes than assumed at the moment of preparation of the Feasibility Study can be a result of current needs related to Project execution.

Figure below illustrates the placement of prototype and pilot run stages in the Project schedule.

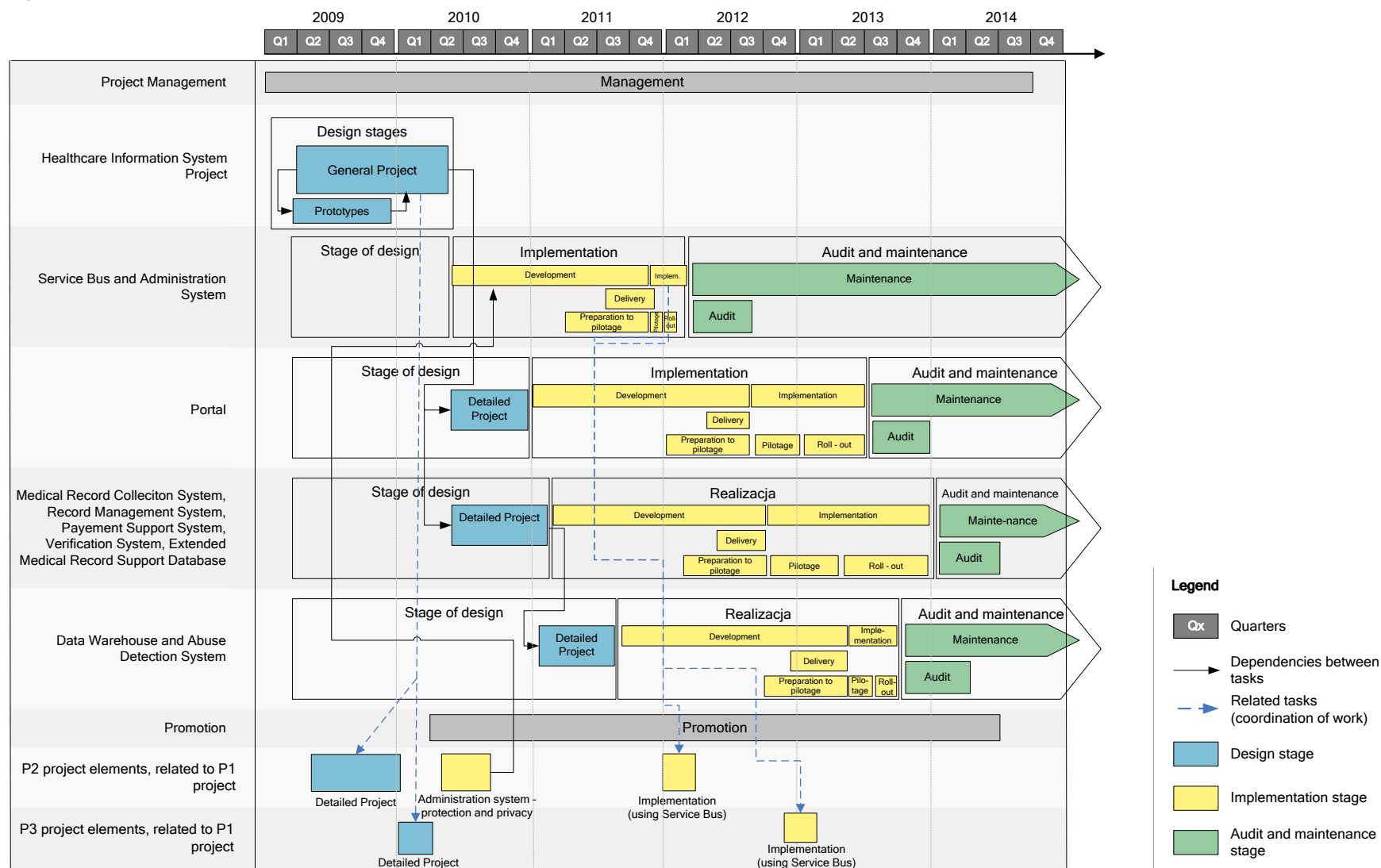
**Figure 17** Project implementation stages



Source: Self study.

<sup>51</sup> The sum indicated includes solemn costs bared during tender proceedings. Total investment costs for the Project, on the other hand, includes other expenditures such as expenditures sustained by the CSIOZ for preparation and conduction of tenders.

**Figure 18** General Project implementation plan



\* - General Project includes development of Detailed Project for Service Bus and Administration System

Source: Self study.

Summary of the Feasibility Study of the project:  
Electronic Platform for Collection, Analysis and Sharing of digital Medical Records

#### 7.1.1.1 Design stage

The design stage includes three phases:

- ▶ General designs,
- ▶ Prototyping,
- ▶ Detailed design.

Works on implementing prototypes of selected elements for the target solution should commence in parallel to development of general system design.

Conclusions from the prototyping stage, at the same time verifying technical and organizational assumptions taken on the design stage, should determine the basis for decisions taken when developing the detailed design.

##### **General design**

The main objective of General Design creation is to confirm and detail on the scope of the target functionalities for all IT solutions implemented under the Project as well as to prepare a general functional and technical design including relationships between existing and planned components of the implemented system. The General Design encompasses more detailed implementation works scope planned under the project and a subsequent new implementation cost estimation.

Under the General Design, assumptions for the whole healthcare IT system to be developed under projects constituting the Healthcare IT Implementation Programme shall be developed.

On the General Design stage, key stakeholders for each Project product should be identified so that they can be involved in the course of further works on those products.

##### **Prototypes**

Components of the target solution significant for the stakeholders were selected as preliminary prototypes. Those are characterized, however, by low dependence levels on other components of the system implemented under the solution, so that they could be initiated as soon as possible and with minimal outlays.

Prototype implementation can be restricted geographically as well as with regard to users' groups and functionalities. The prototype stage will be executed in parallel to the design stage. Under this stage, the following will be developed and implemented:

- ▶ electronic prescription service prototype,
- ▶ analytic and reporting system prototype.

On further stages of Project execution further decisions on development and implementation of prototypes for other components of the final solution can also be taken.

##### **Detailed design**

The main objective of the Detailed Design development is to prepare a document to define technical requirements necessary to commence implementation execution for individual IT solutions. The Detailed Design stage includes, among other things, the analysis of conclusions from the prototype stage, identification of minimum system functionality scope, creation of a detailed functional and technical design for systems, approval of deadlines and works sequence as well as verification and updating of the solution implementation cost estimate.

On this stage, the Project Beneficiary shall cooperate closely with key stakeholders for products a given Detailed Design relates to.

### 7.1.1.2 Execution

Prior to commencing the implementation stage, the fully functional scope together with a detailed technical design should be approved formally.

Project implementation includes the following phases:

- ▶ Development, occurring in parallel to preparations for the pilot run,
- ▶ Delivery,
- ▶ Implementation, occurring in parallel to the pilot run, followed by system roll-out.

The abovementioned stages could be executed in an iterative way, that is the development and implementation can relate to individual Project product components. It is, however, necessary to ensure that the implementation of individual products will be concluded in accordance with the schedule presented and that product execution indicators will be achieved in a timely manner.

#### **Development**

The development stage aims at creating individual components of the system executed under the Project, testing and preparing them for implementation.

Main elements of the development stage include development works aimed at creating individual system components and preparing the system that would meet the assumed functional requirements for the pilot run.

#### **Preparing for the pilot run**

The main aim of the preparation for the pilot run stage is to define and prepare a system meeting the assumed functional requirements, preparing healthcare units for system implementation and developing monitoring and failure resolving system for the pilot stage.

#### **Delivery**

The delivery includes acceptance of license and hardware necessary to implement the developed software. In particular, the delivery stage includes verification of compliance for parameters of the delivered hardware with order specification and settlements with the suppliers.

#### **Implementation**

The system implementation stage includes the pilot stage, preparation for implementation of other system components and organizational units not covered under the pilot run as well as the system roll-out. It is significant as well that the system start up moment in units not covered under the pilot run will depend on conclusions from the pilot run and decisions following it.

#### **Pilot run**

Prior to start up of the full system implementation, the assumed functional and technical process should be verified as to correctness of basic functional and efficiency assumptions.

Conclusions from the pilot run execution will constitute the basis for decision on start up or resignation from full implementation.

#### **Roll-out**

Should the pilot run result in a decision on expanding the implementation, it will be followed by system roll-out to other units included in the Project. Prior to roll-out commencement, all errors recorded during the pilot run should be removed and analyzed and all necessary modifications should be included in the system. System modifications during roll-out should only relate to critical errors.

Furthermore, during the roll-out stage appropriate maintenance procedures should be developed and maintenance and service agreements concluded. The roll-out should

commence as soon as possible following the completion of pilot run and in accordance with an earlier schedule.

Roll-out also includes user training executed based on materials developed during the pilot run. Trainings can also be executed following formal completion of the roll-out stage and the whole implementation stage.

Obtaining full P1 functionality is planned for the year 2014, following successful implementation of all Project components.

### 7.1.1.3 Auditing and maintenance

#### Auditing

On the auditing stage, works will be performed aiming at the verification of achievement of Project goals or its subsequent stages and phases as well as verification of compliance with assumptions taken on the system design stage. It is also possible to carry out audits on earlier stages, in particular whenever there is a suspicion of non-compliance with assumptions taken on the system design stage or with project management standards

#### Maintenance

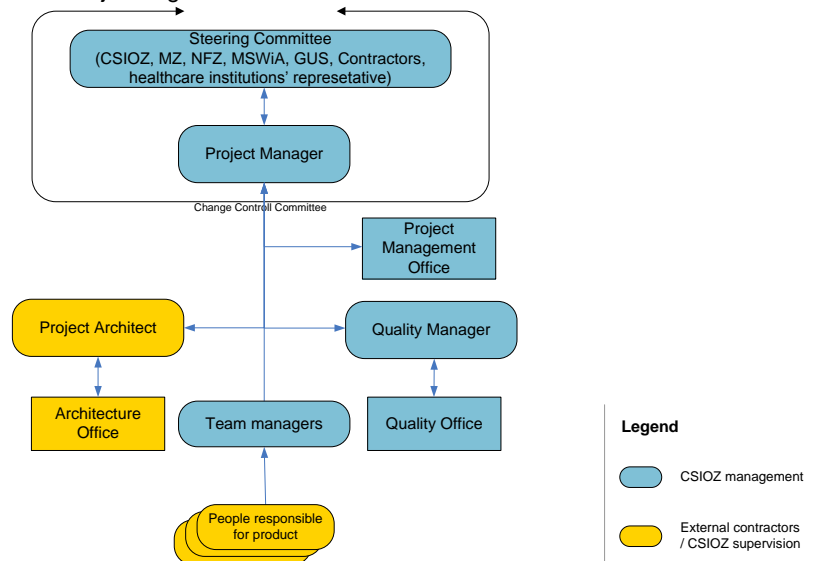
On this stage, maintenance procedures need to be implemented as well as service provision is to be monitored. The system should be included in an operational continuity plan. System utilization following implementation is also inclusive of functional development.

## 7.2 Project organizational structure

In order to implement the Project, the Centre of Health Information Systems should create an organizational structure that defines the participants of the Project management team and the scope of responsibility for individual design team members.

The Project organizational structure outlay is presented in the figure below and is a result of the PRINCE2 methodology utilized to manage the Project.

**Figure 19** Project organizational structure

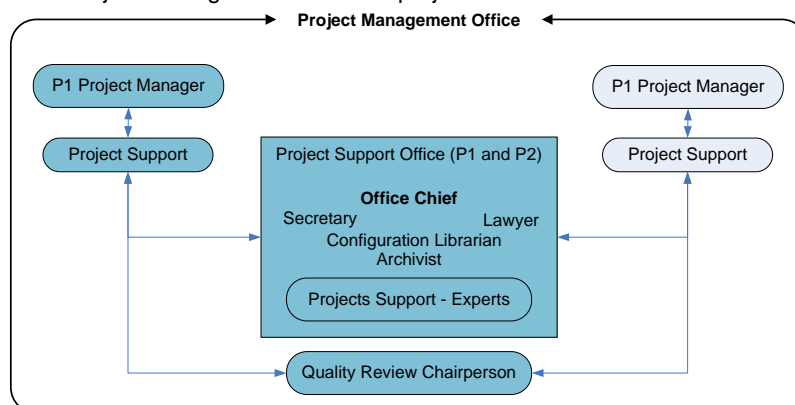


Source: Self study.

The assumptions as to roles in Project execution presented below were adapted to suit current Centre of Health Information Systems needs related to Project execution. It was assumed that Centre of Health Information Systems needs to be able to provide the functioning of basic Project Management Office parts and coordinate tasks that would require direct involvement of Centre of Health Information Systems staff, as well as to provide necessary subject supervision over selected areas of the executed projects.

The figure below presents only roles assigned directly to Centre of Health Information Systems.

**Figure 20** Project Management Office for projects P1 and P2



Source: Self study.

The team on the part of the Centre of Health Information Systems shall be supported by external experts working towards providing necessary specialized knowledge as well as executing selected project tasks, including support for Project Management Office operations. Support for the Project can consist both of specialized consulting in terms of specific tools and of administrative services or project management standards.

For the Project to succeed, it is necessary to obtain approval from individual stakeholders as to elements of Project that are applicable to them and to ensure their involvement in developing requirements and execution of those elements. The Project stakeholders include healthcare supervisory, coordinating and financing institutions, service providers and pharmacies, medical staff and the patients. Representatives of units participating in the Project should be included in the Project Steering Committee.

Furthermore, as a part of Project Support groups, stakeholder representative teams for individual products may emerge. Such teams could pursue goals related to stakeholder involvement in the solution planning process, support the implementation and gather support for the Project products.

## 7.3 Risk analysis

The present sub-chapter presents analysis of Project risks. The aim of the analysis is to point out key risks that may influence implementation of the Project. The analysis has been conducted according to PRINCE2® and MSP methodologies.

According to the used methodology, the first step is aimed to identify potential threats. Every threat is properly categorized and possible reactions to it are determined.

The table below describes key threats related to implementation of the Project, categorized according to risk categories, together with reaction examples.

**Table 7** Key threats to Project implementation.

Category	Description	Reaction
Organizational	<p><i>Regarding cooperation at the implementation level</i>– risk of the lack of main Payer's (NFZ) commitment in Project implementation as well as commitment of other entities involved in circuit of health-concerning information (e.g. units maintaining local databases of extended medical records or entities responsible for running registries). Risk of the lack of acceptance of medical circles.</p> <p>Risk related to the fact that the system will only be used by institutions covered by the contract with NFZ, which results in losing representative character of the collected data and statistics at the national level.</p>	<p>Reducing the threat by implementing proper legislation changes, imposing requirement for cooperation of entities contracted by non-public payers, at the Project implementation. In case of record data it is possible to obtain data required to supply secondary records from other sources than Entity records (e.g. from NFZ).</p> <p>Reducing risk related to the lack of acceptance for the new solution, by conducting trainings and advertising the Project.</p>
	<p><i>Personnel-related and management issues</i> - risks related to the choosing of a proper personnel and to abilities of managing the Project on the Beneficiary side – from the point of view of competencies, decision-making capacities and abilities to control changes in the environment of large and complex projects.</p>	<p>Preventing the risk by hiring qualified personnel or by assuring that the implementation of the Project, receives support of external experts, who have required competences and experience.</p> <p>Reducing the threat by educating personnel of the Beneficiary, implementing proper procedures (defining for example maximum amount of time available for making a decision) and assigning responsibilities to specific members of personnel.</p>
	<p><i>Dependency on external projects</i> – threats resulting from influence of external projects, both nation-wide (e.g. „pl.ID – polish ID card“, „ePUAP 2“) and voivodeship-wide (separated initiatives related to voivodeship strategies).</p> <p>This category also includes the risk of delay in the implementation of P2 project, within frames of which, elements of protection and privacy management subsystem will be developed, which may cause delay in implementation of P1 project or make it impossible to use the functionalities.</p>	<p>Reduction of threats in this area is about monitoring the progress of work on the projects, on which given areas of the system implemented within frames of the Project rely on and wherever it is possible, shift the time delegated to implement the relaying areas, to the independent ones.</p> <p>Additionally, it is necessary to promote the Project on the voivodeship level in order to allow initiating potential preparation activities on the voivodeship level.</p>
	<p><i>Related to implementation</i> – this category contains risk of lack of implementation of adequate and universal solutions, resulting from enforcing solution (by e.g. vendors) or to detailed assumption included in the Feasibility Study and also risk related to lack of proper control over the systems adjustment (change management) during the implementation.</p> <p>Additionally these are risks of errors occurrences or too limited functionality of the prototype solutions, in comparison to users expectations.</p>	<p>Reducing the threats by conducting an independent expert review of the solutions, to guaranty that the assumptions are universal and to allow fulfilment of the assumption to be technology- and methodology-independent.</p> <p>Development of change management process adequate to the information system being implemented.</p> <p>Conducting trainings of prototype solutions usage and promoting the Project in order to convince users to the solution.</p>
Legal	<p>Threats resulting from current regulations, their changes – both nation- and EU-wide; also risks of lacking the necessary changes in legislation.</p> <p>From the point of view of threats in this area the risk of lacking the necessary changes in legislation should be taken into consideration.</p> <p>This could prevent the complete or partial execution of the Project.</p> <p>Risk of emerging changes in legislation (such as e.g. changes of requirements considering scope of stored data), that can result in the necessity to implement changes in the system.</p>	<p>Reduction of risks related to legal regulation is done mainly by trying to influence the legal authorities, by spreading awareness of the fact, that the success of the Project depends on necessary legislative changes. Legal changes should be monitored and the licence requirements adjusted. It is also possible to prepare the necessary changes in legislation and ensure its introduction.</p> <p>In case of changes in scope and protection of data the risks are reduced by using flexible solutions that cooperate with widely recognized data format standards, and constant monitoring the requirements concerning storing and protection of data.</p>

Category	Description	Reaction
Trade	Risks identified in this area are concentrated on commercial issues and those related to cooperation with companies/external contractors. This includes risk of Projects' implementation time expansion, which is related to carrying out tender procedures or delays in subcontractors' works. Another risk, that may influence Project's implementation cost, is the increase of prices of subcontractors services during the Project implementation.	Commercial risks can be reduced by detailed analysis of number of the required procedures, time required to sign a contract, precise cost and relation between tenders. Additionally, procedures and people responsible for the process should be defined. Reducing the threat related to price shifting can be done by constant monitoring of trends on the market and warranting proper financial and time reserves, in case of materializing the unfavorable changes.
Economic	Threats resulting from economical aspects. This category classifies project risks related mainly to warranting financial assets for Project implementation (in case of the EU funds denial) and maintenance. Additionally, all risks related to currency exchange rate shifting, changes in interest rates and level of inflation.	Possible reaction to risks related to lack of EU funds granting is preventing the risk by providing proper funds from the state budget and creating reserves from non-state funds (e.g. by including the payer/payers in the financing of the Project). In case of threats related to e.g. currencies exchange rates, it is necessary to reserve required assets in case the risk materializes.
Political	This category of risks includes threats resulting from changes in the Projects' priorities related to changes in the government or changes in its policy, e.g. healthcare management concept.	Reducing the threat by promoting the Project on government level, in order to spread awareness of importance and rightness of the Projects' objectives.
Environmental	Threats related to natural disasters and their influence on the used infrastructure as well as transportation problems.	Occurrence of this type of risk should be assessed based on proper risk analysis and then the real threat should be reduced by implementing proper business continuity plan. It is also necessary to reserve proper funds and time in case the risk materializes.
Technical, operational, infrastructural	<i>Security related</i> – this area covers widely understood risks concerning security (confidentiality, availability, integrity) of data and the system itself, such as risk of insufficient systems availability and security of the system and data being send, risk of not taking into consideration the control and abuse detection mechanisms. Within frames of technical risk there is also risk related to IT infrastructure malfunction and risk of the lack of developed and tested business continuity plans.	Reducing threats through a detailed analysis of the requirements for the systems' security and efficiency. Conducting an independent security audit. Implementing properly redundant technical infrastructure. Conducting risk analysis and implementing business continuity plans as well as requiring regular tests of those plans.
	<i>Technical and exploitation risks</i> – risk of taking the wrong assumptions resulting from having incomplete information during the preparation of Feasibility Study, risk of malfunction caused by contractors' errors.  Risks related to acquiring data from entity records – getting access to the records, data export, inaccurate data in records and adaptation of acquired data.	Detailed analysis of all the aspects of systems' implementation (costs, time, functionalities) and reducing the threat by implementing proper procedures for adaptation tests, change tests and regular quality control.  Analyzing the condition of the records and implementing remedial actions in case o records that are not adapted to cooperate (analysis of data export possibility, adaptation of the acquired data, accuracy of data).

## 7.4 Cooperation with key stakeholders

The discussed Project relates to many areas of the healthcare industry and thus to many entities operating in that industry and referred to as Project stakeholders. The Project stakeholders include healthcare supervisory, coordinating and financing institutions, service providers and pharmacies, medical staff and, in particular, the patients. In order to ensure Project's success, it is necessary to gain acceptance on the part of individual stakeholders for respective Project components as well as ensure their involvement in defining requirements and execution of such components.

The Project assumes close cooperation between the Centre of Health Information Systems as the institution responsible for Project implementation and the key Project stakeholders in individual areas, currently in particular with:

- ▶ Patients' Rights Ombudsman,
- ▶ the medical professionals' environment as represented by The Polish Chamber of Physicians and Dentists, Main Chamber Nurses and Midwives and the Supreme Analytic Chamber;
- ▶ representatives of healthcare units and pharmacies, the Supreme Pharmaceutical Chamber,
- ▶ the payer – National Health Fund,
- ▶ insurance providers – the Social Insurance Institution and the Farmers' Social Insurance Institution,
- ▶ supervisory authorities for individual areas of the healthcare industry, in particular the Central Sanitary Office and the Central Pharmaceutical Inspectorate,
- ▶ the Central Statistical Office,
- ▶ local authorities, in particular on regional level,
- ▶ institutions supervising the execution of legal requirements as to IT systems, in particular the Ministry of the Interior and Administration as well as the Inspector General for Personal Data Protection.

On the design stage for the implemented solutions, representatives of cooperating entities should be included in design works related to products for which they were identified as key stakeholders. In the course of works, the Project Beneficiary together with stakeholder representatives will jointly resolve issues related to detailed scope and model of project execution.

Key stakeholder representatives for individual Project products shall be involved as observers into the tender commissions overseeing procurement of such products. Each time, the specification of key order elements approved by the commission should be formally approved by key stakeholder representatives as well. In case of failure to obtain such acceptance, the decision in disputable cases should be made by a Ministry of Health representative acting on behalf of state administration organ responsible for Project execution.

Design works methodology included in the Feasibility Study includes other actions related to involving cooperating entities into Project execution, in particular:

- ▶ Appointing Project Steering Committee that should include representatives of entities cooperating under the Project and supervising Project execution, e.g. the Ministry of Health;
- ▶ Creating a Communication Plan that should include both internal communication patterns and communication with the environment, in particular communication with Project stakeholders;

- Appointing Project Support groups that can have stakeholder representative teams for individual Project products.

## 7.5 Legal conditions for Project implementation

This sub-chapter provides a summary of the Project legal analysis. The goal of such analysis is to verify whether the existing legal regulations enable efficient implementation and functioning of the Project as well as to specify legislative actions that should be undertaken in order to optimize Project implementation. The detailed legal analysis is presented in the Feasibility Study, sub-chapter 10.3.3.

The legal analysis performed included the analysis of legal acts regarding the healthcare system and in particular ones impacting Project introduction. The analysis encompassed the assessment of legal acts with regard to their interrelationships, completeness and usefulness as to the implementation of a comprehensive information system for healthcare.

The analysis proved the existence of need to instigate a legislative procedure in order to create a new normative act indispensable for unhindered Project implementation process or the need to modify the already existing legislation. It was concluded that it is key for the Project implementation to be successful that a legal act on information system for healthcare comes into life. Such a legal act would constitute one of the most prominent forms of legal basis for the Project environment. Full Project implementation would also benefit from modifications in certain current legal acts related to healthcare that will not be impacted by the resolutions included in the abovementioned act.

In case of delays to the legislative process aiming at introducing an act on information system for healthcare, the Beneficiary would need to introduce modifications into already existing legal acts in order to create necessary legal basis for the Project. Legislative changes would lead on one hand to authorizing the Beneficiary to process data contained in the Health Information System, and on the other hand to the Health Information System process participants being required to relay some pre-defined data. Additionally, the issue of medical registers needs to be resolved and modifications to existing decrees and statutes of certain organizations, in particular the Centre of Health Information Systems, need to be introduced.

## 8 Project implementation indicators

This chapter describes Project implementation indicators. Defining indicators allows monitoring of work progress and precise definition of the expected outcomes.

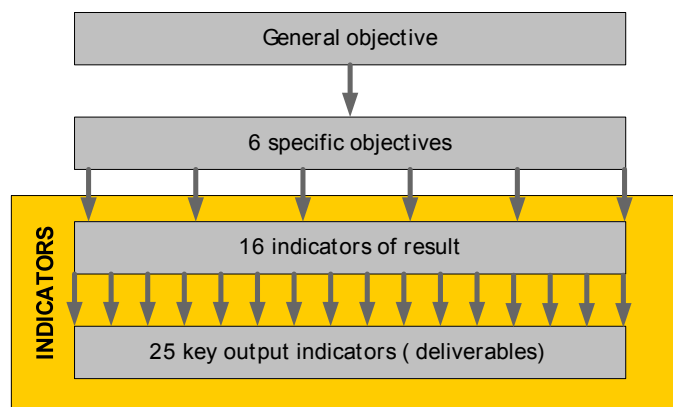
Indicators for the Project were defined according to MSWiA directions<sup>52</sup>.

Results of the Project are profits, which will be achieved by the Beneficiary through the usage of Projects' products right after Project implementation end. Deliverables are understood as direct, material and measurable effects of the Project implementation.

Project implementation indicators are divided into two types:

- indicators of result – are reported for the years following the year of implementation of the Project, and they define how the result will be measured (measure and unit are defined),
- key output indicators (indicators of deliverables) – these indicators are given for the years when the Project is being implemented; they define how the delivery will be measured (measure and unit are defined).

**Figure 21** Connection between Project objectives and its implementation indicators



Source: Self study.

The following pages describe Projects' implementation indicators:

- Table 8 for each result of the Project, it presents an indicator, its base value in year 2007 and target value in the year 2014.
- Table 9 presents the list of deliverables together with the list of expected indicators for particular years of the Project implementation.

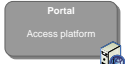

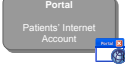
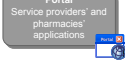
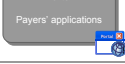
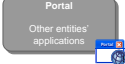
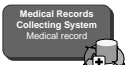

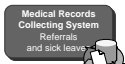
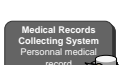
<sup>52</sup>“Manual for preparation of feasibility study of IT projects implemented within frames of 7. priority axis of Operational Programme Innovative Economy”







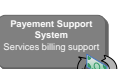

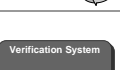
**Table 8** Project results indicators



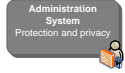



No.	Result	Result indicator description	Indicators' base value (year 2007)	Indicators' target value (year 2014)	Difference between year 2007 and present state
1.	Providing information regarding healthcare	Percentage of citizens using portals which provide integrated data regarding healthcare.	29%	56%	<b>27%</b>
2.	Providing medical personnel with electronic data regarding patients condition	Percentage of medical personnel having access to electronic data on patients' health.	0%	25%	<b>25%</b>
3.	Providing patients with digital medical records	Percentage of medical records available to patients in an electronic form.	0%	80%	<b>80%</b>
4.	Providing recipients of services with electronic records of medical history, received services, referrals, prescriptions, sick leaves, vaccination plans, orders	Percentage of service recipients having access to systems data.	0%	15%	<b>15%</b>
5.	Providing information allowing current monitoring of threats and reacting to it	Percentage of disease entities covered by electronic appointment scheduling.	0%	100%	<b>100%</b>
6.	Owning authorized medical records	Percentage of data authorized by medical personnel.	0%	100%	<b>100%</b>
7.	Assuring interoperability	Percentage of areas <sup>53</sup> , which medical services pavement data are transferred using open formats.	14%	60%	<b>46%</b>
8.	Allowing electronic prescription filling	Percentage of e-prescriptions entered into the system and available for electronic filling.	0%	25%	<b>25%</b>
9.	Allowing electronic appointment scheduling	Percentage of service providers effectively covered by the system (indicator depends on service providers technical readiness).	0%	25%	<b>25%</b>
10.	Allowing electronic invoicing	Percentage of service providers using electronic invoices.	0%	100%	<b>100%</b>
11.	Providing digital resources concerning medical records, following uniform and homogeneous rules	Percentage of service providers effectively covered by the system (indicator depends on service providers technical readiness).	0%	25%	<b>25%</b>
12.	Providing immediate access to medical record in case of emergency	Percentage of service providers covered by the system.	0%	25%	<b>25%</b>
13.	Allowing current analysis of medical record	Percentage of service providers covered by the system.	0%	25%	<b>25%</b>
14.	Improvement of electronic payments for medical services	Time required to make payment for provided services.	15 days	7 days	<b>8 days</b>
15.	Allowing electronic handling of drug refunding	Time required to make refund for drugs and medical products.	15 days	7 days	<b>8 days</b>
16.	Allowing electronic handling of sick leaves	Percentage of sick leaves entered into the system.	0%	70%	<b>70%</b>

<sup>53</sup> It is assumed that the reference point is a list of the types of messages which covers 86 areas (types) defined in the HL7 standard,. These are the messages at the application level and cover areas such as e.g. data transmission, results downloading.

**Table 9** Key output indicators

No.	Key output indicators (deliverables)	Expected key output indicators values in the subsequent years of Project implementation (the measure is the number of implemented information systems)						
		2009	2010	2011	2012	2013	2014	2015
1.	 <b>Portal – Access platform</b> Portal used to provide access to services offered by the implemented solutions via a graphical user interface implemented in the form accessible to users via WWW.	0	0	0	0	1	0	0
2.	 <b>Portal – Publication platform</b> Portal used to provide end users with access to information concerning healthcare in the form accessible via WWW.	0	0	0	0	1	0	0
3.	 <b>Portal – Patients' Internet Account</b> The Portal will provide service recipients with access to personalized functionalities of the implemented systems via Portal-Access platform.	prototype*	0	0	0	1	0	0
4.	 <b>Portal – Service providers' and pharmacies' applications</b> The Portal will provide service providers, their personnel and/or pharmacies, with selected functionalities of the implemented system via Portal-Access platform.	0	0	0	0	1	0	0
5.	 <b>Portal – Payers' applications</b> The Portal will provide payers (currently only NFZ), with selected functionalities (particularly Billing Support System) of the implemented system via Portal-Access platform.	0	0	0	0	1	0	0
6.	 <b>Portal – Other entities' applications</b> The Portal will provide institutions responsible for payers supervision, institutions financing and controlling the healthcare, insurance institutions (e.g. ZUS) and research institutions, with selected functionalities of the implemented system via Portal-Access platform.	0	0	0	0	1	0	0
7.	 <b>Medical Records Collecting System – Medical record</b> The system will allow recording, collecting and processing medical records.	0	0	0	0	0	1	0
8.	 <b>Medical Records Collecting System – Prescriptions</b> The system will collect and process data concerning electronic prescriptions. It will allow issuing prescriptions, reviewing and recording buying out prescript drugs.	prototype*	0	0	0	0	1	0
9.	 <b>Medical Records Collecting System – Referrals and sick leaves</b> The system will manage electronic referrals and sick leaves.	0	0	0	0	0	1	0
10.	 <b>Medical Records Collecting System – Personal medical record</b> The system will collect and share information concerning patient's personal medical record which is here understood as static data concerning service recipient (e.g. blood type) and its relation to medical record collected in Medical Records Collecting System – Medical record.	0	0	0	0	0	1	0

No.	Key output indicators (deliverables)	Expected key output indicators values in the subsequent years of Project implementation (the measure is the number of implemented information systems)						
		2009	2010	2011	2012	2013	2014	2015
11.	 <b>Records Service System - Records</b> The system will allow quick access to up-to-date records to be used for providing electronic healthcare services. Within the scope of the system, reference databases containing main information processes participants' data.	0	0	0	0	0	1	0
12.	 <b>Records Service System - Vocabularies</b> The system will provide quick access to up-to-date vocabulary data to be used for healthcare services. Referential vocabularies, such as vocabularies of medical services, based on accepted norms and standards.	0	0	0	0	0	1	0
13.	 <b>Records Service System – Master data management</b> The system will provide central management of master data. As a result of implementing the product, the rest of the implemented IT systems will be provided with access to consistent master data including patients' data, data concerning drugs and medical services, vocabularies.	0	0	0	0	0	1	0
14.	 <b>Data Warehouse – Analysis, statistics, reports</b> Data Warehouse – Analysis, will assure collecting of data for the purpose of analysis, statistics and reports. The system will allow aggregation and storage of data from other systems and will perform analytical functions. It will also allow to prepare statistics and technical analysis of data.	prototype*	0	0	0	0	1	0
15.	 <b>Data Warehouse – Monitoring</b> Data Warehouse – Monitoring will be part of the analytical layer of the data warehouse. It includes data processing solutions.	0	0	0	0	0	1	0
16.	 <b>Abuse Detection System</b> The system will allow post-factum analysis of data regarding provided medical services and filled prescriptions in order to detect potential abuses and irregularities.	0	0	0	0	0	1	0
17.	 <b>Payment Support System – Services billing support</b> The system will allow the improvement of making electronic payments between the Payer and service providers. Billing data, required by the Payer, will be sent by service providers, keeping the relations with data, authorised by recipients of the services, on provided services. Billing data will be classified and processed for payment by service providers, initially checked by the Verification System and then shared with the Payer.	0	0	0	0	0	1	0
18.	 <b>Payment Support System – Drugs refund support</b> The system will allow to improve making electronic payments between the Payer and pharmacies. Billing data, needed by the Payer, will be generated automatically based on data about filling electronic prescriptions.	0	0	0	0	0	1	0
19.	 <b>Verification System</b> The system will verify data on the medical records based on data collected by Medical Records Collecting System – Medical record. It will ensure credibility of collected data and will perform the service role for the Payers, ensuring the performance of verification process.	0	0	0	0	0	1	0

No.	Key output indicators (deliverables)	Expected key output indicators values in the subsequent years of Project implementation (the measure is the number of implemented information systems)						
		2009	2010	2011	2012	2013	2014	2015
20.	 <b>Enterprise Service Bus</b> Enterprise Service Bus acts in the IT systems architecture as additional middle layer, allowing simple and efficient joining and detachment of services and elements of healthcare's IT system. Adapters will be implemented within the Enterprise Service Bus, that will allow communication between existing information systems, in particular payers', service providers' and healthcare records' systems.	0	0	0	1	0	0	0
21.	 <b>Administration System - Audit</b> The system will perform functionalities allowing to verify users activities in particular systems. It will allow to collect operations performed in the system with the user who performed it.	0	0	0	1	0	0	0
22.	 <b>Administration System – Protection and privacy</b> The system will provide security services for the implemented systems. Main functionalities will include users authentication, privileges management, authorization and access control, identity management and anonymity assurance, electronic signature service, encryption.	0	0	0	1	0	0	0
23.	 <b>Administration System – Administration</b> The system will allow centralized management and administration of all the systems implemented within the frames of the Project. It includes tool applications for operations, administration and management of the system and database.	0	0	0	1	0	0	0
24.	 <b>Extended Medical Record Support Database</b> The database will collect patients' extended medical record in situations, when the service provider, which was originally storing these records, will shut down. This will allow constant availability and security of the extended medical record. The solution will be complementary with the local databases of extended medical record, operated by the service providers.	0	0	0	0	0	1	0
25.	 <b>Healthcare Information System Project</b> The project will include: Healthcare Information Systems' corporate architecture, Healthcare Information Systems' security architecture, including accepted security standards, analysis of norms and rules of collecting, sending and sharing data and integrating healthcare information systems.	The measure of the product is the number of prepared documentations						
		0	1	0	0	0	0	0

\* some prototypes of products (usually with limited functionality) will be put into service earlier than the finished product. As a result, for some deliverables of the Project, the indicator was set as *prototype*

## 9 Summary of the Project feasibility

The present chapter presents the summary of the Project feasibility, including its economic, technical, legal, institutional and schedule feasibility.

### **Economic-financial feasibility**

As a result of the conducted analysis, a long list of economic benefits for the Project was made. The benefits include, among others, savings in patients' and doctors' time, improved effectiveness of doctors' work, improved transparency of the system and improvements in the process of payments between the Payer and service providers. The analysis of economic benefits has shown significant added value through the implementation of the Project and that the Project expenses are justified from the point of view of established objectives and Project scope.

High level of economic effectiveness indicators (ENPV in particular, estimated to PLN 34 billion) indicates social-economic profitability of the Project and is large extent related to high value of the Project for future recipients of the systems services.

The Project itself does not generate any income and its implementation and operation is resulting in negative cash flow during the whole reference period. As a result of that, the financial analysis indicates that the Project is not directly profitable from the financial point of view, which means that it requires engagement of external funds to assure funding of the Project and its maintenance after the implementation.

The results of the Project depend on assumptions taken for calculations, estimated based on best available knowledge and possibilities. Conducted analysis of sensitivity of economic analysis results, proves that even in case of major changes in assumed Project effects, the economic effectiveness indicator for the Project will remain at high level. Results of conducted risk analysis indicate that the Project can be implemented as assumed, whereas key risks include in particular legislative, implementation and funding aspects. Because of that, several possible actions were established to mitigate the identified risks.

### **Technical feasibility**

The Project is feasible from the technical point of view. Electronic healthcare services will be provided based the implemented system and IT solutions of service providers, including locally extended medical record databases, integrated with the central system, to allow accessing patient's data from any location.

In order to choose the best concept for the Project implementation, investment variants analysis was conducted. Assessment of variants and selection of the best one was done based on cost/benefits analysis as well as implementation time criteria and risk level.

The implemented solution will meet the current legal regulations concerning such kind of IT systems, in particular, the regulations of Act of February 17, 2005 on entities providing public services, with amendments - Dziennik Ustaw (Journal of Laws) No. 64 position 565 as amended and further legislation for this act, i.e.:

- ▶ ordinance of the Council of Ministers of October 11. 2005 on minimal requirements for IT systems – Dziennik Ustaw (Journal of Laws) No. 212 pos. 1766 as amended,

- ordinance of the Council of Ministers of October 11<sup>th</sup>, 2005 on minimal requirements for public records – Dziennik Ustaw (Journal of Laws) No. 214 position.

### **Legal feasibility**

According to the conducted legal analysis, the key factor for successful implementation of the Project and getting the expected results, is the introduction of act on healthcare information system. This legal act will be one of the key legal basis for the Project's environment. Furthermore, other legal acts concerning healthcare system need to be adjusted. In case of delay in introduction of the act on healthcare information system, it will be necessary for the Beneficiary to prepare changes for current legal acts, to create required legal basis for the Project.

### **Schedule feasibility**

The implementation of the project was scheduled for the period 2009 - 2014. Such time frame results from Project subsidy contract signed by the Beneficiary.

Results of the conducted analysis indicate that the Project can be carried out according to accepted schedule. Key threats here include in particular organization aspects (e.g. dependency on contracting process effectiveness and dependency on external projects), legal aspects (e.g. risk of lacking the required changes in legislation), as well as technical, operational and infrastructural aspects.

### **Institutional feasibility**

Centre of Health Information Systems has experience in implementing IT projects and projects subsidized by the EU structural funds.

CSIOZ, as a unit of the Minister of Health, will be responsible for the implementation of the Project. Successful carrying out of the Project will require cooperation with many external entities, connected with the healthcare industry. Representatives of the cooperating units will be included in works concerning products, for which they were identified as key stakeholders. Project Beneficiary, together with its stakeholders, should agree on detailed scope and way of currying out the product and should be involved in the process of defining the requirements.

CSIOZ will continue the Project implementation. From the organisational structure, Project Management Office was extracted, which will manage the implementation of the Project provided with additional support from external experts.

# 10 Definitions

Aggregated medical data	Medical record concerning more than one patient in case it is impossible to determine who is personally concerned.
Authority	Entity (a person or a group of people) extracted from the administrative structures, equipped with specific administrative power and its own, specific competences.
Basic healthcare	Health services such as prophylaxis, diagnostics, treatment, rehabilitation and nursing within the area of general medicine, family medicine and paediatric, provided within the range of healthcare ( <i>ustawa z dnia 27 sierpnia 2004r. o świadczeniach opieki zdrowotnej finansowanych ze środków publicznych</i> - Act of August 27 <sup>th</sup> , 2004 about healthcare benefits, financed from public funds).
Beneficiary	Centre of Health Information Systems
Collocation	ICT service whereby clients ICT infrastructure is located at providers' site, where the provider is obliged to assure proper operation parameters for the client's infrastructure.
Data Warehouse	Central managed database, using multiple different data sources (usually containing a large number of records), available within the company/organization. Data Warehouse is designed to conduct complex analysis of gathered information and very often represents the core of the analytical systems used by a company. Data stored in Warehouses are static (read-only), topic oriented (e.g. clients data warehouse), integrated, incrementally powered, often redundant and properly aggregated.
Doctor of Medicine	A person having the required qualification, who provides health services, in particular examinations, diagnosis and disease prevention, patients' treatment and rehab, health consultations and preparation of medical opinions.
e-Health	Information and communication technologies used to prevent diseases, diagnose, improve and monitor patients' health.
Electronic signature	Electronic data, attached to a message to verify its source and identify its sender.
Entity record (medical entity record)	In the context of P1 and P2 projects, entity record contains entities which do activities related to healthcare, entities participating in healthcare, e.g. entities belonging to a particular occupational group, natural persons, legal persons and organizational units lacking legal personality and also particular events related to healthcare.
ePUAP Platform	Electronic Platform for Public Administration Services, allowing public administration to provide services for the citizens via Internet.
European Regional Development Fund	Fund allocated by the European Union since 1975, which aim is to correct regional imbalances within the Union.
Extended medical data	Large volume of individual medical data (pictures, full medical record) and data that is irrelevant for patients' long term health (detailed description of the course of patients hospital treatment).
Feasibility Study	Feasibility study of a project called "Electronic Platform for Collection, Analysis and Sharing of Digital Medical Records" that is being realized by CSIOZ.

Health services	Actions aimed to retain, restore and improve health, rescue patients as well as other medical actions resulting from the process of medical treatment or separate provisions regulating those actions ( <i>ustawa z dnia 30 sierpnia 1991 r. o zakładach opieki zdrowotnej</i> - Act of August 30. 1991 about medical institutions).
Healthcare institution	Institution meeting requirements prescribed in the Act of August 30. 1991 about healthcare institutions – Dziennik Ustaw (Journal of Laws) No. 91 position 408 as amended i.e. hospital, therapeutic and nursing institutions, sanatoriums, clinics, health centres, emergency rescue, medical diagnostics laboratories, prosthetics and orthodontics laboratories, medical rehabilitation institutions, day nurseries or other institutions that meet the requirements prescribed in the act.
Hosting	Service whereby owner of ICT infrastructure offers sharing of different types of its resources.
Medical personnel	A person entitled to provide health services, proven to have gained professional qualifications do provide health services within a specific range or specific field of medicine.
Medical practice	Unit other than healthcare institution, functioning, among others, in the area of ambulatory healthcare.
Medical record	Record concerning healthcare.
Midwife	A person with required qualifications, providing health services, especially nursing, prevention, diagnostics, treatment, rehabilitation and promoting health in the area of taking care of women who are pregnant or giving birth, as well as the newborn child ( <i>ustawa z dnia 5 lipca 1996r. o zawodach pielęgniarstwa i położnictwa</i> - Act of July 5. 1996, about nurse's and midwife's profession).
Nurse	A person with required qualifications, providing health services, especially nursing, prevention, diagnostics, treatment, rehabilitation, promoting health ( <i>ustawa z dnia 5 lipca 1996r. o zawodach pielęgniarstwa i położnictwa</i> - Act of July 5. 1996, about nurse's and midwife's profession).
Patient	Recipient of health services
Payer	Organizational unit, responsible for spending public funds on healthcare. Currently the role of a public Payer is held by the National Health Fund as well as (within a limited range) by other institutions, such as: the Ministry of Health, Ministry of National Defence, Ministry of the Interior and Administration, Ministry of Treasury.
Personal medical data	Medical data concerning a patient.
Priority VII POIG	Priority "Information society – building an electronic administration", part of Operational Programme 'Innovative Economy'.
Project	Project called "Electronic Platform for Collection, Analysis and Sharing of Digital Medical Records".
Recipient of services	A person entitled for health services.
Record	List, file or any other type of data records.
Service provider	A unit providing medical services or a pharmacy.

# 11 Acronyms explanation

B/C	Benefits/Costs ( <i>economical efficiency indicator</i> )
CSIOZ	Centre of Health Information Systems
ENPV	Expected Net Present Value
EIRR	Economic Internal Rate of Return
ePUAP	Electronic Platform for Public Administration Services
e-RZOX	Platform for providing on-line services of Healthcare Institutions Record.
ESB	Enterprise Service Bus
GUS	the Central Statistical Office
ICT	Information and Communication Technology
KEP	National Taxpayers Record
KRS	National Court Register
MSWiA	Ministry of the Interior of Administration
NFZ	National Health Fund
NIL	The Polish Chamber of Physicians and Dentists
P1	Project called "Electronic Platform for Collection, Analysis and Sharing of Digital Medical Records" realized by CSIOZ.
P2	Project called „Platform for sharing services and resources of digital medical records with on-line business" realized by CSIOZ.
P3	Project called "Systems related to rebuilding, adjustment, maintenance and monitoring of registries and other resources of healthcare, by public institutions including state and local government administration" planned to be realized by CSIOZ.
PESEL	Polish national identification number - Universal Electronic System for Registration of the Population ( <i>mandatory for all permanent residents of Poland and for temporary residents living in Poland for over 2 months</i> ).
PIOZ	Healthcare IT Implementation Programme
PKB	Gross Domestic Product
pl.ID	Project called "pl.ID – polish ID card" being realized by MSWiA.
PO IG	Operational Programme 'Innovative Economy'
PRINCE2	PRojects IN Controlled Environments – <i>project management methodology</i>
REGON	Polish National Business Registry
RPO	Regional Operational Programmes
SOA	Service Oriented Architecture
CSG	Community strategic guidelines.
TERYT	National Official Register of Territorial Division of the Country
EU	European Union
UC	European Community
WTP	Willingness-to-pay - <i>willingness to bare costs of implementing a solution</i>
XML	Extensible Markup Language
ZOX	Healthcare institution
ZUS	Social Insurance Institution

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