«PROVIDING EQUIPMENT AND SUPPORT SERVICES IN THE DESIGN AND IMPLEMENTATION OF PROJECT ACTIVITIES

"Improving Healthcare Access through a Personal Health Monitoring System – EHEALTH Monitoring"»,

in the framework of the implementation of the "INTERREG V-A

Greece - Bulgaria 2014-2020" Cooperation Program »

Deliverable 3.2: Policy Implementation Guidelines for achieving long-term objectives

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http://www.ehealthmonitoring.eu/

Contents

1. Introduction

The implementation of Information and Communication Technologies (IT) in health and social care services is a promising effort which addresses the problems created by the increasing of the average age, the reduction of family care and above all the decrease of the working population.

The aim is a more effective management and provision of social and health care through ITT, thereby reducing the time spent in institutions and hospitals, increasing time spent at home and improving the quality of life of the elderly and disabled, people with mental issues and the chronically ill. A recent study for the EU aiming to determine the depth of ITT application in Europe, America and Japan identified two main field of applying said technologies: telecare, referring to the provision of home social care and home telehealth, referring to the provision of home health care.

2. Tele care Services

Tele-care services are divided into:
A) Personal alarm systems (first-generation tele-care) that have been in operation since 1980 and allow elderly people and people with disabilities to send help calls through a portable device. Calls are directed to a center, which then communicates with family members or calls for immediate help. Personal alert systems are usually provided as community (municipal) or private enterprise services.
B) Second generation tele-care, which carries a series of upgrades compared to the 1st generation. The use of drop, motion, smoke, temperature, etc. sensors. allows automatic call for social care services in case of need. Second-generation tele-care is based on personal alarm system infrastructure with additional teleconferencing services.
C) Third-generation tele-care, based on new emerging ICTs with the ability to identify potential user problems before they even appear and intervene proactively. Such systems use sophisticated methods of tracking and identifying occupant behavior and activity.

Tele-health, as mentioned above, uses ICT to provide medical care to home users (and beyond). It includes tele-monitoring, teleconferencing and counseling services, remote rehabilitation, as well as self-management health promotion devices.

More specifically, the applications and services of the above-mentioned method include:

• Tele-monitoring: remote measurement and monitoring of specific human bioassays and indicators such as: blood pressure, blood glucose levels, electrocardiography, etc.

• Teleconference: providing online (phonetic) or video-based consulting services (medical) by qualified medical staff. These services can be provided either in case of need or in the context of a complete package of services.

• Tele-recovery: provision of rehabilitation services to patients through the use of the Internet, network cameras and telecommunication networks. The majority of these services fall into two categories: assessing the patient's clinical status in his / her place of residence and subjecting the patient to treatment. These services are useful in patients who are unable to
hospitalized in a clinic due to physical weakness, long distance, high cost, etc. Areas where such services have been implemented are: neuropsychiatry, otolaryngology, physiotherapy etc.

3. What is Tele health and Care

The term telehealth originates from tele-medicine and tele-care. Telehealth is an emerging field crossing the scientific areas of medicine informatics, public health and business research with respect to the provision of health services and data by means of the internet and relevant technologies. Telehealth is expected to form a significant part of the total European market of information and telecommunication technologies in health.

Even more development is expected in the long term since the use of telehealth services accelerates and becomes more widespread. As a result, telehealth services in home support and monitoring are internationally proven to significantly contribute in better managing these groups while at the same time reducing the ensuing health costs.

The standard home support and care telehealth services for the elderly include:
* 24/7 Tele homecare -monitoring and patient support)

* Medication compliance management
* Identification and management of emergencies through smart devices and movement detectors, fall detectors etc. (smart home)
* Remote video visiting
* Diagnostic monitoring.

The term 'eHealth' covers a wide range of tools based on the information and communication technologies aiming to better diagnose, treat, monitor and manage health and way of life. The term also includes all Telematic applications (the combination of information and communication technologies) in health care, cooperation and information exchange between patients, healthcare organizations and institutions as well as communication among patients or healthcare workers. It also includes information networks on health, digital health records, tele-medicine or personal communication systems (mobile) for the patients' monitoring and support.

Ehealth applications provide access to health information which could have significant benefits for the entire population by improving the quality of and access to healthcare. Furthermore, they contribute to developing healthcare systems aiming to fulfill the citizens' needs, improve healthcare effectiveness, efficiency and sustainability. Given the ever-increasing mobility within the EU borders and beyond, the role of ehealth mainly in terms of saving human lives becomes all the more important.

There are several countries that have already developed strategies for implementing eHealth services, which require funding that exceeds 3% of their total healthcare income, such as countries Ireland, Denmark, and Great Britain.

3.1. Difficulty of definition

Telemedicine is an extremely complex environment of human activity that has as its object the provision of medical service through distance using IT and communications infrastructure in combination with medical equipment. It is, perhaps, established - in public debate or in society - the assessment that telemedicine is a modern and new activity, but it has a history and presence of more than 100 years and of course it is constantly evolving rapidly over the last 20 years, precisely because of the constant and leaps developments in Medicine, Informatics, Telecommunications and Medical Equipment Technology.

The "nuclear" components of Telemedicine are obviously Medical Science, Computer Science, Communication Science and Medical Laboratory Technology. It is therefore a multidisciplinary field which aims to provide medical services, not by conventional means when doctor and patient are in the same geographical / spatial field (ie in the same area), but when they are located in remote geographical locations.

For compatibility with the rest of the literature but also for the completeness of the treatment of the issue of typology, the following are some of the most common, in terms of IT, medicine or even policy definitions for telemedicine:

- The use of modern information and communication technologies to meet the needs of citizens, patients, health professionals, healthcare providers and health policy makers (European Union I - 2000).
- Refers to tools and services that use information and communication technologies to improve the prevention, diagnosis, treatment, monitoring and management of health and lifestyle (European Union II - 2020).
- Cost-effective and secure use of information and communication technologies to support the health sector, including healthcare, health surveillance, health education, knowledge and medical research. (World Health Organisation).
- It is the emerging field at the intersection of medicine, information technology, public health and business, with reference to health services provided remotely via the internet and related technologies with the aim of creating a new way of thinking and a new world wide web for improving the health of citizens at local, regional or central level. (JMIR: Journal of Medical Internet Research 2001).
- The ability to search, find, understand and evaluate information about a person's health from or through electronic sources and the application of knowledge gained to solve a health problem. (Cameron Norman & Harvey Skinner, 2006)
- Electronic health or telemedicine is defined as the use of information and communication technologies that support the health of individuals and health systems with distinct roles to work together harmoniously to address and improve health problems as well as medical research, management and administration. (E-health strategy & scientific review 2018, initiative of 10 countries - Austria, Germany, Sweden, Switzerland, Netherlands, Scotland, Lithuania, Slovakia, Ireland, Denmark).
- The provision of medical services even in cases where the distance between the patient and the doctor is intervened, with the use of specialized infrastructure and other knowledge (EKPA - Athens Medical School, 2008).

- Telemedicine generally refers to the use of telecommunications and medical technologies to provide some or all of the following types of information exchange: data, audio and / or visual communication between physician and patient or between physician and other physician or nurse enable the exchange of information for medical, research, educational or teaching purposes. Such exchanges can be real or in real time (Inmarsat, Horsch & Balbach 2009).

4. Reasons of telemedicine development

The main reasons which have accelerated the development of tele-medicine are mentioned below:

A. Social needs-Requirements

1. Improving the quality of health services provided
2. Demographic changes:

a. Aging population

b. Increase people with chronic diseases / disabilities

c. Increase people who cannot move easily

3. Lack of staff in isolated-remote areas
4. Equal provision of health services in remote and isolated areas
5. Primary care, community care and home care

B. Economic Needs-Requirements:

1. Increased health care costs (eg chronic patients)
2. Cost of advanced medical / nursing equipment
3. New directions in the health sector

C. Options:

1. Computer-digital features:

a. Digital image processing and signal analysis

b. Hospital Information Systems

c. Electronic patient file

d. Decision support systems

2. Communications:

a. Developing communication infrastructure in remote locations

b. Satellite Communications

c. Internet-based networks

d. Wireless networks

5. Telemedicine System

The term e-health covers a wide range of tools based on IT and communications technologies aiming to better prevention, diagnosis, treatment, monitoring and managing health and way of life".

IT and communications technologies applications are as such:

- *Tele -medicine*
- *e-Learning*
- *Healthcare / Medical Informatics*

Tele-medicine systems were developed to cover these needs and can take one of the following forms:

- E-consulting, remotely accessing a specialist's knowledge and expertise.
- E-diagnosis, remotely diagnosing by a specialized physician.
- E-monitoring, monitoring patients not in the hospital.
- E-care, using e-monitoring data to provide assistance.
- E-learning, remotely training patients or healthcare practitioners.
- Joint diagnosis, where a group of healthcare practitioners from different locations work together towards a conclusion.
- Remotely accessing a medical database could be considered an tele-medicine application.

The main needs covered by tele-medicine applications are the following:

1. Remote areas with low quality healthcare services
2. Navigation
3. Home care
4. Emergencies
5. Health tourism units
6. Consulting units to doctors

7. Tele-learning
8. Rare specialties
9. Medical services homogenization

Essentially, tele-medicine or e-health aims at providing clinical support by overcoming the geographical obstacles separating the users via IT technologies in order to improve health outcomes.

Tele-medicine's special properties render it suitable for remote areas (desert, rural, mountain, island regions) where there is a lack of trustworthy and specialized medical presence and knowledge.

In addition, telemedicine is addressed to the following:

- Hospitals
- Health centers
- Private Medical Centers
- Doctors
- Nursing staff
- Insurers
- Patients
- Companies selling medical equipment
- Students (University - Private Schools)

5.1. Mobile Health (m-health)

The tremendous dissemination of mobile technologies as well as advances in inventive application of these technologies in order to address health concerns have evolved into a new field of e-health, which is reported as ''m-health''. This notion represents a medical and public practice which is supported by mobile devices, such as mobile phones, monitoring devices of patients and personal digital assistant (PDA).

This category also includes applications that might be connected to medical devices or through sensors (such as bracelets or watches) and personal guidance systems, information about health and drug reminders that are provided by SMS and also about telemedicine that are provided wirelessly. Solutions include various technological solutions which are important:

1. heart rate
2. the level of glucose in the blood

3. blood pressure
4. body temperature
5. brain activity

5.2. Technological Requirements

Technology plays a major role in the development of all sectors of our civilization. ICT and web services have a major impact on the quality of services and people's lifestyles. The introduction of ICT in the health sector is emerging as one of the fastest growing areas in healthcare. It has paved the way for a new field of research among doctors, scientists and researchers who are trying to develop effective and accurate technologies to deal with health problems. Technological innovations are leading to new applications for disseminating healthcare information to a diverse audience using innovative interoperable designs. These applications are simple, easy to use, engaging and able to provide relevant primary healthcare information to a variety of users.

A major reason for the growing popularity of e-health is the advances in computer and communication technologies that have made health information and services globally available at a very low cost.

The main technologies that are relevant to the provision of e-health services and influence the development of e-health are:

Satellite communication

Satellite communication uses artificial satellites to provide communication links between different points on Earth. With the help of an integrated receiver and transmitter of radio signals, the satellite receives and retransmits signals back.

Satellites are playing an increasingly important role in supporting the health and well-being of the Earth. Satellite medical care is considered a cost-effective and affordable solution, especially in developing countries, where the population lacks even basic levels of health care due to remoteness, poverty and lack of health professionals.

Internet communication

Interconnected networks of computers that use a set of Internet Protocols (TCP / IP) to connect devices located around the world. The network can be private, public, academic, business and government and can be connected to a wide range of

electronic, wireless and optical network technologies. Internet users can not only seek health information, but can also contact a specialist doctor for an appropriate consultation.

Mobile communication

Mobile communication is a wireless form of communication in which voice and data can be transmitted and received through microwaves. Data exchange can take place while moving from place to place, for example, cellular, wireless, pagers, etc.

In recent years, mobile devices can be used effectively to provide medical care to patients in remote locations. Mobile phone services may include collecting data on patients' health, providing collected health information to healthcare professionals, and real-time monitoring of the patient's vital signs.

Cloud communication

Cloud computing relies on sharing computing resources to work with applications. This is a type of Internet-based computing that shares various services such as servers, storage and applications, leading to efficient and optimized use of software and hardware resources.

6. Advantages of telemedicine

The main advantages of telemedicine include the following:

1. Substantial savings in travel and handling costs of the care system
2. Reduction of geographical and physical isolation of patients
3. Eradicate the phenomenon of internal migration to urban centers for better care
4. Avoiding the need to repeat painful examinations and mistakes in treatment
5. Access from outside specialists to provide advice
6. Promotes and improves day-to-day research by providing quick and direct access to new information and knowledge
7. Direct communication of doctors in isolated areas especially on emergency circumstances
8. A drastic reduction in communication time between hospitals and doctors
9. Upgrading of the provided health services at the level of local government
10. Wide coverage of medical incidents

11. Modernize the working environment of medical staff using modern technology and services based on international standards

12. Facilitating and upgrading the continuing education of doctors
13. Modernize the work environment of medical staff using state-of-the-art technology such as electronic medical envelopes

14. Dedication and use of modern telematics technology by medical staff
15. Broad geographic coverage

7. The Benefits of telemedicine systems

Health systems in Europe are facing new challenges such as an aging population and growing budgetary pressures. In this context, eHealth could become one of the tools to address these challenges, contributing to more patient-oriented healthcare, supporting the transition to prevention and at the same time improving the efficiency of the system.

Some of the benefits of using e-Health applications, and in particular telemedicine systems for the citizen, are as follows:

- Instant contact with the doctor even if he is located a kilometer away
  Direct service and increased quality of care avoiding repetition of delays and mistakes
- Direct information on public health issues, prevention epidemics
- Faster recovery time with less needed medication and lower cost for patients and hospitals
- Increasing prevention / quality of life
- More opportunities and responsibilities for patients

8. The programme's goals

E-medicine programme's goals are the following:

1) supporting the Health Centers' medical personnel in providing improved health services. Essentially, it refers to the organization, operation and technical support of a local hub

2) ensuring a proper diagnosis

3) providing continuous medical training

According to the World Health Organization, the use of IT technologies in health is a means of achieving a series of desired effects such as:

1) Better treatment decisions by healthcare practitioners

2) Higher quality and safest healthcare by hospitals

3) Conscious choices by the public regarding their health

4) Greater responsibility by the government in health

5) Support effective, efficient and just healthcare systems by national and local IT systems

6) Ever better understanding of the health risks by the public and the policy bodies

7) Better access to knowledge and information necessary for better health

All above is based on the following properties of e-health:

- Efficiency
- Improvement of healthcare quality
- Scientific documentation
- Strengthening of citizens and patients
- Reinforcing interaction
- Continuous training
- Extension of healthcare range
- Safety
- Equality

8.1. The project «EHEALTH Monitoring»

E-HEALTH Monitoring project aims at developing an IT system for monitoring citizens' health internationally, based on IT technologies and personal, non-invasive sensors. This system will not only enable remote monitoring of citizens' health, beyond the traditional hospital environment but it will also create a permanent connection between the people and the medical practitioners, thereby directly contributing to the equal treatment and access of all citizens to modern health services with the aim of a social and financial development of an enlarged Europe.

The proposed system brings personalized and cost-effective health monitoring in the entire population of two states. The strategic aim is to improve public health and quality of life by adopting technologies which adapt to personal needs while also

being very reliable and low-cost. The project's main aim is to design, plan and develop a novel, user-friendly, adjustable, portable, personal and low-cost e-health system for everyone. This system will consist of a central IT system and portable devices with sensors providing: (1) remote monitoring of citizen's health state, (2) constant monitoring of citizen's compliance to their treatment, (3) live connection to medical personnel.

The system will be able to adjust and reinforce the provision of medical services to: (1) the general population (preventive medicine), (2) short-term patients, (3) chronic patients.

E-HEALTH Monitoring project is part of the "Greece-Bulgaria" European Cross-Border Cooperation Programme 4,«A Socially Inclusive Cross-Border Area», under Priority Axis 9a « Investing in health and social infrastructure which contribute to national, regional and local development, reducing inequalities in terms of health status, promoting social inclusion through improved access to social, cultural and recreational services and the transition from institutional to community-based services» and with the aim 8 «To improve access to primary and emergency health care (at isolated and deprived communities) in the CB area».

The increased impact of poverty has numerous social implications, one of which being the aggravated state of public health. Although the cross-border region (CB) has main health resources (e.g. hospitals and doctors) at quality levels near or even better than the EU28 average, the mean life expectancy is lower than the EU28 average while many epidemiology indexes are higher. In total, Greek regions have in the past presented higher life expectancy rates than the Bulgarian regions but since poverty forces ever more people to seek hospitalization (more than 20% increase documented in Greece since 2010), the total public health levels are reduced in the Greek regions in greater risk of poor healthcare in the future. At the same time, the financial crisis and the lack of investment prevent many CB area residents from accessing healthcare services (non-insured citizens). The project comes to deal with the fact that the area's population is facing significant challenges in health, especially in remote regions and in regions where "special groups" gather by combining opportunities as "A good interaction between cooperating bodies from both countries, Greece and Bulgaria and strategies of smart specialization in both countries and regions".

The combination of IT technologies in healthcare results in improving diagnosis and healthcare. They must be put to use and coordinated so that these wee-defined

systems can be used effectively by mankind. The project contributes to healthcare by the programme "tele-medicine and e-care infrastructure and other technology health services" and will try to improve access to primary and emergency healthcare (in isolated and underprivileged communities) in the border area by offering a personal, portable healthcare system on the basis of video devices support.

9. Tele-medicine in Greece

The year 1989 is a marking point for telemedicine in our country. Medical Physics Laboratory of Athens University Medical School, in cooperation with Sismanoglio Hospital presented an telemedicine system to support primary healthcare and created the first network of Health Centers connected to a public Hospital.

Telemedicine suits Greece especially because of its geographic and demographic peculiarities. At the same time, the constant increase in quality of life, the great number of foreign and Greek visitors per annum, continuously pressure towards improving and upgrading the provided healthcare services by means of modern technology.

The National Healthcare System (ESY) is now compelled to fulfill the reasonable expectations for high quality primary healthcare. Thus, alternative solutions must be found.

To the contrary, positive developments have occurred in the area of modernizing the equipment, indeed to the extreme. The field presenting an excessive delay however compared to the rest of Europe, is the introduction of computers, automations and IT and telematics systems in health and welfare.

While telemedicine is currently portrayed as a novelty, it can be easily incorporated and accepted by all parties of the health and welfare system. Experience so far, both in Greece and abroad, suffices to convince any observant for telemedicine's necessity, while also acknowledging that introducing it at a large scale is a complex and difficult task.

Also note that telemedicine is not an alternative healthcare system. Rather, it is a system which must be introduced in all public and private medical services units or networks to promptly deal with access and quality issues and increase their efficiency and effectiveness.

Telemedicine Program has set the following goals:

1. Support of medical staff of Health Centers concerning the provision of improved health services. In other words, it is about organisation, operation and technical support of a local node.
2. Ensurance of correct diagnosis. Health Center doctors can ask for the aid of experienced doctors of Sismanoglio Hospital in order to treat emergencies. It is apparent that a communication network among all doctors allows them to provide those services which are provided in big hospitals.
3. Provision of continual medical training. The existence of a communication network in order to provide medical treatment to different cases contributes to the procedure of continual training as well as experience acquisition and monitoring of pre-planned courses that are based on a specific program.

In the last years, due to progress of programming, telecommunications and biomedicine, the field of telemedicine has developed significantly. High costs that occurred in 1960's and 1970's have been improved and in this way more and more people can make experiments with telemedicine systems. In Greece there is a high number of telemedicine programs (more than 50).

Despite the fact that the Medical Schools of National and Kapodistrian University of Athens and the University of Ioannina are considered among the top in Europe and among the top in the world, despite the fact that the educational institutions of technology (NTUA, University of Patras and Polytechnic School of Crete) have registered excellent scientific research and success in areas such as robotics, informatics, especially software development and communication technology. Despite the fact that government spending on research and development is constantly being reduced, it is constantly being fragmented into less and less available funds as European funding is constantly growing. Despite the fact that the geography of Greece favors the development of telemedicine systems either due to the existence of the islands and the dispersion of the population on them or due to the mainland with restrictions and difficulties in travel. And while the country theoretically has all the prerequisites to become a leader in this field, it remains in line, documenting the emergence of great contradictions and the loss of untapped opportunities over time.

9.1. Telemedicine in Bulgaria

E-health has been a constant key priority in all government programs and national health strategies in Bulgaria over the last decade.

The state health policy is managed and implemented by the Council of Ministers, which on the proposal of the Minister of Health approves the National Health Strategy, which is adopted by the National Assembly.

Health Strategy 2020 was adopted by a decision of the National Assembly on 17.12.2015, which is based on the National Health Strategy 2014-2020 and an action plan to it.

The first sectoral Strategy for the implementation of e-health was adopted by the Council of Ministers at the end of 2006.

At the end of 2014, an e-health development program was adopted, which defines key actions for the establishment of the National Health Information System. The roadmap to the program covers a period of six years (2014 - 2020).

The strategic goal of the introduction of e-health is to improve public health and quality of life in accordance with changing needs and use of existing and new technological opportunities, while increasing efficiency and reducing the cost of health services (Strategy for the implementation of e-health , 2006).

The measures for realization of the operational goals, defined in the Strategy for implementation of the e-healthcare are in the following main areas:

1. Establishment of an integrated information system for exchange of information between the employees in the field of healthcare (between medical, educational, scientific, financial and administrative units)

2. Standardization and information security

3. Awareness and training

In report 3.5.2 "Joint Strategy towards sustainable e-health management" (D.3.5.2), part of the work under Contract № 272 / 01.07.2019, concluded between the Municipality of Kirkovo and "Advanced Business Consulting" Ltd., the team of the company examines in detail the degree of achievement of the goals for construction and development of e-health and comes to the following conclusions:

E-health has been a constant key priority in all government programs and national health strategies in Bulgaria over the last decade. However, its implementation is

hampered by weaknesses and gaps in the operational planning of strategic goals, measures and activities at the level of the Ministry of Health, the National Center for Public Health and Analysis and the National Health Insurance Fund. The implementation is complicated by the lack of legislation on the nature and organization for the implementation of e-health, the national health information system and their components.

The introduction of national health information standards is a key measure of the Strategy for implementation of e-health from 2006. The Ordinance for approval of health information standards applied by medical institutions (SG, issue 94 of 25.11.2016) does not necessarily provide application of the specified standards in the health establishments under the Health Act and the Medicinal Products in Human Medicine Act, in the state, municipal and public bodies and institutions for organization, management and control of the activities for protection and strengthening of health.

Against the background of the rapid development of e-health in other European countries, Bulgaria still does not have an integrated health information system to provide the necessary information for the needs of the management and users of health services, incl. to fulfill the country's commitments in connection with the cross-border exchange of health data. The available information systems and databases are not systematically integrated and do not give a real idea of the general state of the healthcare system, which complicates the planning process.

Since 2006, there has been a gradual postponement of implementation and change in the structures responsible for creating an electronic direction, electronic prescription and laboratory data at the level of strategic documents, which creates risks for their effective implementation. Almost 10 years after the realized and strategically declared need for these applications, they have not been developed and implemented, which deprives patients of opportunities for faster and better service. In January and February 2017, the Ministry of Health developed a prototype of a system for electronic prescription, electronic referral and electronic outpatient list. The expectations of the Ministry are that these measures will be implemented in the future within the project № BG05SFOP001-1.002-0007-C01 "Completion of the National Health Information System / NHIS / - stage 1 and stage 2", funded by the operational program "Good Governance" 2014 –2020, with a deadline until the end of December 2020.

One of the main operational goals of the Strategy for implementation of e-health in Bulgaria since 2006 is to improve access to health information. The key measure for providing electronically accessible information to the population through the implementation of portals has been a permanent priority measure since 2006 and continues to be so in the next strategic and program documents. With the Program for development of e-health from 2014, the last National Health Strategy 2020 and the project of the National Strategy "E-Health" the construction of a national health portal is envisaged. The attempts of the Ministry of Health to build an electronic health portal are not coordinated with the National Health Insurance Fund, which hinders the implementation of a unified and shared by key participants vision and creates a risk of inefficient spending of public funds.

9.2. Telemedicine in the EU

Some important European programs that implement the above categories are:

- CHRODIS+
- e-SMART – European Cancer Patient Coalition
- e-health standards
- Pen Medicine
- Open Medicine
- i CARE 4 EU
- ICT for Life
- Semeoticons
- Simpathy
- Meditrav (Medical Information Platform for Continuous HealthCare Services to European Travelers)
- HUS PACS,
- MEDCOM
- RUBIS
- PROMODAS
- MOMEDA

- ReAction
- SJuNet
- SmartCare
- SESAM Vitale
- CHRONIOUS
- BraveHealth
- United 4 Health
- Valu-e-Health
- InterSTRESS
- ISISEMD
- JASHEN : Join Action to Support the e-health Network–EIF
- REMPARK PHS (Personal HealthCare System)
- ALFRED
- SPLENDiD
- Help4Mood
- Momentum
- HeartTEN (Horizon 2020)
- PD_Manager (Horizon 2020)
- C3 Cloud (Collaborative Care & Cure Cloud) (Horizon 2020)

The overall funding architecture in the EU over time for telemedicine (and beyond) is shown in the following figure:

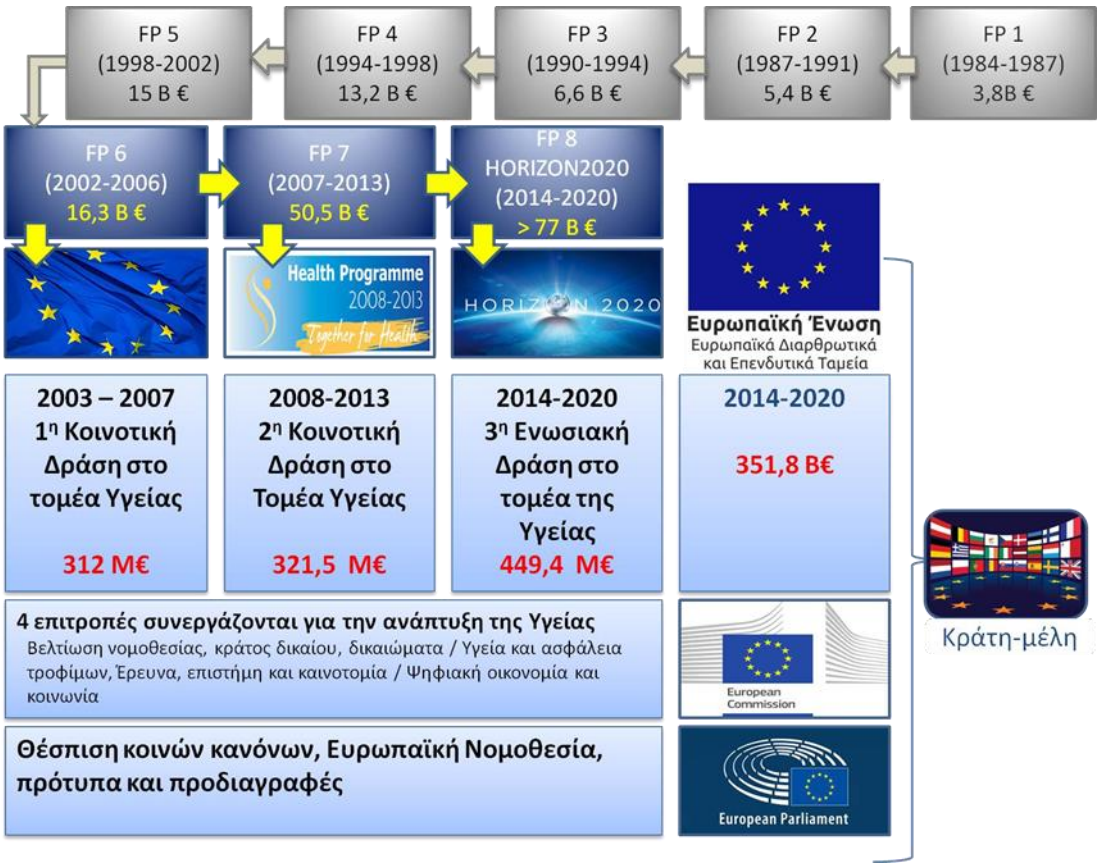

Figure 1: Telemedicine and digital health financing and implementation architecture in the EU

10. Best Practises

The term 'best practice' is used to indicate a tested process or action practically proven to be more effective than others when applied under specific conditions. Such **Best Practices** are meant for the local government, their better organizing, to be directly applied after the necessary adjustments with the aim of better fulfilling a given local need. They are best practices because they introduce innovation, yield results, are sustainable, can be 'copied', are transferable and easy to utilise. The term 'good practices' or 'best practices' or 'effective practices' is used to indicate a tested process or action practically proven to be more effective than others when applied under specific conditions.

According to the European Union, the main characteristics rendering a set of practices 'best' are the following:

- ***innovation***, when a new creative solution is proposed which is also accompanied by a realistic implementation policy,
- ***effectiveness***, as the proposal is actually feasible,
- ***sustainability***, proven by how long the results last,

- ***easy reproduction***, implementation under similar or identical conditions, and
- ***transferability***, more specifically implementation in different environment by new users who want to adopt the practice.

Good practices offer tips, guidelines, techniques or methodologies whose implementation can lead to greater safety and reliability in a desired outcome.

By upgrading the services provided through the extensive use of information technology, broadband and wireless networks and promoting the interactive role of the citizen with the ability to communicate, inform and participate in the decisions that concern him, the Municipality is able to develop an excellent positive dynamic profile for local development and the general well-being of its citizens.

'Best Practices' in Health constitutes seeking and applying the methods and processes which ensure the best possible results in the least possible time at the least possible cost. This definition identifies **four properties** of a 'Best Practice" applied to promote health:

a. The scientific accuracy of the method or technique compared to other similar ones

b. The method's suitability for the specific purpose

c. The method's effectiveness compared to others

d. Its efficiency in relation to the resources and time.

In the field of medicine, finding the most validated, suitable, effective and efficient method is neither obvious nor easy. It requires a process of constantly evaluating current scientific knowledge and ever-produced new scientific data, the sheer volume of which renders said evaluation extremely difficult. These concerns led to the development of a series of techniques aiming to find the best practice for each case with the best scientific validation in terms of effectiveness.

The following chapters provide indicative examples of best practices and e-Health system strategies used both in Greece, Bulgaria and in Europe in general.

10.1. E-prescription in Public Hospitals

One of the most crucial reforms of our times in Health and Social Care affecting both public health and public finances is E-Prescription. This refers to the production, distribution and check of medicine prescriptions and referrals by using ITT in a way that ensures validity, safety and transparency of information.

This task has the following goals:

• Modernise the healthcare system

• Identify and deal with the parameters ensuring broad and successful operation

• Facilitate the introduction and utilization of E-Prescription practices in everyday process

• Creating a favourable operation environment based on transparency and broad acceptance and participation of involved parties in the relevant processes

• Showcasing and utilizing existing or under way relevant actions.

Out of all the doctors in the country's 131 hospitals, 10,000 are already in the system and 2,500 have been certified. Out of the country's 220 Health Centers, 3,000 doctors are in the system and 2,000 are certified. The aim is to connect E-Prescription with IT sustems.

10.2. 'DELOS': District Health Network in the Cyclades (Phase A)

The project Creation of DELOS District Health Network in Cyclades (Phase A) pertains to the development and operational support of the Comprehensive 'DELOS' Information Health System for the A' South Aegean Health District, under pilot operation since the summer of 2006. The project aims to use ITT towards upgrading the quality of services, re-organising internal processes and providing better services to the citizens.

As part of this project, remote Health Centers and District Clinics are connected to large hospitals (support units) as well as to the Shifts Coordination Center-National Health Operation Center. Each point is in communication with one or more others through 'Syzefksis' network. Tele-diagnostic services are provides since medical data can be transferred from the patient to the support center. Also tele-consulting is available, as is tele-medicine for emergencies, tele-training for doctors, nurses and administration staff, even tele-psyciatry services.

10.3. ACTIVAGE Action

European Committee ACTIVAGE project incorporates the **Municipality of Larissa** through 'CitieNet AE' inter-municipal development company along with the **Municipalities of Veria, Volos, Grevena, Ioannina, Karditsa, Katerini, Kozani, Lamia and Trikala which holds the presidency of the Board.** With this project, the European Committee aims to complete and enhance elderly care by means of new technologies.

More specifically, the European Committee officially introduced ACTIVAGE project, an initiative aiming to effectively deal with the challenges created by population ageing through solutions incorporating the use of new technologies. This is based on inter-connectedness, which in this case will try to make everyday life safer for the elderly by promoting an independent and socially active way of life and reducing the impact of chronic illnesses.

The Project involves 49 Organisations, 10 of which are in industry, 10 are top research centers or universities along with numerous large- or middle- to small-scale businesses from all over Europe.

10.4. Medaship Program

Through this advanced technology program, shipping ships have the ability to connect via satellite with hospitals in different parts of Europe to deal directly and effectively with an incident that may occur at sea. This application of telemedicine to ships contributes to the upgrading of services provided to touring passengers as well as to ship workers. The main goal of the service developed by the proposed Medaship program is to provide integrated solutions for medical consultations on ships.

10.5. HYGEIAnet project

This project aims to make Crete a great paradigm for the development of regional networks of integrated telematics services in health, culture, public administration, tourism. Such examples are telemonitoring at home specialised at children with asthma, telematics support for remote primary health providers, integrated information systems for the management of the electronic health record of the citizen, and the extensive use of telematics to improve the functioning of the regional system health.

10.6. TelePACS Program

The main objectives of this project were: Recruitment, distributed archiving and management of medical images and other data of patient medical records in a hospital environment.

10.7. "Twister" Program

It is a European research program that aims to connect via satellite Venizelos Telematics Center with the Health Centers and regional clinics of Santorini, Thirassia, Folegandros, Anafi and Sikinos. since these are remote areas.

10.8. DMI Program

The Digital Medicine Institute (DMI) is a non-profit scientific institution founded and funded by a team of scientists and technicians to develop new digital technologies in their medical and clinical applications, in order to support, prepare, examine and improve all telemedicine applications in Greece in preparation for the 2004 Olympic Games.

10.9. Technological applications in healthcare through Vodafone network

The cooperation between Vodafone and Athens Medicine Center is certified by the Ministries of Health and Marine & the Aegean. The programme includes the National Inter-Municipal Network of Healthy Cities- Promotion of Health and Vidavo firm and makes the best possible use of technology to apply programmes supporting local communities and people.

In the 100 clinics participating in the Programme visitors can perform basic preventive medicine tests, such as cardiogram or spyrometry.

The Programme also allows for the creation of a digital patient file in order for the GPs to have a better and more complete image of their patients' health. Tele-Medicine Programme promotes preventive medicine while also caring for the chronically ill, as it allows for the systematic check of their health status at their area of residence breaking geographical or other boundaries.

Such an initiative is the Vodafone Tele-Medicine Programme, applied for the 13th consecutive year in 100 remote areas of continental and island Greece. The Tele-Medicine Programme supports GPs while also promoting preventive medicine. It contributes to illness prevention through timely diagnosis while also caring for the

chronically ill, as it allows for the systematic check of their health status at their area of residence breaking geographical or other boundaries.The cooperation between Vodafone and Athens Medicine Center is certified by the Ministries of Health and Marine & the Aegean. The programme includes the National Inter-Municipal Network of Healthy Cities- Promotion of Health and Vidavo firm and makes the best possible use of technology to apply programmes supporting local communities and people.

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10.10. TALOS Programme

The aim of this project is the design and development of a mobile medical device which allows tele-diagnosis, support of long distances and provision of advice to mobile health care units (ambulances, doctors of provinces etc.). Yet, it allows monitoring and provision of advice to boats, monitoring of patients at home from specialized doctors who work at a hospital or health center and the constant monitoring of patients who are hospitalized in Intensive Care Units (ICU), wherever the doctors are.

The system allows collection and transmission of important bio-threads (blood pressure, temperature, electrocardiogram) as well as collection and transmission of patient's images. These images provide doctors information about patients and in this way they can make a visual inspection. Telecommunication is achieved through different networks because it is ensured that communication is always present no matter how far a patient is.

10.11. Information System of the National Emergency Center (NEC)

This program aims at upgrading of national pre-hospital emergency response systems, by using modern information and communication technologies. It is a part of the attempt to develop an integrated telemedicine regional network in Crete and provides solutions regarding geographical monitoring of ambulances and mobile units, optimal use of available resources, capturing, transferring, analyzing and storing vital parameters with the possibility of remote monitoring of incidents and an electronic emergency record.

The Pilot Information System for Early Emergency Medicine of National Emergency Center in Crete consists of applications that serve Center's personnel and other health providers with whom it cooperates. More precisely, it contains the following applications:

- Application for voice mail and administrators at the guidance center of NEC allows the creation, completion and printing of the electronic 'Incident Card'.
- Applications for doctors at the guidance center of NEC, in collaboration with special subsystems in mobile units or a health center, gives the opportunity of telemonitoring based on vital parameters, electrocardiograms and video images transmitted by telemedicine from the place of the event.
- Application for NEC management uses advanced methods for data analysis from the incident file in order to support administrative decisions which concern hiring, training and day-to-day staff planning and purchase of equipment.
- Application for the crew of mobile units deals with receiving and sending the vital parameters of the patient from the ambulance to NEC guidance center.
- Application for ICU personnel and ER of hospitals as well as doctors at health centers which are under development.

10.12. Electrocardiogram at Home

It is about a service that is provided by the web in order to monitor patients from home. This application is used for collection of clinical data. A web browser allows access to patients' documents and E.C.G. data. The data comes from a database that exists for patients and it can be recalled and used. An 'intelligent' software is

activated whenever new E.C.G. data is sent from home and this software can make comparisons between older and recent data. In this way, an optimal strategy can be created with respect to the aid that is provided to the patient, reports about their condition can be created, as well as suggestions in order for the problems to be faced.

Personal Computers which are used to make the E.C.G. measurements consists of a bus card, a protected E.C.G. cable, E.C.G. equipment and the suitable software for the safe monitoring of patient. The software was designed for Windows 9. Advanced graphics are used and user interface is quite specialized. There is a way of linking the database to the web. The language developed uses Open Database Connectivity (O.D.B.C.) and a web browser (Internet Explorer, Microsoft Corporation) plays the role of the client. This technology offers new and promising methods about patient monitoring when at home.

10.13. SmartCare Program

In the European Program 'SmartCare', there was participation from the Municipalities of Paleo Faliro, Alimos, Agios Dimitrios and e-trikala SA of Municipality of Trikala. The project concerned the development and integration into existing care structures, technologies about independent living of patients and the elderly at home with services such as monitoring of the physiological, environmental and behavioral parameters of the patients, various self-care services, management of patients' medical treatment, prevention of accidents and practice of cognitive functions. According to project results, there were not remarkable alterations with concern to improvement of participants' health.

10.14. Thalea

Through this ongoing project, five hospitals from Germany, the Netherlands, Spain, Belgium and Finland will launch joint pre-procurement focused on obtaining a joint platform for telemedicine and telemonitoring to improve care for critically ill patients and patients in intensive care units.

10.15. Chain of Trust

The project focuses on telehealth, aiming to assess the views, needs, benefits and barriers related to telehealth from the perspective of key EU end-users - patients, doctors, nurses and pharmacists). Ultimately, the project aims to significantly increase the levels of awareness and trust for all key stakeholders

10.16. RENEWING HeALTH

REgioNs of Europea WorkINg together for HEALTH project aims to implement, validate and evaluate innovative telemedicine solutions for the management of chronic diseases - diabetes, chronic lung and cardiovascular diseases in nine European regions. The scope of the project includes about 7,000 patients. The activities are aimed at encouraging the participation and empowerment of patients in the management of their own diseases, while helping to optimize the use of resources in the provision of health care.

11. E-health systems in Europe

11.1. Estonia: Digital Prescription

'Digital Prescription' was introduced in Estonia in 2010. The aim was for every doctor and every pharmacy in Estonia to be able to use e-prescription. The programme includes numerous partners such as government bodies, hospitals and pharmacies. It has already enhanced transparency in medicine prescription and plays a great part in data collection, improving healthcare and decision-making among the policy bodies.

E-prescription is conducted through a computer via the suitable software. Thus, information can be directly sent to the national database and the prescription is accessible by every pharmacy after a request by the patient.

11.2. Denmark: Danish Health Data Network-DHDN

The Danish Health Data Network (DHDN) developed by MedCom was introduced in 1994. It is a long-term plan allowing for the effective transfer of data among various healthcare departments, thereby enabling all people involved in healthcare to communicate more efficiently and reliably. It starts from the patient early care. It provides the citizens with numerous services such as access to pharmacies, hospital diagnostic services, specialized consult, hospital referrals and home care.

11.3. Czech Republic: IZIP Medical E-File

This is one of the five best E-Health practices in the world. IZIP is a patient medical e-file system accessible through the network. The pilot version of IZIP was introduced in February 2002 in four selected regions of the Czech Republic: Benesov, Beroun, Jicin and Rokycany. It contains all relevant information for the citizens' contacts with healthcare services, such regular visits to a pathologist, dental treatment, lab and imaging exams, operations etc. IZIP system allows doctors access

to the patient's e-file whenever they consider it advisable so that each doctor can know his patient's background and provide him with the most suitable treatment or be able to resume an interrupted treatment.

The IZIP's main goal is to turn the medical database from isolated healthcare professionals and healthcare providers to the insured citizens. This is achieved by replacing the printed forms with safe digital records on-line. Citizens can access their files but they cannot alter the registered information.

11.4. Sweden: SJUNET Healthcare Network

SJUNET is a broadband network based on IP network protocol supporting communication among healthcare providers. It was firstly introduced in 1998 as a local network in Upsala but soon evolved into the country's National Healthcare Network. Today, all of Sweden's hospitals, health centers and healthcare stations are connected in this network.

Technically, SJUNET operates independently from the internet thereby safeguarding the exchange / transmission of data, such as patients' personal information. Most ITT applications of the SJUNET pertain to tele-medicine.

11.5. Slovenia: Health Insurance Card System (HIC)

The Health Insurance Card System (HIC) was introduced by Slovenia's Healthcare Department in 2000. The HIC provided Slovenia's Healthcare System with digital files for all insured persons and created data connections among all insurance and healthcare providers. The system combines smart card technology and network services and includes the following tools: micro-processor cards for the insured party (HIC) and the healthcare professionals, environment to process healthcare providers' data and a direct (online) network of personal service terminals (SST). Health insurance rights can only be applied via the HIC.

The card alone or in combination with local and remote databases provides accurate data throughout the healthcare system. HIC system includes the registration of personal doctors (GP, dentist and gynecologist), allows healthcare workers to automatically fill in subscriptions and facilitates the registration of medical technical assistance devices.

12. Legal and Ethical Issues

This issue includes numerous separate issues related to the protection of the individual – be it a patient, a citizen or a healthcare professional – from malevolent third party action or even failures or defectively handling issues originating from human activities and constructions. More specifically, issues to be dealt with are as follows:

- ✓ The roles and responsibilities of the involved parties (natural entities) and bodies (legal entities)
- ✓ Safety and integrity of data, information, systems and facilities
- ✓ Rights and obligations of patients and citizens in general

The issues especially concerning all involved parties are the following:

who is responsible for providing e-health services and how to ensure the strict implementation of any rules set

is it necessary to pass a special law on e-health and if so what should it include

The matter of personal data privacy draws lots of attention, so let us look into some relevant issues.

13. Personal Data

This is an issue concerning everyone and all of us certainly wish to be in complete control of our personal data and information and wish for them to be properly used to our benefit. This intention is currently supported by both national and international frameworks.

The most important issue concerning e-health services is "Informed Consent".

Doctors or other healthcare professionals using telematic equipment and the provision e-health services must have the patient's approval before using the service. Should this not be feasible, approval must be given by relatives as stipulated by law for other healthcare services.

Obviously the doctor (and any healthcare professional in general) could claim that he is "not using the service for scientific reasons" (ie, he believes this specific technology and process has nothing to offer towards successfully handling the case) while taking the relevant responsibility.

At the same time, the patient or his family are not entitled to demand the use of e-health services contrary to the doctor's or nurse's opinion.

It is also worth noting that despite the expected rise in the use of e-health services in dealing with cases of immediate risk to the patient's life and other emergencies, they are practically proven to be in great demand in non-emergency cases or scheduled visits. Greece has adopted the general guidelines set by international organizations (e.g. the Council of Europe and the European Union) and has implemented Law 2472 of 1997 regarding the "Protection of the individual from personal data processing".

14. Current Legislation on E-Health

The basic legal framework governing the operation of e-health in Greece is Law 3984/2011. More specifically, article 66, par. 16 thereof stipulates that:

There are laws and other provisions in Greece covering e-health cases as they protect medical privacy and personal data. Some of them refer to the following:

- Personal data protection: L. 2472/97
- Medical privacy consolidation: P.C art. 371 and R.D. 25/5/1992 on Medical Ethics Regulation
- Classified Nature of Medical Files: L. 2071/1992 NHS art. 47
- P.D. 1258/81: setting the time for hospital record keeping
- Medical Ethics Regulation, amended and updated via L. 3418/2005
- European Convention on Human Rights, setting strict criteria for medical data protection and the conditions for sharing them with third parties
- Guideline EU 95/46 on automated and non-automated personal data processing, explicitly stipulating that medical data are subject to special safety and protection regulations.

L. 3325/2014 refers to primary healthcare which includes:

1. Healthcare services not requiring hospitalisation
2. Assessing citizens' healthcare requirements, planning and implementing measures to prevent disease and promote health
3. Family planning

4. Necessary infrastructure to ensure and manage all population medical information and data
5. Dental care focusing on prevention dental services
6. Post-hospital services and rehabilitation services
7. Monitoring the chronically ill not in need of hospitalisation
8. Social services

This law guarantees access to a sufficient group of primary healthcare services, aiming to social cohesion and growth. It also ensures access to equal healthcare services for all residents, comprehensive care, a system focused on the individual and their families, managing data and information so as to ensure prompt availability at all points of the healthcare system and finally ensuring the right to a free doctor selection.

It also establishes the institution of the personal and family doctor for all citizens. The main beneficiaries are the Healthcare providers and more specifically doctors, social services benefiting from timely communication by being ready to receive patients transferred to them from hospital and finally, the citizens. This legal framework also refers to the digital file, stressing that each Health Center and clinic must establish a complete system to keep and update digital file records.

At the European level, on March 9th 2011 a Guideline was introduced on patients' rights in cross-border healthcare. It notes that Guideline 2011/24/EU facilitates access to high quality cross-border healthcare and promotes cooperation in the area of health among the EU states. Article 14 refers to e-health. The targets of the e-health network concern cooperation to produce financial and social benefits for EU states, e-health services and applications towards a high level of trust and safety so as to enhance healthcare and ensure access to safe and high quality services.

The health technology assessment network must support cooperation between national authorities and EU states in providing objective, reliable, comparable and transferable information, analysis of exchanged information's nature and type to avoid repetition. However, EU assistance is necessary to meet these targets.

15. E-health Technological Requirements and Tools Used

E-health includes tools and solutions for healthcare professionals, patients, administrative and other services, personalized systems for citizens and patients, internet platforms and smart systems, equipment incorporated in daily activities and clothes, mobile devices and health portals.

Diagnosis Support-Scenario

Intensive Care Units (ICU)

15.1. Tele health at Home

Tele-health, as mentioned above, uses ICT to provide medical care to home users (and beyond). It includes tele-monitoring, teleconferencing and counseling services, remote rehabilitation, as well as self-management health promotion devices. More specifically, the applications and services of the above-mentioned method include:

• Tele-monitoring: remote measurement and monitoring of specific human bioassays and indicators such as: blood pressure, blood glucose levels, electrocardiography, etc.

• Teleconference: providing online (phonetic) or video-based consulting services (medical) by qualified medical staff. These services can be provided either in case of need or in the context of a complete package of services.

• Tele-recovery: provision of rehabilitation services to patients through the use of the Internet, network cameras and telecommunication networks. The majority of these services fall into two categories: assessing the patient's clinical status in his / her place of residence and subjecting the patient to treatment. These services are useful in patients who are unable to

hospitalized in a clinic due to physical weakness, long distance, high cost, etc. Areas where such services have been implemented are: neuropsychiatry, otolaryngology, physiotherapy etc.

15.2. E-health Medical equipment and systems

Apart from scientific personnel and administrative structure, developing an e-health service requires infrastructure depending on its nature. The equipment of all e-health applications combines:

• Telecommunications infrastructure, wireless or not.

• Medical equipment, which could concern usual medical devices,

•Data processing systems (PCs, larger servers or even micro-processors incorporated into "smart clothes")

Below follows a brief mention of the e-health systems and the medical equipment suitable for e-health applications:

- ✓ **Cardiograph**
- ✓ **Digital Stethoscope**
- ✓ **Spirometets & Oximeters**
- ✓ **Digital blood pressure meter**
- ✓ **E-health systems with image transfer and storage abilities**
- ✓ **Ultrasound devices**
- ✓ **Video imaging transfer systems**
- ✓ **Image – Tele-conference systems**
- ✓ **Robotic applications**
- ✓ **Digital Health booths**

16. Difficulties in applying e-health

The Greek healthcare system is a mixed one, combining social healthcare insurance and the centrally-funded National Healthcare System (NHS). Since 2010 structural reforms have been introduced towards making the system more efficient, with many of them being part of the country's fiscal adjustment plan. A significant reform came in 2011 with the creation of the National Organisation for Healthcare Services (NOHS) by merging the healthcare branches of the main social insurance funds. NOHS is now operating as the main healthcare service purchaser. However, plans to transfer more responsibilities to the regional health units have had less of an impact and healthcare remains highly centralized.

The deep and persistent financial crisis still affects the healthcare system. Cost is cited as the first reason for not fulfilling a health-related need in Greece and could refer not only to financial difficulties in accessing services but also to changes in household income and consumption model as well as to user preferences. The Greek healthcare system operates under strict fiscal restrictions. Furthermore, in Greece public health seems to be faltering, being unable to resist to the underground black market and often offers obsolete services due to the bureaucratic load. For instance,

modern and expensive equipment is put to operation 5 years after its purchase due to lack of personnel. As a result, the technology is already outdated.

Said difficulties do not only apply to Greece but throughout Europe. EU states face an increased demand in healthcare services due to population ageing, high income and education levels.

Moreover, some additional challenges concern the following:

Lack of qualified stakeholders

One of the challenges to the implementation of e-health is the lack of qualified users. Users who do not have the skills to use the system can be either healthcare professionals or patients, developers and supporters of related ICT professionals, this may be due to poor literacy and poor technological skills - internet and computer literacy. Low-level stakeholders are technical staff, but are the main users of health information systems in developing countries. The main challenge is to educate consumers in patient privacy.

Technical and operational implementation of e-health requires strong links between ICT and information systems in different organizations, which has its complexity.

Legal Aspects

Lack of unified standards and the need to develop a legal framework for management in healthcare.

The limitations of financial management reveal the following challenges:

- Need for investments and budget allocation in the electronic field of healthcare and the use of relevant technologies in the healthcare sector;
- Lack of a framework for an economic analysis of the benefits and results of remote health control.

17. Prospects

The action plan's prospects is for e-health to be utilised and developed to deal with some of the most urgent problems in health and healthcare systems in the first half of the 21st century:

- improving the management of chronic illnesses and multiple simultaneous illnesses (multimorbidity) and reinforcing effective prevention and health promotion strategies ·

- increasing healthcare systems' sustainability and effectiveness by releasing innovation, improving citizen/patient-focused healthcare and strengthening citizens while also encouraging structural reforms ·
- promoting cross-border healthcare, health safety, solidarity, universality and equality ·
- improving the market's legal conditions for developing e-health products and services.

The action plan deals with obstacles and subsequent business aims:

- achieving great inter-functionality of e-health services
- supporting research, development and innovation and e-health and well-being to deal with the lack of available and user-friendly tools and services
- facilitating integration and ensuring greater spread
- promoting dialogue on policy and international cooperation on e-health worldwide.

The action plan stresses cross-border activities but it is worth noting that the works conducted at the EU level have significant impact at the national level and nice-versa. Consequently, the action plan encourages national and regional authorities, health and social care professionals, the overall sector, the patients, the service providers, researchers and EU bodies to cooperate closely.

The extensive use of digital healthcare, and in particular telemedicine, is interconnected with the technological capabilities of available hardware and software, and by the requirements imposed by the specifics of medical care and the skills of patients and medical staff to handle these advanced technologies. It is necessary to achieve and ensure technological interaction and software compatibility between popular and widely used smart devices and specialized medical equipment for measuring vital signs.

In technical terms, telemedicine systems imply integration between medical diagnostic devices and various information systems (a complex of communication and computer systems). Individual devices for measuring of medically important vital indicators (such as heart rate, blood pressure, blood sugar, saturation of blood with oxygen, carbon dioxide, etc.) need to be compact, extremely precise, and not to burden the everyday life for patients.

The next steps for the IT specialists and the leading researchers in the field of medicine is to cooperate for the development of artificial intellect which will be able to detect pathologies and risky health situations in real time, to elaborate early alarm systems calculating the potential risk factors, to create predicating models (simulations) that could forecast the patient's medical condition, as well as to create systems for automated support of the decision-making in medical activities.

Digital transformation will have an impact on the work of doctors and health workers. The main impact will be through the integration of data originating from various sources, including big data, Internet of Things (IoT), Artificial Intelligence (AI), Expanded Reality, Block Technology, Virtual Reality (VR), and Robotics.

In the context of the implementation of the project "Improving access to health services through a personal health surveillance system" / "eHealth monitoring", the specific situation in the cross-border region should be taken in cosideration, as the region is characterized by specific demographic structure and geography, socio-economic status and coverage with health care, that require tailored approach and implementation of pilot targeted and state-supported measures.

18. Supporting research, development and innovation

The project's short- and medium-term priorities include health and well-being solutions for citizens and healthcare professionals, improved quality of healthcare including chronic illness while also increasing citizens' autonomy, mobility and safety. Special attention is given to designing user-focused mobile technologies and applications. Long-term goals refer to issues which can promote cooperation between related sciences and technologies while also accelerate breakthroughs in health and well-being. Towards maximising the action plan's impact, the entire spectrum of research and innovation activities will be supported. These include:

1. State and private sector synergies and other actions promoting research and innovation as well as transfer of knowledge for clinical trials
2. Pre-commercial public contracts and innovation public contracts for new products, possibility of extension, inter-functionality, effective e-health solutions supported by set standards and joint guidelines.

The aim is to enable citizens to live independently for longer and healthier, to render healthcare cost sustainable, to expand the market in innovative products and services and to increase EU's international competitiveness.

18.1. Areas of Interest

EHealth and telemedicine can be successfully implemented in different contexts and under various circumstances, expanding their field of application and increasing their added value. In addition to remote medical care, this innovative approach of work could be adapted and applied in emergency situations that require interventions of medical professionals.

The following areas of interest have been identified, where eHealth and telemedicine can be particularly useful:

- Remote monitoring of patients' status and their medical symptoms allowing filtering and differentiating between emergencies and common health conditions that do not require immediate medical assistance, as well as the provision of remote consultation and guidance for first aid until the arrival of emergency teams that can provide qualified medical assistance.
- Telemedicine is an opportunity for regular, planned servicing of patients living in geographically remote, sparsely populated and/or inaccessible settlements. By assessing incoming data on vital indicators and prioritizing the current health status, one could schedule visits of the attending physician or general practitioner, arrange for medication deliveries, or transport patients to carry out scheduled manipulations such as hemodialysis or blood sampling for laboratory researches.
- Tracking of the development of chronic diseases is a further area of interest. Remote digital medical care allows the tracking of medical indicators, for example, of diabetic patients or patients with cardiac diseases.
- Preventive medicine. The possibility of easy remote consultation with medical specialists in case of early symptoms will allow the detection of possible diseases at their initial stage of development, will ensure more effective treatment and will help to reduce the costs incurred for socially significant diseases - both for the specific ill person and his/her relatives as well as the public health system as a whole.
- Possibility to enhance the general health culture of patients and build knowledge and skills to care for one's own health. This area of interest is based on improved access to general and specialized medical information and the ability to optimize communication and interaction between healthcare

institutions, physicians and other healthcare professionals on one hand, and patients and their relatives on the other.

18.2. Health and Telemedicine Policies in EU

Health policy is at the heart of European policy in a mixed design that includes Health (as a service), Economy (in terms of cost) and Innovation (in terms of research and technology). In a sense it could be said to be a duplication of the Canadian model of the social context in which telemedicine borrows from the United States.

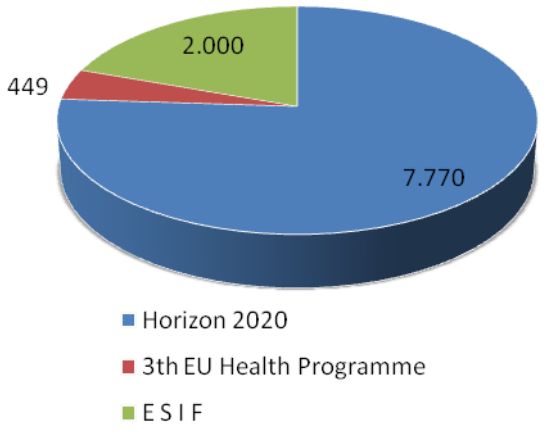
European health policy specifies the content, development and role of telemedicine in the 3rd Union Health Action as described in Regulation 2014/282 and Commission Communication 2018/233 to facilitate the transformation of the healthcare sector in digital single market, empowering citizens and developing a healthier society

Funding for this policy comes from three different sources:

1) The 3rd Union Action with a budget of 449.4 M € for 7 years,

2) From FP8 - Horizon2020 with an estimated budget of about 10% of the total, ie € 7.7 billion (with the first 981 € to be launched and distributed along the axes of the program during the two years 2018-2019).

3) From the Structural and Investment Funds to support national policies, programs and infrastructure, estimated for all MS in approximately € 2 billion.



Therefore, the EU plans to allocate a total amount of € 10.2 billion, equivalent and competitive with that of the US / Canada, seeking to achieve the goals of holistic architecture and in addition to:

⇨ Strengthening employment, work, economic growth,

- Strengthening the internal market and its export activity,
- Better health risks from immigration,
- Improving the human rights of citizens,
- Health insurance, also linked to food safety,
- The efficiency of the social resources of the insurance systems.\

The system of governance is only three levels, at the base are the national bodies and the National Contact Point, followed by the two competent authorities depending on the subject matter where the role of coordinators of the programs is the European Medicines Agency and the European Safety Authority. of Food and is followed by the European Commission. This design achieves fast and flexible management of programs and financial resources for telemedicine and health programs in general.

Figure 2: National Contact Point for Greece in terms of policies is the Ministry of Health and in terms of applications is IDIKA SA

18.3. Telemedicine Technologies

18.3.1. The Digital Health ecosystem (e-healthecosystem)

The Digital Health ecosystem is the overarching set of tools, infrastructure, systems and procedures to support the improvement of citizens' health and care. It is definitely based on high-performance information and telecommunication systems, with the ability to securely transmit, store and manage huge volumes of digital data where analysis and artificial intelligence are applied to them in order to:

- improve the provision of medical care,
- develop new, faster and better diagnoses and treatments
- manage financial resources more efficiently and effectively,
- medical education and medical research are strengthened.

The clarification of the terms with the application of typology mainly by the EU, as in the case of telemedicine, results in the expression of commonly accepted terms as follows:

Digital health (digita lhealth, d-health) or equivalently electronic health (e-health) is the superset of the following interrelated systems:

- **Clinical / Medical Information Systems** (Medical Information Systems) that include specialized software and hardware tools for health professionals and such indicative are medical imaging systems, nursing management, mobile emergency health units. These systems are operated by medical and nursing or appropriately trained staff and provide information in the context of digital health.
- **Telemedicine**: which includes personalized healthcare systems and health services as well as remote patient care and monitoring services. Telemedicine also provides information and receives information from the Clinical Information Systems. Users are certified and specialized doctors.
- **Homecare systems and mobile health applications (m-health)** which are the personalized fixed or mobile outpatient systems located in the homes or premises of patients, participating in monitoring the progression of the disease with data, up to complete cure. Users are patients and certified doctors.
- **National Health Information Systems** which include the high-speed telecommunications networks operated by the public with distributed file systems or shared services (Electronic Health Record, electronic prescription, electronic appointments, Certified Medical Users and Certified Medical Users).
- **Management Information Systems** that include all organized information systems for the management of finances, resources, administrative procedures, pricing of services, patient insurance capacity and coverage. Users are administrators with access to the administrative and not to the

medical databases of the patients (for the issuance of an invoice only the examination or its code will be mentioned and not its results).

- **Educational Information Systems** which are of two categories: the "closed systems" which are accessed by certified physicians, researchers, professors or medical students and technology and medical equipment companies for education, lifelong learning - learning by transfer of experience and know-how and "Open systems" concerning the open education of citizens, patients and can be from simple websites or specialized portals, to YouTube channels or modern and asynchronous distance learning platforms.
- **Social security information systems**

From the above, the e-health ecosystem is distinguished based on the typology and use of the information system (doctors / nurses, administrative staff, patients) and the management of their data.

The reality is that the broader term e-health includes:

- medical information systems
- telemedicine
- Homecare systems
- Mobile Health–m-health
- Patient / Citizen e-services
- Non-clinical and administrative health systems
- Medical Education Systems

18.3.2. Integrated Telemedicine System

An Integrated Telemedicine System includes:

- The medical equipment where the patient is examined by medical or nursing staff and their results, in addition to printing in printed form, can be sent to be stored and processed, analyzed at a second level through software information systems in the hospital. Tests can range from simple blood tests to complex serum tests or imaging tests depending on the infrastructure of the regional health center.
- Local information system, which operates and supports but is also supported by the services of the national infrastructure and records the whole process

while sending the data according to their format to the corresponding data point (data repository) of the other systems. A local telemedicine information system includes local area network switching equipment for interconnecting computers and medical equipment; a wide area external network (Rourouter) router; as well as for secure access to national systems (eg prescription, insurance capacity, electronic patient record). At the same time the same computer is the sender and receiver of the medical examinations to the telemedicine center of the hospital. Such a system definitely has a real-time video communication subsystem (realtimevideo) for both tele-examination and counseling, training or medical advice and investigation from the hospital center.

The three critical infrastructures for Digital Health systems in total are:

1. The information infrastructure
2. Telecommunications infrastructure - data networks
3. Software applications

All three critical infrastructures are analyzed in the spirit of the present in the next paragraph.

18.3.3. Modern Technologies and Architectures for telemedicine

There is a huge literature, studies and researches on the protocols, technologies and information and communication systems involved with telemedicine applications, which in addition to historical value ensure the technological continuity but also go beyond the present analysis. This section coherently mentions the modern technologies for the development of telemedicine systems, which are widely used for the development of other forms of e-health without focusing on the technical characteristics of the protocols but at the level of conceptual design.

Cloud computing is the 5th generation in the field of Information Science in terms of integrated information systems development architectures. This is a new philosophy for the development of computer rooms and computer resources where they go beyond the concept of ownership of the facility in a particular space.

As shown in the figure below, Cloud computing is based on the well-known three-tier service model: Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS).

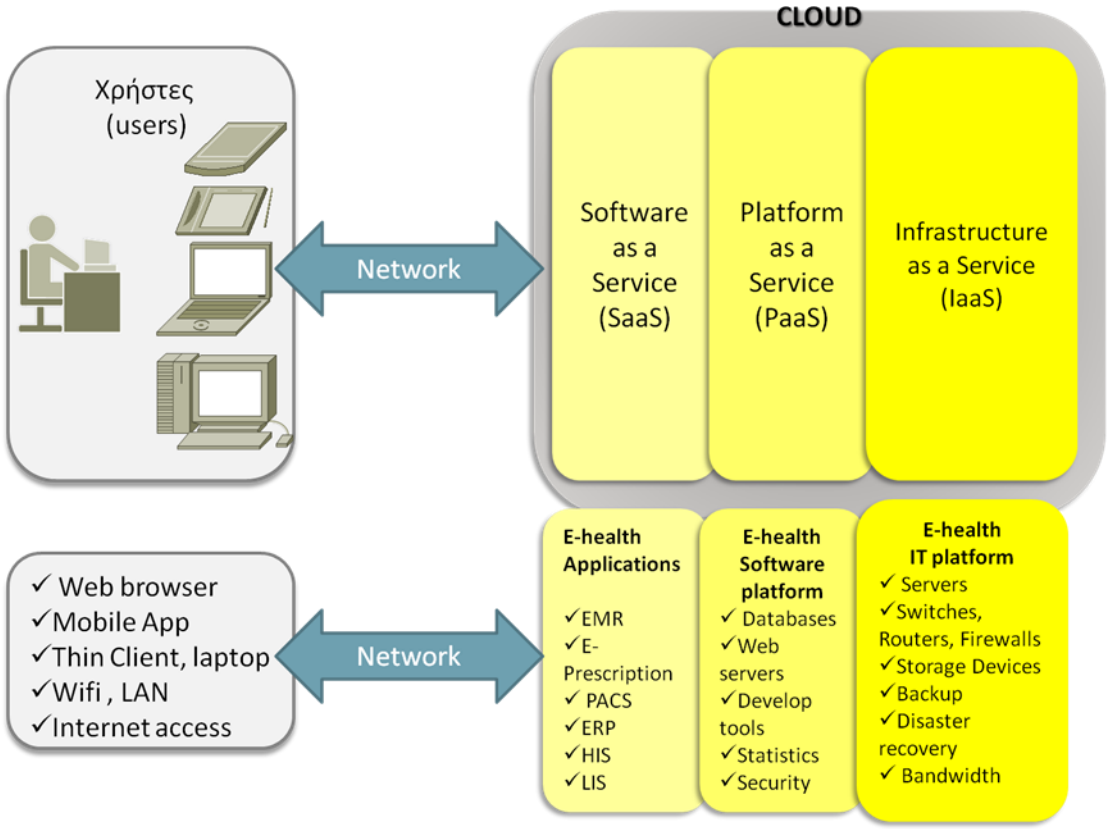


Figure 3: Cloud Computing three-tier service model

Infrastructureas a Service (IaaS): Provides on-demand building resources. These resources are either logical structures, such as virtual machines (VMs), or physical, such as processors, storage, network access, network equipment, security, access, backup systems, or even disaster recovery systems. (disasterrecoverysites). The billing policy followed is for the user to pay on a usage basis. In some

Platformas a Service (PaaS): Provides platform resources such as operating systems, software development tools, relational databases, access management software and authenticated user access (SSL, PKI, DigitalSignature) that allow the user to develop their own applications (medical) based on the Cloud and at the same time how it distributes and accesses them, user rights, etc.

Software as a Service (SaaS): Provides on-demand web applications. The Cloud provider can also be the owner of the applications, and users pay a fixed subscription or depending on usage or even free if the system refers to a public telemedicine infrastructure the amount of resource used, while in others the time period.

Interoperability is a dominant technical concept in information and communication systems that really takes off both the technical and technological value of the system itself and the business exploitation and acceptance by society and users. E-Health is called upon to ensure the sustainability of healthcare systems. To this end, data interoperability is vital.

Interoperability is defined as the ability to transfer and use information in a uniform and efficient manner from different organizations and information systems, or the ability to exchange and integrate digital data formats from different and heterogeneous information environments through the adoption of common standards.

The main benefits of interoperability are

- ☑ Service and satisfaction of information needs. The information is provided regardless of time and physical space. Also, the improvement of the process of handling all types of data (digital signals, documents, multimedia data - image / audio) through information systems forms better service providers.
- ☑ Data exchange: efficient services fully automated and linked to the ultimate goal of saving money by managing and processing the information itself

Conditions for ensuring interoperability are:

- ☑ The adoption of open architectures, which define the location and role of each subsystem. The open architecture of an information system is what promotes the freedom of choice in the components and allows the synthesis of the most suitable solution from interchangeable components, without committing to proprietary technologies and solutions of a manufacturer.
- ☑ The existence of common and widely accepted standards (Standards), which describe the way of communication between subsystems and the form of information exchanged.
- ☑ The control of products by independent organizations, for their compliance with the standards.

For effective data communication between all public organizations, with the aim of uniform access of citizens to public and private data, Greece follows the Greek eGovernment Services Framework (Greek eGIF), which is based on the British e-GIF and specializes for domestic needs, ie for the definition of the Greek

GovernmentCategoryList and the design of Greek XML schemes. The Greek e-GIF sets the techniques, policies and specifications for achieving the interoperability and coherence of public sector IT systems in Greece, as well as the interactions between:

- ☑ Government and citizens
- ☑ Government and business
- ☑ Government and organizations
- ☑ Government and other governments (inside and outside the European Union)

The Greek e-GIF includes rules and standards for the implementation of the general strategy and architecture of e-government regarding:

- ☑ The certification of public websites
- ☑ Interoperability between information systems
- ☑ The development of electronic trading services
- ☑ The digital authentication of citizens and businesses
- ☑ Open access to public data and documents
- ☑ Secure access to private data and documents.

Interoperability standards lead to the following benefits:

- ☑ create the necessary connectivity and data exchange between health systems,
- ☑ minimize the risks of developing new technologies,
- ☑ prevent dependence on a single supplier or service provider
- ☑ reduce costs, as they facilitate the development of competition and eliminate the need for expensive solutions,
- ☑ ensure the diffusion and adoption of new ICT solutions in health,
- ☑ effectively address specific concerns about privacy, security and identification.

19. Difficulties in Telemedicine application

19.1. Greece

The Greek Health System is characterized as mixed, which combines social health insurance and the National Health System which is centrally funded. Multiple reforms have been made since 2010, but health sector is still characterized by a high degree of concentration. Furthermore, the appalling financial crisis that broke up in 2008 keeps affecting the Greek health system. High private health expenditures, mainly in the form of direct payments from patients, have always been an important feature of the Greek health system and are still rising.

In Greece, all resources are distributed to public and private hospitals and health centers, but facilities, personnel and medical equipment are unevenly distributed. In fact, there is high concentration in urban areas and the service which is provided in rural areas is really poor. Additionally, in 2010 there was a reduction in the public sector recruitment and this affected health sector to a high extent.

Going further, cost is considered to be the most common cause of the application of telemedicine. This parameter affects both citizens and medical staff. For instance, due to income collapse citizens are not capable of paying for private services and hospitals are not able to buy equipment because the price is really high. There are also problems because of the high degree of bureaucracy. Unemployment is another issue that plagues Greece. Since 2010 there was a constant reduction in employees' salaries in order for the cost to be decreased. This particular fact creates concerns regarding the adequacy of health system funding, especially in the long-term.

All these obstructions can be found at European level as well. European countries face increased demand concerning health services due to the aging population, high income and education level. Adequacy of health system financing is a cause of concern due to the pressure that is exerted on public spending and as well as high percentage of private expenditure. One of the major obstacles is the lack of interoperability in e-health systems. Lack of interoperability restricts the use of the existing solutions and discourages their adoption from users.

Another important issue is the right use of Information and Communication Technologies in order for the patients to be informed in the right way. Most of the time, patients have already searched online about their symptoms and unfortunately, they have started taking medication on their own. Therefore, the internet has to be

used in a proper manner in order to receive the benefits and avoid any undesired consequences.

The elderly are not very familiar with the internet and technology tools in general, consequently they might be incapable of receiving the benefits that are produced and we should bear in mind that these people suffer from health issues. Finally, lack of a common regulatory framework and legislation, but also the problem of non-friendliness of the final application are regarded as significant obstacles.

19.2. Bulgaria

The difficulties in the implementation of eHealth practices reflect the characteristics of the environment of intervention and the individual peculiarities and capacity of the actors that are part of this environment - doctors and other medical specialists, patients and their relatives, IT specialists, scientists and researchers in the field of medicine, technology and technology.

There are also difficulties caused by legal constraints and / or moral considerations, as well as those that are pre-conditioned by technical possibilities, socio-economic characteristics and cultural and educational status.

The **legal constraints** are related to the overall regulation of eHealth.

- Currently, the Bulgarian legislator has not created enough normative texts to set the framework for defining and protecting the rights and interests, obligations and responsibilities of legally affected subjects
- It is important to take consideration of the requirements for the protection of patients' personal data - their identity, current medical status, health history and chronic diseases.
- Issues of liability in the event of a medical mistake and / or professional negligence of a healthcare professional that operates remotely and in a digital environment, while diagnosing and assigning treatment based on data gathered with the help of technological devices should be specified and refined in order to avoid limiting the use of this innovative approach to work due to fear of being subjected to administrative and / or criminal liability.

Difficulties due to technical abilities and skills can be expected, as follows:

- The technical and technological illiteracy of some users, especially the elderly and / or illiterate population (e.g. facing difficulties when handling

smart devices and specific medical tools and sensors) may lead to incorrect and inaccurate reporting and transmission of measured vital indicators. This could result in a mistaken assessment of the nature and urgency of the observed medical condition, incomplete analysis of incoming data, and misdiagnosis and treatment.

The economic inaccessibility of the technological equipment and software is a critical limiting factor for the rapid and ubiquitous application of telemedicine and other e-health elements.

- Expensive individual medical devices and sensors, highly specialized medical equipment and modern computer configurations, as well as maintenance of the same, are serious obstacles for healthcare institutions and individual patients.
- The high prices of telecommunication services and Internet connectivity also constitute a serious expense that needs to be planned.
- There is need of specialized training for end users and / or physicians to work with advanced technological (medical) equipment.

Difficulties due to socio-economic circumstances and cultural and educational status:

- Poor health culture, lack of interest in one's own health and well-being, which is found in part of the population, especially those living in smaller settlements, geographically remote and / or those with difficulty in transport accessibility.
- Difficulties in applying eHealth practices due to differences in educational level and expertise between IT specialists, doctors and patients, problems due to language barriers in communication between doctor and patient when using medical terminology and / or software in a foreign language.
- Possible mistrust towards new technologies work and communication approach based on prejudice, fear and cultural and educational peculiarities.

20. Benefits of Telemedicine and Needs that are covered

Regarding ***doctors***, this method produces many benefits. Firstly, it can make a diagnosis when a patient lives in a remote village and ask for the opinion of a specialized colleague. Going further, there is direct access to patients' record, reduction in time of diagnosis, direct information and communication with colleagues through the network. ***Employees*** in health centers and hospitals can use new technologies and their job can be facilitated to a high extent, increasing the efficiency and reducing the time spent on an incident. Therefore, productivity is enhanced, mistakes are reduced and sense of security for patients and health professionals increases.

Communication time between hospitals is drastically reduced, there is an upgrade of the provided health services at the level of local government and there is also a wide coverage of medical incidents. Finally, the working environment of medical staff has been modernized with the use of technology and services based on international standards, as well as training of doctors are facilitated and upgraded.

Concerning ***citizens,*** benefits are related to direct contact with the doctor, even if they are miles away, immediate service and increase of care by avoiding repetitions, delays and mistakes. Information about public health issues, epidemics and prevention are of significant importance, as well as reduction in the cost of care without unnecessary expenses. Telemedicine and information systems enhance transparency.

In addition, some other benefits that can be generated have to do with savings on examination costs, reduction in the geographical and physical isolation of patients and the elimination of the internal migration to urban centers in order to receive better and more effective medical care. The ability to provide expert advice from overseas and improvement of day-to-day research are at the top of the pyramid.

The fact that there is quick and direct access to new information contributes to support of diagnosis and treatment, including rehabilitation. E-health applications can constructively help in the management of health units through the dissemination of best practices. The use of applications of telemedicine (tele-consultation, tele-care or tele-monitoring) and health care at home facilitates and enhances people's stay in decentralized areas, improving the overall provision of health services at each level.

The economic benefits of implementing eHealth are related to the identified capacity to improve the organization, functioning, administration, control and

reporting of the used financial funds, human efforts, and material resources in the health sector.

- Reduction and / or optimization of the costs of public health funds that are spent on regular medical care for the population and on the treatment of various diseases;
- More rational planning of the short-, medium- and long-term budgets of health funds, health establishments and individual medical practices;
- Improvement of logistics and organization of work in healthcare facilities, more flexible and rational planning of medical staff location and use of available general and specialized medical equipment;

Economic benefits

- To ensure more accurate and long-term planning of the needs for qualified health professionals and healthcare facilities;
- Limitation and / or prevention of unnecessary engagement of Emergency Aid teams, that result from poor judgment of the patient about the severity of his current medical condition and the necessity to receive urgently f specialized treatment provide by healthcare specialists;
- Reduction and / or optimization of the costs paid by patients themselves for unnecessary and / or excessive visits to doctors, unnecessary and / or overuse of medication, and execution of unneeded medical manipulation and tests.

Health benefits are expected to be generated in the following directions:

- Fuller and timely response to the need for medical care for the population;
- Improved healthcare coverage on the territory of the country and the individual regions;
- Facilitated tracking of the course of unanticipated and / or chronic diseases;
- Improved prevention of medical conditions and diseases leading to an overall improvement in the health status of the population and prolonging the duration and quality of life;
- Enhanced health culture and acquired knowledge and skills to care for one's own health.

The social benefits of wide use of eHealth practices are related to:

- Improvement of doctor-patient relationship due to more direct communication and achieved mutual assistance between patients, doctors and their relatives;
- Building and strengthening of links between health authorities, public authorities, citizens and health professionals;
- Creating and maintaining a community / social network in medical and social situations;
- Improved quality of life and longevity indicators thanks to easier access to medical services.

Educational benefits would come from the use of innovative technology solutions for digital remote medical care during initial and upgrading training for medical students, graduates, practitioners and other health professionals:

- Possibility for (distance) training of medical students, achieved by including those in the process of remote monitoring of patients' health status, during the analysis of incoming data, when the diagnosis is determined and necessary medical interventions and manipulations are prescribed;
- Possibility to form and use extended medical advisory groups to remotely analyse incoming information, diagnose, and plan the treatment required.

21. Public briefing action proposals

E-health is one of the main EU 2020 goals. E-health applications will have to form a significant part of each policy so that the sector spreads wider and faster and the public is properly informed. To that aim, the following strategies are proposed:

Information and awareness campaign in Greece – Bulgaria cross-border region. The campaign aims to cultivate a "responsible behaviour" to effectively use e-health systems and is directed both to the wider public and to specific targets such as the elderly, the chronically ill etc. The campaign's main goal is to motivate citizens to get accustomed with and use the installed e-health applications. This goal is affected by means of purpose-made printed material.

The main goal of the monitoring activities pertains to the active communication of the project's progress to the targeted groups ie, the interested parties. A variety of approaches facilitates public participation.

As communicating and spreading the progress and the results of e-health's monitoring is necessary to render the project visible to the maximum extent possible,

special attention will be given to communication activities towards ensuring broad participation in the decision-making process.

Communication activities will address management bodies, regional authorities, healthcare providers based on EU and primary healthcare (public sector only), municipalities and social healthcare services, universities, relevant NGOs etc. and will promote their messages, the measures to be applied and their time-schedule.

E-health monitoring will process tools from multiple media and use new forms of dialogue to spread the project's results, such as: project's webpage, information and advertising printed material (leaflets, posters, banners) information publications (cross-national, local), e-newsletters promoting the public information and awareness campaign for this specific e-health systems applications action also aiming to extend the policy. Special attention will be given to committing the interested parties during local briefing sessions, training meetings and cross-national information events.

A main precondition for the information campaign to achieve its goals is:

- creating a recognizable positive image
- communicating one main message – promise of social benefits from applying the project's actions
- communicating with the public at their own language, with their won peculiarities and for their own needs.

The information campaign will be specified in terms of:

- Time (frequency, duration)
- Type of communication (written, digital)
- Medium (printed media, digital media, internet)
- Content (general, special, brief, detailed) of the information policy

Below are cited certain indicative information actions:

- Distribution of information leaflets, posters and e-health system manuals, adjusted to the needs of each target-group
- Briefing through digital information material
- Mobile information units
- Happenings

– Special events

Publications in local and national media, newsletters and press conferences will enhance citizen information and awareness. Finally, this project aims to prepare and apply a comprehensive strategic promotion plan of the project through social media.

The most significant advantages of this type of advertising are:

- Penetrating markets without geographical boundaries.
- Aiming at specific markets and public groups.
- Attracting the public at the moment they are seeking the service (project).
- Prompt message adjustment and reorientation per case.
- Unlimited flexibility in content, locus and time of appearance management.
- Prompt briefing on the project's results.
- Complete reports and statistical analyses.
- Low cost (mainly compared to other media).
- Controlled cost with absolute accuracy (PPC - PayPerClick)

22. Awareness Raising and Communication

The first step regarding information about telemedicine and e-health is a campaign which will be carried out in the cross-border area. Its target is mainly old people, people with chronic conditions etc. The main goal is to induce citizens to use the telemedicine application through the creation of a special printed material. Transnational and local events are also a useful method. A site has also been created as well as social media accounts (facebook, instagram, twitter and youtube) and visitors can be informed about project's goals, events, action plan and project results.

Communication to the public will be achieved through printed material which consists of two leaflets, a poster and a banner. Furthermore, public awareness can be carried out by press release, e-newsletters and the internet. Last, local and national media will enhance information sharing and will raise awareness.

In order to promote the benefits and possibilities offered by telemedicine and e-health-based practices, it is necessary to carry out targeted information campaigns and awareness raising activities adapted to the needs of and aimed at the general

public, scientists and researchers, doctors and health professionals, representatives of the public authorities responsible for public health, health insurance funds, insurers, social partners, business organisations.

Examples of such targeted information activities could be the following:

- Organizing and conducting of on-the-field demonstrations (e.g. measuring of blood pressure, pulse, blood glucose, etc.) with the collaboration of health institutions, Regional health inspectorates, Bulgarian Red Cross, non-governmental organizations active in the field of provision of health and social services and community work, public and local authorities, institutions for provision of medical and social care;
- Voluntary events for blood donation, educational, sports and culinary activities to promote healthy lifestyle;
- Visits to places where the E-Health approach is applied;
- Pilot initiatives for introducing, testing and adapting of the E-Health approach;
- Training of mediators, activists, agents at the local level to further promote, implement and develop the proposed approach;
- Specialized training for end-users and medical staff;
- Introducing the concept of sharing of medical and smart devices, in order those to used by multiple end users.

23. Conclusions

E-health contributes to providing healthcare to patients located far away from treatment centers. This alternative means of providing healthcare services is achieved by using modern telecommunications networks and IT systems which enable real-time communication between people in remote and isolated areas. Properly trained doctors can address significant health issues by offering diagnosis, second opinion or consultation services by means of advanced telematic services. E-health provides a system for the management and transfer of medical information (cardiogram, ultrasound, scans etc.) with numerous applications in diagnostics, treatment and doctor training.

Given the priceless nature of human life, it is imperative to apply e-health to ensure better healthcare services at the national and international level. Better access for non-accommodated areas, such as rural communities, is one of the most significant benefits guaranteed by e-health.

At the cross-border level, EU must take action in terms of inter-functionality. The inter-functionality of IT technologies and data exchange solutions is a prerequisite for the enhanced coordination and integration throughout the healthcare provision and data exchange chain while at the same time freeing the EU's single market for e-health. Apart from the European and national standards and specifications, testing procedures for inter-functionality, marking and certification must also be established. The public's and competent bodies' information and awareness on e-health are the most significant factors.

The whole project will also result in lifting the morale of said regions' residents in both Greece and Bulgaria as it will eliminate the sense of being excluded from all kinds of medical care. This specific action plan would not be financially sustainable a few years back. However, technological progress along with a significant reduction in e-health equipment installation and operation costs now renders such a project feasible. More specifically, such designs and synergies lead to streamlining costs and promoting better plans based not only on financial criteria but – in this particular case – primarily on social ones.

The social benefits of such action plans are the main aim of the healthcare system ie, providing healthcare services to as big a part of the population as possible, actions sending strong messages of solidarity and respect towards human life.

Innovative digital telemedicine solutions and applications can improve human health, quality of life, and provide more efficient ways of organizing and delivering health and care services. To achieve this, they must be designed to meet the needs of citizens and health systems and carefully implemented to fit the local context. Digital technologies and telemedicine applications should be considered an integral part of health and care and should be geared towards the broader goals of health systems.

The most successful and rapid development of innovative digital health and telemedicine solutions requires cooperation at EU level and exchange of experiences on development, impact measurement and innovation transfer between Member States and regions. The active involvement of all parties is essential to successfully securing a triple-benefit solution for citizens, health systems and the economy.