eHealth strategy and implementation activities in GREECE

Report in the framework of the eHealth ERA project

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About *eHealth ERA* and this report

This report is the outcome of research in the context of the eHealth ERA project (Towards the Establishment of a European Research Area). The project is implemented by empirica GmbH (co-ordinating partner, Germany), STAKES (Finland), CITTRU (Poland), ISC III (Spain), CNR (Italy) and EPSRC (United Kingdom), based on a Coordination Action contract with the European Commission.

The European Commission, Directorate General Information Society and Media, supports this project to contribute towards greater transparency across Member States and other participating countries on eHealth strategies as well as innovation-oriented research and technology development (RTD) initiatives, including the coordination of Member States' eHealth strategy formulation and implementation. Thereby the project aims at fostering the establishment of an effective European Research and innovation Area (ERA) in eHealth. All project results are available on the internet and can be accessed at the *eHealth ERA* website: www.ehealth-era.org.

The status of activities described is generally August 2006.

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Executive Summary

Strategic aspects

In June 2006, the Ministry of Health and Social Solidarity launched the National Strategy for Quality and Safety of Healthcare Services in the Knowledge society, incorporating the national eHealth Roadmap. The process of laying out the national eHealth Roadmap has involved a critical review of the national 2002-2006 ICT Action Plan and the re-orientation where appropriate to accelerate progress, incorporate new policies and align with the European eHealth Action Plan.

The revised eHealth Road map extends over the period 2006-2013, sets out priorities and encompasses both strategy and an action plan. Briefly: **Quality and Safety** of health services constitute overriding strategic objectives. The establishment of a National Health Information System (NHIS) i.e., a system for organizing health related information is the most fundamental requirement for quality and safety. The Electronic Patient Record is a major objective and a priority of the NHIS.

IASYS shall emerge as the central infrastructure of the NHIS and will comprise the national interoperability framework through which the exchange of data and messages and access to information across the multitude of public and private health services will be effected. In particular, the **National Integrated Shared Care Record** will hold information shared between care organizations, under agreed protocols.

Implementation is foreseen to go through 3 major phases:

2006-2007: Strengthening standardisation and communication infrastructures and creating preparedness through spearhead pilots (health cards, e-prescription, e-care), legislative interventions and market preparation;

2007-2012: Large-scale pilots, Regional Health Networks and integration at the regional level;

2012-2015: Integration at the national level.

Deployment

Greece, through its final beneficiaries -mainly the Ministry of Health and Social Solidarity- is implementing under the current programming period the following standardisation activities:

- § a Health Portal as the interface to the national health information system and a platform for eHealth services to citizens;
- § a study on the National Telemedicine Service, that will define the co-ordination and support of delivery of telecare between points of health service provision, according to contracts and agreed protocols;
- § an eHealth Forum as a mechanism for addressing major issues of national importance and making shared informed decisions;
- § an eHealth Forum Portal for professionals, providing access to tools and information for professionals, including health standardization information.

Associated projects also include:

- Smart card-based health insurance project for civil servants
- Information system for the national ambulance service
- Information system for transplantation coordination and control
- Information system covering transactions between hospitals and insurance organisations on patient charges
- EDI-based hospital procurements
- National blood-bank information system
- Primary care information system
- Medical Libraries information system
- Telemedicine

Future perspectives

1. Information distribution infrastructures and systems

- § Support of NHS decentralization with information systems to monitor health indices and support policy drawing with emphasis on health prevention and promotion
- § Completion of the introduction of ICT (lab systems, patient's record etc) so that the health and welfare services systems will be based on operational data
- § Development of tele-medicine applications
- § A National ICT framework for biomedical technology management
- § Development of data bases concerning public health with the aim of setting up modern drawing and programming tools for health and welfare services

- Creation of health portals.

2. Health networking and telematics services

- Setting up a secure data network to transfer information between health bodies
- Primary healthcare support e-services including: GP/ specialty electronic health records; e-prescribing; e-referrals; e-labs. Such projects may be taken up in partnership with the private sector
- Extramural e-care: Work in partnership with community-based health services to transfer care for chronic patients and the elderly from the hospital to the community
- Making use of the Internet for access to health and welfare information and knowledge with the provision of reliable health and welfare services for citizens
- Operational inter-connection of the social security system with health services
- Telematics services for citizens in health-care issues
- Provisions for Accreditation, Testing and Certification.

3. Development of information systems for the elderly and people with special needs

- Utilisation of new technologies for the improvement of the services provided to the elderly and people with special needs by bodies of welfare and mental health

1. Basic facts

The official name of the country is Hellenic Republic and it is a parliamentary republic in terms of its government. The Hellenic Parliament has 300 members, elected for a four-year term.

The total surface of Greece is approximately 132000 km^2, with a coastal line of 15 km and more than 3000 islands. The total population is 10,934,097 (2001 census), with the urban population representing 65,7% [1, 2].

The official language is Greek and the dominant religion Christian Orthodox (98% of the population). Average life expectancy is 82 years for females and 77 years for males.

Greece has been a member of the European Union since 1981.

2. Healthcare System Overview

2.1 Basic facts & features of the healthcare system

The Greek healthcare system is a mixture of "the public contract and public integrated models" (according to the 1992 OECD taxonomy proposed by Hurst) where the financing is provided by a combination of social insurance and general taxation and services are offered by both public and private providers.

Public and private health expenditure as a share of the GDP is 9,4% (OECD data of 2004). A substantial part of total expenditure (47,4%) is covered by private health expenditure, making the Greek health care system one of the most 'privatized' among EU countries.

The National Health System (NHS) was established in 1983 to provide universal coverage to the population on the basis of the principles of equity, equal access to health services for all and social cohesion. Since then considerable progress has been achieved in the provision of health care services to the Greek population, although several challenges remain, such as: the drafting of a National Action Plan for Public Health, the integration of primary health care services, the reduction of high expenditure on pharmaceuticals, and the need to modernize the NHS itself [3, 4].

The main decision making level for health care policy

The Ministry of Health and Social Solidarity [5] is the main decision making body on matters concerning overall health policy and the national strategy for health. It defines priorities on the national level, determines the extent of funding for proposed activities and allocates resources.

Since 2001, 17 Regional Health Authorities have been established, originally named PE.S.Y.P. (Regional Systems of Health and Welfare) and currently referred to as D.Y.PE (Administration of Health Services Region). These authorities have extensive responsibilities

for the implementation of national priorities at regional level, coordination of regional activities and organisation and management of health care and welfare services in their respective geographical areas.

Main healthcare service delivery systems

Primary health care in the public sector is delivered through primary health care centers (particularly in the rural areas), as well as through the outpatient services of NHS hospitals and the primary care units belonging to the largest social fund, IKA. Health care centers provide also emergency services, short-stay hospitalization and follow-up treatment for recovering patients, dental treatment, family planning services, preventive health, vaccinations and health education.

The National Health System is responsible for the provision of hospital, emergency pre-hospital and primary healthcare services on a universal basis.

Out of the total 132 NHS hospitals, those with capacities between 100-200 beds provide primarily secondary care services to their respective populations, while the 32 hospitals with a capacity of over 400 beds provide tertiary and highly specialized care.

Outside the NHS, there are 13 Military Hospitals financed through the Ministry of Defense, 5 IKA Hospitals, financed by the social fund and two teaching hospitals under the authority of the National Kapodistrian University of Athens.

The private sector offers hospital level services (primarily through general and maternity hospitals making up for almost 26% of total hospital bed capacity in the country) and primary care services through private practices, laboratories and diagnostic centres. These services are remunerated on a fee-for-service basis either through contracts with social insurance funds or directly by patients themselves. Dental care, rehabilitation services and services for the elderly are for the largest part offered through the private sector [3, 4].

2.2 National level health goals

Major national programmes for public health

Although public health policies in Greece appear to have contributed substantially to raising life expectancy, lowering disease-related mortality and controlling infectious diseases, a national strategy for Public Health still remains to be developed. There is also a need to develop the appopriate infrastructure for public health services and the corresponding human resources in the sector [3].

An area where substantial effort has been undertaken is that of reforming and re-organising the country's psychiatric services under the support programme *Psychargos* [6]. The programme was originally set up in 1999, in order to secure the continuation of earlier

activities that had received European Union funding. It was conceived as a ten year programme, with its first period running from 2000 to 2001. In 2001 it was revised with the intention to extend for another decade and a new revision was schedule for 2004. The main objective of the programme is the deinstitutionalization of psychiatric services and their provision in modern, community-based practices.

3. Strategic eHealth Plans/Policy Measures

3.1 National-regional eHealth policy

Ministries involved in or influencing national eHealth policy.

The main actor in defining eHealth policy in Greece is the Ministry of Health and Social Solidarity (YYKA), General Secretariat for Public Health.

Other ministries that affect national eHealth policy are [7]:

- The Ministry of Economy and Finance, that provides overall funding for government activities, as well as supports the National Health System expenses. The Information Society Operational Programme, that funds measures related to the deployment and promotion of eHealth, is also operating under the Ministry of Economy and Finance.
- The Ministry of Employment and Social Protection, particularly through the mechanisms for reimbursment of health services
- The Ministry of the Interior that has the primary responsibility for issues related to identification, and
- the Ministry of Justice that is responsible for matters of data protection, security and confidentiality.

eHealth strategic documents

The National eHealth Strategy, entitled "Quality and Safety of Healthcare Services in an e-Government Environment: Common Goals and Action Framework 2006 - 2015" was made public in June 2006 [8, 9].

Although efforts for the introduction of ICT in healthcare settings had begun already in the mid-'80s, the results up to now have not yet reached the desired magnitude. There have been positive experiences concerning the potential benefits to patients, health care professionals and the healthcare system at large, but healthcare ICT solutions have not yet become an integral part of healthcare practices.

In producing the national strategy, the General Secretariat of Public Health of the Ministry of Health and Social Solidarity followed closely the activities of relevant national forums (such as

the health-specific Working Groups of the Greek e-Business Forum), as well as a considerable number of international scientific eHealth events. Representatives of the Ministry participate in the High Level Group for Health Care Services co-ordinated by DG SANCO, as well as in the eHealth Working Group of DG INFSO. These experiences and the input they have provided contributed substantially to the formulation of the strategy, goals and main action lines for the coming decade.

Main strategic targets in the national eHealth roadmap

The strategy envisions the transition to the Information /Knowledge Society through new organisational structures, national infrastructures for e-government and the design and development of new methods of service provision to citizens. At the same time, the necessary support will be offered to healthcare professionals so that continuity of care and patient safety can be guaranteed, and the required tools will be made available to citizens as well.

The aim is to facilitate the transition of the healthcare system to one characterized by sustainability, citizen-centred orientation and adaptability, through a Programme of focused and interconnected Actions. These Actions are the following:

Regulatory Framework: The regulatory framework for the Quality and Safety of Healthcare Services and the National Health Information System will be systematically updated and specified further.

Organisational Actions: Establishment and operation of an Authority for Information, Quality, Human Resources Development and Innovation. Creation and operation of a capable operational structure that will realize the policies and will support the development of services in an e-environment, as well as of the infrastructures required for continuous skill development.

Communication Actions: Activities aimed to increase awareness and the development of a new work ethic and mode of action, as well as multiple fora for discussion and convergence.

Development Actions:

These include the development of basic infrastructures, electronic services and standards, as well as actions of project administration and management.

The core infrastructure is the National Health Information System which will be supported through IASYS (see below for more details) and which will interact with its environment through the (citizens') health card and the professional card. A requirement is the preceding development of the basic body of healthcare-relevant standards. Around the NHIS a number of citizen services will be developed, aimed at improving accessibility, simplifying procedures and enforcing communication with both the doctor and the healthcare system. In parallel,

services for healthcare professionals will be developed, which will offer support in medical decision making and in executing daily work tasks.

Market preparation: Actions targeted at the maturation of new collaboration models with the actors in the health IT market, so that the industry can act as an important stakeholder in the development process.

For the success of the Programme, co-ordination, comprehensive guidance and daily management are required. The creation of a "Health 2015" office by the Minister of Health and Social Solidarity is foreseen, with the simultaneous assurance of human and technical resources required for the support of day-to-day management, until the permanent modernization structures are put in place: the National Centre for Quality of Healthcare Services (EKEPYY) and the Centre of Information Management and technical Support of Healthcare Systems (KEPYSY).

EKEPYY will be the Authority responsible for implementing policies and developing national planning concerning quality and its assessment, human resources development, as well as the development and promotion of research and innovation. It will collaborate with the Ministry of Education, Universities and other educational institutions of the country on matters of defining the needs of the healthcare labour market, as well as the necessary knowledge, skills and behaviours. In addition, EKEPYY will be appointed as the Healthcare Information Authority. The Healthcare Information Authority will make proposals to the Minister of Health and Social Solidarity regarding the policies and the strategies concerning health information, utilization, availability and exploitation of the information, as well as publication of data that concern the quality of provided services. In addition, the Authority will make proposals regarding the priorities and content of the National Health Information System, and the corresponding modernisation strategy for the National Health System in the latest technology environment and in the framework of the service development policies of the Ministry of Health and Social Solidarity.

KEPYSY will be an operations mechanism. The main responsibilities of the Center will be the development, maintenance and allocation of resources of the National Health Information System and the provision of effective support to health care service providers and healthcare professionals, so that they actively contribute to it. Among the Centre's responsibilities are the development of the Information Strategy for Healthcare in the Information Society environment, the operational planning of actions and the follow up of strategy deployment, the technical support of standardisation activities in the healthcare field and the related compliance control, as well as the development and technical support of the framework for using and utilizing information.

IASYS [10] will constitute the backbone of the National Health Information System. It is a system for organising, as well as managing information and it will contain the basic infrastructure for the *National Electronic Health Record.* As a result, IASYS will provide the receiving end for accepting and exchanging information, the rules of capture, access and dissemination of information, data centres and the applications required for comprehensive information management. IASYS will accept a predefined number of data in a standardized manner, therefore allowing flexibility will regard to the applications from which these data will be extracted.

In the initial phase of operations, the target is to include in IASYS 18 hospitals throughout the country, which cover the whole spectrum of hospital level care and outpatient services, as well as 80% of hospital bed capacity. The first phase of IASYS implementation should also demonstrate the interoperability capacity with the systems currently being implemented in the healthcare regions.

Social Care

The Institute for Social Protection and Solidarity (Institouto Koinwnikis Prostasias kai Allillegihs - IKPA) [11] is the organisation that manages the **disability card.** The plan is to utilize ICF (International Classification of Functionality, Disability and Health) which has already been translated into Greek and uses four degrees of impairment severity (Note: it is not yet clear whether a disability card will be necessary for all four degrees). Other countries have based earlier implementations of disability classification on the use of ICIDH (International Classification of Impairments, Disabilities and Handicaps - the second edition of which in 2001 was renamed to ICF - International Classification of Functioning, Disability and Health) [12].

Two protocols have been developed:

first, a protocol for roughly classifying the seriousness of the disability (based on the French and Australian system). These are aspects which are not covered by ICF and are important for the determination of financial coverage where they will replace the present, percentages-based system. One unified protocol has been accepted by all funds, thus improving on the currently fragmented system.

The second protocol utilizes all ICF codes- through the infrastructures of the functionality assessment centres - to produce a detailed profile of the patient, treatments, services, interventions etc. Subsequently, the corresponding services needed are defined on the basis of the profile.

A draft law enabling the use of the disability card has been prepared and provided (in April 2006) to the National Disability Association (ESAEA) for review and feedback.

A database for statistical processing and control of disability assessments will be created. A budget of 20 million euros has been allocated for the creation, funding, and start-up of new disability assessment centres by 2007.

The plan is to set up one Disability Assessment Centre per prefecture, at the region's main hospital, with the exception of the cities of Athens and Thessalonica. In the earlier disability assessment system, hospitals and prefectures had first and second degree review committees, a structure that resulted in conflicting verdicts and problems.

A standardized medical report for disability assessment must be provided by the treating doctor. Although not implemented as such at present, this assessment could in principle be an extract or report generated from the Electronic Patient Record of the patient.

Because the concept of the disability card was developed much earlier than that of the corresponding health services card, the two activities have not as far been coordinated.

The need for coordination between health and social care on **roadmap level** has been acknowledged however, as well as for coordination with the labour market, through the Ministry of Employment and Social Protection.

International Collaborations

Some examples of by-lateral cooperation exist in the form of INTEREGG projects, funded between 2004 and 2006 as shared projects between Greece and Bulgaria, Cyprus, FYROM and Albania. Areas covered by these projects concern public hygiene, primary care, mental health, environmental health, quality of services and information technology and the development of health service units.

Dissemination Activities

In the past, there have been difficulties noted in the coordination of dissemination activities, due to the lack of such culture and the existence of a large number of different organisations and bodies active in the field.

On the level of the Information Society Programme [13], the organisation responsible for monitoring, as well as dissemination activities is the Observatory for the Greek Information Society [14], a non-profit organization placed under the supervision of the Ministry of Economy & Finance and the Ministry of Interior, Public Administration & Decentralization. The Observatory for the Greek IS was established by the Greek Law 3059/2002, while it became operational on November 2004 with the nomination of its Managing Director. eHealth is one of the Observatory's areas of interest.

The new national eHealth strategy was presented by the minister of Health and Social Solidarity in a one day seminar dedicated to the topic of 'Health 2015". The seminar was co-organised by the Ministry of Health and Social Solidarity, the Managing Authority of the Information Society Operational Programme and the Managing Authority of the Operational Programme for Health and Welfare. There was a related press release issued by the Ministry, and the event received substantial coverage through newspaper articles. Also, the strategy has been made available for download through the Ministry's web site.

3.2 Investment and Reimbursement framework

The biggest challenge facing eHealth deployment and development in Greece so far was the immaturity of the regulatory framework as a result of which funding processes have been delayed, although funds would be available.

A considerable bottleneck in the allocation of funds has appeared to be the required paperwork for Calls for Tender, which could be addressed by improved collaboration between the Ministries involved.

The latest eHealth strategy states that a specific estimation for the full implementation of the Programme will not be possible before a detailed operations planning has been made, on the level of interventions and projects. Based on the experience from the realization of similar programmes in other EU countries, the following is assumed:

- the initially required infrastructure for the basic system set up requires approximately 10-15% of the national health care system budget;
- annual operation costs reach approximately 6-7% of the budget;
- substantial costs are connected to the training of *all* healthcare personnel and to the funding of the necessary actions for the change of current practices;
- it is absolutely necessary to establish quality and uptake control of projects and changes, both regionally, as well as nationally.

The realization of the Programme envisioned by the Strategy will utilize funds available through the 3rd and 4th Community Framework Support, through the Public Investments Programme, self-financing funds, as well as private capital [15].

3rd Community Framework Support (CSF)

Development actions to be completed by the end of 2008, are for the largest part foreseen under the Operational Plan of the Ministry of Health and Social Solidarity for the Information Society, with a total budget of over 120 million euros. These actions have already been included or are to be included in the running Funding Programme. Particularly IASYS, is in the

finaly stages of negotations with DG Regio in order to be accepted as a large scale bridge project which will be funded by the the 3rd CFS and will be completed during the next programme period.

Through the 3rd Community Support Framework, there is still up to 17,5 mil euro funding available for use until the 2nd half of 2008, for the purposes of supporting maturity of strategic targets.

Applicants for **development funding** can be hospitals or other organisations, e.g. for activities such as certification, improvement of existing infrastructures etc.

4th Community Framework Support

The 4th CFS addresses health care services to the extent that actions are aimed at the preservation of an individual's health and thereby of his or her productive ability as a critical capital for the development course of the regions. These actions are grouped under four priorities:

- Skills development
- Employee's health promotion
- Management skills
- Facilitation of Innovation and Promotion of Entrepreneurship in the Public Sector.

Regarding the support to healthcare practitioners for purchasing and installation of necessary equipment and system, there have been several projects funded through the Ministry of Development and there is new funding to be made available for private practitioners.

The **reimbursement** of eHealth services needs to overcome significant hurdles around the clarification of shares of payment between private insurance, public insurance, various funds etc. Also, the need to clarify and make necessary adjustments to the DRGs to be utilized has been acknowledged and the Austrian LKF system (LKF = **L**eistungsorientierte **K**rankenanstalten-**F**inanzierung = procedure and diagnoses-orientated hospital financing) is being considered as a useful approach [16].

4. eHealth deployment status

4.1 eHealth infrastructure

4.1.1 Physical networks

SYZEYXIS is a large scale project for provision of telecommunications and telematics services [17]. The objective is to function as the National Public Administration Network, offering free-of-charge services to all participating organisations for a period of three years.

Such services include:

- Connection to an Integrated Data and Voice Network of about 2000 Public Administration bodies
- Broadband services for Internet access and e-mail
- Internet Portal with added-value services, e.g. yellow pages, teleconferencing faciltiies etc.
- Security Infrastructure for the issuing of digital certificates
- e-Learning system (for both sychronous and asychronous training)
- Videoconferencing services
- Free-of-charge telephone services between the services of the participating organisation, as well as for all connected services.

One of the main goals of the proejct is the reduction of costs for Public administration as e.g. through reduction of telephone costs via use of VoIP technology.

The project received funding through the Information Society Programme and by the Ministry of the Interior. The total cost for the three years of operations of SYZEYXIS is estimated to around 75 mil euros.

In an initial phase, a needs analysis study was undertaken, to specify how many users would require services and what sort of services would be needed. The project provides one access point per organisation and then further connections are created internally. Until now SYZEYXIS operated on the basis of the first-come-first-served principle, but a price list of services has also been established, in the case some organisation would like to connect later.

The service providers - who are all operating under one organisation and through one Helpdesk are: ALTEC-TELECOM for Athens, FORTHNET for the area of Thessalonica, and OTE for the rest of Greece.

The project consists of nine sub-projects, of which sub-project 1 concerns the development of the backbone and, sub-project 8 training. Sub-project 9 concerns the PKI part of SYZEYXIS

and provides 50000 digital signatures on smart cards for Public Administration officials and 2000 SSL certificates for servers. There are five Certification Authorities, (Ministry of the Interior, Public Administration and Decentralisation; Ministry of Health and Social Solidarity; Ministry of Defense; Ministry of Finance and Ministry of Public Order). All related services are provided by ADACOM.

At present, there 1766 points connected to the network, or through VPN networks, in the case that SYZEYXIS is not functional. Of those, 476 points are part of VPN-2 which is dedicated to healthcare, i.e. all hospitals, primary care centers, regional authorities and welfare organisations. At this phase, there is no planning for patient access to the network.

A project called Mini-SYZEYXIS, will incorporate approximately 800 new points (Prefecture offices and services of the Ministry of Finance (e.g. tax and customs offices) with a budget of approximately 30 million euros.

SYZEYXIS provides also interconnections with other networks, such as the trans-european network TESTA (Trans European Services for Telematics between Administrations) of the IDA programme (http://ec.europa.eu/idabc/en/chapter/3 - IDABC: Interoperable Delivery of European eGovernment Services to public Administrations, Business and Citizens) where SYZEYXIS is meant to act as the access point of Greece for cross-boarder transfers, the ARIADNE and GRNET networks (networks of academic and research institutions) and the network of Centers for Citizen Services (KEP).

Measures 4.3 - 4.2 offer the possibility for broadband connections (Wi-Fi or fiber optic), for example to municipalities' points of interest, such as municipal healthcare centers.

BROADBAND - latest developments

The Plan for the Development of Broadband Services until 2008

In 2004, Greece ranked in the last place among EU countries with regard to the sector of new technologies and broaband services.

The Plan for the Development of Broadband Services forms part of the government's Digital Strategy 2006-2013 [18]. Its implementation has started by the Special Secretariat for the Information Society of the Ministry of Economy and Finance. The objective of the Digital Strategy is to increase the utilization of fast Internet from 0.1% of the Greek population in 2004, up to at least 7% of the population in 2008. For this purpose, investments are supported and actions are financed with regard to broadband services, the cost of which amounts in total to over € 450 million. The related actions can be grouped into three large categories:

A. Development of broadband infrastructures

Under the actions for the development of broadband infrastructures, there are several pertinent to health care.

The project aiming at developing broadband metropolitan networks in 75 municipalities (with a budget of €59 million) will connect in each municipality at least 20 spots of public interest, such as educational institutes, Universities, schools, Tax Offices, Public Hospitals, the buildings of Municipalities or of Prefectures, municipal libraries, museums, chambers, Police, Fire Brigade, etc.

Further, the project for Wireless broadband networks in 120 municipalities and 20 Local Associations of Municipalities and Communities (budget of €42 million) will give less populated municipalities the opportunity to supply wireless broadband access (e.g. via Wi-Fi technologies) to at least 10 spots of public interest, e.g. buildings of municipalities, museums, municipal libraries, regional surgeries, etc. The municipalities will utilize the wireless technologies to get interconnected with the SYZEYXIS network while they will commence to develop the networks from June 2006. Through this action, 320 regional surgeries and health centres will have the possibility to join the network.

Finally, within the framework of the plan for the development of broadband services, the utilization of HellasSAT satellite is financed for the provision of broadband services to islands or other remote areas of the country. Infrastructures of satellite connection and access systems are developed for remote spots of public interest, i.e. schools, health centres, military camps' entertainment units, etc. so as the provision of broadband services (image, sound, data) to these spots will become feasible.

B. Development of broadband content and services

In the course of 2006, the Special Secretariat for the Information Society will finance with €36 million the investment plans of enterprises aiming at the development of new broadband services, where Health and Social Care are included as one of the crucial financial activity sectors.

Another budget of €5 million is targeted to agencies/bodies for Disabled People, for the purposes of development of relevant specialized services, e.g. services of information and self-education in the use and utilization of modern broadband services, the development of electronic communications access infrastructures for the disabled etc.

An additional €45 million budget supports the equal access of disabled people to Digital Television, via the distribution of a specially configured decoder.

C. Increase of the demand for broadband services.

Actions funder under this category include, e.g. activities for the familiarization of citizens with broadband activities at 85 spots in the country.

Latest developments

The results of the latest study by the Observatory for the Information Society showed that Greece has indeed made progress with respect to the development of fast Internet, with the penetration rate of broadband access reaching 2,66% on July 1 2006, compared to 1,5% on 1-1-2006 [19]. The increasing rate in the acquisition of broadband connections is atttributed to the decreasing trend of the average total cost of purchase and use during the first half of 2006. However, it should be noted that catalogue prices in Greece are still more expensive than the respective ones applying in most EU countries.

In July 2006, the EC endorsed a €210 million aid package to Greece for building broadband networks in the country's remotest areas. Until now, the country's network providers have chosen to deploy their services in the urban areas of Athens and Thessalonica, rather than the remote hilltops and numerous scattered islands where the population is much smaller.

The Greek government's broadband initiative aims to bridge this digital divide, by first tackling the supply-side, and funding the provision of broadband access services by network providers to rural areas. Second, the project has the objective of encouraging interest among businesses and households in these communities to start using the services and technologies available to them. Competition Commissioner Neelie Kroes has characterized the project as the 'most ambitious broadband project notified to date under the state aid rules' [20].

4.1.2 Legal and regulatory framework

Security policy is regulated by Law 2472/97 and the body responsible for implementation is the Hellenic Data Protection Authority (www.dpa.gr), which was established in November 1997 [21]. Laws 2819/2000 and 2915/2001 have since amended Law 2472/1997 [22, 23].

The mission of the Hellenic Data Protection Authority is to supervise the implementation of Act 2472/97 and the totality of regulations pertaining to the protection of the individual with respect to the processing of personal data.
The Authority strives to promote:

a. respect of and protection as regards the rights of the individual and the state of democracy.;
b. mutual cooperation between the individual and public administration/private enterprises;

c. action of preventive, suppressive and corrective character in the field of personal data protection.

In addition, the Greek Ombudsman, a constitutionally sanctioned Independent Authority was founded in October 1998 and operates under the provisions of Law 3094/2003 [24]. The Ombudsman provides its services to the public free of charge, and received more than 41.865 complaints during its five first years of operation (from 1 October 1998 to 31 December 2002).

The Greek Ombudsman investigates individual administrative actions or omissions or material actions taken by government departments or public services that infringe upon the personal rights or violate the legal interests of individuals or legal entities.

Before submitting a complaint to the Greek Ombudsman, the complainant should first come into contact with the public service involved with his or her case. Only if the problem is not resolved by the service concerned should a complaint be submitted to the Ombudsman.

The purpose of the Greek Ombudsman is to mediate between public administration and private individuals for the purpose of to protecting citizens' rights, their ensuring compliance with the rule of law rights, observe the rule of law, and combating maladministration. In addition, the mission of the Greek Ombudsman includes protection and promotion of the rights of the child. The Ombudsman does not have the power to impose sanctions or to annul the illegal actions of the public administration.

As a mediator, the Greek Ombudsman makes recommendations and puts forward specific proposals towards the public administration.

The complaints citizens submit are investigated in terms of thematic categories which correspond to five different areas of activity in the Institution: a) The Human Rights Department, b) The Health and Social Welfare Department, c) The Quality of Life Department, d) The State-Citizen Relations Department and e) The Children's Rights Department.

The special Ombudsman for Health and Social Welfare was established by the law 3293/2004 [25]. Examples where this special Ombudsman authority can get involved in the area of health and welfare include cases where treatment was given without patient consent, breach of medical confidentiality and refusal to provide access to the contents of the patient's medical record.

Greek legislation includes laws covering the organisations and operations of telecommunications, the protection of personal data in the telecommunications sector, and the protection of personal data in general. It has been harmonized with EC Directives on Personal Data protection, on the framework for electronic signatures and on the processing of personal data and the protection of privacy in the telecommunications sector [26-29].

Nevertheless, trust building in Greece remains a big challenge and patients can not yet be characterized as truly empowered. Projects on Integrated Regional Health Information Systems (OPSY) are collaborating with the Data Protection Authority in a project examining security aspects and the adequacy of the existing regulatory environment.

4.1.3 Education and training on ICT

An intra-university, cross-disciplinary post-graduate programme in Health Management or Health Informatics has been co-ordinated since 1998 by the Nursing School of the University of Athens [30]. The other participants to the programme are:

- University of Athens, Department of Economics and Department of Informatics;
- University of Thessalonica, Polytechnic School, General Department;
- University of Ioannina, Medical Faculty;
- University of Piraeus, Department of Technology Education and Department of Informatics;
- Economic University of Athens, Department of Informatics.

4.2 eHealth applications & services

4.2.1 Electronic Health Records (EHR)

According to the national eHealth Strategy, the objective is to allow the unimpeded flow of health information within the healthcare system in an absolutely secure manner, following the citizen in his/her interactions and contacts with the system.

The national architecture foresees two secure regional data warehouses where copies of data will be stored from the hospital systems and from the systems of Regional Authorities. This approach is perceived as a necessary intermediate step before a more advanced EHR can be designed, which would require a more integrated level of health care service organisations digitalisation.

The National Electronic Health Record is a subset of medical data concerning every citizen, which should be available in IASYS and which should be easily accessible from various health care units, both nationally and internationally. Data for IASYS will be submitted by various actors, after patient consent has been obtained and will be accessible only for authorised health care professionals. The intention is to ensure the interoperability of the National Electronic Health Record with the European Patient Summary presently under discussion.

In order to realize the vision of the National Electronic Health Record, a number of requirements must be met. These requirements include a National Identification System of

citizens (patients), healthcare professionals and healthcare providers, interconnected with access and security policies, as well as rights for the execution of specific actions (e.g. referrals, prescriptions etc). In addition, the development of the national EHR is strongly dependent on the national standardisation of health on the level of services, systems, information, coding and terminology systems.

The first phase of the national EHR is budgeted at €53 million. Due to the programme's scale and magnitude it will be primarily realized in the forthcoming programme period, while it will be supported by a series of actions that are realized or foreseen to be realized during the current Programme period.

4.2.2 e-Prescription

The Information Society has funded a €1 million pilot that tested the establishment of a connection between 2 hospitals and the association of pharmacists for the purposes of prescription reimbursement. The ELTA-DIAS networks were used for this purpose.

Under measure 2.4 - regional dimensions, funds for implementing IT in the regions also in the area of health are made available. The possibility of connecting Regional Data Centres, hospitals and primary care centres for access to an individual's prescription profile is being investigated, but not the option of pharmacy dispensing.

At present, Primary Care Centres get their medications from hospitals and dispensing to patients also takes place through hospital Pharmacies. The prospect of improving and coordinating ordering of medications has been identified as a potential application.

The National Medications Organisation (EOF) has implemented a bar coding system of medications since the 1st of January 2005. As of summer 2006 there will be additional batch coding for the purposes of pharmaco-vigilance follow-up.

In August 2006 the launch of a pilot e-prescription project was announced, implemented by OPAD (Organisation for Health Care Provision to Public Servants) and utilizing the bar coding system of the National Medications Organisation [31].

4.2.3 Health Cards

There were plans for a pilot, managed by KEPYSY with 1.000.000 cards, and subsequently for a more focused pilot with 100.000 cards for diabetic patients, however the back-end office integration was missing.

Also, gaps have been identified in the whole process of identity management.

Regarding the European Health Insurance Card (EHIC), the General Secretariat for Social Security (part of the Ministry of Employment and Social Protection) has issued the Greek

version of the card for the purposes of substituting the E111 form, but not for use of health services in the country [32, 33].

On the level of R&D projects, some experience has been gained through participation in the Netc@rds project [34]. In that context, Regional Authorities of Attica (Athens) and Central Macedonia (Thessalonica) were provided with card readers and the necessary code numbers for pilot testing. The pilot implementation was carried out in the clinical field for the Emergency Departments (ED) of the country's Olympic hospitals, in August 2004. For the introduction and application of these new procedures, each pilot Olympic hospital was equipped with a local workstation (a local computer, a special smart card reader, the necessary software, etc.). A national server for the country was also set up and connected through secure internet connection to the European NETC@RDS network.

According to the national eHealth strategy, the national health card should support identification services for accessing personal information and for obtaining healthcare services. Efforts will be made on a national level so that the card will be interoperable and gradually common for both Health and Social Welfare services, so that is can ensure the automatic payment of health care expenses.

The necessary mechanism will be created so that the national health card will be standardised with the participation of all relevant actors and organisations. In parallel, the Ministry will establish a mechanism for assurance and accreditation of issued cards. In that way, it will be possible to enable parallel issuing of cards by several bodies, provided that the national standard has been followed and the card has been certified before its distribution.

4.2.4 Health Portals

The need for a national Health Portal for citizens has been recognized and plans are being made for its development following the example of the Danish and British portals.

The citizen portal is aimed to function as the gateway for their communication and interaction with the healthcare system. The portal will accept citizens' claims, offer information and assist them in navigating the healthcare service system.

Electronic services will be offered to citizens through the portal, such as information on health issues - particularly prevention and healthy lifestyles- communication with family physicians, booking, viewing of laboratory test results etc.

In order to provide a constantly updated repository of valid and reliable health information, substantiated on best available scientific evidence, strategic alliances will be necessary both nationally (e.g. with medical schools), as well as internationally (e.g. for shared content development and/or endorsement and translation).

The National Health Portal through which services are provided to citizens should be distinguished from the Ministry's own portal, through which services will be provided on matters of public administration (e.g. job applications, calls for tender, communication with Regional Healthcare Authorities, Prefectures, other Ministries etc).

A third communication channel is the *eHealth Forum*, aimed to function as the gateway for healthcare professionals on matters of standardization, debate and publication of national standards and health guidelines, as well as a source of professional support through information and other tools relevant for their work.

The Regional Authorities are also putting up portals for citizen services, e.g. appointment booking, on call services etc., information on the health systems. In the future the same portals can be utilized when applying for certificates or other documents.

Regarding health information however, the main provision site is intended to be the citizen portal of the Ministry and not the regional level.

4.2.5 Risk Management and Patient Safety

Vigilance activities for pharmaceuticals are possible, but not yet extensively wide-spread even though obligatory by law. The competent authority is the National Agency of Medicines.

Regarding medical devices, there is planning concerning information provision and the necessary infrastructure for recording relevant data is being created, although the corresponding procedures have not yet been specified.

Also, a centralised system has been developed for blood-transfusion vigilance and adopted by 25 centres (1999), but not as yet by blood donation stations.

4.2.6 Patient Identifiers

The latest draft law concerning the Quality and Safety of Healthcare Services and the National Health Information System (March 2005), foresees also a Health-ID number.

The necessary policy framework for information access management is still missing. There is also the need to establish the infrastructure for professional identification, which should take into account differentiation on the basis of specialization differences, as well as practical experience differences.

Currently, there is a unique patient number per hospital, and a single patient number is used on a regional level (DYPE). This regional number however is not always functional on all hospital systems, but rather vendor-dependent.

4.2.7 Other ICT tools assisting prevention, diagnosis, treatment, health monitoring, lifestyle management

A project for the provision of e-health home-based rehabilitation, follow up and home hospitalisation services in patients with advanced stages of chronic diseases has been run by the eHealth Unit of Sotiria Hospital, Athens. The specific project concerned chronic patients suffering mainly of advanced stage COPD, with a past history of multiple hospital admissions. Services were offered in two stages: first, as an outpatient rehabilitation program and then as home-based rehabilitation and follow-up, combined with home hospitalization when needed.

An electronic health record was created for each patient, based on a specially designed multimedia software system. The purpose of the first phase was to create the patients' EHR, to train both patients and their relatives for the optimal, holistic rehabilitative treatment of their disease and to prepare them for the innovative services of the program. The home care phase was accomplished through nurse home visits on a scheduled or on emergency basis. The nurses used a laptop equipped with the project system supporting the patient's EHR, peripheral medical devices for patient examination at home and a digital video-camera. During scheduled home visits, the following tasks were performed:

- Checking of vital signs and physical condition
- Control of pharmaceutical therapy
- Consultation for the correct use of medical devices
- Checking of exercise training program and nutrition
- Reinforcement of patient's and relatives training
- Detection of primary signs of disease exacerbation
- Treatment of other health related special problems of each patient.

On the other hand, the tasks of an emergency home visit were:

- Monitoring of patient's vital signs
- Live communication with the Telemedicine Unit
- Patients' s home treatment (in cases of mild exacerbations) or instruction for patients' s admission to the hospital.

The project achieved a significant decrease in patient hospitalisation in terms of numbers of hospitalizations per year, hospitalization days and number of emergency and scheduled visits per year. These findings were sustained also two years after the intervention and led to substantial cost savings. Also, considerable progress was noted in patients' knowledge of their condition and their ability for disease self-management.

Another example comes from the field of psychiatry, where collaboration with mobile units and home care (assistance services) led to a reduction by 35% of outpatient emergency visits. The service has been utilized further in the area of Ioannina, Thesprotia through a private organisation.

Finally, some municipalities offer tele-consultation services on a small scale (4-5 projects), but these are primarily local initiatives.

4.2.8 Telemedicine services

Telemedicine is a significant priority, due to the need to provide healthcare services to inhabitants of islands and remote areas, but also to the tourists visiting the country. Another application area is that of home care, with the aim of improving the quality of life particularly of chronic patients, as well as achieving substantial cost savings through avoidance of repeated hospitalizations.

There have been several successful pilot experiences, but telemedicine services have not as yet been integrated in the standard service panel of the NHS.

A major obstacle is the absence of a general organisational and legal framework which will clarify tasks, responsibilities, but also reimbursement principles for these services.

The call for tender concerning such a study on Telemedicine is currently in progress. The study is expected to specify both the organisational and administrative interventions needed, as well as the technical requirements for developing the national platform that will support the provision of such services.

4.3 Interoperability and standards

4.3.1 Technical Interoperability

Many of the presently running projects were launched without prior agreements on standardisation and interoperability issues, reflecting the fragmented and undisciplined nature of the health IT market. The new strategy and its actions aim to remedy this situation.

Standardization activities in health will proceed in collaboration between the Central Health Council and the National Standardisation Organisation (ELOT). A Memorandum of Collaboration has been signed between the two bodies in March 2005 [35].

Until the establishment and regular operation of the Health Standardisation Secretariat in the Centre of Information Management and technical Support of Healthcare Systems (KEPYSY), the corresponding body will be set up in KE.S.Y (Central Health Council) and will be offered technical support through a 2 year project with a budget of €3 million, which is presently being tendered. The aim of the project is to ensure the administrative and technical support of the

Technical Committee and Work Groups, so that they can produce hierarchical standardised horizontal services and high quality processes, clinical pathways, referrals, medical notes and content requirements for the National Health Record to be realized in the context of IASYS. Development will proceed in close co-operation and with systematic follow up of corresponding process presently taking place in the European Commission.

The Technical Committee will reflect wide stakeholder membership and will have primarily a supervisory and overseeing role, over the performance and tasks of the corresponding working groups.

Since a few years, a quite active HL7 affiliate has been set up in Greece. Their focus is on technical interoperability and it has been proposed that they could be the body appointed to run interoperability labs, following the example of the Interoperability Lab set up by HL7 and IHE at HIMSS in San Diego.

The **COST** programme has promoted the coordination of research for standards development and has assisted the development of the first such platform. In addition, it has functioned as a research network that has nurtured the advancement of personal contacts and collaborations.

4.3.2 Semantic Interoperability

Decision-making bodies in the domain of the use of healthcare coding and classification systems

The Secretariat of the Central Healthcare Council (Kentriko Symvoulio Ygeias - KESY) is responsible for collecting and coding of patient data in ICD-family codes.

Coding and classification systems used in health ICT applications on the national level

The classification of medicinal products, the International Classification of Disability, Functionality and Health and that of the organisational health units have been successfully translated into Greek. A parallel action with a €1 million budget and seven months duration is being tendered, for the purpose of updating and finalizing the Greek editions of the required classifications, taxonomies and nomenclatures (ICD10, ICPC, medical diagnosis and procedures, GMDN and EDMA).

4.3.3 Accreditation

Options for accreditation of health information systems and applications are being examined, but there is no final decision as yet.

The current view is that accreditation could be optional and voluntary as a start, rather than obligatory, but there should be some specific incentive given e.g. at political level.

The responsible organisation should be an independent body, under the auspice of the Ministry of Health and Social Solidarity.

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