eHealth Strategies

Country Brief: Cyprus

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October 2010

About the *eHealth Strategies* study

The eHealth Strategies study analyses policy development and planning, implementation measures as well as progress achieved with respect to national and regional eHealth solutions in EU and EEA Member States, with emphasis on barriers and enablers beyond technology. The focus is on infrastructure elements and selected solutions emphasised in the European eHealth Action Plan of 2004.

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Acknowledgements

This report was prepared by empirica on behalf of the European Commission, DG Information Society & Media. empirica would like to thank Jos Dumortier, Time.lex CVBA for the review of the section on legal issues, and Professor Denis Protti (University of Victoria) for valuable feedback.

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Bonn / Brussels, September 2010

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Executive summary

In Cyprus, the *National Strategic Reference Framework for Cohesion Policy*[1] (NSRF) 2007-2013, covers aspects of eHealth and eGovernment services. It defines that the supply of eHealth should be extended and action to be taken in the field of eHealth in order to upgrade the quality of health services provided. Prior to this, groundwork had been laid by the *e-Government Vision*. This policy paper was published in 2002, and seeks the continuous enhancement and updating of the Information Society Service (ISS)[2], the developments in Information Technology and the EU Directions. Many of the objectives of the *e-Europe Action Plans* have been achieved. Also related is the *Business Analysis and Systems Report of the Information Systems Strategy*[3] from 2008 which endeavours to identify any procedural and/or organisational issues associated with the implementation of proposed IT projects in health.

In order to consider Cyprus' position regarding eHealth interoperability objectives the following eHealth applications have been examined: patient summaries and electronic health records, ePrescription, standards and telemedicine. In overview Cyprus' situation is as follows:

The new computerised system that is up and running in the two major district hospitals has the ability to manage a single electronic patient record across a patient's life time for any healthcare interaction with the hospital/clinic. This centralised patient record allows administrative and critical care information to be combined and provides a single integrated healthcare record which in turn enables collaboration across specialties amongst the healthcare stakeholders. Furthermore, condition-specific summaries are planned to be introduced in order to manage chronic conditions.

The execution of an ePrescription system in the form of e-Transmission of prescriptions to pharmacies, and a medication record, is foreseen to be implemented in the years 2008-13. At present the system, that is envisaged to be GP based, has an operation rate of 20%.

In terms of standards Cyprus became a member of the International Health Terminology Standards Development Organisation (IHTSDO) in January 2009 in order to develop, maintain and enable the use of SNOMED CT in health systems and is expected to make a member update this year in the IHTSDO framework. Beside SNOMED CT, ICD 10 is also used in Cyprus.

At this time, there is no nationwide implementation of telemedicine services in Cyprus. However, some pilots are running, and hope to be an example for future implementation. Challenges for the implementation of telemedicine services are related to legal harmonisation and infrastructural issues.

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[1] The Planning Bureau 2007

[2] Information Society Service

[3] Business Analysis of Information Systems Strategy 2008

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1 Introduction to the report

1.1 Motivation of the eHealth strategies study

Following the *Communication* of the European Commission (EC) on "eHealth – making healthcare better for European citizens: An action plan for a European eHealth Area",[4] Member States of the European Union (EU) have committed themselves to develop and issue national roadmaps – national strategies and plans for the deployment of eHealth applications addressing policy actions identified in the European eHealth Action Plan.

The *2004 eHealth Action Plan* required the Commission to *regularly monitor* the state of the art in deployment of eHealth, the progress made in agreeing on and updating national eHealth Roadmaps, and to facilitate the exchange of good practices. Furthermore, in December 2006 the EU Competitiveness Council agreed to launch the *Lead Market Initiative*[5] as a new policy approach aiming at the creation of markets with high economic and social value, in which European companies could develop a globally leading role. Following this impetus, the Roadmap for implementation of the "eHealth Task Force Lead Market Initiative" also identified better coordination and exchange of good practices in eHealth as a way to reduce market fragmentation and lack of interoperability.[6]

On the more specific aspects of electronic health record (EHR) systems, the recent *EC Recommendation on cross-border interoperability of electronic health record systems*[7] notes under "Monitoring and Evaluation", that "in order to ensure monitoring and evaluation of cross-border interoperability of electronic health record systems, Member States should: consider the possibilities for setting up a monitoring observatory for interoperability of electronic health record systems in the Community to monitor, benchmark and assess progress on technical and semantic interoperability for successful implementation of electronic health record systems." The present study certainly is a contribution to monitoring the progress made in establishing national/regional EHR systems in Member States. It also provides analytical information and support to current efforts by the European Large Scale Pilot (LSP) on cross-border Patient Summary and ePrescription services, the epSOS - European patients Smart Open Services - project.[8] With the involvement of almost all Member States, its goal is to define and implement a European wide standard for such applications at the interface between national health systems.

Earlier, in line with the requirement to "regularly monitor the state of the art in deployment of eHealth", the EC already funded a first project to map national eHealth strategies – the eHealth ERA "Towards the establishment of a European eHealth Research Area" (FP6 Coordination Action)[9] - and a project on "Good eHealth: Study on the exchange of good

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[4] European Commission 2004

[5] European Commission 2007

[6] European Communities 2007

[7] European Commission 2008

[8] European Patients Smart and Open Services (epSOS)

[9] eHealth Priorities and Strategies in European Countries 2007

practices in eHealth"[10] mapping good practices in Europe - both of which provided valuable input to the present *eHealth Strategies* work and its reports. Member States' representatives and eHealth stakeholders, e.g. in the context of the *i2010 Subgroup on eHealth* and the annual European High Level eHealth Conferences have underlined the importance of this work and the need to maintain it updated to continue to benefit from it.

This country report on Cyprus summarises main findings and an assessment of progress made towards realising key objectives of the eHealth Action Plan. It presents lessons learned from the national eHealth programme, planning and implementation efforts and provides an outlook on future developments.

1.2   Survey methodology

After developing an overall conceptual approach and establishing a comprehensive analytical framework, national level information was collected through a long-standing Europe-wide network of national correspondents. For the report on Cyprus, Pantelis Angelidis provided information on policy contexts and situations, policies and initiatives and examples for specific applications. He is the founder of VIDAVO[11], a health telematics company. He is also the president of INA (South-eastern Europe Telecommunications & Informatics Research Institute) and a member of the Board of HL7 Hellas. In addition, a handbook containing definitions of key concepts was distributed among the correspondents to guarantee a certain consistency in reporting. For Cyprus, relevant information on policy contexts and health system situation, policies and initiatives as well as examples for specific applications was collected by the overall project lead - empirica in Bonn, Germany.

The key tool to collect this information from the different national correspondents was an online survey template containing six main sections:

    A.   National eHealth Strategy

    B.   eHealth Implementations

    C.   Legal and Regulatory Facilitators

    D.   Administrative and Process Support

    E.   Financing and Reimbursement Issues

    F.   Evaluation

Under each section, specific questions were formulated and combined with free text fields and drop-down menus. The drop-down menus were designed to capture dates and stages of development (planning/implementation/routine operation). In addition, drop-down menus were designed to limit the number of possible answering options, for example with regard to specific telemedicine services or issues included in a strategy document. The overall purpose was to assure as much consistency as reasonably

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[10] European Commission; Information Society and Media Directorate-General 2009

[11] Vidavo health telematics

possible when comparing developments in different countries, in spite of the well-know disparity of European national and regional health system structures and services.

Under Section B on eHealth implementation, questions regarding the following applications were formulated: existence and deployment of patient and healthcare provider identifiers, eCards, patient summary, ePrescription, standards as well as telemonitoring and telecare.

The data and information gathering followed a multi-stage approach. In order to create a *baseline* for the progress assessment, the empirica team filled in those parts of the respective questions dealing with the state of affairs about 3 to 4 years ago, thereby drawing on data from earlier eHealth ERA reports, case studies, etc. to the extent meaningfully possible. In the next step, national correspondents respectively partners from the study team filled in the template on recent developments in the healthcare sector of the corresponding country. These results were checked, further improved and validated by independent experts whenever possible.

Progress of eHealth in Cyprus is described in chapter 3 of this report in the respective thematic subsections. The graphical illustrations presented there deliberately focus on key items on the progress timeline and cannot reflect all activities undertaken.

This report was subjected to both an internal and an external quality review process. Nevertheless, the document may not fully reflect the real situation and the analysis may not be exhaustive due to focusing on European policy priorities as well as due to limited study resources, and the consequent need for preferentially describing certain activities over others. Also, the views of those who helped to collect, interpret and validate contents may have had an impact.

1.3   Outline

At the outset and as an introduction, the report provides in chapter 2 general background information on the *Cyprian* healthcare system. It is concerned with the overall system setting, such as decision making bodies, healthcare service providers and health indicator data.

Chapter 3 presents the current situation of selected key eHealth developments based on detailed analyses of available documents and other information by national correspondents and data gathered by them through a well-structured online questionnaire. It touches on issues and challenges around eHealth policy activities, administrative and organisational structure, the deployment of selected eHealth applications, technical aspects of their implementation, legal and regulatory facilitators, financing and reimbursement issues, and finally evaluation results, plans, and activities

The report finishes with a short outlook.

2 Healthcare system setting

2.1 Country introduction[12]

Cyprus is an independent sovereign Republic with a presidential system of government. Under the 1960 Constitution, executive power is exercised by the President of the Republic, elected by universal suffrage for a five-year term of office. The President exercises executive power through a Council of Ministers appointed by him, which may be selected from within or outside the House of Representatives. The members of the House of Representatives are also elected by universal suffrage for a five-year term and they exercise the legislative power. Cyprus is divided into 6 districts, which in their turn have a number of Municipalities. Municipalities partly act independently of the Central Government.

The Council of Ministers has overall responsibility for the state's role in the social protection and healthcare system in Cyprus. It exercises this authority through the Ministry of Health and the Ministry of Labour and Social Insurance and, to a smaller extent, the Ministry of Finance.[13]

The box below summarises the key facts about the Cypriot healthcare system:

> **Key facts about the Cypriot healthcare system:**[14]
>
> Life expectancy at birth: 80.7 years
>
> Healthcare Expenditure as % of GDP: 6.1% (WHO 2005)
>
> WHO Ranking of Healthcare systems: rank 24
>
> Public sector healthcare expenditure as % of total healthcare expenditure: 43.2% (WHO 2005)

2.2 Healthcare governance

Decision making bodies, responsibilities, sharing of power

The Ministry of Health is responsible mainly for the organisation of the healthcare system and the provision of state-financed healthcare services. The ultimate objective of the organisation is to promote and protect people's Health. The Ministry of Health formulates national health policies, coordinates the activities of both the private and the public sector, regulates healthcare standards and promotes the enactment of relevant legislation. It is organised into various departments and manpower development institutes including:

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[12] eUser 2005

[13] Golna, Pashardes et al. 2004, p.19

[14] Data from World Health Organization 2000; Health Consumer Powerhouse 2008; World Health Organization 2009

- General Laboratory, which provides laboratory analysis services including inspection of food, water, medicine, police evidence and drugs investigations (but not services for clinical purposes).

- Pharmaceutical Services, responsible for the testing, supply and pricing of pharmaceuticals, inspection of pharmacies, etc.

- Medical and Public Health Services, responsible for services in the fields of prevention, primary, secondary and tertiary care

- Dental Services

- Nursing Services

- Mental Health Services

The Ministry of Labour and Social Insurance is responsible for the implementation of government policy for employment, social insurance, social welfare and industrial relations. The Ministry is further divided into departments and manpower development institutes.

The Ministry of Finance is responsible for the administration of specific allowances and grants, in particular:

- mobility allowance – a means tested benefit granted to disabled workers and students to cover travelling expenses for work/college

- provision of special grants – applicants' entitlement is determined by their degree of blindness

- provision of financial assistance to persons with disabilities for the purchase of a car – entitlement is determined by the degree of disability

- child benefit – payable to all families with children

- mothers' allowance – paid to mothers with four dependent children who cease to be entitled to child benefit

Healthcare service providers[15]

At present, there is a dual system of healthcare delivery in Cyprus: the government-run public system and the private system provided by the private hospitals, private clinics and physicians. Public primary healthcare (PHC) is provided at four hospital outpatient departments, seven suburban outpatient departments, five urban and 23 rural health centres and 274 sub-centres. These PHC centres are adequately staffed, well-equipped and provide preventive, health promotion and curative services as well as 24-hour on call services.

General hospitals offer only specialist outpatient care. Treatment of common diseases and injuries is available to practically all Cypriots. Almost all citizens have access to primary healthcare and all casualty departments of the main hospitals. The outpatient system has recently been expanded to include community mental healthcare services: providing basic outpatient medical, diagnostic and pharmaceutical ser-vices.

Private health services are dominated by practising physicians and dentists who offer all types of outpatient services in their own surgeries, mainly in towns or large villages. They are supported by all types of diagnostic and other services provided by private laboratories and pharmacies. Recently a number of private polyclinics have been

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[15] Golna, Pashardes et al. 2004, p.53-67

established in urban areas with a number of physicians offering a range of medical services from outpatient consultation to inpatient surgery. Complicated and severe cases, particularly those requiring special equipment, are referred usually to the government sector, usually Nicosia General Hospital.

Both public and private sectors provide dental health services. The public sector provides services in 56 dental health clinics and four mobile dental units. In 2001, secondary and tertiary dental health services were also offered in the four general hospitals and 29 urban and rural health centres.

All low-income earners, government employees, school children and people with special needs are entitled to oral healthcare in public clinics free of charge.

Secondary and tertiary healthcare is provided by the district hospitals and specialist centres. Five district general hospitals dominate the public sector. Nicosia General Hospital acts as the overall referral hospital for certain specialties that are not provided elsewhere in the country. There are also three small rural hospitals in relatively isolated areas, with a comprehensive set of services including specialist inpatient services. The public sector also runs a mental health hospital and a specialised hospital for children and women.

In urban areas there are 105 small private clinics offering inpatient services. Although the private sector offers a more limited scope of services, some private clinics have amalgamated to establish highly specialised facilities (e.g. kidney transplantation and open-heart surgery). The government often uses these facilities to treat eligible patients through contracts with the private owners such as the Bank of Cyprus Oncology Hospital and the Institute of Cyprus.

The Bank of Cyprus Oncology Centre, an autonomous not-for-profit foundation, offers treatment (radiotherapy and chemotherapy), rehabilitation and continuing care (psychological and social support, home care delivery and palliative care), clinical cancer research and cancer control activities (educational courses). The Government funds operating costs through an annual block grant, the Ministry of Health supplies pharmaceuticals and the Bank of Cyprus funds equipment replacement and new capital expenditure.

Non-surgical oncology services are also provided by Nicosia General Hospital's oncology department that employs four radiation oncologists. Chemotherapy is also undertaken in the private sector where all Cypriot patients, irrespective of income, are entitled to free chemotherapeutic agents supplied from the Ministry of Health.

The Emergency Care Unit owns and is responsible for the timely dispatch of ambulances. It aims to offer emergency pre-hospital care, free of charge, to all citizens suffering from an unexpected condition anywhere on the island. The unit's primary concerns include the provision of first aid to patients, immediate alleviation of their condition and safe transportation to the nearest available hospital.

The Ministry's Medical Services Department owns 50 ambulances that respond to emergency calls and two specially equipped ambulances. Hospital ambulances are operated by 69 ambulance drivers who are state employees, whereas rural health centres' ambulances are operated by local volunteers.

Figure 1: Important features of primary healthcare organisation in Cyprus

Political/administrative unit responsible for primary healthcare	Primary healthcare is organised on a national level, supervised by the Ministry of Health.
Consumer Choice	Free choice of GP in Cyprus.
Financing	Mainly tax-based.
Public or private providers	Combination of publicly employed primary care providers and GPs in private practices.
Gatekeeping function of the GP	GP (public & private) gatekeeping function.
Integrating health: initiatives for coordination	National Healthcare plan (launch time estimated beginning of 2011)

2.3   Recent reforms and priorities of health system/public health

Currently ongoing reforms in the health and social care systems

The Health Insurance Organisation (HIO) was set up under Law N.89(I)/2001 as a public legal entity. It is governed by a Board of Directors with trilateral representation (Government, Employers' and Employees' Unions) and its mission is the implementation of a National Health System in Cyprus**.**

The Organisation's main responsibilities are to:

- Administer the Fund established by the Law N.89(I)/2001 for financing of the National Health System.

- Make the required arrangements to obtain affordable healthcare to all beneficiaries by contracting with Healthcare providers satisfying all relevant conditions and specifications.

- Coordinate and ensure the provision of high quality healthcare services by the contracted Healthcare providers.

- Collect, analyze and report data relating to the provision of healthcare services.

Therefore, the challenges for the Government of Cyprus are to reduce the rising costs of healthcare and the inequalities in access to healthcare services, and to improve the quality and financing of the healthcare system in order to achieve the following objectives: maintain the progress achieved in controlling communicable diseases; reduce the

incidence of chronic diseases; and sustain the environment in a way that safeguards the quality of life.

The WHO provides support to the Ministry of Health and to the healthcare sector in developing health policies in accordance with the health for all (HFA) strategy[16]. HFA represents an important aspect of health policy in Cyprus and reforms are developed consistent with it.

2.4   ICT use among general practitioners

This section provides a brief overview of relevant ICT related infrastructure and services data. It draws on earlier studies commissioned by the EC, notably the Indicators eHealth Study . Although the results of this study date from 2007 and may therefore not reflect latest changes, a more recent pan-European survey is not available[17].

In terms of infrastructure, 69% of the Cypriot GP practices use a computer. 58% of the practices are connected to the Internet. These figures indicate that once a practice is equipped with a PC, it is very likely that it will connect to the Internet as well. Around one half of the GP practices that are connected to the Internet use a broadband connection.

Cyprus displays its best eHealth performance in the area of patient data storage and use of a computer for consultation purposes. Although only roughly half of the Cypriot GP practices store electronic medical patient data, those that do so use them to register a variety of different data types.

In Cyprus, computers are used in consultation with the patients only to a very limited extent (roughly 30% of the GP practices). The use of Decision Support Systems is even less common. They are used for either diagnosis or prescribing purposes in only 17% of Cypriot GP practices.

The transfer of individual patient data via Internet or dedicated networks has not yet arrived on the agenda of Cypriot GPs. Only 6% of Cypriot GP practices exchange administrative data either with other carers or with reimbursers via net-worked connections. The exchange of medical data via net-worked connections is equally little prevalent: only 3% of GP practices participating in the survey reported having ex-changed medical data with other care providers while 10% received results from laboratories this way.

ePrescribing is still not a reality in most European Member States. This holds true for Cyprus. Lately, ePrescribing is being used from the Physicians in the two major public hospitals

The relatively low level of ICT use in Cypriot GP practices can be explained to some extend by the fact that eHealth is a very new policy domain in Cyprus that has only been on the government's agenda since 2005.

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[16] World Health Organisation 1994

[17] ICT and eHealth use among General Practitioners in Europe 2007

Figure 2[18]: eHealth use by GPs in Cyprus

Indicators: Compound indicators of eHealth use (cf. annex for more information), % values. Source: empirica, Pilot on eHealth Indicators, 2007.
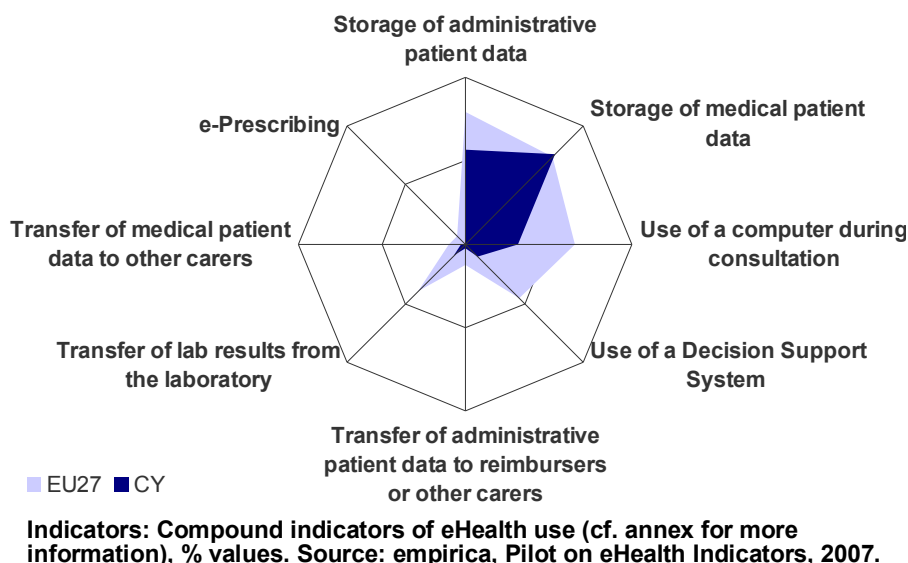
3   eHealth strategies survey results

The following sections present the results of the eHealth Strategies online study. In a first section, the eHealth policy actions undertaken in Malta are presented. This is followed by a presentation of administrative and organisational measures taken. Section 3.3 presents results on key eHealth applications. Section 3.4 focuses on the technical side of eHealth, namely the role of patient and healthcare provider identifiers and the role of eCards. Legal and regulatory facilitators as well as financing and reimbursement issues are presented sections, 3.5 and 3.6. The report concludes with an outlook (4).

3.1   eHealth policy action

The eHealth strategies of EU and EEA countries are not always labelled as such. Some countries may indeed publish a policy document which refers to the ICT strategy in the healthcare sector. Other countries such as France and Germany have enshrined the central eHealth activities in legislation governing the healthcare sector. In Germany, the relevant law is the law on the modernisation of healthcare; in France the introduction of an electronic medical record is included in a law concerning social security.

Sometimes, also documents from domains such as eGovernment or Information Society strategies may contain provisions which concern eHealth. In cases where the healthcare system is decentralised, i.e. where power is delegated to the regional level, there may even be strategy documents regarding eHealth from regional authorities.

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[18]   The notion of „compound indicator" designates an indicator build from a set of other indicators/survey questions regarding the same topic. The compound indicator reflects an average calculated from different values. (see Annex) The final results of the study on eHealth Indicators is available at www.ehealth-indicators.eu.

3.1.1 Current strategy/roadmap

In Cyprus, the National Strategic Reference Framework for Cohesion Policy[19] (NSRF) 2007-2013, as a strategic programme document, also covers aspects of eHealth and eGovernment services. Among other things, the document includes an analysis on the strategic vision and objectives related to the development of the Information Society in Cyprus. It defines that the supply of eHealth should be extended and action to be taken in the field of eHealth in order to upgrade the quality of health services provided on an island-wide scale and to improve their performance.

National Strategic Reference Framework 2007-2013

In this context, the interlinking of the central hospitals with the health centres in rural areas has been promoted to some extent. The necessity for reforms on the health sector is mentioned in the National Reform Programme[20], while the Structural Funds will contribute toward this in the framework of enhancing the use of ICT in Public Administration.

Furthermore, the National Strategic Reference Framework provides an analysis of the development strategy within the framework in which the resources allocated to Cyprus from the Structural Funds and the Cohesion Fund for the period 2007-2013 are defined. The preparation of the NSRF, which was introduced for the first time during the new programming period, gives a more strategic character to the programming for the utilisation of the resources of the Cohesion Policy.

Previous documents in the field were mainly related to ICT and information policy:

In 1987, a strategic study was carried out to examine the information needs of the Government of Cyprus and to identify candidate applications for computerisation. Based on the recommendations of this study, the Council of Ministers adopted a Government Computerisation Master Plan (GCP) in March 1989.

In 1998, the Council of Ministers approved a revised version of the Government Computerisation Plan. Rapid technology changes, evolving user demands and EU accession requirements necessitated the revision of the master plan to include new infrastructure and strategic projects in order to adjust the national Information Systems Strategy to a fast-changing technology environment.

Within the framework of this Strategy, a number of information systems have been developed to support the internal operations of Ministries and Departments, a Government Data Network (GDN) was developed, and a Government Internet Node was established to provide the gateway between Government Systems and the public network. Strategic projects are continuously being developed and/or enhanced in order to satisfy the increasing Information Society needs."[21]

e-Government Vision 2002 in accordance with eEurope+ and eEurope2002

Another important document is the e-Government Vision. This policy paper was published in 2002, aiming for the continuous enhancement and updating of the ISS[22], the developments in Information Technology and the EU Directions, in particular the eEurope+ and the eEurope2002 action plans. Many of the objectives of the e-Europe

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[19] The Planning Bureau 2007

[20] The Planning Bureau 2007

[21] European Communities 2009, p.7

[22] Information Society Service

Action Plans, including the e-Europe 2005 and EU i2010 Strategy – A European Information Society for Growth and Employment, have been achieved whereas the Cyprus Government is also currently promoting the Lisbon Strategy of the European Commission.

Another document, which is related to eHealth, is the Business Analysis and Systems Report of the Information Systems Strategy[23] from 2008, which is defined as an interim working paper for the Ministry of Health in Cyprus. This document presents the results of a business analysis and a review of the existing systems stage of the Information Systems Strategy Study. Here, overall information concerning health issues and business processes of hospitals, departments and services are provided.

The final report of the Information System Strategy will focus on different aspects, which are of importance for the Cypriot Ministry of Health. It outlines problems faced by the Ministry with regard to the introduction of information technology in health. These include:

- The available enabling technologies
- The management and organisational framework in which the Ministry can develop and operate Information Systems to support its own business needs
- A project catalogue

The Final Report was especially – within the Ministry of Health – aiming to identify any procedural and/or organisational issue associated with the implementation of proposed IT projects in health. The part of the strategic goal of the Ministry was successful and the computerized system of the New Nicosia General Hospital and Famagusta General Hospital is up and running.

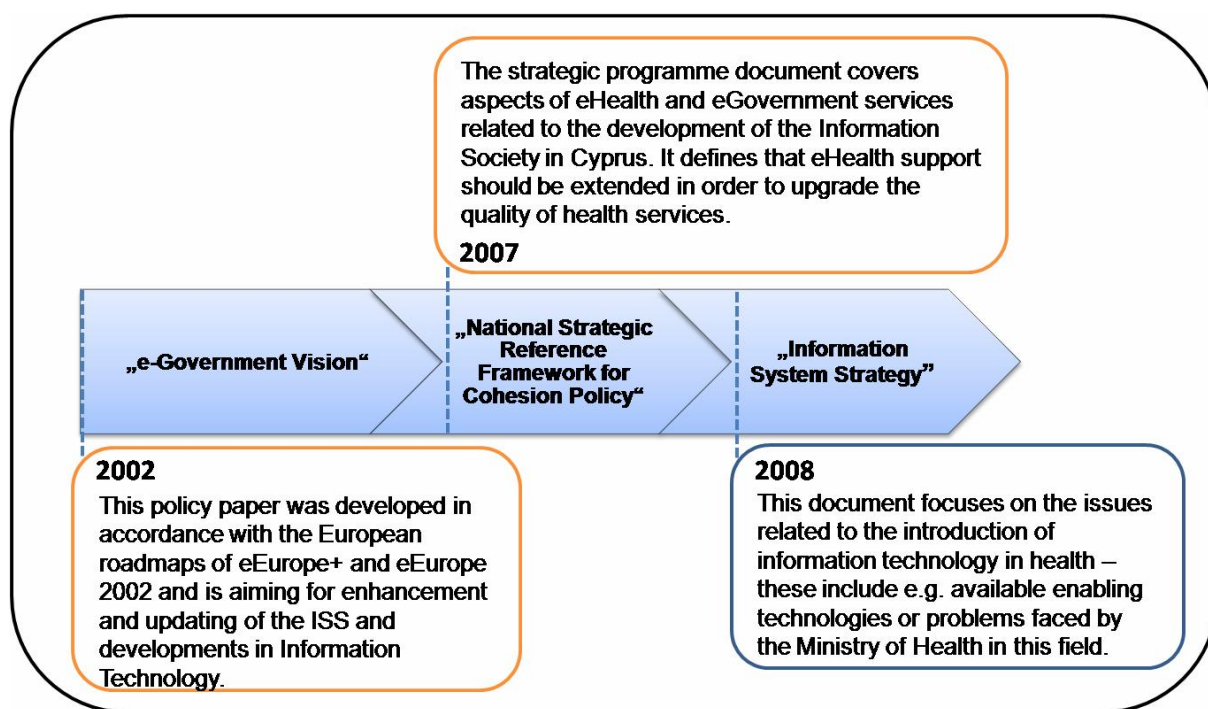The implementation process has taken into account the needs of the management of the Hospitals.

The Business Study mentioned above and also the National Strategic Reference Framework for Cohesion Policy refers to the EU eHealth Action Plan from 2004.

Figure 3 below pictures the development of the different policy document in Cyprus.

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[23] Business Analysis of Information Systems Strategy 2008

Figure 3: Cypriot policy documents related to eHealth

The strategic programme document covers aspects of eHealth and eGovernment services related to the development of the Information Society in Cyprus. It defines that eHealth support should be extended in order to upgrade the quality of health services.
2007

„e-Government Vision"   „National Strategic Reference Framework for Cohesion Policy"   „Information System Strategy"

2002
This policy paper was developed in accordance with the European roadmaps of eEurope+ and eEurope 2002 and is aiming for enhancement and updating of the ISS and developments in Information Technology.

2008
This document focuses on the issues related to the introduction of information technology in health – these include e.g. available enabling technologies or problems faced by the Ministry of Health in this field.

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3.2   Administrative and organisational structure

In Cyprus, the responsibility for public health – including eHealth – is shared between the Ministry of Health and the Planning Bureau. In this process, the Planning Bureau has a financing and business perspective, which includes the calculation of costs and the organisation of funding. The Ministry of Health oversees the implementation of various programs in cooperation with local authorities and other Departments.

The Ministry of Health also works in close collaboration with the Department of Information Technology Services of the Ministry of Finance. This service has been outsourced to the Ministry of health. Together they are working on the implementation of a Health Care Information Support System (HCIS) since 2004. The HCIS system is a turnkey ready-made software application which can provide integrated healthcare information to all Government hospitals, outpatient departments and rural health centres. The system has been implemented[24] in the districts of Nicosia and Famagusta

Cyprus, furthermore, developed a State Data Network and a government Internet portal, and implemented an Office Automated System (OAS) that manages documents thanks to an electronic database on the work undertaken by Ministries, Departments, and Services[25].

Finally an In Patient and Out Patient Administration System was developed, initially intended for hospital patient administration, but now also being implemented in outpatient departments and rural health centres. The Patient Administration Systems (PAS) handle

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[24] Department of Information Technology Services 2010

[25] Centre for Administrative Innovation in the European Mediterranean Region 2004

patient information about for example admissions, operations and waiting list. Using the record number, the system also exports statistical and analytical reports for doctors[26].

3.3 Deployment of eHealth applications

3.3.1 Patient summary and EHR

In this study, the epSOS project's definition[27] of a patient summary was used as a general guideline. There a patient summary is defined as a minimum set of a patient's data which would provide a health professional with essential information needed in case of unexpected or unscheduled care (e.g. emergency, accident), but also in case of planned care (e.g. after a relocation, cross-organisational care path).

Lacking a standard definition, a patient's electronic health record (EHR) is here understood as an integrated or also interlinked (virtual) record of ALL his/her health-related data independent of when, where and by whom the data were recorded. In other words, it is an account of his diverse encounters with the health system as recorded in patient or medical records (EPR or EMR) maintained by various providers like GP, specialists, hospitals, laboratories, pharmacies etc. Such records may contain a patient summary as a subset. As of yet, fully-fledged EHR systems rarely exist, e.g. in regional health systems like Andalucia in Spain or Kronoberg in Sweden, or in HMOs (health maintenance organisations) like Kaiser Permanente in the USA.

It should be noted that in most policy documents reference is made simply to an "EHR" without any explanation of what is meant by it, thereby in reality even a single, basic electronic clinical record of a few recent health data may qualify. As a consequence, this section can only report on national activities connected to this wide variety of health-related records without being able to clearly pinpoint what (final) development stage is actually aimed for or has been reached so far.

The new computerised system that is up and running in the two major district hospitals has the ability to manage a **single electronic patient record** across a patient's life time for any healthcare interaction with the hospital/clinic. Each of the functionality modules required as part of the PAS, links to the central patient record allowing new interventions and relevant information to be captured against the single patient record. At the same time activities which are common across the patient's interaction with the hospital, such as patient registration, are only done once. This centralised patient record allows administrative and critical care information to be consolidated providing a single integrated healthcare record which in turn enables collaboration across specialties amongst the healthcare stakeholders according to security profiles as required. The data model is based on a patient and case-based organisation structure. This makes various perspectives of patient data possible.

From a medical and nursing perspective it is necessary that the patient's complete encounter and medical history can be assessed, irrespective of the current treatment and

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[26] Department of information Technology Services

[27] European Patients Smart and Open Services (epSOS)

specialty. This view of the patient history is made possible by linking all case treatments through a unique patient-ID.

The case-based structure of a patient record supports multiple administrative functions such as billing where for example the respective paying party, the case and the billable items are linked for processing or reviewing purposes.

This case-based structure enables the collation of all essential correspondence of patient history data, new case data, case clinical comments, case attendant doctor details and case admission diagnosis etc, to each individual patient record.

Essentially, a case begins with the patient's admission and ends with the discharge. If the patient is admitted again at a later point in time, a new episode is created and linked to the same patient data. A single patient can have a number of episodes assigned to him/her. It is also possible to carry two cases in parallel if this is required from administrative, clinical and billing perspectives.

The Electronic healthcare record data is presented on a case basis. However, authorised users can access a more detailed view of the content of the patient data for specific, episodes. Hence a life time record of Health interventions is built up over time.

Plans to develop EHRs, condition-specific summaries and a national registry

In Cyprus, the Ministry of Health envisages that over the next 3-7 years it will – through the deployment of information technology – move towards paperless and filmless hospitals by introducing a web enabled electronic health record system. It is planned that the EHR will hold the following data:

- Administrative/demographics
- Electronic medication record
- Medical history
- Laboratory results
- Radiology reports
- Emergency care data

The national electronic health record is connected to the goal of providing access to the given data in external and internal data banks.

Furthermore condition-specific summaries are planned: The Ministry of Health is making an effort to efficiently manage chronic conditions within the healthcare system by planning condition-specific summaries for cardiac defects, asthma, diabetes and other chronic diseases that have proven to apply for the Cypriot population.

Challenges that apply to all digital gathering of data and to the deployment of technology within the healthcare system are the digital illiteracy of health professionals, as well as organisational issues that mostly concern the work load distribution for the operation of the new system. Despite the difficulties the ministry of health has managed to proceed with the computerisation of the Nicosia and Famagusta General hospitals

3.3.2   ePrescription

In the framework of this study and following work in epSOS[28], ePrescription is understood as the process of the electronic transfer of a prescription by a healthcare provider to a pharmacy for retrieval of the drug by the patient. In this strict sense, only few European countries can claim to have implemented a fully operational ePrescription service

The programme[29] developed by the Cypriot Ministry of Health for the years 2008-2013 foresees the implementation of ePrescription in form of e-Transmission of prescriptions to pharmacies and a medication record.

ePrescription share of less than 20%

As ePrescription has only been gradually implemented since 2008, the share is less than 20% at that time. And because the patient's first encounter with the health system in case of illness is with the GP (either public or private) the envisaged ePrescription scheme will be mainly GP-based. For coming years, it is planned to completely replace paper prescriptions. In order to promote ePrescription, training and education for healthcare professionals and pharmacists is necessary.

Figure 4: ePrescription progress in Cyprus
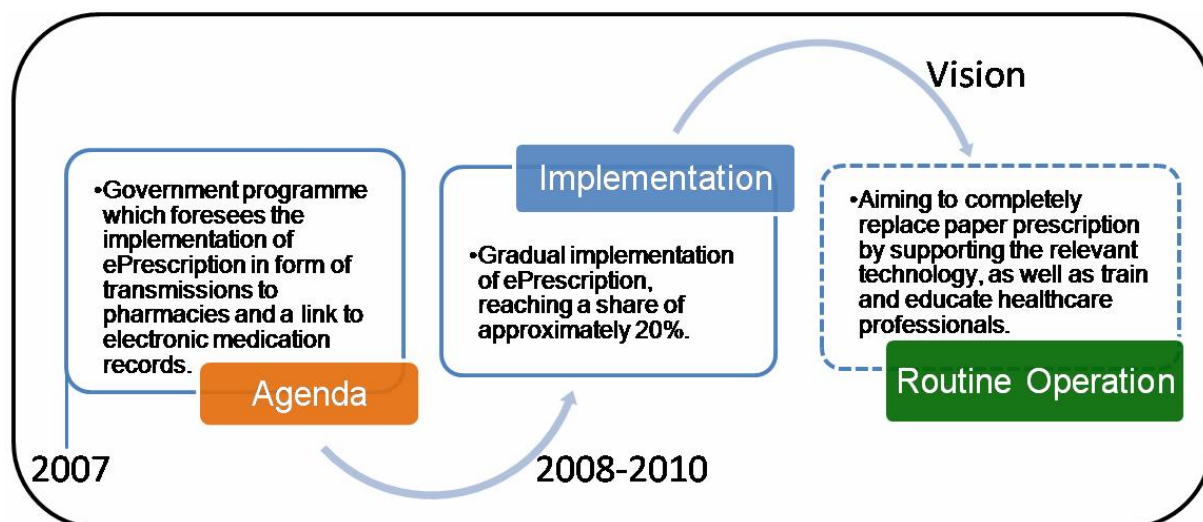
© empirica 2009

3.3.3   Standards

Standards are not only crucial to enable interoperable exchange of meaningful information in the healthcare system; they also ensure secure access to patient records by healthcare providers and citizens. This study aims to identify, among other usage, standards related to the domain of health informatics, such as the SNOMED Clinical Terms or the LOINC terminology.

In January 2009, Cyprus became a member of IHTSDO in order to develop, maintain and enable the use of SNOMED CT in health systems. Users of the terminology will also have

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[28] European Patients Smart and Open Services (epSOS)

[29] Summary of the programme: Government of the Republic of Cyprus 2007

access to new resources as they are developed. Cyprus is expected to make a member update this year in the IHTSDO framework.

Beside SNOMED CT, ICD 10 is used in Cyprus. It was in 1995 that Cyprus started implementing ICD 10 for mortality indicators and now has moved to full implementation. The implementation process is mainly monitored by the Ministry of Health together with some associations such as the European Federation for Medical Informatics[30] (EFMI). Challenging aspects of the implementation of standards by the Ministry are the creation of awareness on standardisation development issues, to educate health professionals on their use and impact and to decide on the most appropriate set of standards for the seamless integration into the practitioner's daily work.

3.3.4 Telemedicine

The use of telemedicine applications is recognised as beneficial to enable access to care from a distance and to reduce the number of GP visits or even inpatient admissions. Commission services define telemedicine as "the delivery of healthcare services through the use of Information and Communication Technologies (ICT) in a situation where the actors are not at the same location"31. In its recent communication on telemedicine for the benefit of patients, healthcare systems and society, the Commission re-emphasises the value of this technology for health system efficiency and the improvement of healthcare delivery[32].

At the time, there is no nation wide implementation of telemedicine services in Cyprus. There are some pilots of (mostly) European funded projects that attempt to set up a good example for future implementation. These pilots include for example call centres for patient information and care.

Pilot projects in Telemedicine funded by the EU

One pilot project addresses the provision of e-emergency services. In the context of two successful European projects, the Ambulance HC1001 and Emergency-112 HC4027 projects (in which the Department of Accident and Emergency of the Nicosia General Hospital participated with the University of Cyprus), a portable medical device for emergency telemedicine was developed. The system enables the transmission of critical bio signals like the electrocardiogram, blood pressure, heart rate, temperature, and still images of the patient, from the emergency site to the hospital. The system enables the physicians to direct pre-hospital care in a more efficient way, improving patients' outcome and reducing mortality. The system was designed in order to operate over several wireless communication links (such as satellite, GSM, GPRS, and UMTS). The Ambulance & Emergency network infrastructure for the island of Cyprus included: the connection of the Department of Accident and Emergency of the Nicosia General Hospital with an ambulance and a distant rural hospital at Kato Pyrgos. The system will be expanded to cover more medical centres.[33]

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[30] European Federation for Medical Informatics

[31] Europe's Information Society 2009

[32] European Commission 2008

[33] The Commonwealth Health Ministers Book 2008, p.2

Main challenges for the implementation of telemedicine services are related to legal and infrastructural issues. First, the harmonisation of legislation is discussed – it is suggested that legislation should be developed based on EC directives regarding specific issues. Second, the infrastructure could be challenging, as the quality of service and the offered reliability are not at highest standards yet.

3.4 Technical aspects of implementation

A key prerequisite for the establishment of an eHealth infrastructure is the ability to uniquely identify citizens/patients and healthcare professionals. This part of the survey deals with identifiers and how they are stored. This section does not deal with the tokens through which identification can or will take place. One such possibility would be via an eCard. This topic is dealt with in the following section. The current section focuses solely on whether or not unique identifiers are in place in Cyprus and for which purpose.

3.4.1 Unique identification of patients

Since 2007, Cyprus has a dedicated patient healthcare ID in place. This ID is closely linked to a Medical Identity Card, which is issued to Cypriot citizens and EU citizens residing permanently in Cyprus. Card holders are divided into the following two categories:

Types of Medical Identity Cards in Cyprus:

Medical Card A (free medical care):

issued to person without dependants whose annual income does not exceed €15.377,41, members of families whose annual income does not exceed €30.754,83 (increased by €1.708,60 for each dependant child), members of families with four or more children, enclaved persons and members of their family, as well as dependants of missing persons and individuals (and members of their families) receiving public assistance.

Medical Card B (treatment at reduced fees):

issued to persons without dependants whose annual income exceeds €15.377,41 but not €20.503,22 and members of families whose annual income exceeds €30.754,83, but does not exceed the amount of €37.589,23, increased by €1,708.60 for each dependant child.

Apart from the patient healthcare ID, Cypriots are also assigned a unique identifier for natural persons at time of birth used as a primary key in almost every governmental IT system and which is also linked to an obligatory identity card. These identifiers are stored in the database of the Cyprus Civil Registration System, managed by the Civil Registry Department under the authority of the Ministry of Interior[34].

For further development, it is planned to introduce a smart medical card in Cyprus based on the aims of the eEurope 2002 action plan. Under the eEurope 2002 Action Plan, EU

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[34] Government Web Portal

Member States agreed to provide all basic eGovernment services online by the end of 2000. Cyprus entered the European Union in May of 2004, thus, it has to adapt to the eEurope Action Plan as soon as possible, and electronic authentication via smartcards is one of the methods used.[35]

Planned purposes of this smart card include:

> **Purposes of the planned smart card/eCard:**
>
> - Administrative identification
>
> - Clinical emergency data (storage/access)
>
> - Clinical prescription data (storage/access)
>
> - Insurance status verification
>
> - Other clinical data

Obstacles for the implementation of smart cards in Cyprus are related to infrastructure aspects: Unique identification of healthcare professionals

The above mentioned challenges also apply for the implementation of eCards for professionals in Cyprus. Registration of doctors has been obligatory in Cyprus since 1961[36]. All public sector doctors are furthermore salaried employees of the Ministry of Health and are registered in a centralised civil service staffing system. So far, a health service professional ID exists (since 2000) for medical doctors, dentists, pharmacists, nurses and midwifes, food scientists/technologists, as well as dieticians[37]. At the moment priorities are given to the smart card for citizens as described above, therefore the professional card will remain at a planning stage.

3.5 Legal and regulatory facilitators

Legal and regulatory issues are among the most challenging aspects of eHealth: privacy and confidentiality, liability and data-protection all need to be addressed in order to make eHealth applications possible. Rarely does a country have a coherent set of laws specifically designed to address eHealth. Instead, the eHealth phenomenon has to be addressed within the existing laws on professional liability, data protection etc.

In Cyprus, legislation on the Processing of Personal Data (Protection of Individuals) Law of 2001 has entered into law in November 2001 and is – since the Amendment Law of 2 May 2003 - compliant with EU directives. In 2004, Cyprus adopted two primary laws – the Law on Electronic Communications and the modification of the 2002 Law on Radio-communications – to transpose the new EU regulatory framework. It has also introduced four pieces of secondary legislation in the field of radio communications. In the field of data protection secondary legislation was introduced by the Processing of Data Regulations of 8 November 2002. Cyprus, however, has not yet introduced the necessary secondary legislation for the Law on Electronic Communications. The Legal Framework

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[35] Louca and Nathanael 2006

[36] Registration of Doctors (Recongnised Qualifications) Order of 1961 (as amended).

[37] Ministry of Health of the Republic of Cyprus

for Electronic Signatures and for Relevant Matters Law and the e-commerce legislation have been also introduced. The e-Commerce legislation addresses the Certain Aspects of Information Society, and specifically Electronic Commerce and for Relevant Matters Law of 2004 and the Distance Conclusion of Contracts Law of 2000."[38] Cyprus does however not dispose of eHealth-specific regulations.

Related to patient rights, two main Cypriote laws were established: the National Health System Law of 2001 provides free healthcare at the time of delivery for the whole population, to be financed by contributions from the state, employers, the self-employed pensioners and all those who have non-employment incomes[39] and the Law on the Protection of the Rights of the Patients and Related Issues of 2005 forms a comprehensive regulation of the patient's rights, safeguarding for example the good quality and continuous healthcare, the free choice of physician and institution and the integrity of the persons. Further regulation of patients' rights can also be found in the Government Medical Institutions and Services Regulations of 2000 to 2007. Additionally, the Ministry of Health published in April 2008 a "Charter of Patients' Rights during Hospitalisation at Government Medical Centres"[40]. The Charter deals however mainly with the before mentioned health cards and entitlement to free or reduced free care.

Under current legislation the patient needs to consent to medical treatment and – in general - to the inclusion of their health data in their record on a case-by-case basis. The consent may be given orally, but needs to be confirmed in writing as soon as possible, also in emergency situations. Recently a discussion has however commenced on the digitalisation of services and it is presumed that this will cause a review on patient consent.

For the legislation concerning telemedicine services, it is envisaged in the National Strategic Reference Framework for Cohesion Policy that specific legislation will be set in place in order to govern the use of telemedicine services. Further details were not released at the point when this report was written.

3.6   Financing and reimbursement issues

In Cyprus, health and consequently also eHealth is considered a public good hence the financing is provided by central government. Social health insurance companies are an indirect way for the government to help finance the eHealth infrastructure. Furthermore, there is an annual public budget, which is dedicated to health and this budget will also fund all eHealth services in place. 2009's budget for health reached the amount of 49,781,520€.

International financing sources are the European Commission and the European Investment Bank: The European Commission has financed various research activities as well as pilots of eHealth services for example in telemedicine. The European Investment

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[38] The Commonwealth Health Ministers Book 2008, p.2

[39] Law 89(I) of 2001 as amended by Laws n° 134(I) of 2002, 101(I) of 2004 and 62(I) of 2005.

[40] ΥΠΟΥΡΓΕΙΟ ΥΓΕΙΑΣ [Ministry of Health] 2008

Bank funded projects in the field of eGovernment and it is expected that this area will be extended towards demands in the eHealth domain.

Obstacle remaining is the fact that legislation has not created a framework for eHealth services, which makes not only funding in this area a difficult legal task.

4   Outlook

In sum, future and current issues in Cyprus concerning eHealth development and deployment include the following:

- As Cyprus entered the EU in 2004, it is still in the process of catching up on the developments in Europe – therefore almost all Cypriot policy documents relate to older version of European roadmaps.

- So far, very basic pillars for the development and deployment of eHealth services are missing in Cyprus. These include a coherent legal framework for any electronic applications, an infrastructure for technical devices and the acceptance by professionals and citizens for these developments.

- Cyprus is – for the time being – basically lacking money for the plans developed, this means that most parts of the modernisation process is co-funded by the European Commission/ Structural Funds which partly regulate which applications are prioritised. The prioritised issue at the moment seems to be the deployment of eGovernment services

"E-Health in Cyprus is intended to cover a wide range of products, systems and services. Examples of such applications are hospital information systems, a national health monitoring system (including the establishment of a number of disease registers in health), computerisation of primary care services, computerisation of the forthcoming Health Insurance Scheme, introduction of a patient card, a high-quality website for the Ministry of Health, information networks, electronic health records, standardisation of medical terminology, classification and coding of diagnoses, medical procedures, and causes of death, introduction of telemedicine services, and personal wearable and portable communicable systems and health portals."[41]

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[41] The Commonwealth Health Ministers Book 2008, p.1

5   List of abbreviations

DRG	Diagnosis Related Group
EC	European Commission
EEA	European Economic Area
EFMI	European Federation for Medical Informatics
EHR	Electronic Health Record
EMR	Electronic Medical Record
EPR	Electronic Patient Record
epSOS	European patients Smart Open Services
ERA	European Research Area
EU	European Union
GCP	Government Computerisation Master Plan
GDN	Government Data Network
GDP	Gross Domestic Product
GP	General Practitioner
HCIS	Health Care Information Support System
HCP	Healthcare Provider
HFA	Health for all strategy
HIO	Health Insurance Organisation
HL7	Health Level Seven International (authority on standards for interoperability)
HPC	Health Professional Card
ICT	Information and Communication Technology
ID	Identification (e.g. number, card or code)
IHTSDO	International Health Terminology Standards Development Organisation
ISS	Information Society Service
IT	Information Technology
LSP	Large Scale Pilot
NSRF	National Strategic Reference Framework for Cohesion Policy
OAS	Office Automated System
OECD	Organisation for Economic Co-operation and Development

PAS	Patient Administration Systems
PHC	Public primary healthcare
PHS	Personal Health System
R&D	Research and Development
WHO	World Health Organization

6 Annex

6.1.1 Annex 1: Compound indicators of eHealth use by GPs

Compound indicator name	Component indicators	Computation
Overall eHealth use	- Electronic storage of individual medical patient data - Electronic storage of individual administrative patient data - Use of a computer during consultation with the patient - Use of a Decision Support System (DSS) - Transfer of lab results from the laboratory - Transfer of administrative patient data to reimbursers or other care providers - Transfer of medical patient data to other care providers or professionals - ePrescribing (transfer of prescription to pharmacy)	Average of component indicators
Electronic storage of individual medical patient data	- A2a - Symptoms or the reasons for encounter - A2c - Medical history - A2c - Basic medical parameters such as allergies - A2d - Vital signs measurement - A2e - Diagnoses - A2f - Medications - A2g - Laboratory results - A2h - Ordered examinations and results - A2i - Radiological images - A2j - Treatment outcomes	Average of component indicators
Electronic storage of individual administrative patient data	- A1 - electronic storage of individual administrative patient	A1 value
Use of a computer during consultation with the patient	- B2 - Computer use during consultation	B2 value
Use of a Decision Support System (DSS)	- B3a - Availability of DSS for diagnosis - B3b - Availability of DSS for prescribing	Average of component indicators
Transfer of lab results from the laboratory	- D1e - Using electronic networks to transfer prescriptions electronically to dispensing pharmacists?	D1e value
Transfer of administrative patient data to reimbursers or other care providers	- D1a - Using electronic networks to exchange of administrative data with other healthcare providers - D1b - Using electronic networks to exchange of administrative data with reimbursing organisations	Average of component indicators
Transfer of medical patient data to other care providers or professionals	- D1c - Using electronic networks to exchange medical data with other health care providers and professionals	D1c value
ePrescribing (transfer of prescription to pharmacy)	- D1d - Using electronic networks to transfer prescriptions electronically to dispensing pharmacist	D1d value

Dobrev, Haesner et al. 2008

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