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eHealth Policy and Deployment in the European Union

Review and Analysis of Progress

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Abstract

eHealth has been a key focus area in European Union policy for over a decade. The 2004 eHealth Action Plan has set specific targets and implementation timelines for both the European Commission and Member States' governments. In the framework of the recently completed eHealth ERA project[1], the state of eHealth policy and deployment across the EU until the end of 2006 was mapped and analysed. The objective was to provide background information that can support co-ordination of Member State activities. The work of the project presented in this report, together with other eHealth ERA-project activities, looked for answers to the question of what should be done in order to achieve a European Research Area for eHealth and what should not be done if we are to avoid failures.

Twenty seven Member States and four countries with either EEA, accession country or other special status were included in the report. However, when reflecting the results of our study against the targets of the European Commission 2004 eHealth Action Plan the main emphasis is given to analysis of the situation in the EU Member States.

The results were first presented to the European Commission as a deliverable of the eHealth ERA project (D2.2 – The European eHealth policy and deployment situation by the end of 2006, Final version, November 2007). After finalization of the project, the STAKES team updated and revised both background information and analysis of the material in the process of preparing this publication. The report presents a structured overview of European eHealth policies, initiatives, roadmaps, and deployment, synthesizing topics with priorities common to multiple Member States.

European countries have made considerable progress in both eHealth policy and deployment in the last five years. Nevertheless, the spectrum of policy aims and priorities is wide, and there is significant variation in terms of stages of deployment among EU countries.

By the end of 2006, 25 of the 27 EU Member States and the four other European countries represented in the EU i2010 Subgroup on eHealth had a documented policy on eHealth, while the other two states were in the process of finalising it. The most common eHealth policy aims were to reform the health care system and improve its performance for more efficiency and quality of care. The most common eHealth tools suggested were electronic health records or electronic patient summaries.

The main eHealth deployment areas identified were electronic health records, patient identifiers, health portals for informing patients and professionals on health issues and disease prevention, citizen card activities and telemedicine. With regard to electronic health records, there is substantial variability in development priorities between countries.

In terms of infrastructure, regional and national eHealth networks are operational or in planning in the majority of countries, while the trend of expanding to international networks is being explored. Broadband is perceived as the indispensable technological platform of the future - already well in use in several countries and fast-growing in others.

Services presently provided over eHealth networks vary widely, depending on each country's overall progress. These services range from messaging and reimbursement claims to telemedicine, booking and consultation services and access to patient summaries or full patient records.

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1   The partners of the eHealth ERA project (http://www.ehealth-era.org – Towards the Establishment of an eHealth European Research Area – IST FP6-2005-IST-015854) were: empirica – project coordinator (DE), STAKES (FI) – leading partner for the study presented in this report, CNR (IT), ISCII (ES), CITTRU (PL), EPSRC and Imperial College (UK).

There seems to be a common understanding among European states that developing semantic interoperability of electronic patient documentation and promoting the use of health cards can encourage the mobility of patients and professionals. At present, 28 of 31 countries were involved in some sort of international eHealth collaboration, but mostly on the level of policy discussions and exchange of lessons learned. Several projects with practical goals were identified; however international collaboration in organising treatment of patients is not yet a routine practice.

Furthermore, although interoperability is high on the policy agenda of many countries and work towards integrated health information networks is well underway, issues of interoperability still require further attention in terms of active deployment.

Keywords: eHealth, health policy, health plan implementation, medical informatics applications, Europe

Abstract in Finnish

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Terveydenhuollon tietohallinto, "eHealth" eli "eTerveys", on ollut yksi keskeinen Euroopan Unionin (EU) toimintapolitiikan painopistealue jo yli vuosikymmenen ajan. Terveydenhuollon tietohallinnon toimintaohjelma 2004 (The 2004 eHealth Action Plan) asetti sekä Euroopan komissiolle että jäsenmaille selkeitä tavoitteita ja aikatauluja. Äskettäin päättyneessä EU-rahoitteisessa "eHealth ERA" -projektissa[2] kartoitettiin ja analysoitiin EU:n jäsenmaiden terveydenhuollon tietohallinnon toimintaohjelmien ja terveydenhuollon tietoteknologian käyttöönoton tila vuoden 2006 lopussa. Selvityksen tavoitteena oli tuottaa taustatietoa, jolla voitaisiin tukea jäsenmaiden "eTerveys"-yhteistyön vahvistumista. Projektin nyt raportoitavassa osiossa, yhdessä muiden "eHealth ERA" -hankkeen osioiden kanssa, etsittiin vastausta siihen mitä pitäisi tehdä jotta saavutettaisiin eurooppalainen terveydenhuollon tietohallinnon ja tietoteknologian tutkimuksen ja muun yhteistyön alue (a European Research Area for eHealth), ja mitä tulisi olla tekemättä jotta ei kohdattaisi epäonnistumisia.

Raportissa on mukana 27 jäsenmaan ja 4 muun maan tiedot. Muut maat olivat joko EFTA-maita tai maita, jotka ovat mukana jäsenneuvotteluissa EU:n kanssa. Niissä analyyseissä, joissa arvioitiin EU:n terveydenhuollon tietohallinnon toimintapolitiikan toteutumista, olivat mukana vain jäsenmaat. Analyysin tulokset esiteltiin ensin Euroopan komissiolle raporttina, joka oli "eHealth ERA" -hankkeen virallinen tuotos (D2.2 - The European eHealth policy and deployment situation by the end of 2006, Final version, November 2007). Hankkeen päättymisen jälkeen kirjoittajatiimi päivitti ja täydensi tietoja. Tämä raportti on tuotettu tätä uudistettua aineistoa hyödyntäen. Raportissa esitellään strukturoitu yleiskatsaus eurooppalaiseen terveydenhuollon tietohallinnon toimintapolitiikkaan ja sen vaikuttimiin, tiekarttoihin sekä toimeenpanoon etsien sellaisia aihealueita ja priorisointeja, jotka ovat yhteisiä useille jäsenmaille.

Viimeisen viiden vuoden aikana Euroopan maat ovat huomattavasti edistyneet sekä terveydenhuollon tietohallinnon toimintapolitiikkojen antamisessa että vastaavan teknologian käyttöönotossa. Toimintapoliittiset tavoitteet ja prioriteettien asettaminen vaihtelevat kuitenkin suuresti ja terveydenhuollon tietoteknologian eri sovellusten käyttöönottoasteessa on maiden välillä huomattavia eroja.

Vuoden 2006 lopussa oli 25:llä 27:stä jäsenmaasta sekä kaikilla neljällä muulla maalla oma dokumentoitu terveydenhuollon tietohallinnon strategia tai muu vastaava toimintapolitiikka ja lisäksi kahdella maalla sellainen oli juuri valmistumassa. Tavallisimmat tavoitteet, joihin terveydenhuollon tietoteknologian käyttöönottoa edistämällä pyrittiin, olivat terveydenhuollon palvelujärjestelmän rakenteiden modernisointi ja terveydenhuollon toiminnan tehokkuuden ja laadun parantaminen. Yleisin työkaluvalinta olivat sähköiset potilaskertomukset tai sähköiset hoitotietojen yhteenvedot.

Tavallisimmat terveydenhuollon tietoteknologian käyttöönoton painoalueet yleisyysjärjestyksessä olivat sähköiset potilaskertomukset, potilaiden sähköinen tunnistaminen ja terveystiedon portaalit potilaille ja ammattihenkilöille, kansalaisten sähköisen tunnistamisen kortit ja telelääketiede. Sähköisiä potilaskertomuksia tarkasteltaessa havaittiin, että eri maissa niiden kehittämisen painotukset ja tavoitteet vaihtelevat hyvin paljon.

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2   eHealth ERA projektin yhteistyökumppanit (http://www.ehealth-era.org – Towards the Establishment of an eHealth European Research Area – IST FP6-2005-IST-015854) olivat: empirica – projektin koordinaattori (DE), STAKES (FI), CNR (IT), ISCII (ES), CITTRU (PL), EPSRC ja Imperial College (UK).

Alueelliset tai kansalliset terveydenhuollon tietoverkot, infrastruktuurit, ovat toiminnassa tai suunnitteilla useimmissa maissa. Myös kansainvälisten yhteyksien rakentamisen mahdollisuuksia selvitellään. Laajakaistayhteydet ovat valittu tavoite, joka on käytössä jo monissa maissa, ja yleistymässä nopeasti myös muualla.

Terveydenhuollon tietoverkkojen yli välitetyt palvelut vaihtelevat maittain vielä paljon ja ovat riippuvaisia teknologiavalinnoista. Käytössä on viestinvälitystä, kuten esimerkiksi laboratoriotuloksia ja reseptejä, vakuutustietojen välitystä, telelääketiedettä, sähköistä ajanvarausta, sähköisiä konsultaatioita ja potilaan pääsyä hoitoyhteenvetotietoihin tai kertomuksiinsa.

Euroopan maiden välillä näyttää olevan selkeä yhteisymmärrys siitä, että sähköisten potilaskertomusten semanttisen yhteensopivuuden lisääminen sekä kansalais- ja ammattihenkilökorttien käyttöönotto voivat edistää potilaiden ja ammattihenkilöiden liikkuvuutta.

Tutkimushetkellä 28/31 maata oli mukana kansainvälisessä "eTerveys"-yhteistyössä. Useimmiten se sisälsi toimintapolitiikka-tason keskustelua tai kokemusten vaihtoa. Myös käytännön ratkaisuja etsiviä projekteja löytyi, mutta varsinainen rajojen yli tapahtuva sähköinen terveydenhuoltopalvelu on vielä harvinaista.

Vaikka tietoteknologian yhteistoiminnallisuus on nostettu sekä poliittisella että toimintapoliittisella asialistalla korkealle monissa maissa ja terveydenhuollon integroitujen tietoverkkojen rakentaminen on hyvässä vauhdissa, tarvitaan vielä paljon työtä ennen kuin aito yhteistoiminnallisuus saadaan toteutettua.

Avainsanat: eTerveys, terveyspolitiikka, implementointi, tietoteknologia, terveydenhuollon tietohallinnan sovellukset, Eurooppa

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Executive Summary

Background

The EU-funded eHealth ERA project (Towards the Establishment of an eHealth European Research Area – IST FP6-2005-IST-015854) attempted to find answers to the question of what should be done in order to achieve a European Research Area for eHealth and what should not be done if we are to avoid failures. Deliverable D2.2, (The European eHealth policy and deployment situation by the end of 2006, Final version, November 2007), the predecessor of this report, mapped the status of European eHealth policy and deployment by the end of 2006. The aim was to increase understanding of the current and future situation and trends in eHealth policy and deployment and follow up the progress toward the goals set in the eHealth Action Plan. The objective was to provide background information that can support co-ordination of Member State activities.

After completion of the project, the STAKES team updated and revised both background information and analysis of the material in the process of preparing this publication. The report presents a structured overview of European eHealth policies, initiatives, roadmaps, and deployment, synthesizing topics with priorities common to multiple Member States. The approach is that of an evaluation study focusing on Member States' needs.

Data and material collection was performed by using the Information Gathering Template developed for this project (Deliverable 2.1, Part III – provided as Annex to this report), by using Country Reports and Fact Sheets produced in the eHealth ERA-project, and by undertaking additional literature searches whenever necessary. The aim of the structured, harmonized data collection and reporting has been to support comparative analysis. In turn, the analysis has focused on identifying commonalities and differences across Member States.

The cut-off date for new data collection was set to the end of September 2006, but additional data up to the end of 2006 has been included in some cases. A total of thirty one countries have been included in the report - the twenty seven EU Member States, plus four countries with either EEA, accession country or other special status. However, when reflecting the results of our work against the targets of the European Commission 2004 eHealth Action plan, the main emphasis is given to analysis of the EU Member States. Bulgaria and Romania have been included in the EU family, since they were full members at the time of finalisation of this report and have been actively participating in EU eHealth developments prior to their full membership.

The **analysis at the policy level** looked at the themes emerging from national strategies and how these themes compare against the eHealth Action Plan targets. Information on each country's **health care system structures** and general health policy aims was also collected as background information, to provide a better understanding of commonalities and differences. The **analysis at the deployment level** looked at how the priorities stated in eHealth policies compare against implementation activities. Initial information on research priorities and outlines of major national or regional research programmes was also collected in the context of this work, but final data collection and analysis on eHealth-related RTD has been undertaken and reported as part of WP3 work.

eHealth policy measures and special foci

Main policy findings

By the end of 2006, twenty five out of twenty seven Member States, plus the four other countries active in the i2010 Subgroup for eHealth were identified as having a documented policy on eHealth (defined on government or ministry level). In some cases eHealth policy was a part of an overall Information Society policy. The remaining two Member States were in the process of finalising their eHealth policy documents. This data should be contrasted to the situation at the end of 2003, when only ten countries possessed a national eHealth policy. It is very likely that the EU-level eHealth policy discussions have had a positive influence on the national activity of eHealth policy drafting. In several countries the process of defining eHealth policy involved a series of policy decisions, many of which were connected to broader Information Society policies (such as eEurope 2005, i2010). Ministries of Health have an important role, but main health policy players and eHealth policy players differ in about half of the countries.

The most common aims set out for eHealth policies are reforming the health care system and improving health care system performance for more efficiency and quality of care. Other aims are promoting quality of life and citizen centredness in care. Also better data for system management and better communication among stakeholders are expected from eHealth.

The most common eHealth tools suggested for promotion and financing through national or regional policies were the electronic health record or a patient summary, building the service network infrastructure or a national health information system, standards, cards and telemedicine. Five countries saw patient access to their own records as a tool to promote change. The practical content of "citizen-centred care" policies seems to be quite vague, with three out of ten countries with this policy priority suggesting access of patients to own health care records, while another four countries suggested providing eHealth services as tools to promote this policy.

Connecting with social care – International collaborations

Extending eHealth developments into the social care sector or independently developing e-inclusion, eWelfare or eSocial services is not yet a strong field, but possibly rising. In more than half of the countries some related policy or deployment activities were identified. Four cases of e-development that is specific to the social sector were found.

Twenty eight out of thirty one countries were involved in some kind of international collaboration. "eHealth society" contacts between different countries are active, but happen mostly on policy and exchange of experience level. There are several projects with practical aims, but no full deployment to routine practices was found. It is possible that more than what was identified is happening, since the method of information gathering used in this project may have missed health care provider-level operational collaboration in areas along countries' borders.

Dissemination

The main means that have been used for bringing the national/regional eHealth roadmap closer to the targeted stakeholder groups were expert meetings, group consultations and workshops and information on public web sites. Some mix of these activities was identified in two thirds of the countries. Public debate on eHealth issues was documented in five countries.

Investment and Reimbursement

There was information available on eHealth Services Reimbursement Status from half of the Member States. Reimbursement schemes that support acceptance of eHealth tools by individual service providers were still rare – these were identified in only five countries.

Structural funds and governments were mentioned as the main funding sources for the investments. Often, however, there were several funding sources. Joint funding within national and regional projects was acquired through federal and regional fund providers, the EU, the World Bank and ITU.

eHealth infrastructure

eHealth networks

From the material available to the eHealth ERA project it appears that in a total of thirty one countries, seven countries have opted for a dedicated eHealth network, and five more have plans to develop one, while another twelve have explicitly rejected the option of a dedicated network. For the remaining seven countries there was not sufficient information on this topic.

The approach of using VPNs over the public Internet networks appears to be the most common, also among countries that explicitly report not opting for a dedicated network solution. One of the reported problems in this case is that multiple eHealth VPNs may be operational within one country, but not necessarily able to interconnect or exchange information.

Broadband is perceived as the indispensable technological platform of the future - already well in use in several countries and fast-growing in others. In at least twelve out of thirty one countries there was information available concerning the utilization of broadband technologies in the healthcare domain, while in another two countries explicit plans to do so were reported. However, the absence of information on broadband may simply reflect the fact that a country already has a high broadband penetration rate; hence the presence of high capacity networks is perceived as a given and no special attention is given to the topic.

Administrative and management functions, as well as communication purposes appear to be strong drivers for the development and expansion of eHealth networks.

Regional eHealth networks are reported to be operational in fourteen out of thirty one countries, either as the present stage of development or as an explicitly intermediate step towards a national network. National networks are reported to be functional in fourteen countries, with another three countries having plans to establish one. A future trend with regard to eHealth networking is that of expansion to international networks, as explored on a pilot basis through the Baltic eHealth project.

Services provided at present over eHealth networks vary widely, depending on the overall progress in the country, even if longer term goals are quite similar. These services range from messaging and reimbursement claims to telemedicine, booking and consultation services and access to patient summaries or full patient records.

Access to and provision of information services also appears to be a major purpose of network use in the healthcare context.

Legislation

The most common and long-standing eHealth-relevant legislations in the Member States were those concerning data protection and telecommunications. Legislation on digital signatures was also already relatively common. Enactments were mainly from the 21st century. The most recent and still rarest legislation concerned eHealth services. Product liability legislation was not common.

Education and training on ICT

Education and training activities on ICT for the general population targeted basic computer use skills in most countries. The training was mainly integrated into school curricula. Some countries reported offering a specific ECDL "drivers licence" for the general population. There were also some countries where education programmes for special adult groups like the unemployed, women or teachers were identified. Among the incentives offered in order to enhance the ICT competence of the population were free computer skills courses, tax deduction for computer purchase, increasing public access to computers e.g. in schools and libraries and specific national programmes that implement Information Society policies. Courses or degrees in medical informatics were the most common, but still not widely deployed mechanism for professional training.

eHealth deployment

Electronic Patient Records

The identified main eHealth deployment areas were electronic patient/health records, patient identifiers, health portals, citizen card activities and telemedicine. With regard to the Electronic Patient Record there is substantial variability in development priorities between countries, with no clear common priority emerging. Some countries have interest in primary and hospital care communication or shared record; others develop life-long records. A minimum data set or patient summary for GPs or emergencies is the main topic in some countries, whereas online repository, conceptual, structured model, sub models or card-based access to data are the focus in others.

ePrescription

ePrescription activities were identified in less than half of the Member States, with nine countries having proceeded past the planning to production phase. The national repository-type solution (national database, portal, data warehouse or mailbox) was the most commonly applied architecture, while a card-based solution was deployed in three countries.

Health Cards – Patient Identification

There were two trends in citizen card activities: some countries concentrate on a general smart card which can also be used in authentication, access and signature purposes in health care services. Other countries were developing or had already deployed a health care -specific card, which in some countries was also intended to be used for storage of the card holder's medical information. The main purpose of health cards can be distinguished into developing a national insurance card or EHIC (the latter is at present deployed in 12 Member States), focusing on patient identification

and on identification of professionals, and in storing medical information on a card. No country focusing on all of these items was found. A few countries have three or four out of these five items in deployment, most countries active with cards have only one or two.

There appear to be two basic models of approaching patient identification: either a patient identifier unique to healthcare purposes or a national citizen identification number which is also utilized in the context of health (and sometimes also social) care services provision.

Health Portals

Citizen health portals varied with respect to their content in different Member States, the most common content being general health-related information, information on services and disease-specific information. Interactive communication services (e.g. questions and answers and appointments services) were also offered, while access to personal medical data was less common. Active eServices are therefore still rare. Portals for professionals and information portals on ministerial eHealth activities were also rather common.

Telemedicine

In regard to telemedicine activities there seem to be countries where the key motive for implementation is the need to increase accessibility of specialist services to remote areas or areas where some specialist services are scarce. On the other hand, in countries where specialist services are readily available throughout the country (e.g. in Germany), the deployment level of telemedicine is lower. Telemedicine activities are often conducted in regional rather than national level. Wide deployment in routine medical work was not as common as the presence of ongoing pilots.

Main conclusions: status vs. eHealth Action Plan targets

This comprehensive review of current eHealth status in Europe shows that considerable progress can be noted in the last five years in both policy and deployment. It is notable that the spectrum of policy aims and priorities is wide, and that there is also significant variation in terms of stages of deployment among EU countries. Clearly more items are in active deployment, than in active policy discussions. The number of items under active policy-level discussion tends to decrease over time, but the number of items in deployment rises. Items discussed on policy level often do not concern the same areas where active deployment is taking place. In examples like legislation, portals, identification, cards or telemedicine there is a lot of activity in many countries and in several of those countries the deployment is part of routine work or ongoing national projects. It seems that when decisions have been made the item is not a major "policy topic" anymore. The responsibilities have been transferred from policy makers to implementors.

Areas where policy priority is high but clear deployment can not yet be found are the national health information systems and constructing other national eHealth service network infrastructures. Electronic patient records and patient summaries seem to be a special case. No country without EPR policy priorities or deployment can be found, while 75 % of Member States have related ongoing activities both on the policy and the deployment levels.

The structure of health care systems varies greatly across EU Member States. This study suggests that certain features of health care system structure might have an effect in eHealth policy and deployment priorities. For example, our results indicate that building an integrated

national health information system is a higher priority in state-centred systems than in others. All insurance-based systems have patient identification and cards in deployment. In region-driven countries this is not such a strong priority. On the other hand, in region-driven countries the architectural choice for an eHealth service network with interoperable connections is favored more than an integrated information system. Promoting and deploying standards is a higher priority in groups other than the state-driven group, which is understandable since the use of standards is essential in multi-player systems.

The actions outlined in the eHealth Action plan of 2004 (SEC(2004)539) appear to have been adopted well, both in terms of the contents of eHealth policy documents and actual deployment. In countries where Action Plan ideas were incorporated to eHealth roadmaps from the year 2004 and onwards, deployment of new topics can not be expected to be well visible yet. The influence of the Action Plan 2004 on the implementation of eHealth should be examined again in 2009 or later.

From the information gathered in the framework of the eHealth ERA project several positive developments can be identified. The **leadership** of Health authorities is strong. Ministries of Health have been the main players in drafting road maps and corresponding eHealth policy documents, however eHealth is a wider issue. No country was found where the Ministries of Health would have acted alone. **Interoperability** of health information systems is high on the policy agenda of many countries; however, this is a new emerging development since fewer countries are active on the deployment level. A clear majority of countries reported on using or developing cards for **citizen/patient identification**. **Electronic patient records** emerge as a case of special interest in eHealth because all Member States have ongoing deployment activities in this field, at least on the level of planning and because of its simultaneous presence in both policy priorities and deployment activities. Using eHealth tools for **informing patients and professionals on health issues and disease prevention** is well noted and either implemented or under development in the majority of Member States. Twenty two out of twenty seven Member States have already implemented **health cards** or have launched their introduction.

Some of the actions outlined in the Action Plan require special attention. There seems to be a rather common understanding that developing semantic interoperability of electronic patient documentation, patient summaries, and cards can lead to new innovations that promote **mobility of patients and professionals**. At present, however, major international collaboration in treating patients was not identified with the exception of some ongoing projects. With regard to **enhancing infrastructure and technologies** it can be noted that work towards **integrated health information networks** is well underway, but issues of interoperability and interconnecting networks still need further development. Implementation of solutions which do not support interconnection was identified in many countries. Existing schemes for **conformity testing or accreditation** of EPR systems and related applications seem to be operational in only a few countries, but emerging plans for their introduction were identified. When looking at **leveraging investments in eHealth**, no unified picture can be drawn. Funding is many times national. International funding comes from a variety of sources that differ on a case by case basis. **Legislation** on data protection and privacy is well developed, but other eHealth legislation is still under development or not existing at all in the majority of Member States.

1 REPORT BACKGROUND

1.1 Introduction and aims of the work

The eHealth ERA project strived to respond to the EU Member States' need for increased coordination of national innovation-oriented eHealth planning and road-mapping, as well as for stimulation of bilateral and multilateral joint activities. Key means to ensure that the true priorities and needs of Member States have been served throughout the lifecycle of this project have been the interaction and communication with the project's Coordination Committee formed by representatives of Member States, as well as communication with other stakeholder groups.

A prerequisite for coordination is increased transparency concerning current priorities and relevant structures existing within each Member and related State. This requirement was addressed in the eHealth ERA project, by producing an overview of the current and future situation and trends in eHealth. This knowledge, in turn, can support strategic planning and decision making on the level of eHealth policy, deployment and RTD-oriented activities. In addition, the aim of the project was to supply the European Commission with valuable information as regards the progress achieved in the implementation and follow-up of the eHealth Action Plan, as well as with possible necessary modifications or adjustments required in order to optimize EU-wide co-ordination of activities.

The ultimate objective of the project was to support the development of a European Research Area for eHealth by finding answers to two key questions:
1) What should be done in order to achieve a European Research and Development Area for eHealth?
2) What should *not* be done if we are to avoid failures?

As eHealth deployment is progressing from the local and regional to the national and cross-country level, there is a need for increased co-ordination of plans and actions. EU research and development in ICTs in healthcare and more specifically in eHealth has shown a consistent growth for over a decade. The scale of investments is too large to risk major failures; therefore it is imperative to utilize already existing experience. In order to to propose the necessary future steps towards achieving an effective and productive European research and development area for eHealth, we first have to better understand the ongoing policy and development issues in the respective countries and in their collaboration. This has been done by collecting and analyzing a broad range of currently available material.

1.2 Methodology

The present report describes the status of eHealth policy making, and the eHealth deployment situation across the European Union at the end of 2006. A significant part of the work undertaken by the eHealth ERA project concerned the identification and collection of materials in a structured and as much as possible standardized manner across a total of thirty one countries – the EU27 and the EEA, Accession and special status countries (the list of the countries and the abbreviations used are provided in Table 1).

TABLE 1. Countries included in the report and their abbreviations as given in ISO 3166-1 and the corresponding ISO 3166-1-alpha-2 code elements									
Austria	AT	Finland	FI	Italy	IT	Poland	PL	Switzerland	CH
Belgium	BE	France	FR	Latvia	LV	Portugal	PO	Turkey	TR
Bulgaria	BG	Germany	DE	Lithuania	LT	Romania	RO	United Kingdom	UK
Cyprus	CY	Greece	GR	Luxemburg	LU	Slovakia	SK		
Czech	CZ	Hungary	HU	Malta	MT	Slovenia	SI		
Denmark	DK	Iceland	IS	Nederland	NL	Spain	ES		
Estonia	EE	Ireland	IE	Norway	NO	Sweden	SE		

eHealth activities were approached through information and data collection from existing documents, as well as additional (often unpublished) information provided by Member State representatives to the EC eHealth Working Group. The tool that served as the backbone of this structured data collection activity is the Information Gathering Template developed by STAKES and accepted by project partners (7, also availabe as ANNEX 1).

The Information Gathering Template provided the basic structure of the information to be collected, combined with guidance as to how information gathering should be performed and documented. The first draft of the Template was tested by project members in an 'exercise' with data collection concerning each partner's own country. Final adjustments to the Template were made on the basis of the feedback received through this experience.

Due to the sheer volume of material to be identified, processed and analyzed and the restricted time available for the task, the project group operated on the basis of Country Clusters. Each project partner has had the main responsibility of data collection and reporting for a 'cluster' of five to six countries (the allocation of countries can be seen in the list of contributors, provided in the Acknowledgements section). The corresponding partners have collected and synthesized relevant information and data, covering the areas described in the Information Gathering Template. They have also exchanged information on additional information sources and material they may have had available concerning countries which were not under their direct responsibility.

The collection, analysis and synthesis of data was first performed on national (and, where necessary, regional) level. On the basis of the information gathered, each partner produced Country-specific reports. This was done in close collaboration with the Member State representatives (to the eHealth, and subsequently i2010 expert groups of the EC) and other Member State contacts. A summary of the key findings per country, enhanced with latest information available on policy plans were extracted in the form of Fact Sheets and published as a report ("eHealth priorities and strategies in European countries") in March 2007 (8). All Fact Sheets, as well as several of the Country Reports were validated for their accuracy by Member State representatives.

The analysis of the material was performed in the form of an evaluation study. Identifying commonalities among Member States has been achieved by looking for answers to the following questions:

1) *How common are certain themes in eHealth policy setting and deployment?*
   How many countries have set these topics as priorities, have already worked or are currently working on them? How large and how significant projects have been undertaken on these topics?

   The result of this analysis was an overview of main themes or topics. Two of the main topics were selected for closer study: Patient Summaries and Patient Empowerment. The resulting reports (9, 10) formed the background material for a SWOT analysis (11).

2)   *Are Member States doing the right things in order to progress towards, as well as promote the European eHealth Research Area?*
     The difficulty in this task lies in defining the criteria on the basis of which a course of action is deemed 'right' or not. The approach chosen has been to use the eHealth Action Plan as the starting point and extract the main targets set forth for both Member States, as well as the EC. Then the analysis has proceeded by identifying two different sorts of activities:
     1)   How much and what type of development is going on *related* to each of the set targets;
     2)   How much and what type of research and development is going on *beyond the scope of* the Action Plan targets? The latter information was planned to assist in identifying innovative trends and pointing out areas of divergence between the proposed eHealth Action Plan and national level activities.

The information available on each topic from each country's Template was extracted and organised in thematic tables, or so-called Data Boxes (to distinguish them from the Tables accompanying the text of the report). Essentially, each Data Box contains all the information available across the studied countries on a given topic (e.g. on eHealth networks or health cards), with reference markings included. (For researchers interested in this data, the Data Boxes are available upon request from the report's authors).

All available information on the studied countries was explored through qualitative content analysis methods, utilizing the structure of the Information Gathering Template. The related analysis and reporting work was divided among team members as follows: Päivi Hämäläinen was responsible for chapters 2 through 7, 10 and 11; Persephone Doupi for sub-chapters 8.1 and 9.1; and Persephone Doupi and Hannele Hyppönen for sub-chapters 8.2, 8.3 and 9.2–9.8. Typologies and simple tables for frequencies, graphs and basic descriptive statistics have been produced wherever possible to reflect the overall picture by using the SPSS and Excel programs. After completion of the eHealth ERA project, and in the process of preparing the present publication, all the report's background material and related analysis were reviewed anew and when necessary updated and revised accordingly.

Challenges and shortcomings

During the processes of data collection and analysis, we encountered repeatedly the known problem of conceptual inconsistency that often accompanies eHealth documentation: variable terminology was used for describing the same things, and conversely, the same term was used to describe rather different things. To address this issue as best as possible, future data gathering and analysis activities should be accompanied by a commonly agreed, predefined glossary of terms. Also, the instructions to those undertaking data collection locally should be as specific as possible.

Collecting the material necessary for drawing a European-level picture is a massive and quite time consuming task. Completed Information Gathering Templates and/or country reports were not made available on all countries before the end of June 2007. Even so, it has not been possible to get an adequate amount of reliable information for analysis from all countries. As a result, the research team responsible for synthesis and analysis of the material in this final report has needed to undertake additional literature search to fill some major gaps.

In order to promote transparency and give readers of the report the possibility to make their own judgements on the quality of background information used for each country, the Information Gathering Template required that references are provided separately for each sub-section or field of the Template. Since this approach was not consistently followed by all data collection teams, we were only able to provide the list of references available to us for each country studied, without

linking references to the report's text. The reference list does, however, give the reader of this document the possibility to further explore additional country-specific information.

eHealth, both on the policy and on the implementation level is an area constantly in motion, therefore any mapping exercise will only partly capture the situation at any given point. Nevertheless, for purposes of comparability, defining a cut-off point in the data collection process is an absolute must. In the case of this report, that point is the end of 2006. Still, and even precisely because of the volatility of the domain, regular updates on the status of eHealth are quite useful checkpoints. The involvement of local experts both in the identification and in the reporting of regional and national developments is an invaluable component of success in this undertaking.

2   BASIC FACTS AND FEATURES OF HEALTHCARE SYSTEMS AND GENERAL HEALTH POLICIES

eHealth can not be analysed in a vacuum because it happens within the context of the health care system of each country. However, it has not been systematically analysed how much the overall features of the health care system affect the way eHealth roadmaps are drafted and deployed. To have a better understanding of the phenomenon, some information on the basic facts and features of each country's health care system was collected. The comparative analysis of national and regional health systems was subsequently utilized in the analysis of eHealth policies and deployment. The resulting background information was used to support the general understanding of the special features of each country and to try and answer the question on the relationships between the health care system in general, and the "eHealth story" of each country. The aim was to try and identify possible general features and trends, with the emphasis on identifying factors with impact on eHealth (such as the financing and organisational structure of each healthcare system), as well as those most likely to have an effect on eHealth deployment.

The information on the main features of the health care systems was collected, as all the material for this analysis, by structured questions on the Information Gathering Template. For the purpose of this study only the most prominent features in the health care system(s) could be described. In many countries the systems are so complex and mixed, that some simplification had to be done during the analysis. The information on each country was analysed by qualitative methods and on the basis of the typologies of main features in the health care systems, as they emerged from the material. With a set of typologies it is possible to group the countries accordingly and identify possible general trends reflected in eHealth policy and deployment. The findings are provided in Chapter 10.

In all European countries the basic framework of the health care system is built on parliamentary legislation processes and state budgets that are put forward by each government or legally structured insurance schemes with a stable financial framework. Some of the countries are federal and the role of the legislator is largely given to the regions. The decision making power in the different levels of implementation varies greatly according to both differences in the formulation of the state itself and also differences in the organisation of the health care system. The Ministry of Health (MoH) alone or as a joint ministry that also attends to social services or other tasks, has usually the main responsibility on the strategic steering of national health policies. It is the clear main decision making level in nineteen (16+3) out of thirty one (27+4) countries. In two countries health care and social security issues are under the responsibility of different ministers that formulate health policies together. In six countries the government or the Prime Minister's office works closely together with the MoH in formulating health policies. In four federally structured countries the federal council or ministry shares health care policy making powers with the regions.

The MoH and/or other authorities that participate directly in the work of the acting government rarely have the full power in health care policies. In half of the Member States and also in other i2010 active countries, the regional states, regions and/or municipal health care authorities play a role in health care policies. In many countries their role is strong and given by legislation. In over half of the countries the social security or national level insurance institutions have a clear role as well. In one third of the countries medical boards and councils are important players and in one fourth of the countries different governmental institutions participate in policy formulation.

There is great variation among the health care delivery systems of European countries. In all countries the main funding source of the health care system is the society; either by taxation or through obligatory insurance payments, but patients also participate directly with varying proportions of out-of-pocket payments. The state, Ministry of Health and other ministries, insurance institutions themselves, regions, local authorities and private profit and non-profit organisations may all act as health care providers or also health care service purchasers. Some countries have a purchaser-provider split, some do not. The overall picture tells that in most countries the roles and ownership of providers and the roles of purchasers are complicated and usually mixed. Many countries have gone through health care system reforms and have different historical layers in their systems.

Most countries have several different parallel systems in operation (like private and public systems, insurance schemes and directly tax-funded services). When health care system features are used in comparative analysis, it is important to identify the components of health care systems. A health care system may be defined as the combination of health care institutions, supporting human resources, financing mechanisms, information systems, organizational structures that link institutions to resources, management structures that collectively culminate in the delivery of health service to patients.[3]

To better understand the relationships between the specific characteristics of eHealth and a country's health care delivery system in general, some main components and features of the systems have been identified. The features that were systematically collected from all countries are:

1) The overall structure of the state, central or federal;
2) The main decision making level for health care policy in the country and other players involved;
3) the main structural features of the health care service system and service provision.

Information on national level health care policy goals and trends and information on major national general health care policy programmes was also collected. This material was somewhat difficult to collect for some of the countries. The main types of health policies and projects were identified, but the available information does not give a full coverage on all countries. Two main groups were identified, those having a wide public health and well-being policy, usually with WHO/HFA influence, and those where the main emphasis is on the functionality/ financing or reform of the health care service system.

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3   Lassey M, Lassey W, Jinks, M. Health Care Systems Around the World, characteristics, issues, reforms. Prentice Hall, New Jersey 1997.

3   STRATEGIC eHEALTH PLANS/POLICY MEASURES

3.1 National-regional eHealth policy documents

To identify the contents and the history of national and/or regional eHealth policies of the countries of interest, all policy-relevant documents available were identified. These documents appeared under different titles such as: strategy, programme, roadmap, implementation plan, national action plan etc. Some were drafted as part of a wider Information Society programme. The level of validation of the policy documents were: government level, ministry/ministries, or other national level decision making authorities. Also major state-level documents of federal countries or regional documents were accepted in the analysis. Some policy documents were drafted by different interest groups, but were accepted in the analysis only if the group had been established by national/ major regional authorities. The time when documents went public or were accepted in policy processes was identified. Several countries had a long history of "eHealth policy processes". Information on dates of previous documents was registered, but the contents analysis was made on the latest valid policy contents. The time frame of the development of eHealth policy documents is shown in Table 2. At the end of 2006, two countries had documents still under preparation. Twenty five out of twent seven Member States and all four affiliated countries were identified as having a documented policy on eHealth. Some countries were also in the process of updating their eHealth policy documents.

In almost half of the countries the eHealth road map/action plan or other national level eHealth policy document has been drafted as part of a national broader Information Society programme. Many have links to EU-level eGovernment, eEurope and i2010 Information Society programmes. E-health was identified as part of an Information Society programme in twelve Member States and two additional eHealth i2010 sub-group countries. In three Member States the eHealth policy was an integrated and important part of a national health care reform/ reconstruction programme. In all three countries there was also an ongoing Information Society programme which included eHealth visions, so the policy development arose simultaneously from two different backgrounds. In fifteen (13+2) countries the eHealth policy was more of a "stand alone" policy process.

3.2 Main actors shaping regional – national eHealth policy and drafting related policy documents

The Ministry of Health is the major player in defining eHealth policies. This is the case in twenty seven (25+2) out of thirty one (27+4) countries. In the remaining countries the MoH is also a significant player, but the Prime Minister's office, the Ministry of Informatics or the Federal Council are the leading players. It is important to note that in twelve (10+2) countries the highest ministerial level in charge of formulating general health policies and eHealth policies is not the same. The Ministries of Health have the main or clear influence in all cases, but the influence of Prime Ministers' offices and other policy level actors of telecommunication or information, industry, finance, trade and internal affairs is stronger in eHealth than in other health care affairs.

In eight countries where the Ministry of Health is leading or coordinating the activities, yet another ministry or similar organisation is involved. (Government itself, Prime Minister's office, State Ministries of Health in a federal country, Ministry of Investment, Industry and IT,

TABLE 2. Time trends in eHealth policy documents' development				
	1995–1997	**1998–2000**	**2001–2003**	**2004–2006**
I European Union Member States				
Austria				▪
Belgium				*
Bulgaria				▪
Cyprus				▪
Czech Republic			▪	▪
Denmark	▪	▪	▪	▪
Estonia				▪
Finland	▪	▪	▪	▪
France		▪	▪	▪
Germany		▪	▪	▪
Greece			▪	▪
Hungary			▪	▪
Ireland				▪
Italy				▪
Latvia				▪
Lithuania				▪
Luxembourg				▪
Malta				▪
Netherlands				▪
Poland				▪
Portugal				▪
Romania				**
Slovakia			▪	▪
Slovenia				▪
Spain				▪
Sweden				▪
United Kingdom		▪	▪	▪
II Further countries represented in the i2010 Subgroup on eHealth				
Iceland				▪
Norway	▪		▪	▪
Switzerland				▪
Turkey			▪	▪

* Legislation, note for the Council on be-health platform and regional documents exist.
** Under preparation since 2005, developed as part of an eGovernment strategy.

Ministry of Industry, Tourism and Trade and The Secretariat of Electronic Government Affairs). Two or more ministries are involved in seven countries (such as ministries of social security, interior, communication, work, economy and finance, justice, innovation and technologies, infrastructure, education, transport and telecommunication and industry; also the government, and state secretaries or commissioners of administration, computers, information society and economic planning) and other players like Interministerial conferences and permanent State-Region committees. The National Board of Health, foundations, Insurance institutions and health care providers are also mentioned as participants in the policy formulating level.

3.3 Other key players involved in drafting eHealth policy and working in the roadmap 'implementation chain'

Ministries of Health have been the main players in drafting road maps and corresponding eHealth policy documents but no country was found where the MoH would have acted alone. Other ministries mentioned in Chapter 3.2 participated accordingly. Three countries had nominated an eHealth Initiative or working group where active roles during the drafting of documents had been given to a wider representation of different stakeholders in the society. Different governmental boards or institutions were participating in seven countries; regional and/or local (municipal) representation was involved in four, insurance institutions in one, health care providers in two, competence centres in three and a standardisation organisation in one country.

Identifying "the implementation chains" was found to be somewhat difficult. There was not enough information on this issue collected in the data collection templates and more work had to be done to identify these mechanisms. This is a very important aspect when analyzing the relationships of the policies and the deployment situation in the countries.

The types and numbers of players involved varied somewhat. Health care providers and different governmental institutions and agencies are most often participating. Also competence centres, insurance, regions and local authorities are usually included. The number of players in the "implementation chain" ranged from one to eight players, with an average of four players. All types of stakeholders identified are listed in Table 3.

TABLE 3 eHealth implementation chain participators in Member States + other i2010 active countries	
eHealth implementation chain participator	no.
Health care providers	15+1
State institutions or agencies	11
Compentece centres or similar	10+1
Social security funds, Insurance institutions	9+2
Regions and/or States of federal countries	9+2
Municipalities/local authorities	8+1
Professionals	6
Working group, councils, commission, board for eHealth	6+1
Universities public research centres	2+1
Standardisation organisations	2
National Board of Health	1
National ICT Directorate	1

3.4 Main strategic targets of national or regional eHealth roadmaps

It has been difficult to identify which of the policies and actions of governments and ministries can be perceived as constituting specific eHealth road maps. For the purposes of this analysis the information on all the policy level planning for promoting different aspects of eHealth has been extracted from the information collected on each country to identify the respective policy level scope of interest. The reliability of this information has been strengthened in cases where representatives of each country have given feedback, especially through the validation of the country-specific content of the publication "eHealth priorities and strategies in European

countries". Also, in some cases, the policy content was checked by going through the original policy documents as well. In all countries included in the study we were able to identify eHealth strategies or other defined eHealth policies. Not all countries had official eHealth policy documents; but those without, had documents under development or other forms of ongoing documented national level eHealth discussions. The analysis on eHealth policies was performed on the basis of the content of these documents.

The "why" and the "what" of eHealth policies

The content of the policies is first described through the general aims of these policies, answering the question "why does this country want to enhance/promote usage of ICT in health care". Subsequently, the content is analysed from the point of view of tools named in each policy; in other words how each country wants/intends to promote eHealth through specific actions or measures. In many cases the general topics of policies may be similar, but the actual specific targets and other important aspects differ greatly when looking at the details of meanings. The analysis presented in this report gives an overview of the main active areas, but an in depth, detailed analysis of different variations within all topics would require future research.

It should also be understood that in several countries there is a lot of expert level interest and activity to promote eHealth, and also that industrial parties, standardization organisations and health service providers may promote and implement different eHealth activities in spite of the fact that these are not stated in the government level policies. Governments commonly take up issues on their policy level discussions only when they see a need to promote them with special actions such as funding, legislation or special programmes.

No single motivation forimplementing eHealth was found that would be common to all countries. Out of the twenty seven Member States plus four other status countries, the most commonly stated targets were: efficiency (11+1), improving or reforming the health care system (10+2) and improving quality of care (10+2), and promoting citizen/patient centred services (10+1). In several countries enhancement of eHealth is part of a wider health care service system reform.

It is possible to group the different policy targets to subgroups that reflect the differences in the aims and the expectations of the benefits eHealth will bring to the country. These issues are overlapping and are not fully independent of each other. Table 4 shows a more detailed grouping of eHealth policy targets:

The main groups are:
1. Improving the health care system for more efficiency; getting more, or better, services for less funding or the same price/cost;
2. Improving the health care system to have better quality and safety of care, effectiveness and better health outcomes;
3. Changing the role of the patient/citizen towards an active partner/driver of the health care system;
4. Improving governance and managerial capabilities and having more authority control on the developments of health care system performance and structural changes;
5. Improving governance, managerial capabilities for better authority control on developments of public health (infections, usage pattern of medications, tobacco, alcohol and drug abuse etc.);

6. Improving access to information to be able to act on an "informed basis" as a citizen, professional, administrator or policy maker. The topic of informed choice, evidence based medicine, evidence based management and policy;
7. Promoting innovations and ICT-development and markets for economic growth.

TABLE 4. Why eHealth?	
Policy target	**MS and other**
IMPROVE, REFORM HEALTH CARE SERVICE SYSTEM	10+2
COST CONTROLL	7
EFFICIENCY	11+1
EFFECTIVENESS	5
ACCESS TO CARE	7
QUALITY OF CARE	10+2
PATIENT SAFETY	3
HEALTH PREVENTION AND PROMOTION, IMPROVING PUBLIC HEALTH STATUS, WELFARE	3
QUALITY OF LIFE	7+1
EQUITY	3
CITIZEN ORIENTED, PATIENT CENTERED CARE	10+1
PATIENT/CITIZEN ACCESS TO INFORMATION ON HEALTH CARE AND SERVICES	5+2
USER (PATIENT) SATISFACTION WITH SERVICES	1
PATIENT MOBILITY	2
PATIENT PARTICIPATION, PATIENT EMPOWERMENT	5
INFORMATION ON HEALTH ISSUES TO THE PUBLIC	5+1
ACCESS TO INFORMATION, DECISION SUPPORT, PROFESSIONALS	4
IMPROVE PROFESSIONAL TRAINING	2
REMOTE AND RURAL AREAS SERVICE IMPROVEMENT	2+1
IMPROVE COMMUNICATION BETWEEN ORGANISATIONS	7+2
SEAMLESS, INTEGRATED CARE	4
REORGANISE ADMINISTRATIVE STRUCTURES	2
DATA FOR MANAGERS, FOR HEALTH CARE AUTHORITIES	9
MONITORING, SURVEILLANCE OF THE HEALTH CARE SYSTEM AND HEALTH STATUS	5
IMPROVEMENT OF DATA EXCHANGE WITHIN OR FOR THE MANAGEMENT AUTHORITY SECTOR	4
QUALITY OF MANAGEMENT	2
ACESS TO INFORMATION, DECISION SUPPORT (NOT SPECIFIED FOR WHOM)	4
IMPROVE ECONOMY VIA E-HEALTH TECHNOLOGY	6
OTHER: to serve the needs of healthcare professionals, improve quality of services of health insurance system, closer to home services, improving hospitals, better quality of information systems, harmonisation of e-health and e-government developments (one country for each topic)	6

When selecting the kind of eHealth innovations that should be used in order to reach the targets set in eHealth policies, the most common tool was the development of an electronic health record or, as the first step in some countries, the creation of a patient summary or a minimum data set for recording patient information. One or several of these tools were included in eHealth policies of twenty four (20+4) out of thirty one (27+4) countries. Building an infrastructure or network for eHealth and/or a national health information system were also common choices (24+4/27+4). Picture 1 shows the deployment tools that had been chosen on the policy level in at least five Member States. A large variety of tools mentioned on policy level documents were identified. It seems that not only the policy targets, but also the chosen tools promoted as main eHealth issues have a great variation among the countries.
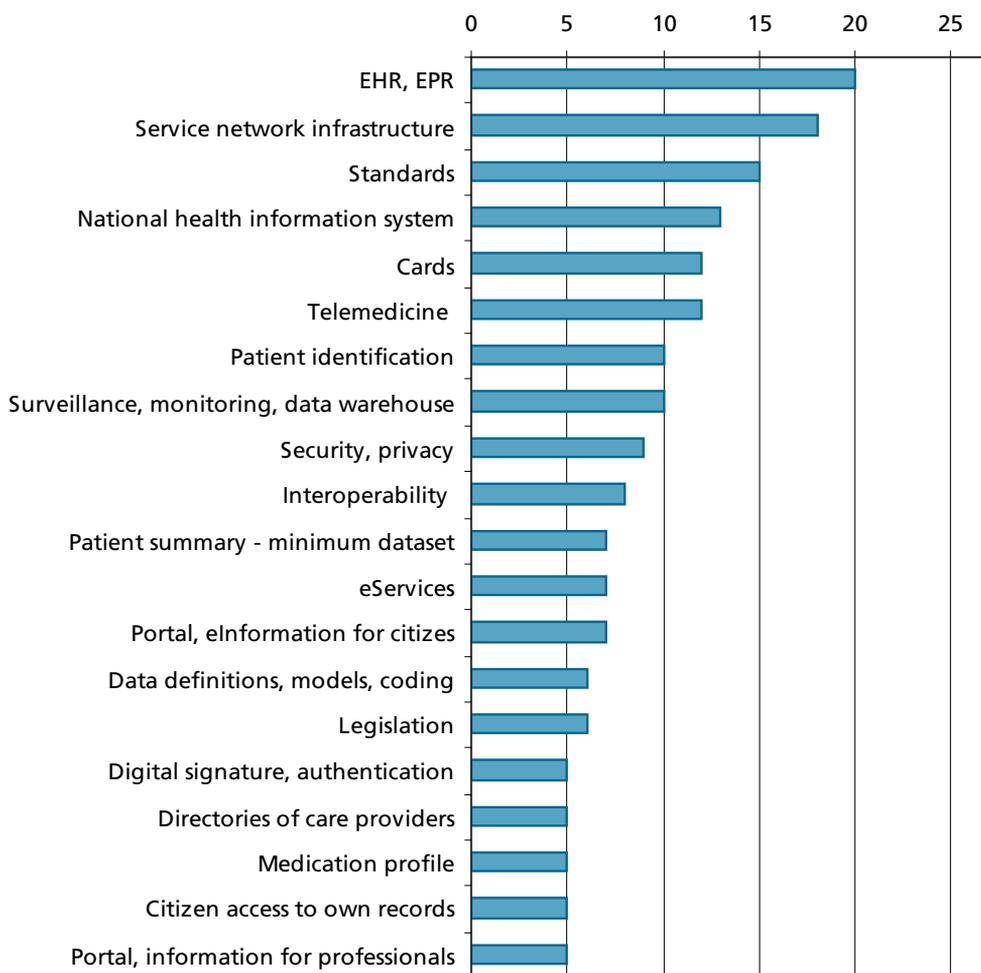
FIGURE 1. Tools in eHealth policies of the EU-27

Countries seem to perceive that enhancing different ways of electronic communication between different health care system players will improve the efficiency of the health care system. The main tool for achieving this goal is building an eHealth infrastructure. Policy documents do not describe the architectural specifications of their ideas or plans. Descriptions that can be grouped under the title "*eHealth service network infrastructure*" were found in twenty one (18+3) countries. Examples of descriptions are presented in Figure 2. *"A national health information system"* was described in the plans of fourteen (13+1) countries. Seven countries with descriptions of an eHealth service network had also plans to build a national heath information system, eleven countries discussed the network only and six countries used only the term "national health information system".

There seems to be an important architectural difference between these plans. The network infrastructure seems to rely more on different kinds of connections between organisations or regional solutions, while the national information system appears to be a more integrated system with more central state control and funding.

- an eHealth backbone infrastructure, information network connecting points of care
- better communication of organisations
- countrywide integral network of interoperable eHealth services
- integration of secondary and primary care services and a nationwide interoperability between legacy systems
- a national interoperability framework to enable organisations to seamlessly access and share health related information
- linkage and connections between health care institutions
- information technology infrastructure in healthcare institutions with a system of communication between facilities
- linking of existing information system islands and establishing a basic informatics infrastructure,
- common technical infrastructure and facilitating interoperable ICT systems like networks
- effective electronic communication and connecting GPs to a network and a broadband network infrastructure
- medical information of patients available to all doctors / clinical information available any time anywhere

- integrated information system
- integrated information environment
- health care information support system
- integrated health information system
- a national health information system
- regional integrated health information systems
- a national health care information system to share clinical data,
- eHealth information system
- national public health portal supporting integrated healthcare and sharing patient information
- the national infrastructure for health care with a national switchpoint
- information system of the public and private health insurance, care providers and other stakeholders
- a national healthcare information system, integrated IT infrastructure and system for all organisations

FIGURE 2. Text boxes with examples of descriptions of an *"eHealth service network infrastructure"* and a *"national health information system"*, as presented in national/regional eHealth strategies

A third type of an information system was also identified. This type was not planned for exchange of patient information during care processes. In some countries the need to follow the effectiveness of the health care system was mentioned, in others the need to build systems for public health surveillance. Ten Member States were planning a national information system of the authorities for monitoring, surveillance and statistical data warehouse functions. Four countries intended to utilize the same "information system" for addressing the needs of both health care provider organisations and authorities. Four countries discussed building a network service structure and the monitoring system for the authorities. Two countries used policy wordings of all three types in their plans; service networking, a national information system and a monitoring system.

The conclusion from this analysis is that European countries have different ideas on the type of architectures they are planning to implement and the sort of functionalities they are expecting from building structures for electronic information exchange between stakeholders. It is also possible that in some countries the more detailed ideas are not yet very mature. In a few countries some details of their plans were reported such as; systems for archiving, hospital information systems, communication between health care providers and the health insurance system, modular structure, exchange of data between registers and authority, linking ambulances to hospitals, promoting messages transmission. Four countries mentioned that they planned joint networks for health and social care.

An interoperable, common structure of the information and relevant useful content in the information that is exchanged electronically between organisations are seen by many countries as essential elements for both the functionality of the system and the quality and safety of care.

Standardisation is mentioned as a topic in sixteen (15+1) countries. The more general concept of interoperability is discussed in the policy documents of eight Member States. More detailed discussion of this topic was also found. Eight countries were reported as working on aspects of health data concepts, such as coding, classifications, clinical terminology, data models and dictionaries of clinical terms. Three countries discussed semantic interoperability.

Developing the electronic patient record or electronic health record is seen as the most powerful tool in driving change in health care system performance. Twent four (20+4) countries are working on the issue. Seven countries out of them perceive that developing a patient summary or a minimum data set is the first step towards sharing patient information among health care providers. Developing a medication record is also seen as an urgent priority. Other early steps mentioned are: GP-records, child health records and records for diabetics. Sharing laboratory results and images can also be included in this category.

ePrescriptions and telemedicine are most commonly mentioned as specific important tools. Eleven (10+1) countries have electronic prescriptions on their eHealth policy agenda and fourteen (12+2) countries plan to promote telemedicine. These plans include "promoting telemedicine" or "building telemedicine services". A common feature to all of the fourteen plans was that no details on the content of telemedicine services were mentioned. From policy documents it is not possible to draw any conclusions on the kind of services that are planned.

Security, privacy and legal aspects are discussed in several policies. Seven (6+1) countries mention plans to develop their legislation. Issues like "legal existence of an eHealth platform, new legal regulations, legislative intervention, legal environments, new rules of law, making laws and regulations into line with extended use of ICT" were mentioned. Security and privacy (including confidentiality and data protection) are mentioned as an important issue in the policy documents of twelve (9+3) countries. Main tools for supporting security and privacy are patient consent and cards. Cards and the systems built around them are used for identification of patients and professionals and for providing electronic signatures, authentication and authorization. Thirteen (12+1) countries mention cards in their policies. Cards are not used only as privacy and security tools, but also to support services. They may contain health information or information on the insurance status of the patient.

Citizen-centred care is high on the policy agenda of several countries. Five countries mention plans to give patients access to their own patient records. Planning other practical eHealth tools for supporting the citizen in their central role are not yet well developed. Reports of eight (7+1) countries mention them. Plans are described as: "eCare, eServices, providing health care services electronically and online, telecare or services easily accessible to citizens". Few plans are more detailed like: "telemonitoring, online services for communication with a doctor via internet and mobile or continuous monitoring of chronic illness". Providing information on health issues and health care services is also a tool, but it is not mentioned in many policy documents. Information to citizens is mentioned by seven (3+4), online information about health care services by two, and health information portal for citizens by two countries. Some other eHealth tools for citizens were also mentioned, such as promoting freedom of choice (1), notifications and reminders by SMS to patients (1), use of ICT at home (2), care closer to home (2), and booking appointments electronically (1). Two countries promise their citizens electronic application forms for access to services etc.

Supporting professionals in their work is seen as a tool for efficiency, effectiveness, quality and safety. Portals or other means promoting improved access to information resources are mentioned in policy documents of five countries. Decision support is mentioned for four countries, electronic booking services where GPs can book their patients into specialised care are mentioned for two countries. Aspects of professional education such as medical informatics programmes, incorporating ICT training in to educational curricula and making health care professionals

more skillfull in using ICT, as well as distance learning (education, training and research, better learning) were reported for six countries. Providing Internet connections, hardware and software to care providers was a policy level issue in four countries.

Some other issues are also mentioned. Directories of care providers and/or professionals are mentioned for five countries, but it was not possible to identify if they were to be used as a part of the national eHealth architecture or whether they were meant to serve the public. Issues like evaluation criteria for eHealth applications or certification of applications were mentioned for four countries. Some issues mentioned by one country only have not been included in this report.

The practical content of "citizen-centred care" policy seems to be the vaguest aspect. Ten (10) countries had citizen-centeredness as one of the priorities in their eHealth policies, but only three of them suggested access to own health care records, and another three the provision of eHealth services, as tools to promote this policy.

4   SPECIAL FOCUS: SOCIAL CARE

Extending eHealth developments in to the social care sector or developing e-inclusion, eWelfare or eSocial services independently is not a strong field yet, but possibly rising. Some mention of this topic was found in the documentation of eighteen (16+2) countries . Social sector is included in the eHealth roadmaps or other policy documents of five Member States, but in several of them no specific plans on practical deployment were mentioned.

e-Inclusion-type plans seem to be present in the eHealth plans that have been developed as part of a larger Information Society programme. Two countries mentioned plans such as web access to the visually impaired and deaf, Internet Assistance Portal for Disabled People, Internet portal for people with special needs and an information system or Internet portal for handicapped people. Two other countries had more general plans for Internet access to welfare information and services by citizens. Four countries had included the social sector in the development of health care /social security cards and planned card usage also for some services of the social sector.

The most common area for participation of the social sector was the field of home care and services to the elderly. Seven countries were identified as active in this field. The usual aim of the plans or projects was promoting communication and cooperation between health and social care professionals. In this area there was ongoing activity that was more than plans, however the projects seem to be of a rather small scale.

Several examples can be mentioned. Electronic use of the Residence Assessment Instrument (RAI) as a first case of multi-disciplinary work and shared electronic health records will include social workers in Belgium. Cyprus is piloting a home care service system with a virtual team for cancer patients. Unified health records that embrace health and social care are under development in Sweden. Other countries also discussed plans to connect social security and healthcare services or implement eWelfare services, but practical examples were not given.

Four cases of e-development that is specific for the social sector were identified. There is a pilot in Belgium on electronic management of handicapped persons' benefit scheme. In England some work has been taking place on the development of an electronic social care record. In the "Every Child Matters" strategy of England, work for the IT implications of the programme is ongoing. The Dutch government has launched the Nationwide Action Plan for Social Sectors and ICT (2005–2009). Finland has had an ICT project for the social sector ongoing since 2003. Handling of social service customer documents was included in the new eHealth legislation that was approved by the parliament in late 2006.

In Norway, (one of the i2010 active countries, even though not a Member State), extension of eHealth implementation to social care is a major policy initiative. Continuity of care is the target. Exchange of information between health and social care is included in the roadmap, and deployment is in the planning phase. Iceland has explored the possibilities for handicapped persons to use ICT in their communications with the health sector.

5   SPECIAL FOCUS: INTERNATIONAL COLLABORATIONS

Twenty eight out of thirty one countries were identified as having some international collaboration in planning or deployment in the field of eHealth. Several countries were active in many projects, but operational collaboration in eHealth deployment is still rare. In two cases the collaboration concerned policy liaising or harmonisation discussions on the policy level. Three networks where the main focus was sharing of experiences were identified. Practical developments were enhanced in Baltic eHealth which was a project that aimed in building networks for communication and exchange of real health care services. Other practical level examples found were a project for cross country authentification of professionals, two projects around social security insurance co-operation and international use of the electronic EHIC (Net@cards and Belgium-Netherlands-Germany cooperation) and two examples of projects on patient data exchange between health care providers of different countries.

Other types of collaboration identified were work around EPR development in three cases, and standardization and interoperability or prototype development in another three. Romania and Italy had collaboration in professional education.

The main result from the available data is that the "eHealth society" contacts between different countries are active, but happen mostly on the level of policy and exchange of experience. There are several projects with practical aims, but no full deployment to the level of routine practice was found. It is possible that more than what was identified is happening since the method of information gathering used in this project may have missed health care provider-level operational collaboration in country border areas. International collaboration in the framework of the EU i2010 Health subgroup and other EU working groups and CEN were mentioned in several country reports, but this cooperation was not taken into account the results above. Figure 3 gives an idea on the activity of collaboration, with the exception of groups organised by EU and CEN and the ProRec project. Latvia, Malta and Switzerland were the only countries were information on collaboration activities was not identified.
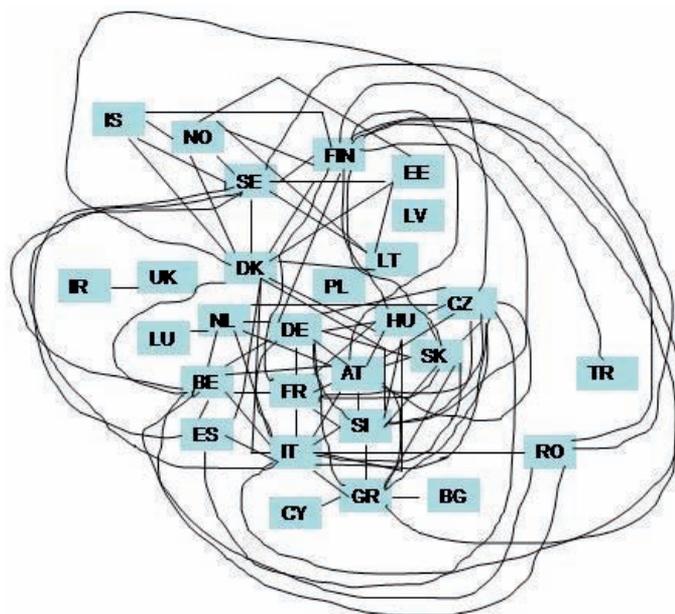
FIGURE 3. International collaboration activities – links between countries

6   DISSEMINATION AND CO-ORDINATION ACTIVITIES

eHealth know-how and information dissemination activities, and their coordination on the regional and national level are an important success factor in increasing awareness, participation and acceptance of eHealth roadmaps and their implementation process. Nevertheless, it has been one of the challenging areas in the data gathering process of this project, where information was scarce or difficult to identify. The main means found to have been employed for bringing the national/regional eHealth roadmap closer to the targeted groups were expert meetings, group consultations and workshops, and information on public websites. Public debates on eHealth issues were documented in five countries. All identified activities are displayed in Table 5.

A coordinating body for dissemination of information on eHealth policies and plans was identified in twenty four (20+4) countries and in most cases it was the Ministry of Health. Means available to the general public for expressing their opinion on eHealth policies and developments were identified in eight countries. Comments, views or queries were invited via the websites of governments or Ministries of Health. Also actual policy documents were made available for discussion and commenting. Patient-representative groups have been involved in programme development, and focus groups opinion polling has been used. A public hearing of the draft National eHealth strategy is undertaken in Switzerland.

TABLE 5. Utilization of various media for eHealth roadmap awareness							
COUNTRY	Expert meetings, group consul-tations, work-shops	Con-ferences, Forums Seminars	Public debates Consul-tations	News-papers, Journals, Other publica-tions	Online info – Website	Press Confe-rences	Other
I European Union Member States							
Austria	YES		YES	YES	YES		
Belgium	YES	YES		YES	YES		radio, TV
Bulgaria	YES						YES
Cyprus (no info found)							
Czech Republic	YES				YES		
Denmark	YES		YES		YES		
Estonia							
Finland	YES	YES		YES	YES	YES	
France	YES						
Germany	YES	YES	YES	YES	YES	YES	YES
Greece	YES	YES		YES	YES		
Hungary	YES	YES		YES	YES		Leaflets
Ireland	YES				YES		
Italy				YES	YES		Weekly eHealth bulletin
Latvia	YES	YES	YES		YES		
Lithuania					YES		
Luxembourg							
Malta					YES		
Netherlands					YES		
Poland	YES			YES	YES		
Portugal	YES			YES	YES		
Romania							
Slovakia		YES		YES	YES		
Slovenia	YES				YES		
Spain	YES	YES		YES	YES		
Sweden	YES	YES		YES		YES	
United Kingdom	YES	YES	YES	YES	YES	YES	leaflets
II Further countries represented in the i2010 Subgroup on eHealth							
Iceland	YES	YES					
Norway	YES	YES			YES		
Switzerland					YES		
Turkey	YES	YES		YES	YES		

7   INVESTMENT AND REIMBURSEMENT FRAMEWORK

We sought to identify the investors and types of investment available for implementation of eHealth systems and applications, as well as the types of eHealth systems and applications that are supported. The usage of special investment sources such as the regional and structural funds and the World Bank were identified and shown in Table 6.

TABLE 6. Utilization of Development Funds						
COUNTRY	Regional	Structural	World Bank	PHARE	National Credit	Other
I European Union Member States						
Austria	no	no	no	no	no	no
Belgium	X	X			X	
Bulgaria		x				
Cyprus						State budget
Czech Rep.			X	X		
Denmark						
Estonia		X				
Finland						State budget
France						State budget
Germany	no	no	no	no	no	no
Greece	X	X				
Hungary	X	X	X	X		
Ireland						
Italy		X				
Latvia		X	X			
Lithuania	X	X			X	
Luxembourg						
Malta						
Netherlands						State budget
Poland		X	X	X	X	
Portugal	X	X				
Romania		X				
Slovakia		X	X	X		
Slovenia		X				State budget
Spain					X	X
Sweden5	X	X				State budget
United Kingdom						State budget
II Further countries represented in the i2010 Subgroup on eHealth						
Iceland	no	no	no	no	no	no
Norway	no	no	no	no	X (to support PKI of GPs)	no
Switzerland						
Turkey			X			ITU

Of the 27 Member States, there was information available on eHealth Services reimbursement status from fourteen countries. Of these, reimbursement schemes that support the uptake of eHealth tools by individual service providers were identified in five countries (Austria, Demark, Finland, Poland and UK). In Austria the health insurance card system (e-card) is an eHealth service reimbursed at the country (given to patients). In Denmark reimbursement for e-services

is offered to GPs for e-mail communication with patients and lab information exchange. In Finland there is no specific scheme; if telemedicine services are a part of some private health care service, the reimbursement mechanism follows the normal rules for this service. In Poland there is no special scheme of reimbursement for implementation of eHealth systems and applications. There are a few procedures, e.g. tele-ECG which were/are reimbursed for some time within the contracts with regional health funds and cardiac surgery teleconsultation on the basis of agreements between healthcare providers. In the UK, funding for health services comes fully from the Government, therefore implementation will also come directly from Government funding, so no reimbursement is required.

Description of the channels for eHealth reimbursement was also recorded whenever identified. In Austria the reimbursement is federal, in Denmark through regional authorities, in Finland through the National Social Security Fund and Municipalities. In Poland the reimbursement for existing eHealth applications is based on bilateral agreements and cooperation between providers.

Regarding the status of eHealth investment, there was information from fifteen Member States.. In seven countries the government was mentioned as the only funding source. In addition to these, government was mentioned among other funding sources in five countries. Joint funding was undertaken with federal and regional fund providers within national and regional projects, the EU, World Bank and ITU. In the remaining three countries, insurers, providers, credit programmes, self-financing funds, private capital and development funds were mentioned. Data was missing on eight Member States.

8   eHEALTH INFRASTRUCTURE

Table 7 presents an overview of activities pertinent to the development of eHealth infrastructure in the Member States. The information on each of the infrastructure elements is analysed in detail in the following subchapters.

8.1 Physical networks

Infrastructure in the form of physical networks is the necessary backbone for the creation of integrated health care service provision continuums. It is also an area where substantial investments are required and where differences between countries' stage of development are clearly demonstrated.

The focus was on collecting information concerning the type or types of physical networks available in each country for supporting eHealth services. Whenever possible, the technologies on which these eHealth networks rely were identified, as well as how the technology choices have changed or evolved in the course of the last decade. In this respect, particular attention was given to broadband technologies.

Basic data concerning the penetration and rates of use of eHealth networks in healthcare settings, research facilities, administration, citizens' homes, health-related business (e.g. pharmacies, private laboratories etc) was sought, as well as information on the types of eHealth services that are delivered through these regional or national networks.

Networks are a complex and highly technical topic which may be approached from different perspectives and with a different focus e.g. on the actual technical choices, versus the purposes of use. The experience of collecting, analysing and reporting on eHealth networks in the eHealth ERA project underlined the need for a clearer and more standardized means of reporting on network status as part of a country's eHealth infrastructure, in order to reliably follow up developments and trends.

Dedicated healthcare network

One of the main strategic decisions to be made when considering the type of (physical) infrastructure necessary for the support of eHealth applications is whether a region or country will opt for a (physical) network dedicated exclusively to healthcare use, or utilize instead

TABLE 7. Overview of eHealth infrastructure activities in the EU-27																													
		AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PO	RO	SK	SI	ES	SE	UK	TOTAL
Chapter 8.1	Dedicated Network	2	1			2	1		2	2	2	1	1	1	2	2	2	1		2	2	1	1	2	1	2	1	1	11
Chapter 8.2	Legislation	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	27
Chapter 8.3	Citizen IT training	1	1			1			1	1	1	1	1	1		1	1		1		1	1		1	1	1	1	1	19
	Professional IT training		1	1		1		1	1		1	1				1	1		1	1	1			1	1	1		1	16

Table key:
1: the element in question is either deployed or there are plans for deployment.
2: there are no plans to deploy the corresponding element.
Grey cell: missing data.

publicly accessible networks in combination with the services necessary to preserve security and confidentiality demands particular to healthcare practices and services.

From the material available to the eHealth ERA project it appears that in a total of thirty one countries, seven countries have opted for a dedicated eHealth network, and five more have plans to develop one, while another twelve have explicitly rejected the option of a dedicated network. For the remaining seven countries there was not sufficient information on this topic available to the project.

A note of caution needs to be given with regard to the meaning of *'dedicated network'*, since the expression appears to be used for both earlier explained contexts: either for physically separate, usually fibre optic dedicated networks, such as in Norway and Sweden, or for Virtual Public Networks (VPN) implemented over the public Internet infrastructure as is the case for instance in Denmark and Belgium.

The latter approach of using VPNs over the public Internet networks appears to be the most common, also among countries that explicitly report not opting for a dedicated network solution. One of the reported problems in this case is that multiple eHealth VPNs may be operational within one country, but not necessarily able to interconnect or exchange information.

Broadband

Broadband is perceived as the indispensable technological platform of the future - already well in use in several countries and fast-growing in others. Broadband networks are essential for high-demand applications such as those utilized in healthcare.

The initiative for national strategies and implementation of broadband network is nevertheless undertaken on a wider scope, usually through eGovernment activities, whereby healthcare is just one of the beneficiaries (as e.g. in the Czech Republic, Greece, Iceland and Portugal). In that respect, also the data collected on this subject through the eHealth ERA project should be perceived only as indicative of the trends in this domain.

In at least twelve out of thirty one countries there was information available concerning the utilization of broadband technologies in the healthcare domain, while in another two countries explicit plans to do so were reported. However, the absence of information on broadband may simply reflect the fact that a country already has a high broadband penetration rate, hence the presence of high capacity networks is perceived as a given and no special attention is given to the topic - as for example in Denmark and the Netherlands, both of which are among the EU leaders in broadband adoption.

Penetration of broadband may vary among different healthcare sectors, with hospitals and pharmacies leading, and GP practices lagging behind in one country (e.g. Hungary), while in another country precisely the reverse is observed (e.g. Italy), and yet in a third group of countries a more even distribution is observed, as for example in Denmark and in Sweden. In the latter, Sjunet connects besides hospitals and primary care centres, also pharmacies, the National Board of Health and Welfare, the National Social Insurance Agency and the Swedish National Tax Board.

Drivers for eHealth network development

Administrative and management purposes, as well as communication purposes appear to be strong drivers for the development and expansion of eHealth networks.

In this respect, the role of sickness funds and the respective use of networks for financial and billing purposes feature as substantial factors in some countries. There are even examples where

social security-driven networks have led the development, preceding corresponding health-related networks, as e.g. in Bulgaria and Slovenia.

The fact that often such networks have developed independently from healthcare provision indicates that the need for integration solutions will have to be addressed in the future, particularly by countries that have explicit targets or plans for integrating health- and social care services, as e.g. Austria, Finland, Greece and Hungary.

Stages of development

Regional eHealth networks are reported to be operational in fourteen out of thirty one countries, either as present stage of development or as an intermediate step towards a national network. National networks are reported to be functional in fourteen countries, with another three countries having plans to establish one.

A future trend with regard to eHealth networking is that of expansion to international networks, as explored on a pilot basis through the Baltic eHealth project, in which hospital services in Denmark, Norway and Sweden were linked with partners in Lithuania and Latvia.

Services

Services provided at present over eHealth networks vary widely, depending on the overall progress in the country, even if longer term goals are quite similar. These services range from messaging and reimbursement claims to telemedicine, booking and consultation services and access to patient summaries or full records.

Access to and provision of information services also appears to be a major purpose of network use in a healthcare context.

8.2 Legal and regulatory framework

This section provides an overview of the eHealth-relevant legal and regulatory environment in the countries where information was available. There was information on legislation activities from twenty nine countries (27 Member States + 2).

Table 8 shows that data protection legislation was the most common type of legislation in the Member States. Roughly half of the member states also had legislation on telecommunication and digital signatures. eHealth service legislation and legislation on product liability were less common.

TABLE 8. Summary of legislation activities (drawn from Table 9)

Legislation situation		AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PO	RO	SK	SI	ES	SE	UK		IS	NO	CH	TR
	Activities	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1		
Focus	data protection	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	27	1	1		
	telecomm	1	1			1			1	1	1	1	1		1	1		1		1	1		1	1		1		1	17	1			
	digital sign	1	1			1		1	1	1	1	1		1		1	1	1		1	1	1	1				1	1	18	1			
	eHealth services		1	1				1	1	1	1									1									7	1			
	Product liability		1				1	1								1				1									5	1			

Table key:
1: the legislation in question is either implemented or there are plans for its adoption.

Table 9 focuses on the timeline of adoption of national/regional legislation addressing data protection, telecommunications (with regard to data protection and confidentiality), digital signatures, telemedicine/eHealth service provision and Health-IT product liability. It should be noted that the material available for several countries focuses on matters of data protection specifically from the viewpoint of health care and therefore information regarding the general management of data protection matters (which has been addressed extensively e.g. in the PRIVIREAL project, http://www.privireal.org) may be missing.

| TABLE 9. Overview of eHealth legislation progress					
	Data protection	Telecom	Digital Sign	eHealth services	Product Liability
I European Union Member States					
Austria	2000	2004	2000		
Belgium	1992	2002	2001	2007 (expected)	1991 (no specific law)
Bulgaria	yes (2001)			under preparation	
Cypru	2001 (amended 2003)				
Czech Republic	2000	2000	2000		
Denmark	2000				
Estonia	2003		YES	2003	
Finland	1999	2005	2003	2006	
France	1978, 2002		1996	2004	2004
Germany	YES	YES	2003	2003	YES
Greece	1997	1994, 1999, 2000	2001		
Hungary	1992	1992	2001		
Ireland	1988	2002			
Italy	2003	YES	YES		
Latvia	2000	2004	2003		1999
Lithuania[9]	1996	1998	2000		
Luxembourg	2002				
Malta	2002				
Netherlands	2000	1998	2001		
Poland	1997	2004	2001	2006	2004
Portugal	2002				
Romania	2001	2001			
Slovakia	2002	2000	2002		
Slovenia	2000				
Spain	1999	2003			
Sweden	2003		2001		
United Kingdom	1998	2003	2005		
II Further countries represented in the i2010 Subgroup on eHealth					
Iceland	2000	2003	2001	YES	YES
Norway	2001				
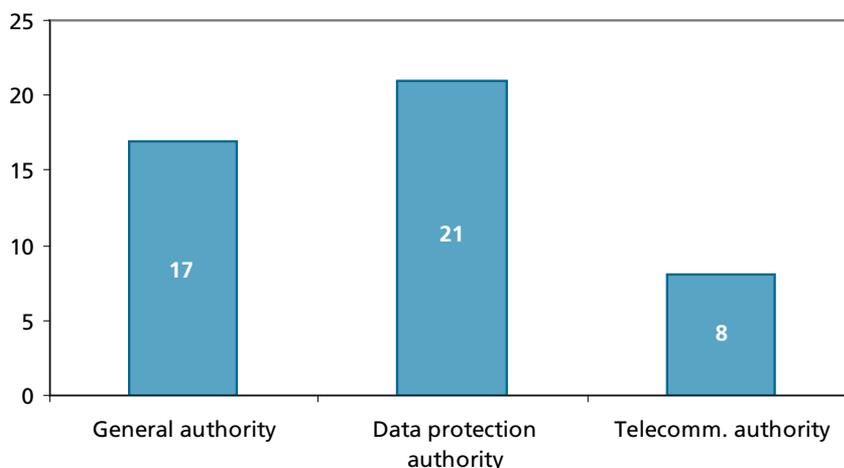
FIGURE 4. Types of authorities responsible for supervising and regulating data protection issues

Information was collected also on the authorities responsible for supervising and regulating data protection issues. The authorities varied in different Member States. In seventeen countries the main supervisory and regulatory body was a general high authority (e.g. Attorney General's office, National Board of Health and Welfare or the Information Commissioner's office), often the Ministry of Health (3 countries) or other ministries (Ministry of Economic Affairs, Ministry of Innovation, Ministry of Justice and Home Affairs). In twenty one countries there is a specific data protection authority, in eight countries a telecommunication authority. In several countries there were specific authorities reported which operate in different sectors and levels, jointly sharing the supervision and regulation responsibilities.

8.3 Education and training on ICT

This section outlines the ICT education and training environment in the countries reviewed, discussing ICT-related education programmes for both the general population and health care professionals (both clinical and administrative staff). There was information on nineteen countries about ICT education and training activities for citizens. Information was missing from eight countries. Ttraining activities on professional level were reported for seventeen countries. Data was missing from eight countries.

TABLE 10. ICT-related education for the general population and healthcare professionals																										
	AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PO	RO	SK	SI	ES	SE	UK
Citizen training	1	1			1			1	1	1	1	1	1		1	1		1		1	1		1	1	1	1	1
Professional training		1	1		1		1	1		1	1				1	1	1		1	1	1		1	1	1		1

Table key:
1: the element in question is either deployed or there are plans for deployment.
Grey cell: missing data.

Of the nineteen countries reported to have education and training activities on ICT for the general population, ten were targeting basic computer skills. For most of the countries reported, the basic training was integrated into school curricula, while four countries were offering a specific ECDL "driver's licence" for the general population. There were also some countries where education programmes for special adult groups like the unemployed, women, or teachers were identified.

Among the incentives offered to enhance the ICT skills of the population were free computer skills courses, tax deduction for computer purchases, increasing public access to computers e.g. in schools and libraries and specific national programmes that implement information society policies.

Out of the nineteen countries, deployment was reported as being in the planning stage for four countries. Five countries were reported as having ongoing project activities and eight with established education and training systems.

For the twent one countries reporting of professional training, it was most common to arrange courses or degrees in medical informatics. Other fields of training included medical engineering, education on computer data processing, ICT administration in Health Care, Tele-education, telemedicine and other courses.

9 eHEALTH DEPLOYMENT STATUS

An overview of the deployment situation of different eHealth applications in the Member States is presented in Table 11.

It can be seen that activities in the area of EPRs are most common among Member States. In addition, over 20 Member States are involved in legislation, training, citizen cards, Patient ID systems, citizen health portals and telemedicine activities. There are least activities reported in the categories of professional card development and safety and quality activities. The detailed analysis of activities in the various areas is presented in the subchapters 9.1–9.8.

In interpreting the results of the eHealth deployment status it is important to note some basic features in the deployment activity: Firstly the application activities have different layers, where older versions can be in established use while more advanced versions are being developed simultaneously. Secondly, the deployment is partly national, partly local or regional. Deployment can also be specific to primary or secondary care or different specialities. Thirdly, many of the applications have different features and functions in different countries, and e.g. speaking of telemedicine, health cards or ePrescription is comprehended in different ways in different countries. For all these reasons, the analysis of the eHealth deployment status is not conclusive and the results presented in Chapter 9 should be interpreted with caution.

9.1 Electronic Patient Record

Most countries have included among their eHealth policy priorities some sort of activity on the Electronic Patient Record (EPR). Given the multidimensional nature of the EPR, it is not surprising that the focus of activities appears to vary considerably, making the drawing of generic conclusions challenging. Depending on the stage of development in a specific country, information may have been reported in a manner that does not do justice to the full scale of EPR-related activities.

With regard to the EPR it is often important to distinguish whether the application concerns primary care, secondary care, both areas or rather the communication of information between

TABLE 11. Deployment status of various eHealth application areas

		AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PO	RO	SK	SI	ES	SE	UK
Chapter 9.1	EHR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Patient summary		1				1	1	1				1		1					1		1					1	1
	Data definition/coding	1	1				1		1		1	1	1			1				1	1		1	1		1	1	1
	Standards	1	1		1		1		1	1	1	1				1	1			1	1		1	1	1	1	1	1
	Semantic interoperability		1		1		1		1	1	1		1							1	1		1			1	1	1
Chapter 9.2	ePrescription	1	1	2	1	1	1	1	1	1	1	1	1		1	2		1		1		1	1	1	1	1	1	1
Chapter 9.3	Citizen health card	1	1	1	1	1		1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1			
	Professional Card		1						1	1			1		1							1					1	
Chapter 9.4	Patient ID	1	1	1		1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1			1
	Professional ID	1	1	1	1				1	1			1		1			1	1			1	1			1	1	1
Chapter 9.5	Citizen Health Portals	1		1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1
	Professional Health Portals	1	1			1	1			1	1	1	1				1	1		1					1	1	1	1
Chapter 9.6	Telemedicine	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1		1	1	1	1	1	1	1	1	1
Chapter 9.7	Safety and quality activities		1			1			1		2	1				2								1			1	1
Chapter 9.8	Other	1			1	1			1	1	1	1	1	1	1	1	1		1		1	1	1	1	1	1	1	1

Table key:
1 = reported activities (actual planning, development, use)
2 = report of no activities
empty = no information

practitioners of the two levels. Unfortunately, this distinction was not clear in the majority of the countries.

Out of the seventeen (17) countries for which information on EPR developments was more specific, the majority reports activities both in primary and in hospital-level care. However, there are also examples where major progress has been achieved in primary care (e.g. Belgium, Netherlands), while for some countries the primary or exclusive focus thus far has been on hospital care (e.g. Cyprus, Ireland, Luxembourg, Malta and Poland). An explicit mention to the life-long Electronic Health Record (EHR) as a strategic target is made by few countries, namely the UK, Estonia and Switzerland.

The development of a summary record or minimum data set primarily for emergency care purposes and for communication between practitioners in different care levels emerges as a key target for thirteen countries, several of which have already made specific progress towards that goal.

The ability of the patient to access their own EPR data is explicitly targeted by the following countries: Czech Republic, Denmark, Estonia, Finland and Germany, although with different implementation approaches and different stages of present progress. Particular emphasis on the standardisation of EPR structure and data models has been given by Denmark, Finland, France and Hungary.

For several countries the perspective of the EPR or EHR as a cornerstone or central building block of a National Health Information system (as a source of statistical data), as well as the establishment of databases, data warehouses and registries are recurring themes, as e.g. for Greece, Cyprus, Czech Rep, Hungary and Italy.

9.1.1   Interoperability and standards of Electronic Patient Records

Initially, the eHealth ERA project attempted to collect information concerning interoperability issues and the adoption of standards both on a general level and more specifically regarding the topic of Electronic Patient Records. Our intention was to achieve a basic overview rather than to cover the subject exhaustively, since other IST-funded projects have been focusing exclusively on standards and interoperability.

Eventually, the materials and information gathered concerning interoperability issues was rather diverse and fragmented. This is a reflection of two things: on the one hand, a weakness of the eHealth ERA data gathering template, which would need a more explicit specification of the type of data sought with regard to interoperability and standards; on the other hand, the existing variety of perceptions with regard to the concept of interoperability, its different operationalizations, and the large number of available standards. The findings of the project are presented and discussed here only within the context of EPR or EHR development and implementation where more concrete information was available to us.

Standards for EPR architecture and messaging

The need to standardize the architecture of EPR systems and the structure of EPRs is mentioned by the majority of countries, which is a positive sign for future developments.

At present, there is variability at the actual deployment stage that each country has achieved.

For eight countries the existence and utilization of standards for the EPR was verified, while another nine countries have either made some progress in EPR standardisation or are in the process of developing the necessary components.

More specifically, with regard to the structure of EPRs, various versions of the HL7 standards appear to be adopted or in consideration by several countries, as well as CEN standards and proprietary standards.

Concerning messaging, XML appears to be adopted by several countries, as well as SOAP and EDIFACT. Noteworthy is also the presence and use of proprietary communication standards (even if based on international standards), as is the case in Belgium, Denmark and the Netherlands.

Semantic Interoperability of Electronic Patient Records

The area of EPR semantic interoperability has been gaining consistently growing attention. Among the most widely adopted classifications are those of the ICD- and ICPC-families, reflecting the leading position of primary care computerization common in many countries. Adoption, selective use or consideration of use of SNOMED CT was reported by eight countries out of thirty one.

Utilization of DRGs was mentioned by nine countries, use of ICF by three countries, while another three countries reported also the use of proprietary classifications (Belgium, Denmark and the UK).

Accreditation procedures

Information on existing schemes for conformity testing or accreditation of EPR systems and related applications was available only in Belgium, Denmark, The Netherlands, Norway and Sweden. An accreditation scheme has been proposed or was under consideration at the time of data collection in Finland, Germany, Greece, Latvia and the UK.

9.2 e-Prescription

Table 12 condenses the ePrescription deployment situation as depicted in the data. Altogether fifteen Member States had some ePrescribing activities (marked as 1 in the table). Information was missing from four countries (presented as grey cells without a symbol). For six countries the information indicated development of digitalised prescriptions together with EPR-systems (marked as 3 in the table). Two countries were reported as not having plans for ePrescription (marked as 2 in the table).

In addition to the twenty one Member States, there was information on two other countries (Iceland and Norway) where there were ePrescription activities. The projects had mainly started recently, in the years 2003 (Finland and Spain), 2004 (Denmark and Hungary), 2005 (Austria, Portugal and UK), and 2006 (Belgium, France, Italy and Slovakia) or later. In the remaining eight countries with information available on ePrescription activities, there was no project start time provided.

TABLE 12. ePrescription deployment situation																									
	AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PO	RO	SK	SI	ES	SE	UK
Activities	1	1	2	3	3	1	3	1	3	1	1	1		1	2		3		3		1	1	1	1	1	1	1

Table key:
1: the element in question is either deployed or there are plans for deployment.
2: there are no plans to deploy the corresponding element.
3: ePrescription closely linked to EPR-systems development
Grey cell: missing data.
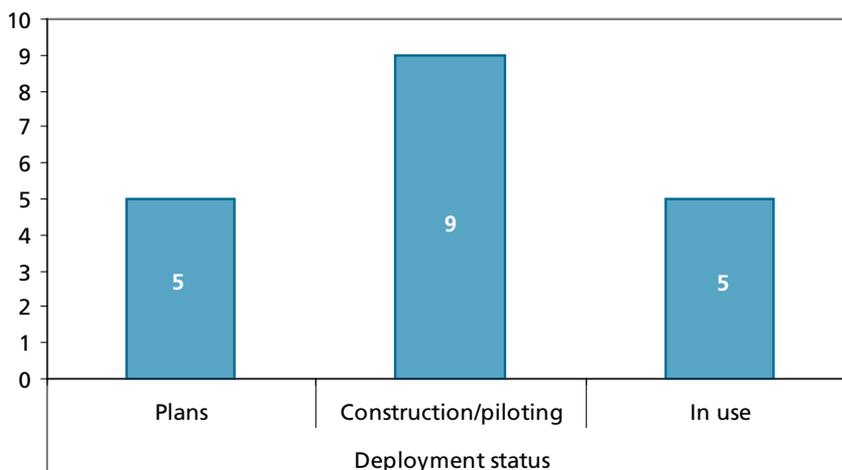
FIGURE 5A. e-Prescription activities: Deployment status

According to the information available, for fourteen out of nineteen Member States, the deployment had proceeded past the planning stage. Nine countries were in the construction, piloting or implementation phase and five had a system that was up and running; in some countries though (such as Greece, Hungary, Italy and Spain) development was taking place primarily or exclusively on regional level at least at the time of data collection.
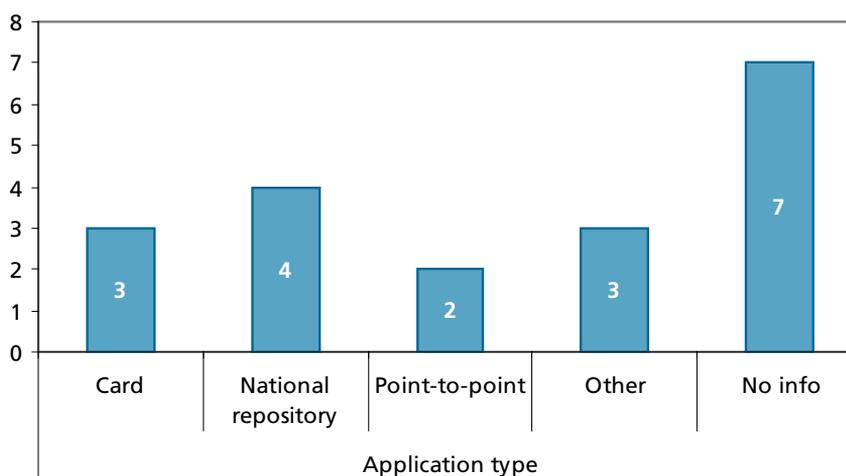

FIGURE 5B. e-Prescription activities: Application Type

There was some information on the e-prescription application type from twelve out of nineteen countries. The national repository-type solution (national database, data warehouse or mailbox) was the most commonly applied architecture, in four countries. A point-to-point solution was applied in two countries, and a card-based solution in three countries. Another three countries were utilizing unique solutions, such as a healthcare professionals' portal (Hungary), regional registries (Italy) and decision support systems (Slovakia). For seven countries (mainly those in the planning phase), there was no information available on the application type. In Norway ePrescription is being built on the basis of a national repository, electronic identification of patients and access to own prescriptions through the national eGovernment portal. Decision and knowledge support components are also planned for integration with EHR systems.
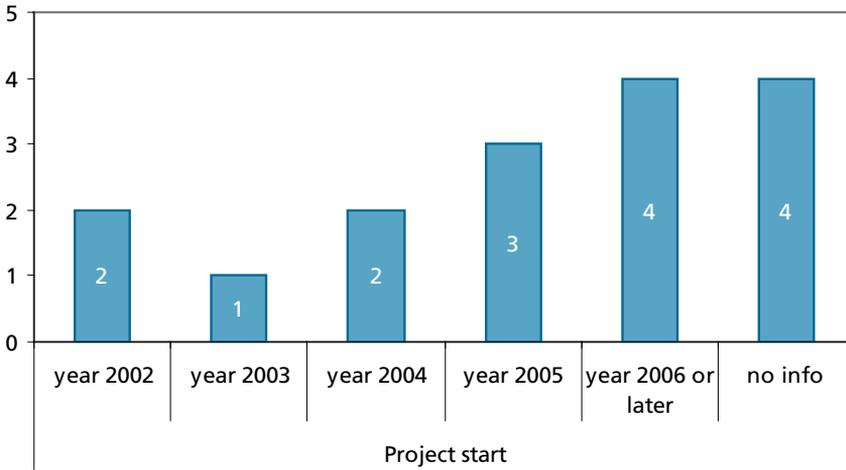
FIGURE 5C. e-prescription activities: Project start

e-prescription projects were mainly very recent: in seven countries development had started in 2005 or later. In five countries development had proceeded for more than two years.
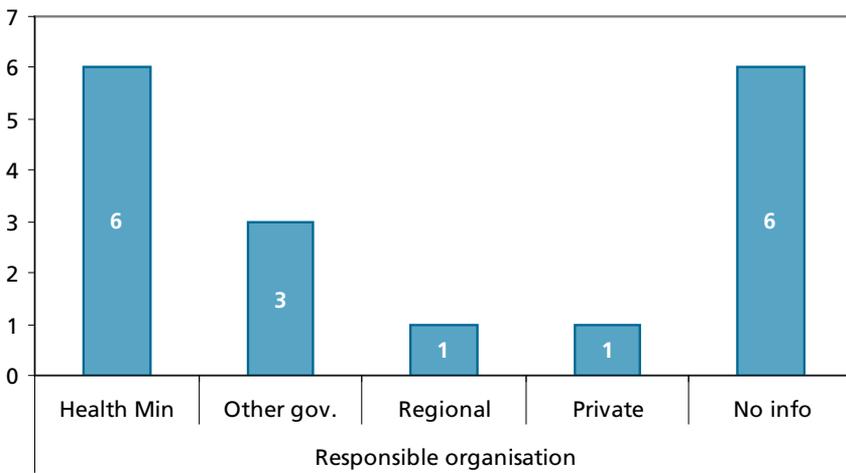
FIGURE 5 D. e-prescription deployment: Responsible authority

Of the eleven countries where there was information available and the question was applicable, the Health Ministry was involved in or responsible for ePrescribing deployment in six countries, other governmental actors in three countries, private actors in one country. In one country the development was the responsibility of the regional authorities.

9.3 Patient and Professional Identifiers

The status of patient identifiers was reported in part jointly with the data collected on the status of health cards. The Template question on patient identifiers aimed at providing additional information on the level and type of identifier that was currently in use, the situation and status of development activities.

TABLE 13: ID Deployment activities																											
	AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PO	RO	SK	SI	ES	SE	UK
Patient ID	1	1	1		1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1		1
Professional ID	1	1	1	1				1	1	1			1		1					1	1		1	1		1	1	1

Table key:
1: the element in question is either deployed or there are plans for deployment.
Grey cell: missing data.

Patient ID deployment activities were reported in twenty four, while information was missing from three countries (appearing as grey cells in Table 13). Of the twenty four countries, twenty two were using or developing cards for citizen/patient identification and two (Denmark and Netherlands) were using a citizen/patient ID number without a card.

The history of having national registers of citizens and using numbers for citizen identification has differed in many countries even before the "e" era and this has implications for the national choices made. There appear to be two basic models of approaching patient identification: either a patient identifier unique to healthcare purposes or a national citizen identification number which is also utilized in the context of health (and sometimes also social) care services provision.

In the first category of healthcare specific identifiers belong e.g. the following countries: Austria (based on social security number), Belgium (pilot project), France, Germany, Greece, Hungary, Luxembourg, Malta, Netherlands, Slovenia, Spain and the UK.

National identification numbers are utilized in the following group of countries: Denmark, Finland, Iceland, Italy (combination of health card and fiscal code), Norway, Portugal and Romania.

Often, but not in all cases, the choice of utilizing a healthcare specific citizen/patient identifier is part of the activities for the introduction of healthcare e-Cards or the EHIC, as e.g. in Austria, Bulgaria, France, Germany, Hungary, Italy, Luxembourg, Portugal, Romania, Slovakia and Slovenia.

An activity complementary to that of citizen or patient identification is the development of a system for identification of professionals. Data on professional identification activities (although not explicitly sought for in the eHealth ERA data collection) were available from sixteen countries, among which: Austria (register), Bulgaria, Finland, France, Italy (regional level), Netherlands (also for insurers and other care agencies), Romania, and Sweden. Again, the implementation of healthcare professional identification schemes is often connected to the introduction of health cards.

9.4 Health Cards

Cards can be utilized in the context of healthcare for a variety of purposes:
- as a national health insurance and/or social security card - which is also their primary function;
- as a European Health Insurance Card (EHIC) - independently or combined with the national insurance card; as a means of combined citizen and patient identification;
- as a storarge medium of a person's medical information, and
- as a means of identification of professionals.

No country focusing on all of these items was found. Some countries have three or four of these application areas in deployment. In most countries where health card activities where reported, they concerned only one or two main purposes of use, but further analysis of the situation from the information available was difficult.

TABLE 14: Health card deployment activities

	AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PO	RO	SK	SI	ES	SE	UK
Citizen cards	1	1	1	1	1		1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1		
Professional cards	1	1	1					1	1			1		1					1		1	1			1	1	1

Table key:
1: the element in question is either deployed or there are plans for deployment.
Grey cell: missing data.

Of the twenty seven Member States there was information on citizens' cards from twenty three countries and on professionals' cards from thirteen countries. Information was missing from two countries, while in one country (the Netherlands) the available information concerned policy level discussions.

Of the twenty three countries with planned or implemented citizen cards, for twenty countries there was information on plans or actual deployment of a health-specific card for citizens. In several countries (Austria, Belgium, Finland, Portugal and Romania) there was information of possibilities, plans or projects where separate general citizen-ID and patient cards would be integrated into a single, multi-purpose smart card. Estonia, on the other hand, is utilizing its general citizen-ID card also in the healthcare domain.
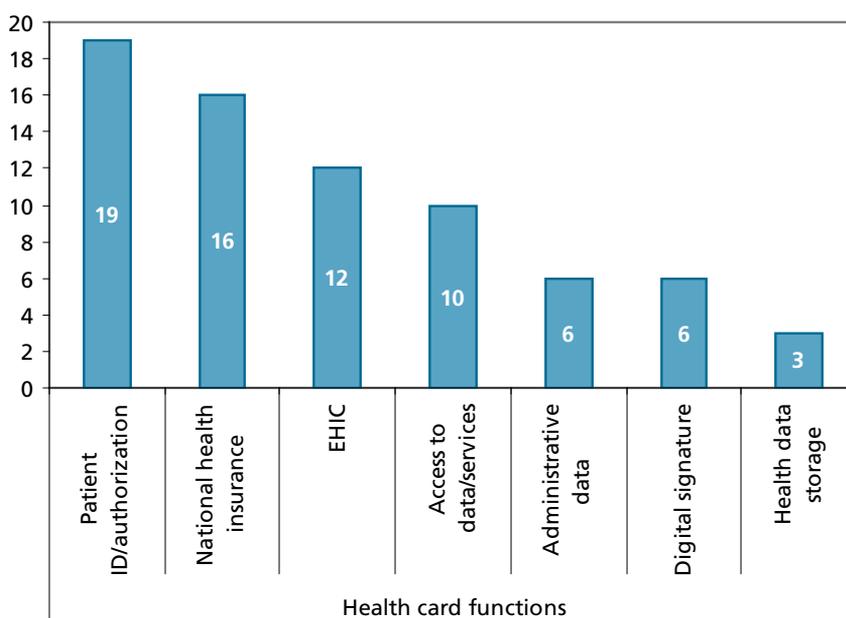
FIGURE 6. Health Card functions

Patient identification and entitlement to national health insurance coverage were the most common functions for the citizens´ health-specific cards. The EHIC was mentioned in the information available on twelve countries.

The plastic health card for patients seems to be giving way to the smart eHealth card. Plastic cards (national or EHIC) were in use or planned in seven of the twenty Member States with information available on specific citizens' health card activities. Smart cards were used especially to plan or deploy authorized access to services (10 countries), storage of administrative data (6 countries), electronic signature (6 countries) and storage of health data (3 countries).

9.5 Health Portals

The material collected on health portals contained information on portals directed to citizens, patients and health care professionals. In twenty three of the twenty seven Member States there were reports of a health portal for citizens/patients. In sixteen Member States, there were portals with contents specifically developed for healthcare professionals. In this analysis, we focus on the results concerning official health-related portals for citizens and patients.

TABLE 15: Overview of Health Portals by targeted audience																											
	AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PO	RO	SK	SI	ES	SE	UK
Citizens/Patients	1		1		1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1		1	1	1	1	1
Professionals	1	1			1	1		1		1	1	1	1			1	1		1				1	1	1	1

Table key:
1: the element in question is either deployed or there are plans for deployment.
Grey cell: missing data.
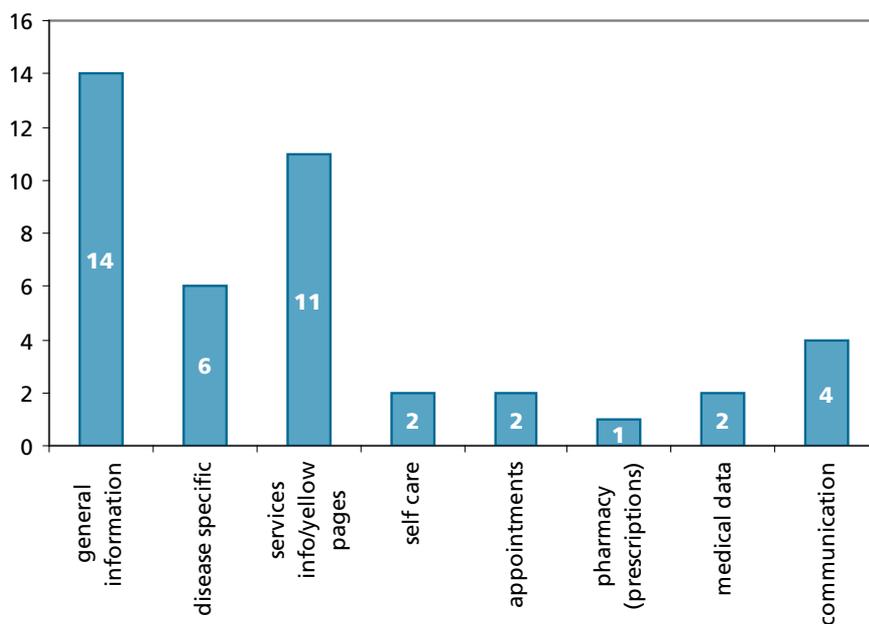
FIGURE 7A. Services provided through official citizen health portals

The services accessible via the official (national and/or regional) citizen health portals varied in the Member States. Most common was the provision of general health-related information (fourteen countries), information on services, often offered through or combined with a "yellow pages" section (eleven countries) and disease-specific information (six countries). Some form of communication services (direct contact with healthcare professionals and/or administration, or question and answer services) were offered or planned by four Member States. Even fewer Member States (2) offered appointments, access to personal medical data (2), online pharmacy (1) or self-care services (2) via the official health portals.
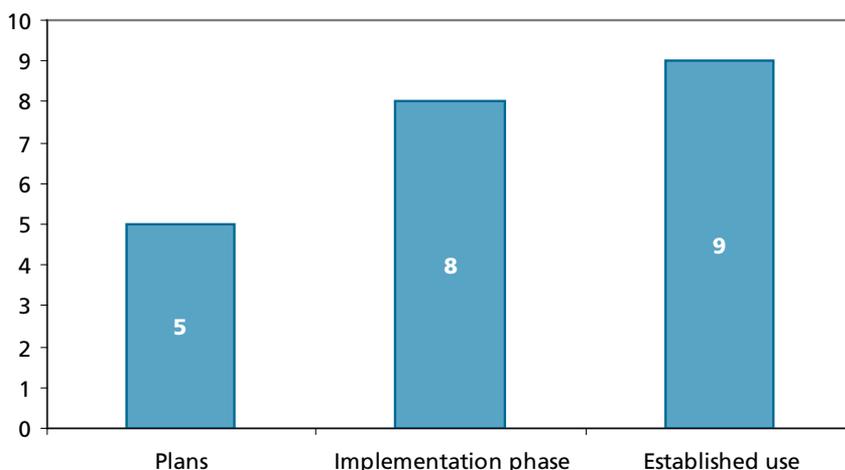
FIGURE 7B. Status of official citizens' health portals development

Of the twenty two Member States reported as having official health portal development activities for citizens the portals were in established used in nine countries. Eight countries were in the construction or implementation phase of a national health portal, while in five countries there were national plans.

The majority of official citizen health portals has been, or is being developed under the leadership of the corresponding Ministry of Health or other relevant Minist/government agency (eighteen countries) or local health authorities (three countries). Information on the leading organisation was unclear or not available for six countries.

9.6 Telemedicine services

Telemedicine activities vary greatly in Member States. One of the key motives to implement telemedicine seems to be the need to increase accessibility of specialist services to remote areas or areas where (certain) specialist services are scarce. This is clearly visible as one of the main factors inducing active development of telemedicine (e.g. in Finland, Greece, and also in France where a development project is ongoing with the French Guiana). Deployment has also been active in Latvia and Poland. Of the further countries represented in the i2010 Subgroup on eHealth, deployment in Iceland and Norway has been particularly active. On the other hand, in countries, where specialist services are readily available throughout the country (e.g. in Germany), the motive for telemedicine development is lower.

| TABLE 16. Telemedicine activities																											
AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PO	RO	SK	SI	ES	SE	UK
1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1			1	1	1	1	1	1	1	1

Table key:
1: the element in question is either deployed or there are plans for deployment.
Grey cell: missing data.

Altogether there was information from twenty four countries on telemedicine activities.

FIGURE 8. Overview of telemedicine services
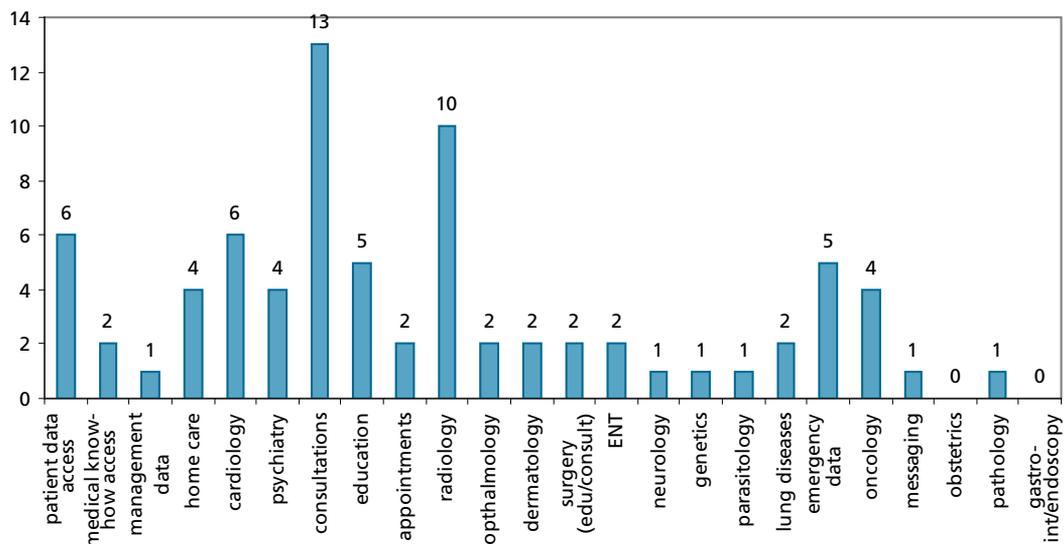
Of the telemedicine services, by far the most commonly mentioned (for thirteen Member States) was teleconsultation (including telediagnostics and monitoring). Tele-Radiology (including PACS) was mentioned or in plans to be deployed by ten Member States, cardiology by six, psychiatry, emergency medicine and education by five, and oncology and home care applications by four countries. There were also many special application areas, where there was experience only in one or two countries. Iceland e.g. had also piloted applications for gastro-intestinal endoscopy, pathology and obstetrics.

FIGURE 9. Telemedicine: Responsible actors
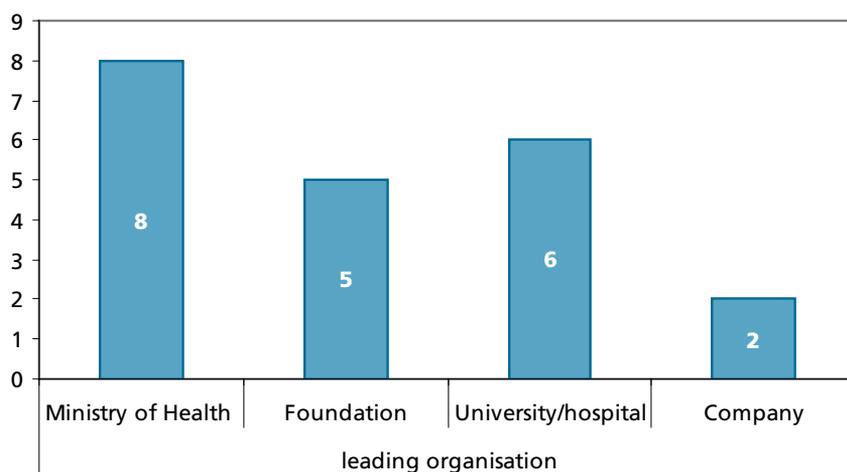
Of the seventeen countries for which information was available on the responsible actors, eight stated the involvement of the Ministry of Health in telemedicine deployment activities. In addition, developments were led by hospitals, hospital districts or universities. In five countries a foundation, and in two countries a company were listed as the leader in telemedicine activities.

In some cases, the deployment of telemedicine activities was a collaborative effort by more than one actor.

9.7 Patient Safety and Quality Initiatives

Taking into account the level of deployment of different eHealth applications, specific patient safety and quality initiatives were identified in surprisingly few countries. The reason may be that safety and quality questions are dealt with as part of the development of specific ICT applications, and therefore not described adequately on the more general level of regional or national projects.

| TABLE 17. Activities in Patient Safety																										
AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PO	RO	SK	SI	ES	SE	UK
	1			1			1		2	1				2								1			1	1

Table key:
1: the element in question is either deployed or there are plans for deployment.
2: there are no plans to deploy the corresponding element.
Grey cell: missing data.

There were seven countries (marked with 1) with reported activities in the field of ICT and patient safety, while for some countries (martked with 2 in Table 17) there was explicit information of absence of relevant activities. Some countries had local activities without high national priorities for patient safety or, although patient safety was identified as a priority area, it was not connected to ICT. In one country patient safety issues were addressed as part of standardisation work.

FIGURE 10. Patient Safety: Activity types
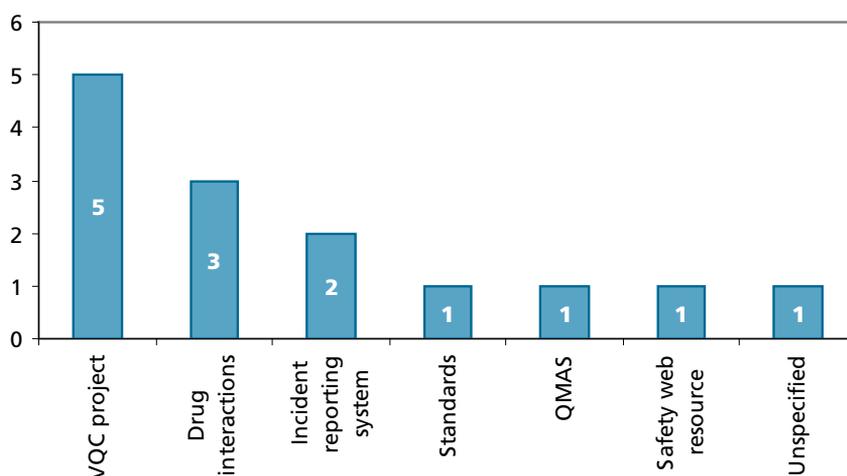
The type of patient-safety related activities was also quite variable. Five countries (Czech Republic, Slovakia, Finland, Sweden and Greece) participated in an international project establishing a Virtual Quality Center (VQC) for managerial Vocational Education and Training (VET). The project was initiated in 2006. Two countries (Sweden and Finland) had in addition to the VQC-project developed a joint drug interaction database. Medical vigilance activities were also reported for Greece. In Poland there were reports of a running Internet-based system for

Monitoring of Consumers' Accidents (implemented in 2003). In Spain, the Plan for Quality in the National Health System, issued by the Ministry of Health and Consumer Affairs, includes among its strategic goals the increase of patient safety through improved quality of care (although ICT is not directly connected to this process). In the UK there was information of a website maintained by The National Patient Safety Agency with a range of resources for the public and health professionals. The UK National Programme (NPfIT) has also included the implementation of the Quality Management and Analysis system (QMAS) into its plans.

9.8 eHealth tools and applications for wellness and disease management

In twenty two Member States there was information of deployment activities related to ICT tools for wellness and disease management, including Personal Wearable and portable communicable systems. Partially, data reported in this section was overlapping with data reported elsewhere, especially in the telemedicine and health portals sections.

TABLE 18: Deployment of applications for wellness & disease management																											
	AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PO	RO	SK	SI	ES	SE	UK
Activities	1			1	1			1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1

Table key:
1: the element in question is either deployed or there are plans for deployment.
Grey cell: missing data.
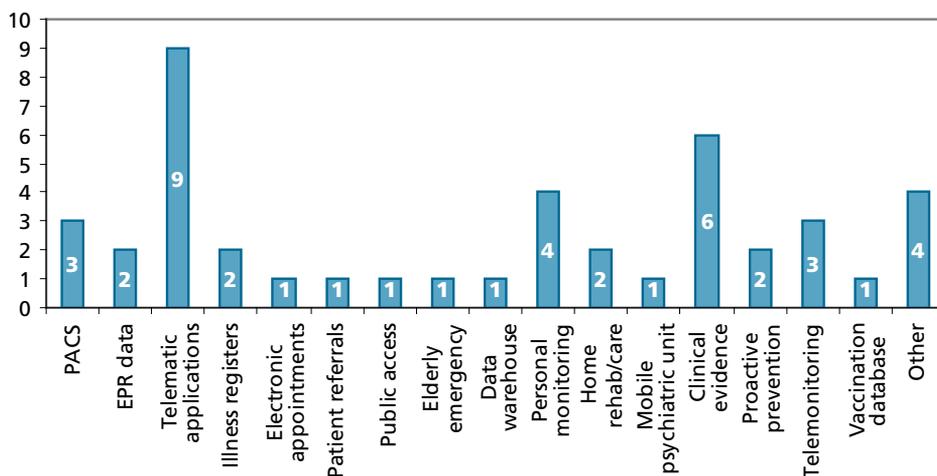
FIGURE 11. Types of eHealth applications for wellness and disease management

Figure 11 provides an overview of the variety of application types identified as related to wellness maintenance and disease diagnosis and treatment.

Applications for improvement of management and administration were identified in only two Member States (Italy and UK). Both of these described eBooking (eAppointment) activities. These were cross-checked with the data available for health portals, since access to eBooking services

usually happens through a portal. In the material collected on Italy there was also information of a National Healthcare Information System (NSIS). The system will provide individual citizens' healthcare information which is pseudo-anonymised to preserve privacy, while grouping all healthcare events for each patient. The result is a minimum dataset for statistical data to be used for governance purposes by health care authorities.

10   THE OVERALL PICTURE AND THE eHEALTH ACTION PLAN 2004

The content of the e-Health Action Plan was taken into account when the systematic collection of country-specific information on all twenty seven EU Member States and the additional four i2010 active countries was planned. Specific topics have been discussed in detail in previous chapters. This chapter reflects the overall picture generated by our study findings to the structure of the Action Plan targets, and collects all the results that give light to the issues and actions necessary towards the development of a European e-Health Area as they are expressed in document SEC(2004)539 (p. 15–22).

Health authorities' leadership

According to the e-Health Action Plan COM(2004)356 each country was to develop a national or regional roadmap for e-Health by the end of 2005. The leadership of health authorities indeed appears to be strong. Ministries of Health have been the main players in drafting road maps and corresponding eHealth policy documents; however no country was found where the Ministry of Health would have acted alone. The influence of Prime Minister's offices and of other policy actors in the fields of telecommunication or information, industry, finance, trade and internal affairs is stronger in eHealth than in other health care affairs. In one third of Member States there is a difference in policy formulation of general health policies and eHealth. By the end of 2006 twenty five out of twenty seven Member States and the four other i2010 active countries were identified as having a documented policy on eHealth. In the remaining two Member States a process was ongoing to finalise their documents. In contrast, by the end of 2003 only ten countries (8+2) had prepared a national eHealth policy document. It is very likely that the EU-level eHealth policy discussions have influenced positively the activity of drafting corresponding documents.

Interoperability of health information systems

Interoperability of health information systems is high on the agenda of many countries. Eighteen Member States have interoperable service network infrastructures on their policy agenda. In several of the countries, however, this is a newly emerging development, since fourteen countries are active on the deployment level and six countries are not active on either level. Standards are a major promoter of interoperability. Twenty four out of twenty seven countries were identified as being active on policy, deployment or both levels regarding standardisation. Questions such as integrated health information systems and eServices are on the agendas of several countries (see Table 19).

Patient identifiers

Ten Member States have taken patient identification in to their eHealth policy priorities, but activities on the deployment side are much more common (twenty four countries). Information on using or developing cards for citizen/patient identification was available for twenty one countries, while another two (Denmark and Netherlands) are using a citizen/patient ID number without a

card. A total of ten out of twenty three countries intend to utilize a general citizen/patient number for identification.

Interoperability of electronic patient / health records

Electronic patient records are a special case in eHealth because in this area both policy priorities and deployment activities coincide (Table 19). All Member States have ongoing deployment activities, at least on a planning stage, on electronic patient records. The development of a summary record or minimum data set primarily for emergency care purposes and for communication between practitioners in different care levels emerges as a key target for eleven countries, several of which have already made specific progress towards that goal.

Mobility of patients and health professionals

Major bilateral or international collaborations for treating patients across borders were not identified, but some projects are ongoing. Since the project did not collect information directly on deployment activities in this area, local health care provider-level exchange of services and patient information may have been missed. Some countries mention these topics among other eHealth policy aims, but they are not featured prominently in the overall policy documentation. International collaboration, however, is active and mainly aims at promoting possibilities to enhance mobility. There seems to be a rather common understanding that developing semantic interoperability of electronic patient documentation, patient summaries, and cards can lead to new innovations that promote mobility of patients and professionals.

Enhancing infrastructure and technologies

There was information available from twelve countries on utilization of broadband technologies within the health care domain, while another two countries reported plans to have them. However information may have been missed. In many countries broadband networks are already routinely in use and therefore not necessarily reported separately in eHealth documents.

Conformity testing and accreditation for an eHealth market

Information on existing schemes for conformity testing or accreditation of EPR systems and related applications was available only for Belgium, Denmark, The Netherlands, Norway and Sweden. An accreditation scheme has been proposed or was under consideration at the time of data collection in Finland, Germany, Greece, Latvia and the UK.

Leveraging investments

There was at least some information from twenty three Member States on the funding source for eHealth investments. In seven countries the government was mentioned as the only funding source. In addition to these, government was mentioned among other funding sources in five countries. Joint funding was undertaken with federal and regional fund providers within national and regional projects, the EU, the World Bank and ITU. In the remaining three countries, insurers, providers, credit programmes, self-financing funds, private capital and development funds were

mentioned. Collecting reliable data on this topic was difficult and some cases may have been missed. There was no data at all from four Member States. In the available data, six countries using regional funding were identified, the number of countries identified as utilizing structural funds was fourteen, for World Bank five, for the Phare programme four, and for national credits also four.

Legal and regulatory issues

Planned changes in eHealth-relevant legislation were included in the policy documents of six countries. In several of them the legislative processes were already ongoing. Of the legislation already in effect the most common legislation concerned data protection. There was data on this type of legislation from all twenty seven Member States. Legislation on digital signatures, as well as on telecommunication was identified in eighteen countries. According to the available material, eight countries have or are planning legislation on eHealth services. There was data on legislation concerning product liability from five countries.

When reflected to the activities stated in the Action Plan it can be noted that the status of security and privacy issues that serve to promote trust in the context of citizen and service mobility seems to be overall positive. In contrast, legislation on eHealth product and service liability, and questions on certification are still in their early stages. Standardisation of qualifications for eHealth in clinical and administrative settings is not well established on the national level. European level discussions at this stage could enhance best practice uptake in relevant developments.

Information for citizens and authorities on health education and disease prevention

The main eHealth tool for providing information on health and disease prevention is national and regional portals. They are not very common in the policy-level documents of Member States; seven mention portals for citizens and five mention portals for professionals. In four countries specific decision support tools for professionals and/or managers were listed in their policy priority agenda. On the deployment level, however, these tools are well in use or under development. Out of the twenty seven Member States, twenty three reported that there is a health-related portal for citizens/patients, while in sixteen Member States there were portals for professionals. Ten Member States had policy level plans for developing modern tools for national health monitoring and surveillance. Their aim is to get high quality health-related data to support disease prevention and support decision making in public health.

Towards integrated health information networks

Out of a total of thirty one countries, seven countries have opted for a dedicated eHealth network, and five more have plans to develop one, while another twelve have explicitly rejected the option of a dedicated network. Virtual Public Networks (VPN) seem to be the most common solution. In some cases there is more than one such network operational in the country without possibilities to interconnect.

Regional eHealth networks are reported to be active in fourteen out of thirty one countries, either as present stage of development or as an intermediate step towards a national network. National networks again are reported to be functional in fourteen countries, with another three countries having plans to establish one.

Promoting the use of cards in health care

Twelve Member States had promotion of different kinds of cards on their policy priority agenda. Out of these countries only one had started the work on the policy discussion level only, the others had started deployment also. Another group of eleven countries had ongoing deployment without policy level documentation on the topic. Out of these countries several were using cards as a normal daily tool (Table 19).

Disseminating best practices, benchmarking and international collaboration

A coordinating body for national level dissemination of information on the eHealth policies and plans was identified in twenty Member States and in most cases it was the Ministry of Health. International collaboration is active on the project level. The aim of many projects is information sharing and enhancing best practice. Clear international collaboration on the practical level of health care provision was not identified.

Conclusions

The actions outlined in the Action Plan of 2004 have been adopted well in both the contents of eHealth policy documents and on the deployment level. Since "early birds" have started their eHealth development around 5–10 years before the Action Plan, they have already made their national choices earlier. In many of the countries where road maps and similar eHealth documents date from the year 2003 or earlier, new updates of the policies have been made and topics from the Action Plan have been incorporated to the national work. The time frame from policy-level discussions to full deployment seems to be rather long. In countries where Action Plan ideas have been adopted to eHealth roadmaps from 2004 or later, deployment of new topics can not be expected to be clearly visible today. The influence of the Action Plan 2004 on the implementation of eHealth should be studied again in 2009 or later.

11   DRIVERS, BARRIERS AND OTHER RELATIONSHIPS OF eHEALTH DEVELOPMENT

Over-all eHealth progress appears to be well on track, as indicated by the analysis of the main activity areas (fourteen in total) presented in Table 19. On average, five of these activity areas were mentioned as priorities in the policy documents of each Member State. The corresponding number of activities identified as being in the deployment phase was even higher. On average, ten of the fourteen main activity areas were deployed in each country. All countries had proceeded to deployment in at least some of the areas. Three countries had policy or deployment or both in all of the areas of eHealth activity. Further details on the policy vs. deployment distribution status on the single country level can be derived from Table 19. In addition, Table 20 shows the average number of items present per country in each of four eHealth activity status categories: inactive policy, policy activity only, simultaneous policy and deployment activity, deployment activity only. The positive finding is that simultaneous policy and deployment activity on several items was identified in all twenty seven countries, in other words, there are presently no inactive EU countries in the area of eHealth.

TABLE 19. Overview of eHealth policy and deployment activity

AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PO	RO	SK	SI	ES	SE	UK	
P	P	P				P		P	P		P	P	P	P		P				P	P	P	P				Standards
P													P											P			Semantic interoperability
	P		P		P					P			P							P							Data definitions, codiig
					P				P				P					P		P		P		P			Patient summary, minimum data set
	P	P	P		P	P		P	P		P	P	P	P	P	P		P	P	P	P	P	P	P	P	P	EPR, pHR
	P	P			P			P	P							P				P		P		P		P	ePrescription
	P	P	P	P	P	P	P	P				P		P	P	P		P	P		P	P	P	P		P	Service network infrastructure
	P	P			P			P		P		P		P	P	P	P	P		P	P				P		A national health information system
	P	P							P									P					P	P			Legislation
	P											P		P						P						P	Portal, information for professionals
					P								P		P		P			P				P	P	P	Portal for patients/public
	P	P	P					P	P				P		P		P		P	P	P		P				Citizen Health Cards
P	P					P						P				P		P		P	P				P		Patient identification
P	P	P	P	P					P	P								P	P				P			P	Telemedicine

p policy and deployment coincides
□ there is deployment without policy priority
p there is policy without deployment

TABLE 20. eHealth policy and deployment activity on single country level

eHEALTH ACTIVITY STATUS	NUMBER OF COUNTRIES	AVERAGE NUMBER OF ITEMS PER COUNTRY
One or more "inactive" policy items	24 (89 %)	3,0 (min–max 0–8)
One or more eHealth items with policy activity only	19 (70 %)	1,6 (min–max 0–3)
One or more items with both policy and deployment active	27 (100 %)	4,2 (min–max 1–8)
One or more items with deployment activity only	24 (89 %)	6,5 (min–max 2–12)

Duration of active eHealth policy seems to be a driver for further deployment progress. When looking at the number of eHealth topics in countries with recent eHealth policies versus countries where eHealth documents have been produced during 2003 or even earlier, it seems that the amount of different topics taken into policy level discussions decreases over time. The number of topics where active deployment is ongoing seems to be higher in the countries with "older" policies. Therefore, the picture that emerges from the analysis is one of a "to-do list", where new ideas are first discussed on policy level and then taken into deployment. Another aspect of this phenomenon can be seen in Table 19. Items discussed on policy level are often not the same items where deployment is active. In examples like legislation, portals, identification and health cards, ePrescription or telemedicine there is a lot of activity in many countries, and in several of those countries the deployment is part of routine practice or ongoing national projects. The decisions have been made and the item is not a major "policy topic" anymore. This finding is important in the context of cross-national collaboration. When discussions on different policy choices are ongoing in a country, suitable "partners" for sharing ideas and experiences are not only those countries discussing similar items on the policy level, but also those that might not be as active anymore in policy-level communication, but have progressed in the implementation of the items in question.

There is great variation of health care system structures among EU Member States. For the purposes of contrasting the policy and deployment situation, countries where assigned to one of three country groups. The first group was formed by countries where the state is the main player in organising the health care system, which is based primarily on a national health service or similar; the second group was one where the national insurance system is the main player, and the third was a group of countries where regions or other areas with great autonomy are the main organisers of health care. Differences among these groups are very small and there are so few cases in each group that statistical comparison can not be done. However the simple frequencies suggest the same conclusion that an educated guess would give; building an integrated national health information system is a higher priority in a state-centred system than in other healthcare system types. All insurance-based systems have patient identification and cards in deployment, while in region-driven countries this is not such a strong priority. Conversely, in region-driven countries the architectural choice for an eHealth service network with interoperable connections is a more favoured choice than an integrated information system. Promoting and deploying standards is a higher priority in other groups than in the state driven group, which is understandable because using standards is essential in multi-player systems. All the region-driven countries had ePrescriptions in deployment, while this was the case in about half of the countries in the other groups. It is difficult to suggest any explanation arising from health care system structure for this finding.

The information collected in the context of this project concerning funding and investment for eHealth deployment was rather fragmented. In addition, there was limited information available on the actual performance of eHealth applications that are operational in each country, since most of the available data was derived through desktop research, rather than from interviewing persons in the local field. Many of the questions on the drivers and barriers for eHealth development can thus not be answered and additional information is required on the overall situation of each country for future (further) analysis.

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ANNEX 1 - Information Gathering Template

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D2.1 - Part III: Information Gathering Tool

eHealth Policy & RTD Reports Template

</div>

Introduction

A main objective of the eHealth ERA project is to provide a clear picture of the present and emerging eHealth policy and RTD landscape across Europe. In order to achieve that objective, pertinent information must first be identified and collected across the European Union Member States and the accession and EEA countries. The sheer volume and variability of the material mandates the adoption of a structured and as much as possible standardized method of data collection and reporting. Consistency in collecting and reporting data is also necessary for the purposes of comparative analysis that will follow in the next phase of the project.

The information gathering tool that will act as the backbone of the project's data collection *and* reporting activities is the eHealth Policy and RTD Reports Template developed by Stakes and provided as Part III of this deliverable.

Each section of the Template contains specific, clearly stated questions aimed to guide the report authors (i.e. the corresponding eHealth ERA project partners on the basis of the Affiliated Country Cluster division of work) in identifying relevant sources and providing concise answers. When brought together, these answers will produce the corresponding eHealth Policy and RTD Country Report.

The eHealth Policy and RTD Country Reports will provide a detailed description of eHealth policy, strategy, roadmap and implementation initiatives, as well as of related RTD activities which are in progress or in preparation. Although the reports will be on first instance focused on the national level, region-level reports may well be warranted with regard to certain topics. In the Country Report, both the region-specific answers will be provided in the sections where it is relevant, as well as a summary report' of the regional responses for the national level reporting.

Before proceeding with extensive data and material collection activities, the eHealth ERA project partners will check the feasibility of the proposed approach by applying the Template in the collection and reporting of material on their own country of origin. Any shortcomings and potential changes that will arise through this process will be taken into account and addressed in an updated version of the Template.

Notes for Authors

The Template for the eHealth Policy & RTD Report is divided into four sections or Parts. In addition, descriptive elements and reference tables are provided in the Annexes, to be utilized in the production of the Reference section and Index of the Report, as well as in next phases of the project work.

The Template offers a comprehensive and detailed guideline for a thorough analysis of eHealth strategy, roadmap and deployment activities, as well as of related RTD status and trends. Although the primary focus is the national level, reference is often made to the regional level, too, since the administrative structure and tradition of some countries may warrant that. The authors are expected to answer all questions to the extent possible or meaningful in the context of their national system (since some information may not be applicable to the individual country).

- Omit sections and/or questions that do not apply to the country/region under consideration. Please indicate whether data or information is not applicable or not available.
- In case of data/information unavailability, you may use instead expert estimates or opinions, provided you indicate your expert reference source and the medium of consultation.
- Please provide reference to relevant documents, as well as to their online form whenever possible. Priority is given to material available in English, as the shared working language of the project. In the case of state documents, indicate whether it concerns an official or unofficial translation.
  If an English version is not available, you can reference materials in the original language of publication and provide - as a minimum- an English translation of the title.
  If a summary or abstract is available in English, provide it with an indication of whether it concerns an official or unofficial translation.
- At present the template is not accompanied by a glossary. You may find the 2003 Telemedicine Glossary useful as a reference resource. In addition, we have provided a number of reference tables to assist you in approaching the section of eHealth applications and services. Give feedback for terms and concepts that you find are unclear or confusing. If you wish, you may propose a definition or refer to a source that does.

For any queries and information please contact the developers of the eHealth Policy and RTD Report Template, in Stakes.

Overview of Template Sections

PART I - Healthcare system

Part I concentrates on the national health system as the backdrop and environment for eHealth RTD and implementation.

Detailed reports on national healthcare systems are already produced in the context of other initiatives, such as the European Observatory on Health Care Systems and the Bertelsmanns Stiftung International Network for Health Policy and Reform. Statistical information and indicators concerning national healthcare systems are also provided through other channels (OECD, Eurostat etc). Therefore, we do not intend to duplicate such work.

Instead, our focus is on identifying and presenting some basic, concise information on the healthcare system landscape within which eHealth strategies are created and implemented and related RTD actions take place. The emphasis should be on identifying factors with a critical impact on eHealth (such as the financing and organisational structure of the healthcare system), as well as those most likely to be affected by eHealth deployment.

More specifically:

- the section on **Basic facts & features of the healthcare system** should make particular reference to such aspects that are distinct for the specific country and can, or already have an impact on the level of interest and progress achieved regarding eHealth.
- the focus of the section **National-level health goals** is on the objectives set for healthcare in the country on a general level and *not* specifically concerning eHealth.

PART 2 - Strategic eHealth Plans/Policy Measures

Part 2 aims to describe the relevant policy context, focusing on strategic eHealth plans and the related organizational structure, main actors and financing frameworks.

In this section there maybe more than one terms applicable to the type of documentation we are targeting; e.g. roadmap, strategic plan, strategy, policy etc.

Also, although the primary focus is on policy initiatives undertaken by health and social care national and/or regional decision makers, you may also refer to similar initiatives in other related areas (such as, for example, eGovernment, eLearning, eCommerce etc.), if they have explicitly addressed the area of eHealth.

PART 3 - eHealth deployment status

Part 3 takes a closer look at the status of eHealth deployment, particularly with regard to infrastructure, applications and services, and interoperability aspects. The material and data that will be collected in this context will serve the needs of the further in-depth analysis in the Priority Theme Cluster (PTC) work, during the next phase of the eHealth ERA project.

The bullet list below presents the targeted areas in covering the current eHealth implementation level in the country (or region), as well as future plans and timelines.

- **eHealth infrastructure**
  - including: physical networks, legal and regulatory framework, education and training.
- **eHealth applications and services** (See Annex 2 for more details)
- **Interoperability (technical and semantic)**
  - **technical standards**
  - **coding, classifications, terminologies**
  - **conformity testing, accreditation schemes.**

The distinction between eHealth 'infrastructure', 'applications' and 'services' is not always straightforward and there is some degree of overlap between these concepts. In order to assist you further in the process of data collection and reporting, we have also compiled indicative reference tables of eHealth applications and services for various stakeholder groups e.g. healthcare professionals, citizens, healthcare providers and organisations, and public health systems (See Annex 2). We have drawn for this purpose upon earlier work of project partners and relevant scientific literature.

At first instance, though, we will give priority to infrastructures, applications and services addressed in the eHealth Action Plan.

PART 4 - RTD

The last section, Part 4, addresses the area of eHealth-related RTD and innovation.

1   PART I - Healthcare system

1.1   Basic facts & features of the healthcare system

Q1.	Which is the main decision making level for health care policy in the country (e.g. National or federal ministry, regional health authorities, other)? **NOTE:** *Please refer to the country "Health Systems in Transition" profile whenever possible to assist you in explaining (http://www.euro.who.int/observatory/hits/20020525_1)*
Answer	
References	1. 2.

Alternatively, you may utilize the categories indicated in the graph below, to describe the main 'players' in the healthcare system:

Give any additional information or details you think may be needed to accompany the graph.

Health Care Authority (authorities) such as ministry of health, regional government etc	Third party = insurer (such as state, municipality, insurance company etc)	Funder (such as taxpayer from state or local tax, employer, employee etc)

Primary care provider

Secondary (hospital) care provider

Long term (elderly etc) care provider
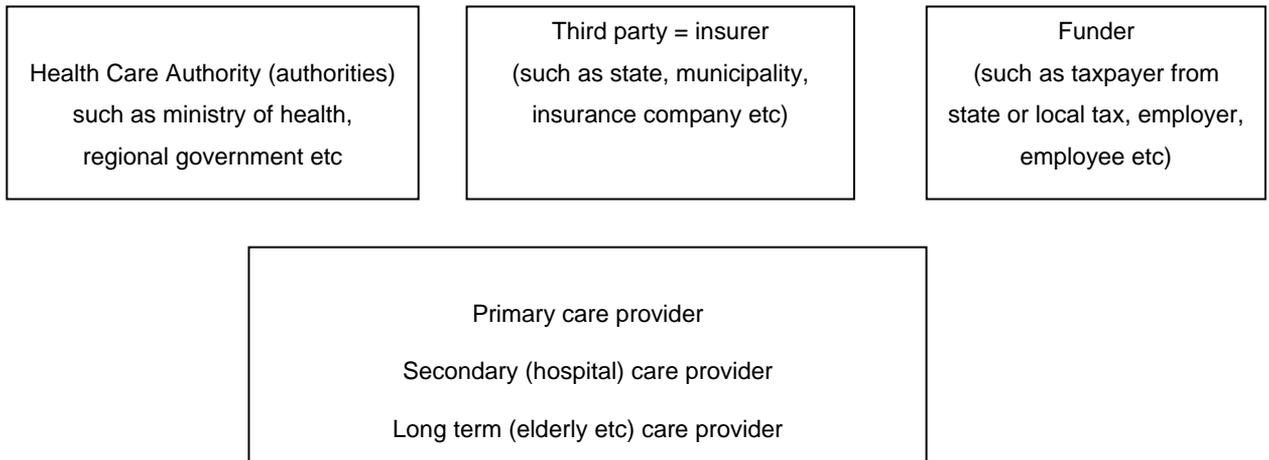
Q2.	What are the main healthcare service delivery systems in the country? (For example: primary care, specialized care, laboratories, dentists, pharmacists, paramedical professions - physiotherapists, occupational care, student care, etc.).
Answer	
References	1. 2.

1.2   National-level health goals

Q3.	What are the main issues and strategic targets of the national (or regional) healthcare policy and implementation in the country for the period 2005-2010?
Answer	
References	1. 2.

Q4.	Provide information on the major *currently running* national (or regional) programmes for public health and/or healthcare system development. Copy and fill in the Overview Table below **for each programme separately**. Using the space provided for this purpose, accompany your response with references to the relevant documentation (such as project plans, reports, research studies, evaluation results etc.). If these documents are available online, please provide also their URLs, as well as links to the programme web sites, if available.

Public Health Program Overview	
Official name or title of the programme	
Co-ordinating organisation(s)	
Area(s) targeted by the programme	
Main objectives set forward in each area	
Timetable for implementation of the programme	Start Date: End Date:
Current progress status of the programme	in preparation
Implementation progress with regard to the targets and milestones set in the project plan	
Future targets or plans for further development	
Timeframe for achievement of future targets	
Role of ICT in the programme (if any)	monitoring of programme activities
Programme funds earmarked for ICT (indicate the actual amount and/or percentage of total funds)	

References
 	
     1.
     2.	

2   PART 2 - Strategic eHealth Plans/Policy Measures

2.1   National/regional eHealth policy

2a. Main actors

Q5.	Provide a list of ministries that play a role in influencing regional/national eHealth policy. Indicate each ministry's main areas of responsibility with regard to eHealth and indicate their interrelations.
Answer	
References	1. 2.

2b. eHealth Roadmap

> ### *Definition*
>
> A roadmap is generally a program for future development indicating what will be developed and when. National or regional eHealth roadmaps are officially endorsed strategic documents focusing on deployment of e-Health systems.
>
> Due to the variability among Member States, relevant documents may appear under any of the following titles: *national or regional eHealth roadmap, national or regional eHealth strategy, eHealth programme, eHealth implementation plan, national action plan, Health ICT strategy etc.*
>
> Moreover, eHealth-related initiatives may be undertaken through differing channels and within various frameworks; the primary target is generally initiatives of the Ministries of Health, however other sources may be: information society programmes, eGovernment programmes, etc.

Q6.	Does the country have an eHealth roadmap or corresponding government-level strategic document? Is there some similar policy document available on regional level (if applicable to the country's administrative structure)? If there have been several relevant strategic documents, either on the national or on the regional level, please list them in chronological order and add the corresponding references (also to electronic versions of these documents, if available). Please report also on eHealth roadmaps that are currently in a preparatory phase (i.e. a final version has not yet been formally ratified).
Answer	
References	1. 2.

Q7.	Which was the body or organisation having the main responsibility for drafting the (latest) national (or regional) eHealth roadmap? If several organisations have been involved, please list the most significant of those and indicate their role in the preparation, drafting, discussion and approval process.
Answer	
References	1. 2.

Q8.	Describe briefly the roadmap 'implementation chain'; which are the main 'players' expected to participate? Indicate the role each of these organisations has in the process towards eHealth implementation (e.g. decision making, coordination, financing, deployment, etc).
Answer	
References	1. 2.

2c. Timeline and targets

If there have been several strategic plans for eHealth on the national or regional level, then this section should be answered only with regard to the most recent plan.

Q9.	When was the eHealth roadmap made public? Have there been any subsequent updates or revisions? If yes, please indicate when these took place and which aspects did they affect?
Answer	
References	1. 2.

Q10.	What are the main strategic targets stated in the national or regional eHealth roadmap?
Answer	
References	1. 2.

Q11.	When did implementation work towards achieving the eHealth roadmap goals start?
Answer	Start date: Other comments:
References	1. 2.

2d. Progress

Q12.	What progress has been achieved in the implementation of the national or regional eHealth roadmap as compared against the milestones set in the plan?
Answer	

References	Please provide references to corresponding follow up reports, evaluation studies etc. and to their electronic versions, if available.
	
	    1.
	
	    2.

Q13.	Are there some preliminary plans or experiences in extending eHealth implementation to the field of social care or increasing interaction with social care providers' organisations?
Answer	
References	1. 2.

Q14.	Are there examples of existing or planned by- or multi-lateral cooperation among the country in question and other Member States concerning targets of their corresponding eHealth strategies or roadmaps? (Co-operation may be at the policy, implementation or RTD level)
Answer	
References	1. 2.

2e. Dissemination and co-ordination activities

Q15.	What activities have been launched for making the national/regional eHealth roadmap more widely known?
Answer	- Public consultation ☐ - Expert group consultation ☐ - Workshops ☐ - Presentations in events ☐ radio ☐ TV ☐ newspaper or journal articles ☐ - Online information ☐ - Other (please specify)
References	1. 2.

Q16.	How have these dissemination activities been co-ordinated and which has been the responsible organisation?
Answer	
References	1. 2.

Q17.	Have there been dissemination activities concerning the eHealth roadmap through alternative media channels? If yes, what were those channels?
Answer	
References	1. 2.

Q18.	What kinds of activities have targeted specifically healthcare professionals?
Answer	- Expert group consultation ☐ - Workshops ☐ - Presentations in events ☐ radio ☐ TV ☐ newspaper or journal articles ☐ - Online information ☐ - Other (please specify)
References	1. 2.

Q19.	What kinds of activities have targeted specifically the general public?
Answer	- Public consultation ☐ - Consultation of civil organisations ☐ - Workshops ☐ - Presentations in events ☐ radio ☐ TV ☐ newspaper or journal articles ☐ - Online information ☐ - Other (please specify)
References	1. 2.

Q20.	What means are made available (if any) to the general public for expressing their opinions on eHealth policies and plans?
Answer	
References	1. 2.

2.2 Investment and Reimbursement framework

Q21.	Which type of investment for implementation of eHealth systems and applications is supported or funded (e.g. investment for hardware, software, update/upgrade of systems, professional training etc)? Please indicate the provider and the recipient of the funds (e.g. state to regions, regions to care facilities, regions to individual professionals etc).
Answer	
References	1. 2.

Q22.	Indicate whether there is eHealth investment in the country from the funding sources listed below. If yes, tick the corresponding box.	
Answer	Regional Funds	☐
	Structural Funds	☐
	World Bank	☐
	PHARE Programme	☐
	Specific national credit programmes	☐
	Other (main) funding source(s)	

References	Please provide references to relevant resources
	     1.
	     2.	

Q23.	Are there reimbursement schemes available to support the diffusion and implementation phase of eHealth applications? E.g. physician reimbursement for provision of eHealth services, subsidy of practitioners for purchasing and installation of necessary equipment and systems.
Answer	
References	1. 2.

Q24.	Which types of eHealth services are eligible for reimbursement in the country (or region)?
	For examples of eHealth services please refer to Part 3 of the template and to the tables provided in Annex 2.
Answer	
References	1.
	2.

Q25.	Through which channels are eHealth services reimbursed (government, agencies, private, other)?
Answer	
References	1.
	2.

3   PART 3 - eHealth deployment status

3.1   eHealth infrastructure

3.1.1   Information on physical networks

History, implementation approach, development over time

Q26.	What type(s) of physical networks are available in the country for supporting the provision of eHealth services: local, regional, national or international networks?
Answer	
References	1. 2.

Q27.	Does the country/region have a dedicated healthcare network or plans to establish one?
Answer	
References	1. 2.

Q28.	On which technologies are these eHealth networks based? Has there been some change or evolution in the technologies adopted during the last decade?
Answer	
References	1. 2.

Q29.	What is the penetration and rates of use of eHealth networks in: healthcare settings, research facilities, administration, citizens' homes, health-related business (e.g. pharmacies, private laboratories etc) Whenever related information is available, please provide your answer in terms of the share of a certain network type within each sector, e.g. 15% of primary healthcare settings use broadband networks.
Answer	
References	1. 2.

Q30.	Which types of eHealth services are delivered through these regional or national networks? If the type of services differs between the regional and national level, please give a separate answer for each level.
Answer	
References	1. 2.

Q31.	What are the plans for future development and expansion of these eHealth networks? (If such information is available). What timelines have been set?
Answer	
References	1. 2.

Q32.	Have there been any assessment or evaluation studies concerning the impact and/or effectiveness of eHealth networks on the regional and/or national level in the country?
Answer	
References	Please provide references to the corresponding studies or reports (also to their online versions, if available). 1. 2.

Q33.	Are you aware of some success stories where progress was achieved with regard to the implementation and use of networks for eHealth purposes in the country?
Answer	
References	Please provide references to related sources, also in electronic form if available. 1. 2.

3.1.2 Legal and regulatory framework

Q34.	Is there national/regional legislation in the country addressing the following issues:			
Answer		**YES**	**NO**	**N/A**
data protection		☐	☐	☐
telecommunications (with regard to data protection and confidentiality)		☐	☐	☐
digital signatures		☐	☐	☐
telemedicine/eHealth service provision		☐	☐	☐
Health-IT product liability		☐	☐	☐
References	Please provide references to related sources, also in electronic form if available. 1. 2.			

Q35.	When was legislation regarding the following issues introduced or updated? If not yet, when is it expected to be introduced?			
Answer		**Introduction Year**	**Expected Introduction Year**	**N/A**
data protection				☐
telecommunications (with regard to data protection and confidentiality)				☐
digital signatures				☐
telemedicine/eHealth service provision				☐
Health-IT product liability				☐
References	1. 2.			

Q36.	Which are the relevant regional/national bodies and authorities that have the responsibility of overseeing and/or co-ordinating the development and enforcement of the legal and regulatory requirements for the areas above? (If such exist).
Answer	
References	1. 2.

Q37.	What liaisons with Ministries are required and which are these Ministries?
Answer	

References	Please provide references to relevant resources and organisations.
	    1.
	    2.

Q38.	Has regional or national legislation on the targeted areas been harmonized to the EU-level regulations listed below? If yes, tick the corresponding box.	
Answer	Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 "on the protection of individuals with regard to the processing of personal data and on the free movement of such data". (Data Protection Directive)	☐
	Recommendation No. R (97) 5 of the Committee of Ministers to Member States on the Protection of Medical Data and Explanatory Memorandum to Recommendation No. R (97) 5.	☐
	Directive 1999/93/EC of the European Parliament and of the Council of 13 December 1999 on a Community framework for electronic signatures".	☐
	Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 "concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communication)	☐
	Directive 2000/31/EC of the European Parliament and of the Council of 8 June 2000 "on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market ("e-commerce Directive").	☐

References	Please provide references to relevant resources
	    3.
	    4.	

Q39.	Have there been some limitations or problems identified with existing or newly introduced (or revised) legal and regulatory framework concerning the above areas?
Answer	

References	Please provide references to related resources, also in electronic form when available.
	    1.
	    2.

Q40.	Are you aware of some success stories where progress was achieved with regard to the eHealth legal and regulatory framework in the country?
Answer	

References	Please provide references to related resources, also in electronic form when available.
	    1.
	    2.

3.1.3 Education and training on ICT

Q41.	Are there education programmes available on the national or regional level to promote the acquisition of necessary general (or eHealth-specific) ICT skills **by the general population**? If yes, please list some examples and provide references to relevant resources.
Answer	
References	1. 2.

Q42.	Are there education programmes available on the national or regional level to promote the acquisition of necessary general (or eHealth-specific) ICT skills **by health care professionals at all levels**?
Answer	
References	1. 2.

Q43.	Are there education programmes available on the national or regional level to promote the acquisition of necessary general (or eHealth-specific) ICT skills **by health care administrative and support staff at all levels**?
Answer	
References	1. 2.

Q44.	Are you aware of some success stories where progress was achieved with regard to the provision and acquisition of eHealth-related skills in the country?
Answer	
References	Please provide references to related sources, also in electronic form if available. 1. 2.

Q45.	Is "Health ICT specialist" and "Chief Information Officer" recognised as a job profile? If yes, give a brief description of the work tasks involved.
References	1. 2.

Q46.	Is there a specific training curriculum available for the qualification of "Health ICT specialist"? If yes, when is this education provided (as part of basic professional education or through continuing professional education)?
Answer	
References	1. 2.

Q47.	Who is responsible for the organisation of these education programmes? Who provides the training?
Answer	
References	1. 2.

3.2 eHealth applications & services

Q48.	Indicate in which of the following eHealth applications and/or services there have been major implementation or pilot projects undertaken on the regional and/or national level, during the last five years or currently ongoing. For **each category** of application, service or system where you indicate presence of regional and/or national activity, you must reference *at least one project or programme* as an example and provide the requested information.

Answer	**Electronic Health Records**	
	Title of project or programme	
	Type of application/service/system	
	Timeframe of activities	Start Date: End Date:
	Main partners and actors	
	Current status	in preparation Comments:

References	Please provide references to related sources, also in electronic form if available.
	    1.
	    2.	

Answer	e-prescription	
	Title of project or programme	
	Type of application/service/system	
	Timeframe of activities	Start Date: End Date:
	Main partners and actors	
	Current status	in preparation Comments:
References	Please provide references to related sources, also in electronic form if available. 1. 2.	

Answer	Health Cards	
	Title of project or programme	
	Type of application/service/system	national insurance card ☐ EHIC ☐ health professional card ☐ patient (citizen) identification card ☐ storage of medical data ☐ other (*please specify*)
	Timeframe of activities	Start Date: End Date:
	Main partners and actors	
	Current status	in preparation Comments:
References	Please provide references to related sources, also in electronic form if available. 1. 2.	

Answer	Health Portals	
	Title of project or programme	
	Type of application/service/system	**Type of portal** portal for citizens ☐ portal for patients ☐ portal for professionals ☐ **Types of content** yellow pages ☐ general health information ☐ disease specific-information ☐ information on services ☐ healthcare professional content ☐ interactive features: if yes, please explain other
	Timeframe of activities	Start Date: End Date:
	Main partners and actors	
	Current status	in preparation Comments:

References	Please provide references to related sources, also in electronic form if available.
	    1.
	    2.	

Answer	Risk Management and Patient Safety	
	Title of project or programme	
	Type of application/service/system	
	Timeframe of activities	Start Date: End Date:
	Main partners and actors	
	Current status	in preparation Comments:

References	Please provide references to related sources, also in electronic form if available.
	    1.
	    2.	

Answer	Patient Identifiers	
	Title of project or programme	
	Type of application/service/system	
	Timeframe of activities	Start Date: End Date:
	Main partners and actors	
	Current status	in preparation Comments:

References	Please provide references to related sources, also in electronic form if available.
	   3.
	   4.	

Answer	Personal wearable and portable communicable systems	
	Title of project or programme	
	Type of application/service/system	
	Timeframe of activities	Start Date: End Date:
	Main partners and actors	
	Current status	in preparation Comments:

References	Please provide references to related sources, also in electronic form if available.
	   1.
	   2.	

Answer	Other ICT tools assisting prevention, diagnosis, treatment, health monitoring, lifestyle management	
	Title of project or programme	
	Type of application/service/system	
	Timeframe of activities	Start Date: End Date:
	Main partners and actors	
	Current status	in preparation Comments:

References	Please provide references to related sources, also in electronic form if available.
	   1.
	   2.	

Answer	Telemedicine services	
	Title of project or programme	
	Type of application/service/system	**Brief description** **Communicating parties** patient - professional ☐ professional - professional ☐
	Timeframe of activities	Start Date: End Date:
	Main partners and actors	
	Current status	in preparation Comments:
References	Please provide references to related sources, also in electronic form if available. 　　1. 　　2.	

3.3　Interoperability and standards

3.3.1　Technical Interoperability

Q49.	What is the current status and future plans concerning the adoption and implementation of technical health ICT standards in the country?
Answer	
References	1. 2.

Q50.	Which are the relevant decision-making bodies concerning the use of healthcare coding and classification systems?
Answer	
References	1. 2.

Q51.	Which technical standards are employed in health ICT applications on the regional or national level (e.g. for data security, health messages, health cards etc.)?
Answer	
References	1. 2.

Q52.	How long have these standards been in use in health ICT applications?
Answer	
References	1. 2.

Q53.	What is the general trend and future plans concerning the adoption and implementation of technical health ICT standards in the country?
Answer	
References	1. 2.

3.3.2 Semantic Interoperability

Q54.	Are there some specific initiatives concerned with semantic interoperability (generally or specifically for healthcare) underway in the country?
Answer	
References	1. 2.

Q55.	Which coding and classification systems are in use in health ICT applications on the regional or national level?
Answer	
References	1. 2.

Q56.	In which healthcare settings are these applications used? (primary care, tertiary/hospital care, home care etc)
Answer	
References	1. 2.

Q57.	How long have these coding and classification systems been in use in health ICT applications in the country?
Answer	
References	1. 2.

Q58.	How is the use of healthcare coding and classification systems managed in the country? e.g. healthcare specific organisation or body established for this purpose; as part of national standards organisation, etc.
Answer	
References	1. 2.

3.3.3   Interoperability of Electronic Patient Records & Electronic Health Records

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Definitions

- A ***patient record*** is the repository of information about a single patient. This information is generated by health care professionals as a direct result of interaction with a patient or with individuals who have personal knowledge of the patient (or with both). Traditionally, patient records have been paper and have been used to store patient care data.

- A ***computer-based patient record*** **(CPR)** is an electronic patient record that resides in a system specifically designed to support users by providing accessibility to complete and accurate data, alerts, reminders, clinical decision support systems, links to medical knowledge, and other aids. Alternative terms for the CPR are **Electronic Medical Record (EMR)** and **Electronic Patient Record (EPR)**.

  Adapted from: *The Computer-Based Patient Record: An Essential Technology for Health Care, Revised Edition,* Institute of Medicine *of the National Academies.* The National Academies Press, Washington, D.C., 1997.

- The term **Electronic Health Record (EHR)** refers to the longitudinal collection of electronic health information for and about persons, where health information is defined as information pertaining to the health of an individual or health care provided to an individual. Electronic health records (EHR) are maintained by providers (e.g., hospitals, nursing homes, ambulatory settings) and by individuals (also called ***personal health records***).

  Adapted from: *Key Capabilities of an Electronic Health Record System: Letter Report.* Committee on Data Standards for Patient Safety, Board on Health Care Services, Institute of Medicine *of the National Academies.* The National Academies Press, Washington, D.C. 2003.

Q59.	Is there a common EPR architecture available and/or in use on a regional and/or national level in the country?
Answer	
References	1. 2.

Q60.	Is there a common structure for EPRs available and/or in use on a regional and/or national level in the country?
Answer	
References	1. 2.

Q61.	Are there interoperability standards established and in use for EPR on a regional and or national level?
Answer	
References	1. 2.

Q62.	Is there a common lifelong Electronic Health Record architecture available and/or in use on a regional and/or national level in the country?
Answer	
References	1. 2.

Q63.	Is there a common structure for lifelong EHRs available and/or in use on a regional and/or national level in the country?
Answer	
References	1. 2.

Q64.	Are there interoperability standards established and in use for EHRs on a regional and or national level?
Answer	
References	1. 2.

3.3.4 Accreditation procedures

Q65.	Is there some form of conformity testing or accreditation scheme for eHealth systems and applications in the country?
Answer	
References	Please provide references to relevant resources and organisations. 1. 2.

Q66.	If yes, since when does the scheme exist, and how is it managed?
Answer	
References	Please provide references to relevant resources and organisations. 3. 4.

Q67.	If not, are there are plans for the introduction of such a scheme?
Answer	
References	1. 2.

4   PART 4 - eHealth RTD status

4.1   General information on RTD structure

When answering the following questions, please specify whether the information concerns the regional or national level.

Q68.	Which are the main actors in RTD policy setting in the country (or region)?
Answer	
References	Please provide a list of the relevant organisations, bodies, authorities, as well as URLs to the respective web sites. 1. 2.

Q69.	Which are the main groups directly involved/undertaking RTD activities in the country? (e.g. university or other research groups, institutes, companies etc)
Answer	
References	Please provide a list of the relevant organisations, bodies, etc, as well as URLs to the respective web sites. 1. 2.

Q70.	What are the main focus areas and targets of RTD activities in the country (or region)? Please list both general and eHealth-specific targets (if available).
Answer	
References	1. 2.

4.2   Research Programmes

> **Definition**
>
> **Research programmes** are to be understood as: "full research and innovation programmes, part of such programmes or similar initiatives. Typically, such activities should be: strategically planned, executed at national or regional level, financed or managed by national or regional public bodies or by structures closely related to or mandated by public authorities".
>
> *Source: ERA-NET scheme presentation folder*

Q71.	In which of the following areas are there major research programmes underway in the country? Please tick the corresponding boxes.	
Answer	ICT applications	☐
	Telemedicine	☐
	Health informatics/eHealth	☐
	Bioinformatics	☐
	Genomics, proteomics	☐
	GRIDs	☐
	Nanotechnologies	☐
	Microdevices	☐
	New materials (including bio materials)	☐
	Other area(s) which you feel are relevant for eHealth RTD.	☐
References	Please provide references to relevant resources 1. 2.	

Q72.	Please provide information on some of the major *currently running* national (or regional) research programmes in each area. Copy and fill in the Overview Table below **for each programme separately**. Using the space provided for this purpose, accompany your response with references to the relevant documentation (such as project plans, reports, research studies, evaluation results etc.). If these documents are available online, please provide also their URLs, as well as links to the programme web sites, if available.

Research Program Overview	
Official name or title of the programme	
Programme web site (if available)	
Main participant organisation(s) and their roles	
Area(s) targeted by the programme	
Main objectives set forward in each area	
Timetable for implementation of the programme	Start Date: End Date:
Current progress status of the programme	in preparation
Implementation progress with regard to the targets and milestones set in the project plan	
Future targets or plans for further development	
Timeframe for achievement of future targets	
Funding through the ICT-for Health, eTEN programme or other EU-research funding (if possible, indicate the actual amount and/or percentage of total funds)	
References: List main programme documentation and/or publications, combined with URLs to online documents (if available) 1. 2.	

4.3 RTD Funding - National

Q73.	Which are the major national and regional funding sources and agencies in the country?
	Please the fill in the Overview Table below *for each* organisation *separately*.
	Using the space provided for this purpose, accompany your response with references to the relevant documentation. If these documents are available online, please provide also their URLs.

Funding Organisation Profile	
Official name or title of the organisation	
Official web site (if available)	
Main contact person responsible for eHealth related activities (if existing/known)	
References: Please provide references to: - mission and strategy documents (if available) - annual reports of the last five years (provide the link to online versions if available) - evaluations reports of existing/earlier funding programmes (link to online versions if available) - major eHealth or related studies, reports, other publications. 1. 2.	

Q74.	What is the amount of annual funding available for eHealth related activities on the regional and national level in the country? Please provide references to the corresponding resources.
Answer	
References	1. 2.

4.4 Technology transfer

Q75.	Are there some initiatives on the regional or national level to promote and support technology transfer in the area of eHealth or related fields? If yes, please describe shortly
Answer	
References	1. 2.

Q76.	What structures and mechanisms, if any, are available on the regional or national level for eHealth-related technology transfer in the country?
Answer	
References	1. 2.

4.5   Innovation support

Q77.	Which forms of support actions have been employed to promote eHealth-related innovation on the regional or national level
Answer	conferences ☐ seminars ☐ studies - analyses ☐ working/expert groups ☐ information and communication activities ☐
References	1. 2.

Q78.	Which types of structures and mechanisms exist in the country to promote and support eHealth-oriented innovation?
Answer	
References	1. 2.

4.6   Industry Strategies and Programmes

Q79.	Are there *national-ownership companies* active in the area of eHealth and related RTD? If yes, please fill in the Overview Table below *for each* company *separately*.

National Company Profile	
Company name	
Official company web site (if available)	
Areas of activity and interest; actual involvement in eHealth-related RTD and implementation;	
Most significant achievements	
References: Please provide references to related strategies and plans, if available 1. 2.	

Q80.	Are there companies of *international ownership* active in the area of eHealth and related RTD? If yes, please fill in the Overview Table below *for each* company *separately*.

International Company Profile	
Company name	
Official company web site (if available)	
Areas of activity and interest; actual involvement in eHealth-related RTD and implementation;	
Most significant achievements	

References: Please provide references to related strategies and plans, if available
 	
   1.
   2.	

Template Annex: eHealth Applications & Services

Reference Tables

Table 1. eHealth applications and services

for Healthcare Professionals

APPLICATION	SERVICES
EPRs - EHRs	Clinical messages
e-prescribing	Clinical access to patient data
	(lab results etc) – shared records
	Decision support for:
Professional card	- e-prescribing
	- Treatment protocols
	- Guideline support
	- Risk –prognostic assessment
	Continuing Medical Education
Digital signature	(Web-based, Personalised)
Appointment booking	Benchmarking information
Tele-consultation:	
- with peers	Billing services
- with patients	
(e-mail, other means)	
Telemedicine services:	
- telepathology	
- teleradiology	
- telediagnosis	
- telesurgery	
Mobile and emergency systems	
Home care monitoring systems	
Clinical trials – Research co-ordination & follow-up	
Clinical libraries, Guideline libraries	

Table 2. eHealth applications and services for Citizens

APPLICATIONS	SERVICES
Personal Health Records	Access to own medical data
Health Card	e-pharmacy services – health products purchase
Digital signature	e-prescription – scheduling of delivery
Personal agents-assistants	Booking Services
Individualised health information and advice	Online health information - health portals
Directories of providers/services	Home care services & monitoring
Eligibility & enrolment in clinical trials	Online health insurance services:
	- eligibility – enrolment
	- filing & processing of claims
Risk assessment – Health promotion behaviour	
Personal wearable and portable communicable systems	

Table 3. eHealth applications and services

for Healthcare Providers and Organisations

APPLICATIONS	SERVICES
e-procurement	Payments
	- transfer of banking transactions
	- transfer or exchange rates
	- transfer of payments
e-commerce	Insurance verification
e-logistics	Claims submission, status checking, payment
Patient administration	Information on qualifications of employees
Customer Eligibility management	Patient-id, Provider-id, Security, Privacy

Table 4. eHealth applications and services

for Public Health Systems

APPLICATIONS	SERVICES
Online health information provision - health portals	Monitoring of population health status
Online health promotion and education	Identification and outreach to high risk groups
	Disease outbreak and monitoring
	Occupational safety & accident prevention

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