Benchmarking ICT use among General Practitioners in Europe
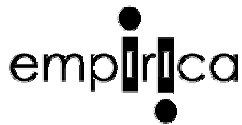
Final Report

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EXECUTIVE SUMMARY

The 'Pilot on eHealth Indicators' study	This report presents the outcomes of the "Pilot on eHealth Indicators" study, carried out by empirica in association with IPSOS on behalf of the European Commission, Information Society and Media Directorate-General. The data used for this report were collected by means of a survey of primary care physicians and their use of ICT for eHealth purposes. The survey was carried out in all 27 Member States of the European Union and in Norway and Iceland in 2007.

Overview

A rapid development in eHealth	A rapid development has taken place in the eHealth area in Europe over the past five years, and General Practitioners have been able to profit from it. A basic ICT infrastructure consisting of computers and Internet connections is today available in most of the General Practitioner practices in Europe. The electronic storage of administrative and medical patient data, the use of a computer during consultation with patients and other uses of ICT in the health area are becoming more and more a daily experience in the practices. At the same time, there is still room for improvement when it comes to electronic networks connecting their IT systems with other health actors, the electronic exchange of patient data and electronic interactions with patients.
ICT infrastructure is increasingly less of an issue...	Today, almost all General Practitioner (GP) practices (87%) in the European Union use a computer. There is a tendency towards larger practices being better equipped — 93% using computers — than smaller ones — 84%. There remain 13% of practices that are currently without any computers and are therefore cut off from the benefits eHealth has to offer. In some countries, the share of practices using a computer is as low as 65% (Malta, Romania) or 57% (Latvia).
	69% of the EU27 GP practices have an Internet connection. Its use varies according to the size of the practice, with use rates ranging from 61% among single GP practices to 81% among practices of four or more GPs. While there are Member States where Internet use has reached saturation level — such as in Estonia, Finland, Denmark, Sweden and Iceland — there are also several Member States where less than 50% use the Internet (Bulgaria, Hungary, Romania and Slovakia).
	Broadband connections have clearly arrived on the scene and are used by nearly half of the EU27 GP practices (48%). There are considerable differences between the countries, with broadband penetration ranging from 93% in Finland to 5% in Romania.
...while eHealth use still varies across the EU countries and presents a patchwork pattern.	The use of ICT for Health purposes by General Practitioners in Europe varies considerably. While eHealth usage based on the availability of a computer rather than an Internet connection (e.g. electronic storage of patient data) is relatively widespread, more advanced applications are less common.
	The result is a patchwork pattern of eHealth use related to the complexity of the eHealth application in question. On the one hand, the more complex the application gets — in terms of the necessary infrastructure, skills needed by the user, the number of actors and the complexity of the processes involved etc. — the more substantial are the differences between the countries. On the other hand, the overall use rates decrease with growing complexity so that the most complex ones — i.e. those involving the electronic transfer of medical patient data over a network — are used to a larger degree only in a couple of countries.
	From the data collected for this study, Denmark, the Netherlands, Finland, Sweden and the UK emerge as the European frontrunners in eHealth use by General Practitioners. On the other side there is a group of countries where either the use of eHealth at large or the use of advanced applications still

leaves considerable room for improvement. This group consists of Greece, Latvia, Lithuania, Poland and Romania. In between lies the large group of average performers, consisting of the remaining 15 Member States.

A gap between readiness for and use of eHealth remains.

Comparing eHealth readiness with eHealth use — i.e. the availability of ICT infrastructure in a practice with the actual use of eHealth applications — shows varying degrees of untapped potential for higher eHealth use rates if the available infrastructure were fully used. The 'Readiness-Use Gap' for patient data storage ranges from 8% to 29%, depending on the type of data to be stored. Gap values for the storage of medical patient data are slightly higher than for administrative patient data storage. The average gap between availability and use of a computer in consultation is at 12%, ranging from 0% in Finland — where all GP practices have a computer in the consultation room and also use it — to 54% in Slovenia. The gap between availability of an Internet connection and the electronic exchange of patient data ranges from 29% to 59% on EU27 average, largely mirroring the fact that this kind of data exchange is currently used to a larger extend only in some countries.

eHealth use in detail

Patient data are stored electronically in many European GP practices.

Administrative patient data are stored electronically in 80% of the EU27 GP practices. In some countries, usage rates are at and below the 50% level, going down as far as 26%. Practice size plays a certain role in this regard, with an average difference of 11 percentage points between the smallest and the largest size class. The highest use rates can be found in Denmark (97%), Estonia (98%), Hungary (100%), the Netherlands (97%), Finland (100%), Sweden (96%), the United Kingdom (95%), Iceland (99%) and Norway (98%). Storage of administrative patient data is practised least frequently in Greece (49%), Latvia (26%), Lithuania (39%) and Romania (47%).

When it comes to different types of patient data stored for medical purposes, data on diagnoses and medications are stored by the highest share of GP practices (92% of practices storing also administrative patient data), followed by basic medical parameters such as allergies etc. (85%), laboratory results (81%), a patient's symptoms or the reasons for his/her visit (79%), the medical history of a patient, ordered examinations and their results (77% each), results of vital sign measurement (76%) and — with some margin — storage of radiological images (35%).

76% of all practices store individual patient data in a structured manner, which facilitates the automatic processing of the data in other electronic systems.

Computers are available in most GP consultation rooms, but they are not always used.

A computer can nowadays be found in the consultation room of 78% of the European GP practices. It is (nearly) ubiquitous in practices in Finland (100%), Denmark, Norway (98% each), Estonia, the Netherlands, the UK and Iceland (97% each). It is available in less than half of the consultation rooms of practices in Malta (48%), Poland (41%) and Lithuania (29%).

These computers are however not always used during consultation with a patient: 66% of the practitioners do so, while in 12% of the practices the computer is not used while a patient is present. In the seven countries with availability rates of 97% and more, the computer is also used by most GPs. In Malta, the computers are used by 27% of all GPs, compared to 11% in Poland and 8% in Lithuania. Low usage rates can also be found in Greece (20%), Romania (21%) and Slovenia (18%).

A Decision Support System (DSS) is available in 62% of the EU27 practices. DSS supporting diagnoses are met more frequently than those supporting prescribing (59% compared to 32% on EU27 average).

In addition, most DSS systems tend to offer general advice rather than patient

specific advice (42% compared to 19%).

▶

Electronic connections to other health actors are on the advance, but use rates are still fairly low...	The Internet as well as other dedicated types of electronic networks allow GP practices to establish connections to other health actors' electronic systems. These include laboratories, other GP practices, secondary health actors such as specialists and hospitals, health authorities, insurance companies, pharmacies, patients' homes and care homes. Use rates for these types of connections are moderate to low on European average. About 21% of European GP practices connect to other primary care actors, i.e. other GPs. Between the two types of connections to secondary health actors — hospitals and specialist practices — there is a noticeable gap. While about one fifth of GP practices connect to hospitals only somewhat more than one tenth (12%) do the same with specialist practices. A similar situation can be observed in relation to connections to health administration actors. 17% of the practices have a connection to health authorities, compared to only 3% connecting to insurance companies. Connections having to do with social care purposes — in this case to patients' homes and care homes — are virtually non-existent with shares between about 2% and 3% respectively. A notable exception is found in the case of connections to laboratories: with about 40% of the European GP practices, this is the most frequent connection type. Connection to pharmacies are considerably less frequent (used by about 7% of the practices), a finding that is also confirmed by the low use rates for ePrescribing (see below). Electronic networks are also used for other professional purposes: 26% of the practices search for medication information, while 15% order their practice supplies online, 12% make appointments with other care providers and e-mail exchange with patients is done by about 4%. Both telemonitoring and the transmission of vital data from patients' homes are virtually non-existent as a professional purpose for network use (use rates below 1%).

▶

...as are use rates in the area of electronic transfer of patient data.	Further to connections to other health actors, the Internet and other, dedicated networks can also be used to electronically transfer patient-identifiable data. Use rates are again moderate to low and show considerable variations. While the transmission of analytic results from a laboratory to the GP occurs with a comparatively high frequency (40%), other types of data are transferred electronically less often: administrative data are transferred to reimbursers by 15% and to other care providers by 10%. Medical data are transmitted to care providers or other professionals by 10%. ePrescribing is practiced by 6% of the EU27 GP practices. It can today be regarded a reality in three Member States: Denmark (97%), the Netherlands (71%) and Sweden (81%). Medical data exchange across national borders does not occur to any notable extent (0.7% on average).

▶

GPs' perception of facilitators, barriers and impacts

European GPs are positive about the role of ICT in health care.	Quite remarkably, European GPs are positive about the question whether ICT improves the quality of healthcare services. On a five-point scale ranging from strong disagreement (-2) to strong agreement (+2), the EU27 average score is 1.3 — i.e. somewhere between

partial and strong agreement. In none of the 29 countries under observation, a negative attitude is prevalent. A positive attitude seems to have nothing to do with whether a country is more of an eHealth laggard or a frontrunner. Those countries displaying the least positive attitude (Germany, France and Austria) are all solid average eHealth users. At the same time, GPs in countries that can be considered eHealth laggards (e.g. in Greece, Cyprus and Romania) show an attitude that is considerably more positive than the EU27 average.

They have a clear idea of what would facilitate a wider spread of eHealth use.

Among factors that could facilitate the diffusion of eHealth, most European GPs would prefer if the issue were included in the curricula of medical education. The second most important facilitating factor is an increase in IT training provision to the GPs themselves. Thirdly, a better networking of all health actors in order to share clinical information is also regarded as beneficial by a majority of GPs. When it comes to telemonitoring — which is currently used quite rarely among the GPs — the practitioners on average are moderately positive that it will facilitate their treatment of patient with chronic conditions. In relation to these facilitators, there is not much difference between the countries.

While eHealth users do not perceive any major barriers, non-users are considerably more critical.

While European GPs on average regard neither a lack of IT support nor cost as serious barriers to eHealth use, the perception of practitioners from countries with low eHealth use levels — Greece, Poland, Romania, Lithuania and Latvia — is quite different.

Mostly, GPs in those countries perceive more and stronger barriers than their colleagues in the rest of the EU. A lack of IT training for GPs is probably the strongest hindering factor. A majority of GPs from the laggard countries strongly agrees to the statement that more IT training would help them to make more and better use of eHealth applications. Accordingly, there seems to be a lack of this kind of training, hindering wider uptake. In a similar manner, a lack of IT support as well as costs for the procurement and maintenance of an ICT infrastructure and eHealth applications are seen as barriers by many of the GPs in the laggard countries. The former result is well in line with other data indicating that only a minority of GPs in Greece (38%), Latvia (29%), Poland (30%) and Romania (10%) receives IT support from professional service providers — compared to 74% on EU27 average.

Impacts are largely perceived as being either positive or neutral.

Overall, European GPs tend to see either positive impacts or no impacts emanating from the use of eHealth applications and services. Explicitly negative impacts are the exception — occurring to a noticeable degree only in two areas: the doctor-patient relationship and the workload of the practice support staff.

GPs are largely positive about impacts on working processes, both personal ones and the processes of the practice staff. They are more ambivalent in relation to patient-related and medical impacts. For every GP being positive about those impacts, there is at least one other GP not perceiving any. This is true for quality of diagnosis and treatment, the scope of the services offered by the practices, the average number of patients treated per day and the number of patients coming to the practice.

eHealth use in Europe 2002 — 2007

ICT infrastructure and many eHealth

In the past five years, the share of GPs active in eHealth in the former EU15 Member States has increased remarkably. As regards ICT infrastructure, the

usage figures have increased considerably over the past five years.

share of practices that use a computer has gone up from 81% in 2002 to 90% in 2007. The Internet — or dedicated GP networks — are nowadays used by 72% of the EU15 GPs, as compared to 63% in 2002.

Continuous education and the search for prescribing information were and are the most frequent use cases for an Internet connection. The latter was done by 35% in 2002 and has nearly doubled to 62% today.

Electronic patient data transfer is becoming ever more prevalent, even if actual use rates among the EU15 countries still leave some room for improvement, depending on the application under observation. The share of GPs engaging in patient data transfer went up considerably from 17% to 63% in the past five years. Transfer of laboratory results such as blood sample or ECG data occurs much more often today (54%) than it did five years ago (11%). Transfer of administrative patient data to reimbursing organisations and to other health care providers each went up to 22% from 6% and 5% respectively in 2002. In relation to transfer of medical patient data there has been an increase from 8% to 28%. ePrescribing was done by about 3% of the EU15 GPs in 2002 and is done today by about 11%.

A comparison with the 2007 results for all 27 EU Member States shows that the enlargement of the Union did not have much impact — neither positive nor negative — on the developments in the past five years. The 2007 figures for the EU15 are in most cases nearly identical to the EU27 figures. Deviations of 5 percentage points and more can be found in relation to the search for prescribing information and the general transfer of patient data.

The role of eHealth policy strategies

National eHealth policy strategies seem to have a positive impact on spread of ICT infrastructure and eHealth use.

An eHealth policy strategy can today be found in all EU Member States, either as a dedicated approach or as part of larger initiatives, e.g. targeting the health system as a whole or the eGovernment domain. These strategies seem to play an important role in increasing eHealth deployment and take-up among General Practitioners.

Based on data about eHealth strategies collated in the framework of the eHealth ERA project (http://www.ehealth-era.org) this study found varying degrees of sophistication. The maturity of the strategies ranges from one year to more than ten years. While some countries turned to a dedicated eHealth strategy only recently — sometimes developed from earlier and wider Information Society or health system action plans — in others second or third generation strategies can be found. The scope of the activities carried out either directly under the auspices of a strategy or in parallel varies. In some Member States the particular focus is still very much on the deployment of suitable eHealth infrastructures, while others are deeply involved in setting up their own Electronic Health Record systems, in some cases building on precursor projects of limited scope. But even in countries with relatively new strategies the aim is often high — i.e. for the implementation of EHRs and fully networked health information systems.

All in all, the current eHealth strategy sophistication level matches well with the actual eHealth deployment and use among General Practitioners found by this study. In some countries, such as Denmark or France, there is a longstanding eHealth policy tradition while at the same time eHealth use is either high (DK) or average (FR). In other countries, such as Latvia, eHealth has arrived on the agenda only recently and use is therefore not yet very widespread. A third example is Estonia, where there is a high use of certain eHealth applications — mainly for data storage and consultation support — which can be explained by a rather mature legislation obliging primary carers to use computers, while attention has been given to electronic transfer of

medical patient data only recently and usage rates are therefore still rather low.

MAIN REPORT

1   The "Pilot on eHealth Indicators" study

This "Pilot on eHealth Indicators" study was carried out by empirica in association with IPSOS on behalf of the European Commission, Information Society and Media Directorate-General.

The purpose of the present study was:

- To measure the availability and use of ICT by primary care physicians in the EU27 and EEA countries,
- which was achieved by means of a telephone survey of primary care physicians on their use of ICT and Internet for communicating with patients and between primary and secondary care and other eHealth agencies.
- Through this survey up-to-date information and data on eHealth developments was obtained and analysed in this final report
- In addition to the final report there are 29 Country Briefs for each of the Member States, Norway and Iceland — enabling Member States to monitor their performance to improve public services.

To meet these objectives the study organised and executed a survey of primary care physicians as described above.

1.1   Methodological notes

The survey

The data presented in this report were collected by means of a survey of primary care physicians and their use of ICT and Internet for communication with patients and between primary and secondary care and other health actors.

The survey was carried out in all 27 Member States of the European Union and in Norway and Iceland. The fieldwork took place in the third quarter of 2007. It was coordinated by the German Ipsos branch and was conducted in cooperation with national partner institutes.

The survey was carried out in the form of a Computer-Aided Telephone Interviewing (C.A.T.I.). Exception is Malta where face-to-face interviews using P.A.P.I. methodology (Paper-and-Pencil Interviews) were conducted. In Sweden CATI interviews were used, until the sample was exhausted due to the specificities of the Swedish health system. The remaining interviews were accomplished through Computer-Aided Web-Interviews.

Universe / Target Person and Sampling

The universe consisted of all General Practitioners in the respective countries. From the universe a random sample of practices / institutions with a quota on region and — where possible — private practice / institution was drawn. The target respondent within the practice / institution was selected via a random procedure if more than one GP were present. In total, 6,789 interviews were achieved. The sampling was done in a decentralised way and by each of the partner institutes.

Number of Interviews Conducted		
Country code	**Country**	**Interviews**
BE	Belgium	318
BG	Bulgaria	206
CZ	Czech Republic	304
DK	France	261
DE	Germany	253
EE	Estonia	150
EL	Greece	315
ES	Spain	325
FR	France	302
IE	Ireland	206
IT	Italy	290
CY	Cyprus	72
LV	Latvia	177
LT	Lithuania	263
LU	Luxembourg	63
HU	Hungary	251
MT	Malta	92
NL	Netherlands	258
AT	Austria	299
PL	Poland	351
PT	Portugal	284
RO	Romania	304
SI	Slovenia	103
SK	Slovakia	261
FI	Finland	250
SE	Sweden	267
UK	United Kingdom	257
IS	Iceland	103
NO	Norway	204
	Total	6.789

Weighting schemes

After the fieldwork, weighting coefficients were computed giving each country a weight according to its population size in the respective group of countries: EU27+2 (for all 29 countries surveyed), EU27 (all EU Member States).

Questionnaire and indicators used

The English version of the questionnaire used for the survey can be found in the annex of this report. The annex also contains a listing of all statistical indicators covered by the survey. The indicator codes used in the footnotes of the graphs and tables (e.g. B2, C1 etc.) can be used to identify the corresponding indicator in the list.

2 Access to and use of ICT by European General Practitioners

This first analytical section of the report describes European GPs' access to and use of ICT in their day-to-day practice work. It presents the core data of the GP survey carried out in the framework of this study.

In more detail this section deals with the following issues:

- ICT infrastructure and eHealth readiness (Section 2.1)
  - o Availability of computers in the practice, including use of IT support services (Section 2.1.1)
  - o Availability of an Internet connection and bandwidth used (Section 2.1.2)
- ICT applications and eHealth use (Section 2.2)
  - o Computer use for storage of individual patient data (Section 2.2.1)
  - o Computer use in consultation with the patient, including the use of Decision Support Systems (DSS) (Section 2.2.2)
  - o Use of the Internet and dedicated electronic health networks (Section 2.2.3)
  - o Electronic transfer of patient data (Section 2.2.4), including
    - ▪ Transfer of patient data for administrative and medical purposes
    - ▪ Interoperability, data security and patient consent
  - o ICT use for continuous education (Section 2.2.5)
  - o Internet research by patients (Section 2.2.6)

Each sub-section begins with a box containing key results, targeted to readers who want to gain a quick overview rather than reading the full text. This overview can also help to easily identify and access those thematic areas that are deemed most relevant.

2.1 ICT infrastructure and eHealth readiness

The first questions of importance in relation to eHealth use by General Practitioners deal with the availability of a basic ICT infrastructure in the practice. In more detail this entails:

- o the availability of one or more computers in the practice;
- o a connection to the Internet; and
- o the bandwidth of the Internet connection.

This infrastructure can be regarded as an eHealth readiness factor since it forms the foundation on which the diverse computer and networking uses (such as storage of patient data, exchange of medical and administrative data etc.) analysed in the remainder of this report are built. It is the baseline from which a European GP can start his or her professional participation in the Information Society in general and in the eHealth domain in particular.

Key results

Today, almost all General Practitioner practices (87%) in the European Union use a computer. There is a tendency towards larger practices being better equipped — 93% using computers — than smaller ones — 84%. There remain 13% of practices that are currently without any computers and are therefore cut off from the benefits eHealth has to offer. In some countries, the share of practices using a computer is lower: 65% in Malta and Romania or 57% in Latvia.

When it comes to Internet use, **69% of the EU27 GP practices currently have an Internet connection**. Internet use varies according to the size of the practice, with use rates ranging from 61% among single GP practices to 81% among practices of four or more GPs. While there are singular Member States where the Internet is used in all or nearly all practices under observation — Estonia, Finland, Denmark, Sweden and Iceland — there are also several Member States where less than 50% use the Internet (Bulgaria, Hungary, Romania and Slovakia).

Broadband connections have clearly arrived on the scene and are used by nearly half of the EU27 GP practices (48%). There are considerable differences between the countries, with broadband penetration ranging from 93% in Finland to 5% in Romania.

2.1.1 Computer

On average, about 87% of European GP practices are equipped with at least one computer (cf. Exhibit 2-1 below). Between the Member States there are noticeable differences with computer availability ranging from about 57% (in LT) to 100% (in EE, HU and FI). There is no clear geographical pattern to explain for these differences. Neither a North-South nor an East-West divide is evident. The differences and in particular the relatively low figures in some countries can probably only be explained by the specific circumstances in the individual country, e.g. in terms of the existence of a dedicated eHealth strategy and GPs' extrinsic motivation —taking — for instance — the form of economic incentives — to use computers themselves, regulatory requirements e.g. in relation to data security, the financial situation of the practices, etc.

Further to the geographical differences, computer infrastructure differs according to the size of the practice. About 93% of European GP practices with 4 or more GPs use computers, compared to about 84% of the single GP practices, a difference of about 10 percentage points. Nine EU Member States show a gap of more than 20 percentage points mostly — if not always — in favour of the large practices. Some factors might explain for these differences. The most obvious one is that a larger practice is in a better position to bear the investment needed to establish a computer infrastructure in terms of hard- and software, maintenance and support (cf. below), energy, computer training for staff etc. While this assumption surely is true to a certain extent, it does not explain for those cases where small and medium practices are better equipped than large ones. Here, again, individual influence factors depending on the framework conditions in the country are likely to play a role.

Exhibit 2-1 Use of computers in European GP practices

| | | Size of practice | |
	Total	Single GP	2-3 GPs or physicians	4+ GPs or physicians
EU27	87.4	83.8	90.6	92.6
EU27+2	87.5	83.8	90.7	92.8

BE	86.1	80.8	96.4	96 *
BG	97.1	95.3	100.0	100 *
CZ	82.2	81.7	85 *	85 *
DK	98.9	96.9	100.0	100.0
DE	98.8	99.4	97.6	100 *
EE	100.0	100 *	100 *	100.0
EL	79.4	74.2	96 *	96.1
ES	77.2	68.2	74.3	87.1
FR	82.8	78.3	89.4	100 **
IE	73.4	58.5	88.4	100 *
IT	86.2	82.6	95 *	98 *
CY	69.4	74 *	100 **	56 *
LV	88.1	90.0	83 *	87 *
LT	57.4	61 *	60.3	56.5
LU	79.7	75 *	95 *	67 **
HU	100.0	100.0	100 *	100 *
MT	65.2	71 *	33 *	63 *
NL	98.5	96.2	99.1	100.0
AT	83.6	77.3	91 *	98.6
PL	71.5	61.3	75.9	78.7
PT	88.0	55.4	92.2	100.0
RO	65.8	71.3	56.4	60 *
SI	97.1	100 *	78 **	98.5
SK	95.8	95.5	96 *	97 *
FI	100.0	100 *	100 *	100.0
SE	99.6	96 *	100 *	100.0
UK	97.3	87 *	100.0	100.0
IS	99.0	100 *	94 *	100.0
NO	98.0	83 *	100.0	100.0

Base	All GPs
Indicator	R4: Computer use (cf. indicator annex for more information), % values.
Notes	* marks cells with 10<=n<50, ** marks cells with n<10.
Source	empirica, Pilot on eHealth Indicators, 2007.

IT maintenance and support

As has been said above, operation of a computer infrastructure requires investment in resources including — but not limited to — IT maintenance and support services. Between the two basic alternatives of either doing the support by themselves — e.g. by skilled staff members — or hiring an external service provider, the latter model is clearly favoured by a majority of European practices (cf. Exhibit 2-2 below). Overall, 74% of the practices that use computers receive professional IT support. From a country perspective, use of support services varies from 10% to 97% of the practices that use a computer in a country.

Use of support services varies to a certain degree depending on the size of the practice. Single GP practices in particular are less likely to have an external service provider (69%) than medium and large practices (77% and 78% respectively).

Exhibit 2-2 GP practices receiving professional IT support

IT support: IT support by professional service provider yes
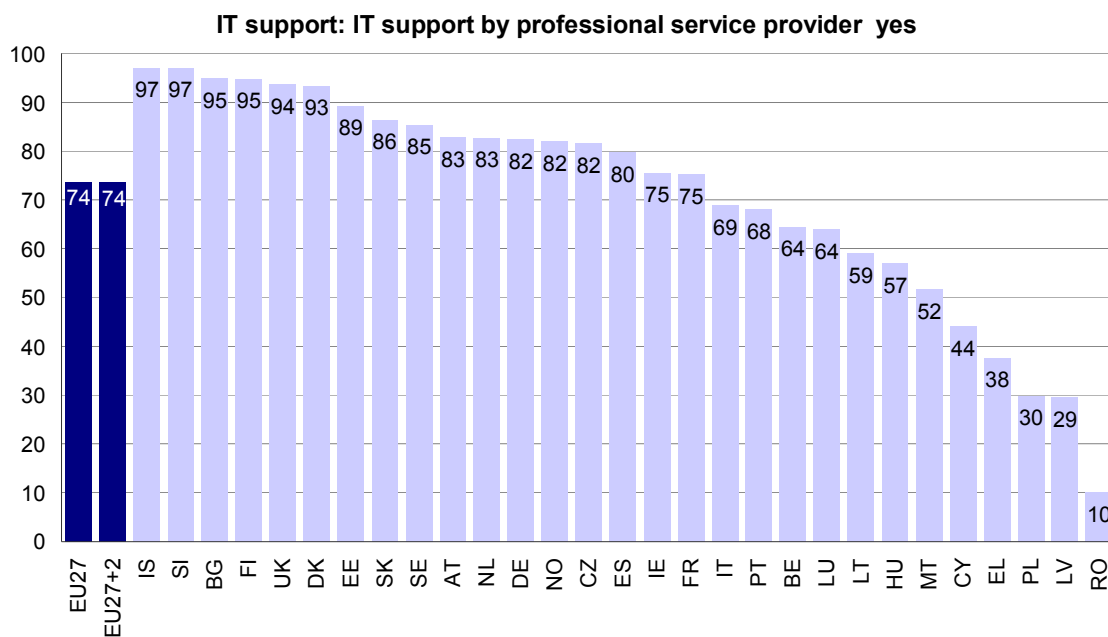
Base	GPs using computers
Indicator	J5: Professional IT support (cf. indicator annex for more information), % values.
Source	empirica, Pilot on eHealth Indicators, 2007.

2.1.2   Internet

The second infrastructure component under observation here is the Internet. An Internet connection can be seen as a prerequisite for most types of advanced data exchange between the practice and other parties, including health care providers, reimbursing organisations, pharmacists, laboratories etc. Further to this it can be used for information research and interactive services such as online ordering of supplies or patient monitoring. In these application areas, the Internet is an alternative to other networking infrastructures such as direct computer connections via the phone line or the exchange of data by means of storage media such as CD-ROMs. Reasons for the advantage of an Internet connection over the alternatives can be found in the relatively wide availability of the necessary infrastructure, the — potentially — higher bandwidth and the decreasing costs for Internet connections. In terms of bandwidth, a broadband Internet connection is clearly superior to the slower connection speeds provided by PSTN (standard phone line) or ISDN dial-up connections.

On average, about 70% of GP practices in the EU27 Member States have an Internet connection. Differences among the Member States are marked, with shares ranging from 35% to 100%. Even clearer than in the case of computer infrastructure, Internet connectivity varies with the size of the practice. There is a gap of about 20 percentage points between the share of EU27 single GP practices connected (60.9%) and 4+ GP practices (81.4%). This pattern is repeated in the individual countries: 12 EU27 Member States and Norway show a gap of more than 20 percentage points, favouring nearly exclusively the larger practices.

**Exhibit 2-3 Use of the Internet in European GP practices**

			Size of practice	
	Total	**Single GP**	**2-3 GPs or physicians**	**4+ GPs or physicians**
EU27	68.8	60.9	72.9	81.4
EU27+2	69.0	60.9	73.1	81.8
BE	83.9	77.9	96.4	92 *
BG	47.1	46.9	38.3	77 *
CZ	62.8	61.2	73 *	67 *
DK	98.9	96.9	100.0	100.0
DE	58.9	55.7	61.5	91 *
EE	100.0	100 *	100 *	100.0
EL	66.3	60.4	77 *	88.2
ES	51.4	39.1	55.7	60.0
FR	73.2	70.4	78.8	67 **
IE	64.7	47.4	81.9	95 *
IT	70.7	67.1	76 *	85 *
CY	58.3	67 *	75 **	40 *
LV	85.3	85.8	83 *	87 *
LT	51.7	52 *	57.4	50.0
LU	63.7	57 *	85 *	34 **
HU	49.0	52.5	48 *	32 *
MT	55.4	57 *	25 *	59 *
NL	96.6	93.6	96.3	100.0
AT	67.6	56.4	63 *	97.1
PL	61.5	51.6	62.0	70.6
PT	65.5	32.3	71.9	75.9
RO	35.2	39.8	26.9	31 *
SI	83.5	89 *	56 **	84.8
SK	43.7	45.8	48 *	29 *
FI	100.0	100 *	100 *	100.0
SE	98.5	92 *	100 *	99.0
UK	95.4	81 *	98.6	98.6
IS	98.1	100 *	94 *	98.6
NO	86.8	46 *	84.2	98.1

Base	All GPs
Indicator	C1: Internet connection (cf. indicator annex for more information), % values.
Notes	* marks cells with 10<=n<50, ** marks cells with n<10.
Source	empirica, Pilot on eHealth Indicators, 2007.

Connection bandwidth

As has been said above, bandwidth plays an important role when it comes to the usefulness of an Internet connection, in particular when the amount of data to be transmitted is comparatively high as in the case of transmission of visual medical data (e.g. radiographs, ultrasound pictures) or data streams from constant monitoring.

A broadband connection (either DSL or other technologies such as cable, power line etc.) can be found in about 48% of the EU27 practices. Narrowband connections (PSTN and ISDN dial-up) are less prevalent but have by no means disappeared entirely: an average 16% of the EU27 practices use them[1].

<div align="center">

Exhibit 2-4 Bandwidth of practice Internet connections
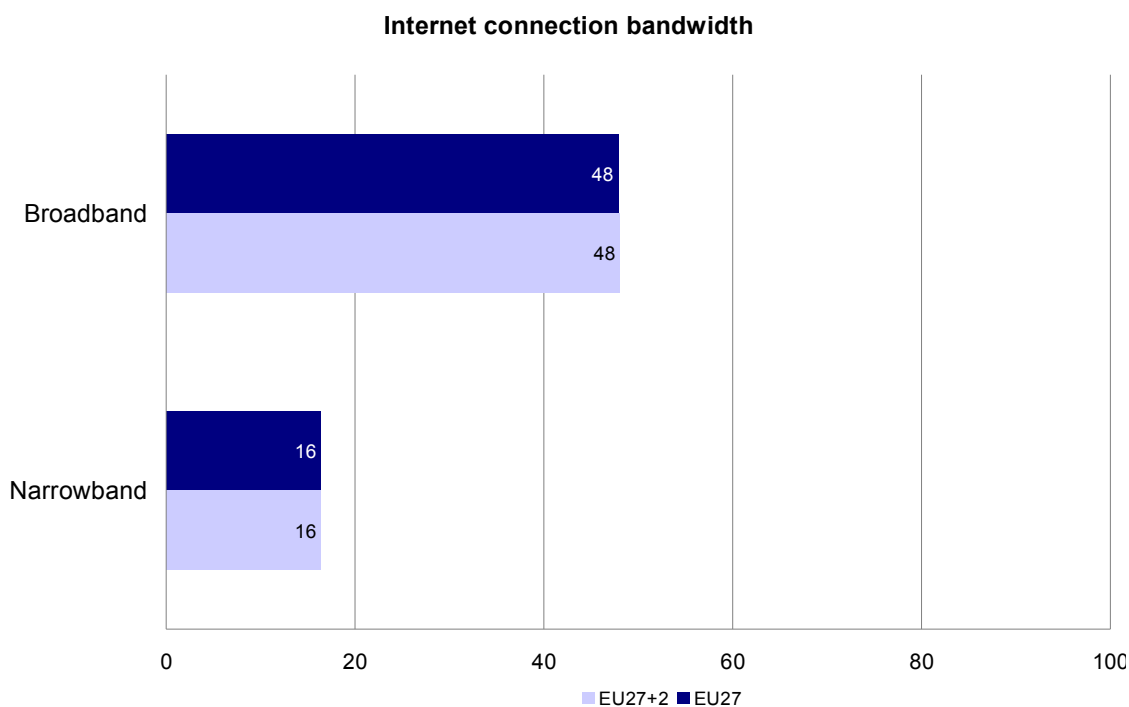
</div>

Internet connection bandwidth

Base	All GPs
Indicator	C2: Internet connection bandwidth (cf. indicator annex for more information), % values.
Note	Data do not include mobile Internet connections used outside the practice and GPs ignorant of their connection bandwidth.
Source	empirica, Pilot on eHealth Indicators, 2007.

Exhibit 2-5 below shows the use of broadband connections in more detail. In some countries a considerable negative deviation from the EU27 average can be observed (about and below 30%), while six countries show broadband usage rates of more than 90%.

In relation to practice size classes, there is a gap of not quite 20 percentage points between small and large practices when looking at the EU27 average. In seven Member States and Norway, larger practices show considerably higher broadband rates than the smaller ones (more than 20 percentage points difference).

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[1] It should be noted that there is also a considerable share of GPs that does not know what kind of Internet connection is used (16% of all GPs on average). This is most often the case in larger practices of four or more GPs, here about 30% do not know the bandwidth of their connection, as compared to only 8% in single GP practices. This is probably related to task allocations in practices of different sizes. In a larger practice, it is much more likely that the GP is not concerned with details of the IT infrastructure, whereas in a small practice the practitioner will probably know quite well what is going on in technological regard. The relatively high share of "Don't know" answers might also indicate that some practitioners look at the ICT infrastructure in their practice from a strictly end-user perspective, i.e. their primary interest is in the use of the applications available rather than in the technology that lies behind it.

## Exhibit 2-5 Use of broadband in European GP practices

		Size of practice		
	Total	Single GP	2-3 GPs or physicians	4+ GPs or physicians
EU27	47.9	41.1	53.4	59.1
EU27+2	48.1	41.1	53.7	59.7
BE	79.5	74.9	88.7	88.1 *
BG	23.0	25.0	17.9	30.0 *
CZ	38.5	37.2	46.9 *	45.5 *
DK	91.0	86.8	93.8	93.3 *
DE	40.0	38.0	39.5	80.0 *
EE	72.0	59.4 *	76.0 *	84.0 *
EL	43.8	38.2	61.9 *	66.7 *
ES	35.8	21.3	49.2	42.5
FR	59.1	54.9	67.0	55.6 **
IE	44.3	28.9	61.3	81.3 *
IT	48.8	46.2	47.2 *	64.1 *
CY	31.9	35.7 *	25.0 **	26.1 *
LV	58.3	58.8	62.1 *	33.3 **
LT	32.7	15.0 *	29.8	36.6
LU	61.5	54.1 *	84.3 *	33.6 **
HU	35.7	38.6	41.9 *	16.7 *
MT	50.6	52.1 *	25.0 *	52.0 *
NL	81.6	82.7	82.3	80.0
AT	36.8	27.9	46.7 *	71.1 *
PL	32.1	29.2	28.8	38.7
PT	32.1	13.8	32.5 *	43.5
RO	5.3	6.0	4.2	4.5 *
SI	54.0	59.3 *	44.4 **	52.9
SK	15.3	16.0	13.0 *	13.3 *
FI	92.7	80.0 *	91.7 *	94.6
SE	88.1	78.3 *	81.3 *	91.9
UK	72.6	46.4 *	79.7	76.1
IS	85.7	83.3 *	83.3 *	87.0 *
NO	73.8	34.8 *	75.9	83.5

Base	All GPs
Indicator	C2: Internet connection bandwidth (cf. indicator annex for more information), % values.
Notes	Data do not include mobile Internet connections used outside the practice and GPs ignorant of their connection bandwidth. * marks cells with 10<=n<50, ** marks cells with n<10.
Source	empirica, Pilot on eHealth Indicators, 2007.

Practice website

Practice websites[1] are not overly common in most of the EU countries. On average, less than two thirds of the GP practices in a country have a website. There are however some notable exceptions to this rule: In Finland, nearly all GP practices present themselves on the Internet. A similar share (86%) can be found in Iceland, while in Sweden and Denmark still about three quarters of the practices reported to have a website. On the other side there are countries such as France, Romania, Hungary, Luxembourg and Latvia, where about or less than 10% of the practices present themselves online via a website.

The reasons for these differences are not clear. All countries with a high share also show high Internet use rates, but so do several other countries where websites are obviously not common (e.g. Estonia or Belgium, but also — if to a lesser extent — the UK and the Netherlands). Another influence factor might be found in legal regulations relating to advertising or marketing, respectively. Germany may serve as an example: According to the professional code of conduct issued by the medical association of Germany, a doctor may — irrespective of the media used, i.e. also on a website — only inform about his or her occupational title (including titles acquired through continuous education), areas of expertise and organisational issues. While the latter includes — besides practice opening hours and similar information — also information about social sponsoring by the doctor, practice open days etc., the communication means are still very much limited. Thus, a website may not be used for the advertisement of products or services offered by a GP practice.

Exhibit 2-6 Practices having a website

Website: Practice website
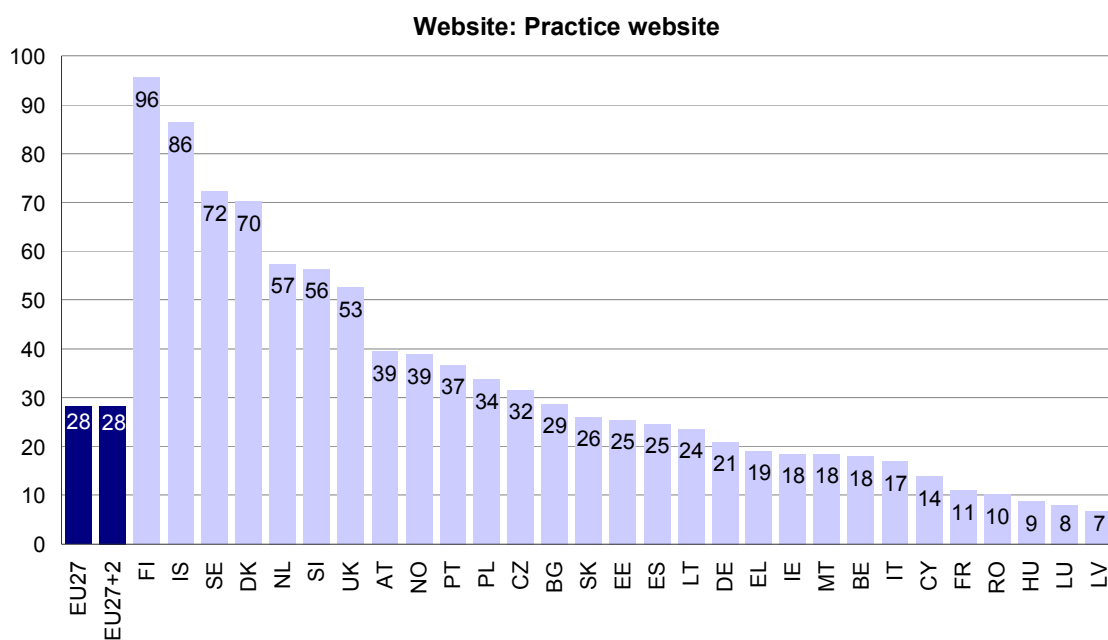
Base	All GPs
Indicator	E1: Availability of a practice website (cf. indicator annex for more information), % values.
Source	empirica, Pilot on eHealth Indicators, 2007.

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[1] The indicator covers practices' own websites as well as joint websites operated by third parties (e.g. regional GP portals maintained by a GP association or similar).

2.2   ICT applications and eHealth use

With about 87% of European GP practices having a computer and about 69% having an Internet connection, the question is as to if and how this ICT infrastructure is used. This section deals with the use of ICT for different purposes in a practice's day-to-day business. This includes:

- The use of computers for storage of identifiable patient data.
- The use of computers in consultation with the patient.
- The use of the Internet for connections to other health actors and for patient interaction.
- Electronic transfer of patient data.
- The use of ICT for training.

Key results

The overall picture emerging from this part of the analysis is that **the use of ICT for eHealth purposes varies considerably**. On the one hand, the more complex the application gets — in terms of the necessary infrastructure, skills needed by the user, the number of actors and the complexity of the processes involved etc. — the more substantial are the differences between the countries. On the other hand, the overall use rates decrease with growing complexity so that the most complex ones — i.e. those involving the electronic transfer of medical patient data across a network — are used to a larger degree only in a couple of countries.

Electronic **storage of administrative patient data is done in 80% of the EU27 GP practices** on average. In some countries, shares are at and below the 50% level, going down as far as 26%. Practice size plays a certain role in this regard, with an average gap of 11 percentage points between the smallest and the largest size class.

When it comes to different types of **patient data stored for medical purposes**, data on diagnoses and medications are stored by the highest share of GP practices (92% of practices storing also administrative patient data), followed by basic medical parameters such as allergies etc. (85%), laboratory results (81%), a patient's symptoms or the reasons for his/her visit (79%), the medical history of a patient, ordered examinations and their results (77% each), results of vital sign measurement (76%) and — with some margin — storage of radiological images (35%).

Computers are used for consultation by about 66% of the EU27 GP practices while a **Decision Support System (DSS) is available in nearly two thirds of the EU27 practices**. DSS supporting diagnoses are more common than those supporting prescribing (59% compared to 32% on EU27 average). Also most DSS systems tend to offer general advice rather than patient specific advice (42% compared to 19%).

The **Internet** as well as other, **dedicated types of electronic networks** are **used by about 55% of the European GP practices to connect to other health actors** such as laboratories, other GPs or health authorities. About 21% of European GP practices connect to other primary care actors, i.e. other GPs. Between the two types of connections to secondary health actors analysed here — hospitals and specialist practices — there is a noticeable gap. While about one fifth of GP practices connect to hospitals, only somewhat more than one tenth (12%) do the same with specialist practices. A similar situation can be observed in relation to connections to health administration actors. 17% of the practices have a connection to health authorities, compared to only 3% connecting to insurance companies. Connections having to do with social care purposes — in this case to patients' homes and care homes — are virtually non-existent with shares between about 2% and 3% respectively. A notable exception is found in the case of connections to laboratories: with about 40% of the European GP practices, this

connection type is used most frequently. Connections to pharmacies are considerably less frequent (used by about 7% of the practices), a finding that is also confirmed by the comparably low use rates for ePrescribing described in section 2.2.4.

While the **electronic transfer of patient identifiable data to at least one health actor is done by 48% of the EU27 GP practices**, a more patchy picture emerges from the detailed analysis. While the transmission of analytic results from a laboratory to the GP occurs with a comparably high frequency (40%), other types of data are transferred electronically less often: administrative data are transferred to reimbursers by 15% and to other care providers by 10%. Medical data are transmitted to care providers or other professionals by 10%. ePrescribing is practiced by 6% of the EU27 GP practices, it can today be regarded a reality in three Member States: Denmark (97%), the Netherlands (71%) and Sweden (81%). Medical data exchange across national borders does not occur to any notable extent (0.7% on average).

Comparing eHealth readiness with eHealth use — i.e. the availability of ICT infrastructure in a practice with the actual use of eHealth applications — shows varying degrees of untapped potential for higher eHealth use if infrastructure available in the practices were fully used. The **Readiness-Use Gap for electronic patient data storage ranges from 8% to 29%** on EU27 average, depending on the type of data to be stored. Average gap values for the electronic storage of medical patient data are slightly higher than for administrative patient data storage. The average **gap between availability and use of a computer in consultation is at 12%**, ranging from 0% in Finland — where all GP practices have a computer in the consultation room and also use it — to 54% in Slovenia. The **gap between availability of an Internet connection and the electronic exchange of patient data ranges from 29% to 59%** on EU27 average, largely mirroring the fact that this kind of data exchange is currently used to a larger extend only in some countries.

2.2.1   Computer use for storage of individual patient data

Individual patient data to be stored in a practice's computer system can be classified into two categories: a) patient data used primary for administrative purposes and b) patient data used primary for medical purposes e.g. on the patient's health status, diagnoses, treatments etc. Overlaps are of course possible as, for instance, data on a treatment or on prescribed medications can also be used for billing, i.e. an administrative purpose.

On average 80% of European GP practices store patient data for administrative purposes (cf. Exhibit 2-7). In 12 countries, usage rates are at 90% and more, going up to nearly 100% in Hungary, Finland and Iceland. In five countries — Greece, Latvia, Lithuania, Malta and Romania — shares are at and below 50%, going down as far as 26% in the case of Latvia. Again, the size of the practice seems to play a certain role in this regard, with an average gap of about 11 percentage points between the smallest and the largest size class on EU27 average. There are four countries where the size gap is greater than 20 percentage points. A good example is Ireland, where less than 50% of the practices in the smallest size class store administrative patient data compared to 100% of the practices in the 4+ GP size class.

Exhibit 2-7 Electronic recording and storage of individual administrative patient data			
		Size of practice	
	Total	Single GP	2-3 GPs or physicians	4+ GPs or physicians
EU27	79.5	74.2	85.1	85.6
EU27+2	79.7	74.2	85.3	85.9
BE	83.5	76.9	96.4	96.2 *

BG	93.7	92.2	96.7	94.1 *
CZ	67.1	65.8	72.7 *	74.1 *
DK	96.9	92.8	99.0	100.0
DE	92.5	89.2	97.6	100.0 *
EE	98.0	100.0 *	97.7 *	96.6
EL	49.2	45.8	68.2 *	56.9
ES	68.3	53.6	65.7	82.1
FR	74.2	68.8	83.7	77.8 **
IE	63.7	47.4	78.0	100.0 *
IT	84.5	80.3	94.6 *	97.5 *
CY	56.9	60.5 *	75.0 **	48.0 *
LV	26.0	26.7	26.2 *	20.0 *
LT	38.4	34.8 *	39.7	38.7
LU	70.1	67.0 *	85.1 *	33.6 **
HU	100.0	100.0	100.0 *	100.0 *
MT	50.0	57.1 *	33.3 *	40.7 *
NL	97.3	96.2	98.2	97.1
AT	80.3	73.5	87.5 *	97.1
PL	54.1	45.2	54.4	61.2
PT	73.6	43.1	76.6	84.8
RO	46.7	51.9	34.6	46.7 *
SI	86.4	92.9 *	66.7 **	86.4
SK	90.0	90.5	92.0 *	85.3 *
FI	99.6	100.0 *	100.0 *	99.5
SE	96.3	92.0 *	92.9 *	97.5
UK	95.0	81.4 *	100.0	97.2
IS	99.0	100.0 *	94.4 *	100.0
NO	98.0	83.3 *	100.0	100.0

Base	All GPs
Indicator	A1: Electronic storage of individual administrative patient data (cf. indicator annex for more information), % values.
Notes	* marks cells with 10<=n<50, ** marks cells with n<10.
Source	empirica, Pilot on eHealth Indicators, 2007.

As has been said above, computer systems can also be used to store further individual patient data used for medical purposes. Exhibit 2-8 below shows different types of data and how many GP practices also storing administrative patient data store them routinely[1].

Most frequently, the practices store data on diagnoses and medications (92%), followed by basic medical parameters such as allergies etc. (85%), laboratory results (81%), a patient's symptoms or the reason for his visit (79%), the medical history of a patient, ordered examinations and their results (77% each), as well as results of vital sign measurement (76%). Slightly more than two-thirds of the GPs also store date on treatment outcomes. Compared to these results, digital storage of radiological images is not yet something that is done by many practitioners: 35% store these images electronically.

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[1] Quantifications such as "routinely" or "regularly" refer to answer categories used in the survey.

**Exhibit 2-8 Storage of further individual patient data**

Store of identifiable patient data

	EU27+2	EU27
Diagnoses	92	92
Medications	92	91
Basic medical parameters	85	85
Laboratory results	81	81
Symptoms or the reasons for encounters	79	79
Medical history	77	77
Ordered examinations and results	77	76
Vital signs measurements	76	75
Treatment outcomes	67	67
Radiological images	35	35

■ EU27+2 ■ EU27
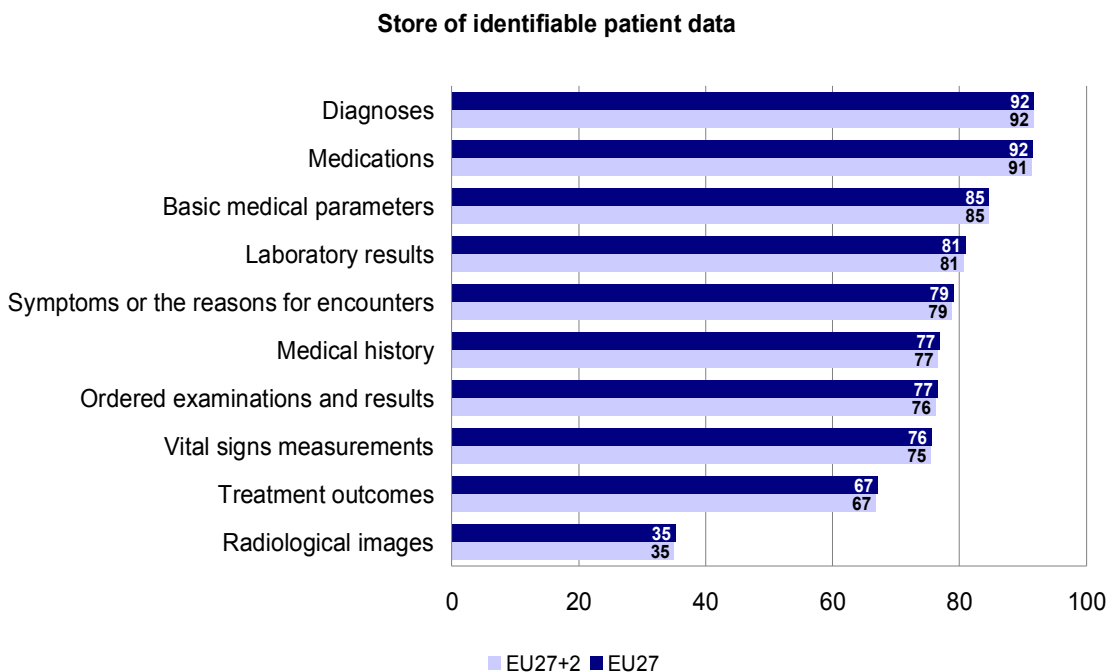
Base	GPs storing any individual patient data
Indicator	A2: Electronic storage of identifiable patient data (cf. indicator annex for more information), % values.
Source	empirica, Pilot on eHealth Indicators, 2007.

In order to further process electronic data beyond simple storing for documentary purposes it is helpful to store them in a structured or even coded manner. In particular, structured data are a prerequisite for automatic processing, i.e. processing by other electronic systems without or with only limited human interaction. In this context 'structured data' means that different bits of information are stored as separate entities[1]. Also codes can be used to describe more complex information in a way that makes it machine readable and helps to avoid confusion created by misspelling or use of alternative wordings, e.g. by storing an ICD[2] code instead of the description of a disease. Both structured data entry and data coding therefore play an important role when it comes to data exchange between different actors in the health domain.

All in all about three quarter s(76%) of the European practitioners that store individual patient data do so in a structured manner, by using interfaces with structured data entry fields. 21% of the GPs code their medical data according to a given specific type of classification system, whereas 30% enter only un-coded plain text data. Slightly less than half of the GPs (45%) use both entry manners, depending on the occasion. In this latter case, a clear estimation of the coded/un-coded share is not possible.

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[1] To illustrate: A patient name could be stored in three bits: First name: Jane, Surname: Doe, Title: Ms. The two separate name bits would allow to automatically separate Jane Doe from John Doe by simply exchanging the first name bit.
[2] The WHO's International Classification of Diseases, cf. http://www.who.int/classifications/icd/en/index.html.

Exhibit 2-9 Manner of patient data entry and use of data coding

Manner of data entry
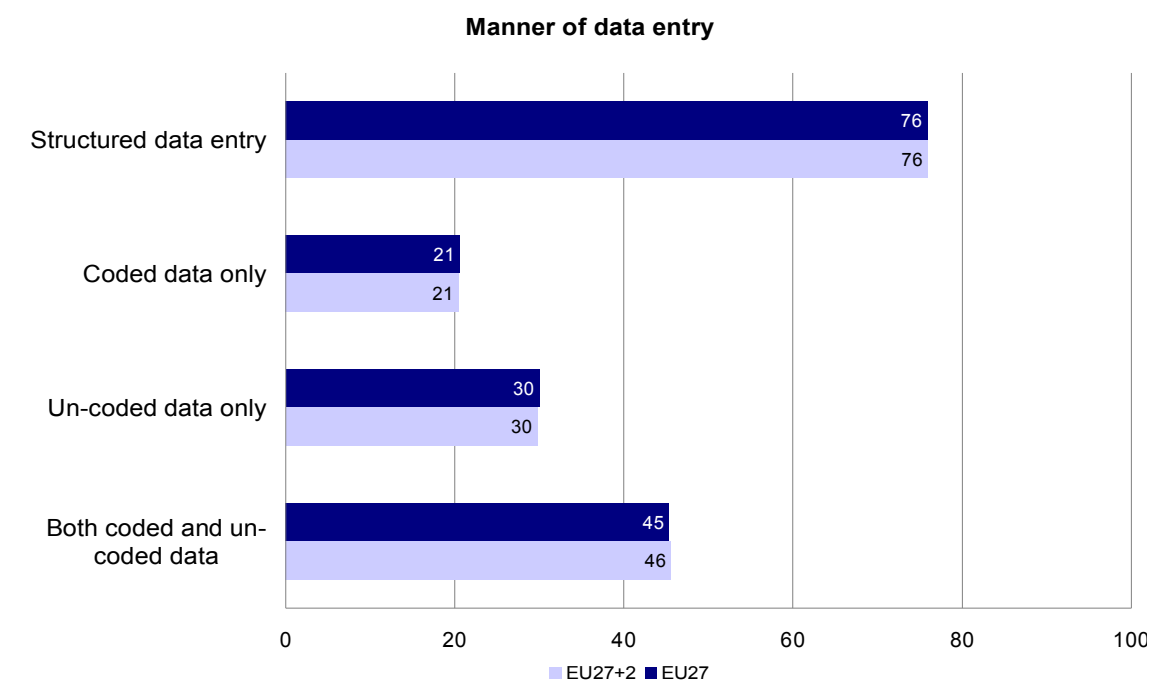
Base	GPs storing any individual patient data
Indicators	A3: Structured data entry, A4: Coded data entry (cf. indicator annex for more information), % values.
Source	empirica, Pilot on eHealth Indicators, 2007.

Computer availability vs. patient data storage

Comparing eHealth readiness with eHealth use — i.e. the availability of ICT infrastructure in a practice with the actual use of eHealth applications — shows an untapped potential for more patient data storage in a number of EU countries. As has been said above, computers are by now available in a majority of the European GP practices (87% on EU27 average). They are however not always used to store administrative or medical patient data. Depending on the application under observation, this Readiness-Use Gap ranges from 8% to 20% on average, with gaps in singular Member States being as high as 85% (cf. Exhibit 2-10 below).

The gap between computer availability and the use of computers for patient data storage was analysed for four types of patient data: administrative patient data, patient diagnosis data, patient medication data and patient basic medical parameters — the latter three being the types of medical data stored most frequently in European GP practices on average.

The gap analysis for administrative patient data storage (first graph in the Exhibit below) shows that in 11 Member States — namely Bulgaria, Sweden, Austria, Belgium, the UK, Estonia, Denmark, Italy, the Netherlands, Finland and Hungary — nearly all practices that have a computer use it to store administrative patient data. This group contains all five eHealth frontrunner countries as identified in the eHealth use indicator scoreboard in section 5.1 of this report (Denmark, the Netherlands, Finland, Sweden, the UK). In seven Member States the gap is between 6% and 11 % (Slovakia, Germany, France, Spain, Luxembourg, Ireland and Slovenia). 9 countries shows gaps of more than 11%, ranging from a maximum of 62% in the case of Latvia, 30% in Greece, nearly 20% in Romania, Lithuania and Poland, to about 15% in Malta, the Czech Republic, Portugal and Cyprus.
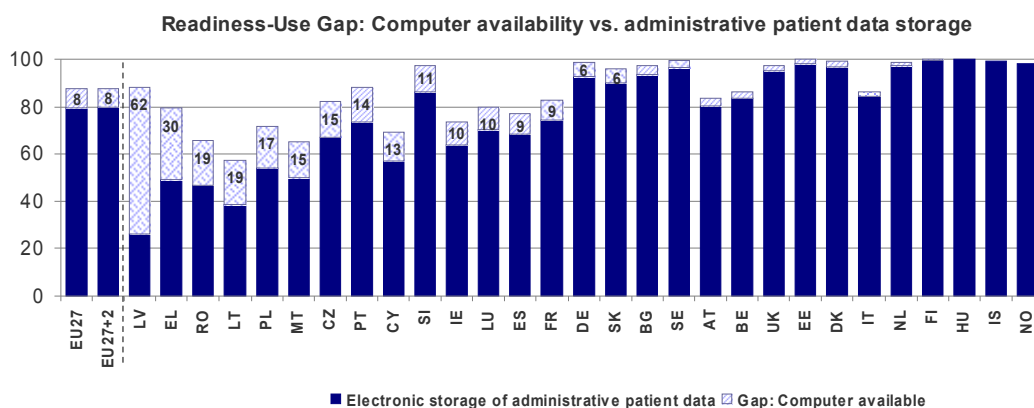
The average gap in relation to storage of medical patient data is slightly higher, ranging from 15% to 20% on EU27 average, which is an effect of the decreasing use rates for those eHealth
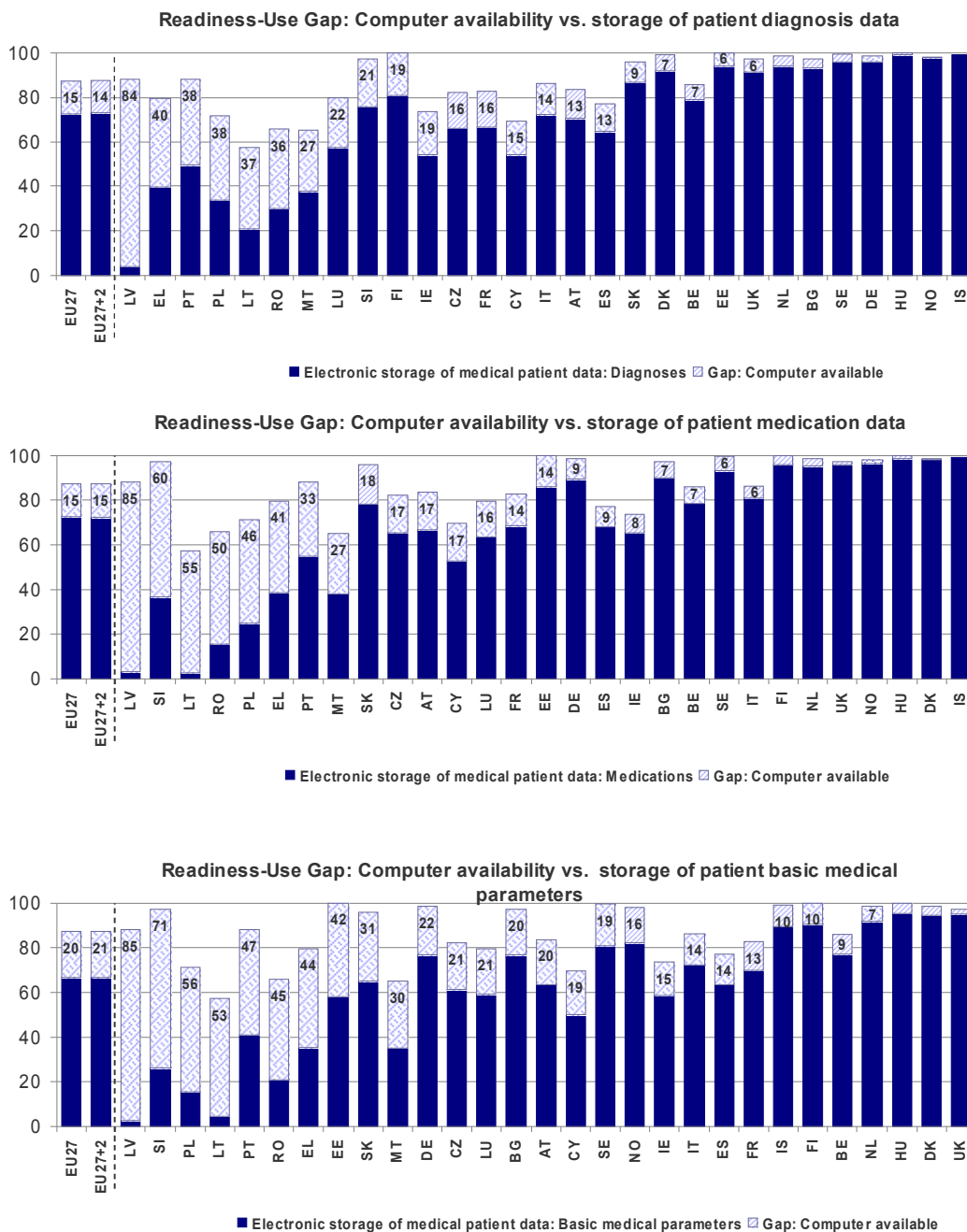
applications (cf. above). There are only few changes to the country patterns identified for administrative data storage. The five eHealth frontrunner countries always show gaps that are among the lowest found in all countries under observation. The group of countries with the highest gap remains largely stable in its composition, while some countries swap positions. The highest gap is found in Latvia for all types of data storage analysed here, being stable at about 85%, which may indicate barriers hindering the adoption of eHealth applications that are stronger than in most other Member States. Deviating from the pattern described here, Slovenia shows a gap of 21% for storage of patient diagnosis data versus computer availability in the practice, positioning the country in the mid-field for this type of data. The gap increases to 60% and 71% for medication data and basic medical parameters, respectively, in the latter case making Slovenia the country with the second highest gap of all Member States.

Another pattern observable from the gap analysis relates to changes in the size of the gap between the different types of medical data storage. In several countries, there are notable differences between the gap values for each type of storage, usually the gap size increases from data type to data type. This effect can be observed for Germany, Estonia, Lithuania, Poland, Portugal, Romania and Slovakia. This is in line with the findings analysed so far indicating that certain applications in the same field — in this case electronic patient data storage — are used more frequently than others. Explanations for this patterns are not readily apparent; in the case of electronic patient data exchange via the Internet or other networks, complexity clearly plays a role. The more different actors are involved and the more complex the underlying processes are — e.g. in terms of regulatory obligations that play a role — the higher is the Readiness-Use Gap. This might also be true for patient data storage, e.g. in relation to data protection laws. More generally, it can be assumed that further explanatory factors may be found in national framework conditions, for instance taking the form of pilot projects or funding schemes supporting one type of data storage but not others.

In other countries such as the Czech Republic, Greece, France, Cyprus, Latvia and Malta, the Readiness-Use Gap is largely similar across the different types of data storage. A deeper analysis shows that in each of them there is a group of GP practices not storing any of the data types analysed here rather than storing one type but not the others. In Greece, for example, 40% of the practices do not store diagnoses data despite the fact that about 80% have a computer. Of these 40% about three quarters also do not store medication data and basic medical parameters. In Cyprus and Malta at least three quarter of the practices "in the gap" do not store any other data under observation compared to about half in the Czech Republic and France. According to this, there is a number of practices in those countries that do not store patient data at all despite the fact that the necessary infrastructure is available.

Exhibit 2-10 Readiness-Use Gap: Computer availability and different types of patient data storage

Readiness-Use Gap: Computer availability vs. administrative patient data storage

■ Electronic storage of administrative patient data ☒ Gap: Computer available

Readiness-Use Gap: Computer availability vs. storage of patient diagnosis data

■ Electronic storage of medical patient data: Diagnoses ▨ Gap: Computer available

Readiness-Use Gap: Computer availability vs. storage of patient medication data

■ Electronic storage of medical patient data: Medications ▨ Gap: Computer available

Readiness-Use Gap: Computer availability vs. storage of patient basic medical parameters

■ Electronic storage of medical patient data: Basic medical parameters ▨ Gap: Computer available

Base	All GPs
Indicators	R4: Computer use, % values.. A1: Electronic storage of individual administrative patient data, % values. A2: Electronic storage of identifiable patient data, % values.
Source	empirica, Pilot on eHealth Indicators, 2007.

## 2.2.2   Computer use in consultation with the patient

Further to the data storage purposes described above, a computer can also be used in direct interaction with a patient, i.e. during the consultation process in the practice. In such a context the computer can of course be used to display a patient's file to the practitioner, e.g. to assess his medical history. Furthermore, the GP might rely on a decision support system (DSS) supporting him in making a diagnosis or in choosing the right medications for prescriptions. While a doctor can of course not lay a decision in the hands of a software

system, he can still receive some assistance, e.g. by calling a list of the patient's known allergies to select the proper medication to be prescribed. A third use case for a computer in the consultation room can be seen in the demonstration or explanation of medical issues to the patients, e.g. by means of a graph, photo or animation.

A basic prerequisite for all of this is the availability of a computer in the consultation room, moreover the availability of a computer that can also be accessed by the GP during consultation. As Exhibit 2-11 below shows, nearly 80% of the EU27 GPs do have access to such a computer. Again, there is considerable variation between some of the countries, with shares ranging from 29% to 100%. The highest availability in the EU can be found in Finland (100%), Denmark (98%), Estonia, the Netherlands and the UK (97% each). In Iceland and Norway computers are found in 97% and 98% of the practices, respectively. In Lithuania, 29% of the practices have a computer in the consultation room.

When comparing these data to the general availability of a computer in the practice presented above (Exhibit 2-1), it becomes apparent that — on average — about 10% of the practices have a computer only outside the consultation room, i.e. in their office, in practice administration, reception etc. In six Member States (EL, LV, LT, PL, SI, SE) this gap is as big as 20 percentage points or more, in singular cases even rising to 37%. Practices falling into this group can be considered to use computers primarily for administration purposes and to have a low level of computer integration in patient-related processes.

Exhibit 2-11 Access to a computer in the consultation room

Computer in consultation room
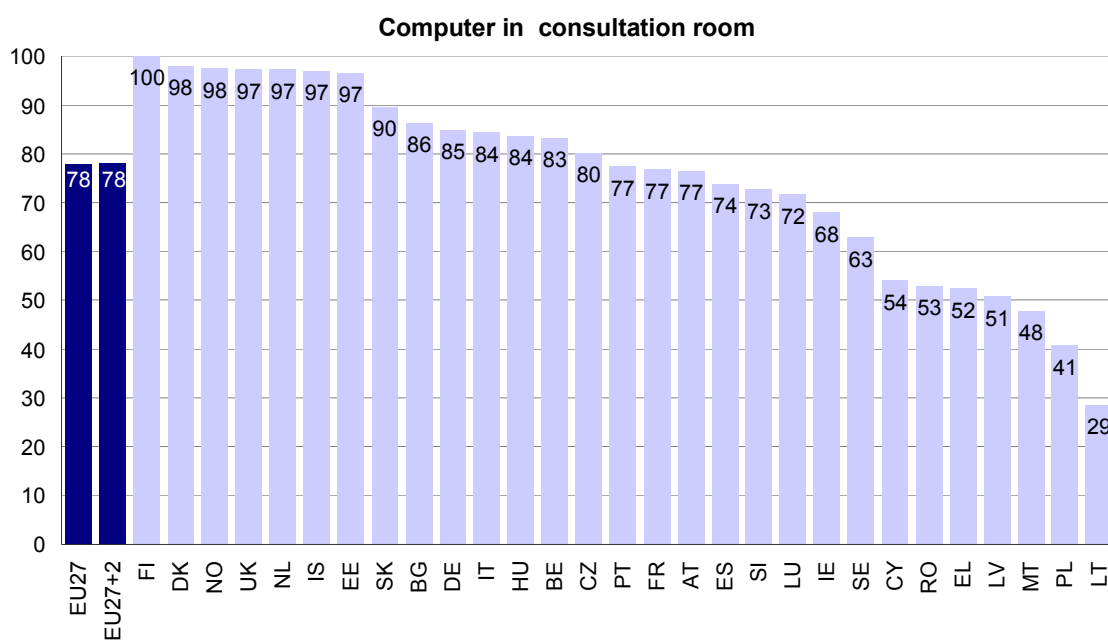
Base	All GPs
Indicator	B1: Computer access during consultation (cf. indicator annex for more information), % values.
Source	empirica, Pilot on eHealth Indicators, 2007.

A computer in the consultation room is not necessarily used by the GP during consultation, as Exhibit 2-12 and Exhibit 2-13 below show. While 78% of the GPs have a computer available, only 66% also use it in the presence of a patient, a Readiness-Use Gap of 12%.

Computer use during consultation is the rule in Finland: all practices have a computer in the consultation room and all GPs use it in the presence of the patient. A similar situation can be found in the UK (95% using the computer during consultation) Estonia and the Netherlands

(94%), Norway (93%) and Denmark (92%). Of those, only Denmark shows a small but noticeable Readiness- Use Gap of 7%, i.e. here computers are available in 98% of the consultation rooms. There is a large mid-field where between 50% and 85% of the practices make active use of computers for consultation. It comprises Belgium, Bulgaria, the Czech Republic, Germany, Spain, France, Ireland, Italy, Luxembourg, Hungary, Austria, Portugal, Slovakia, Sweden and Iceland. The gap in these countries ranges from 5% in France to 23% in Austria. In Greece, Cyprus, Latvia, Lithuania, Malta, Romania and Slovenia, use rates are below 50% going down as far as 8% in Lithuania and 3% in Latvia. The gap analysis shows that lack of infrastructure (i.e. of a computer in the consultation room) only explains part of these results. Most countries — with the exception of Poland, Malta and Lithuania — could reach use rates of 50% or more if existing computers were used more frequently.

While the size-class gap is at 10% for the EU27 average, some countries such as Cyprus, Lithuania and — to a lesser degree — Malta show a noticeable deviation from this pattern. Here, use rates among single GP practices are higher than among the 4+ GP practices by 18% to 25 percentage points. This is again a strong indication of the fact that structural differences on or below the national level — rather than on an international level — have a strong influence on ICT use.

Exhibit 2-12 Use of a computer during consultations

	Total	Single GP	2-3 GPs or physicians	4+ GPs or physicians
			Size of practice	
EU27	66.1	61.0	72.6	71.4
EU27+2	66.4	61.1	72.9	71.9
BE	76.3	67.9	96.4	80.8 *
BG	76.7	71.1	85.0	94.1 *
CZ	59.2	57.9	63.6 *	66.7 *
DK	91.6	86.6	96.1	91.8
DE	71.6	67.7	75.9	90.9 *
EE	94.0	91.7 *	93.0 *	96.6
EL	19.7	19.2	27.3 *	19.6
ES	66.5	51.8	62.9	81.4
FR	72.2	66.1	81.7	88.9 **
IE	55.9	38.1	71.5	95.0 *
IT	81.4	77.0	91.9 *	95.0 *
CY	31.9	41.9 *	25.0 **	16.0 *
LV	2.8	3.3	2.4 *	0.0 *
LT	8.0	21.7 *	7.4	6.5
LU	59.0	54.1 *	75.1 *	33.6 **
HU	64.5	63.0	61.3 *	73.7 *
MT	27.2	36.7 *	8.3 *	18.5 *
NL	93.9	91.0	98.2	91.4
AT	53.8	51.9	65.6 *	55.7
PL	10.8	16.1	8.9	10.0
PT	63.7	33.8	67.2	76.6
RO	21.1	21.5	16.7	26.7 *
SI	18.4	17.9 *	33.3 **	16.7
SK	72.8	72.1	84.0 *	67.6 *

FI	100.0	100.0 *	100.0 *	100.0
SE	47.2	44.0 *	38.1 *	49.7
UK	94.6	81.4 *	95.9	98.6
IS	84.5	78.6 *	88.9 *	84.5
NO	93.1	75.0 *	93.4	97.1
Base	All GPs			
Indicator	B2: Computer use during consultation (cf. indicator annex for more information), % values.			
Source	empirica, Pilot on eHealth Indicators, 2007.			

Exhibit 2-13 Readiness-Use Gap: Computer availability in consultation room vs. use

Readiness-Use Gap: Computer available in consultation room vs. use in consultation
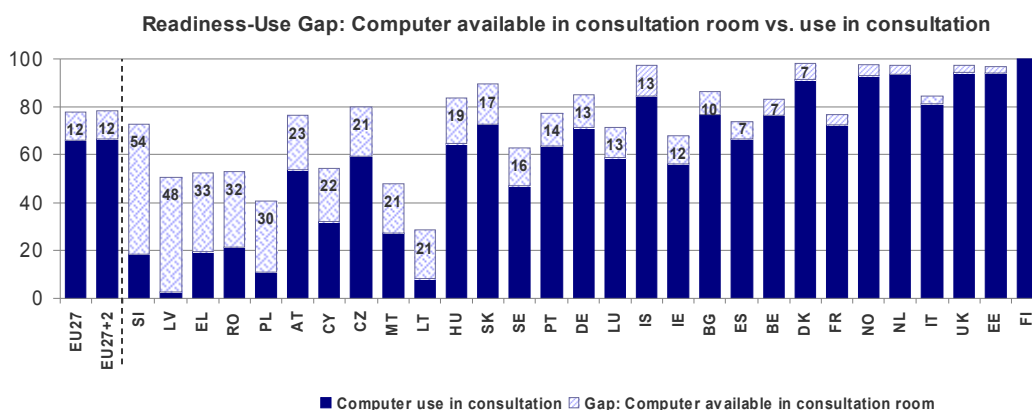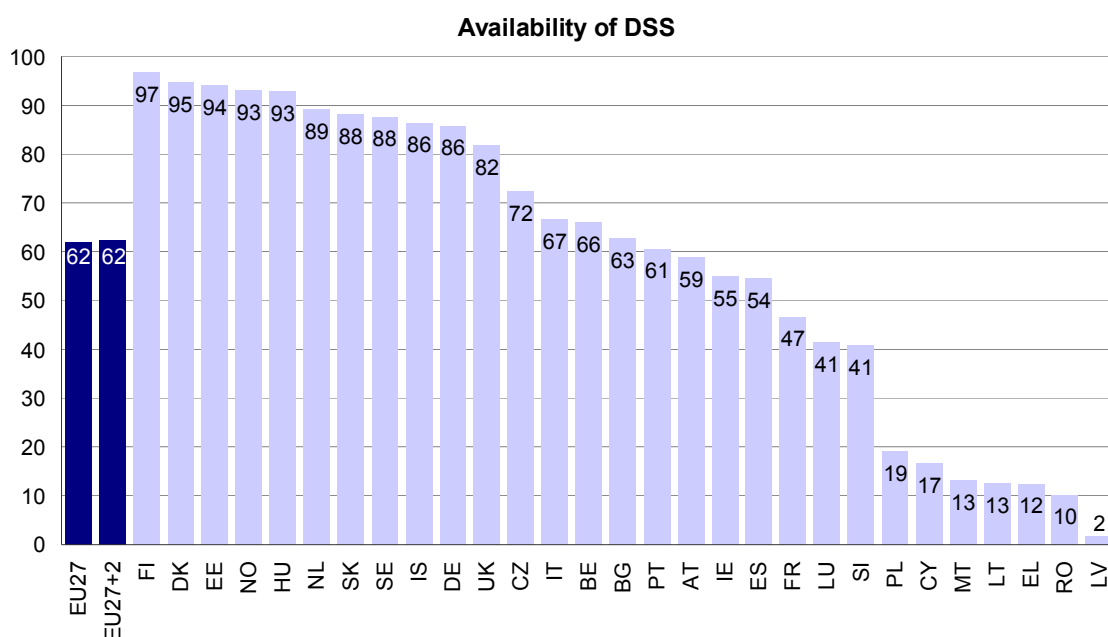
Base	All GPs
Indicators	B1: Computer access during consultation, % values. B2: Computer use during consultation, % values.
Source	empirica, Pilot on eHealth Indicators, 2007.

Decision Support Systems

A decision support system (DSS) is available in nearly two-thirds of the EU27 practices (cf. Exhibit 2-14 below). It should be noted that DSS is a widely defined term — encompassing a range of different applications — that can be used to denote different things depending on the understanding of the responding GP. Differences between the countries are pronounced, with shares ranging from 3% to 97%. Decision Support Systems are widely available in GP practices in Finland (97%), Denmark (96%), Estonia (94%), Hungary and Norway (93%), the Netherlands (89%), Slovakia and Sweden (88%), as well as in Germany and Iceland (86%). On the other hand, there is a wide range of countries where this kind of software has not yet arrived on the agenda and is used by less than one-fifth of the GPs. This group comprises Poland (19%), Cyprus (17%), Lithuania and Malta (13%), Greece (12%), Romania (10%) and Latvia (2%).

Exhibit 2-14 Availability of a decision support software (DSS)

Availability of DSS

Base	All GPs
Indicator	B3: Availability of any DSS for diagnosis or prescribing (cf. indicator annex for more information), % values.
Source	empirica, Pilot on eHealth Indicators, 2007.

When looking at the functionalities of DSS software currently in use in some more detail, decision support for diagnosis is met more frequently than support for prescribing (59% compared to 32% on average). Only in Sweden do both types of DSS reach similar usage levels of about 80%. Also most DSS systems tend to offer general advice rather than patient specific advice (42% compared to 19%).

Exhibit 2-15 DSS functionalities in detail

	DSS for diagnosis	DSS for prescribing	General advice	Patient specific
EU27	59.4	32.0	41.9	19.3
EU27+2	59.7	32.3	42.1	19.4
BE	63.1	35.3	32.8	36.9
BG	59.7	24.8	32.0	20.9
CZ	69.7	22.4	23.4	12.2
DK	94.3	58.6	53.3	30.3
DE	83.0	43.1	58.1	19.4
EE	92.0	53.3	50.0	13.3
EL	7.9	8.6	5.4	4.8
ES	50.2	32.3	37.5	13.2
FR	44.7	14.2	22.2	18.9
IE	53.0	22.9	34.0	9.2
IT	65.5	30.0	54.1	21.0
CY	15.3	5.6	5.6	8.3
LV	1.1	1.7	0.6	0.6

LT	6.5	9.1	8.4	2.3
LU	38.2	8.0	12.8	8.0
HU	92.8	58.6	62.5	21.1
MT	9.8	8.7	8.7	6.5
NL	87.6	60.1	68.3	53.1
AT	56.2	27.8	47.8	18.4
PL	15.4	10.0	12.0	6.3
PT	59.2	34.5	38.7	19.4
RO	5.3	7.9	6.6	3.6
SI	30.1	27.2	29.1	4.9
SK	87.4	39.8	61.3	23.0
FI	95.6	78.0	80.4	38.4
SE	82.0	80.5	42.7	17.6
UK	79.8	42.8	64.3	28.0
IS	86.4	41.7	31.1	22.3
NO	90.7	72.1	60.8	31.4

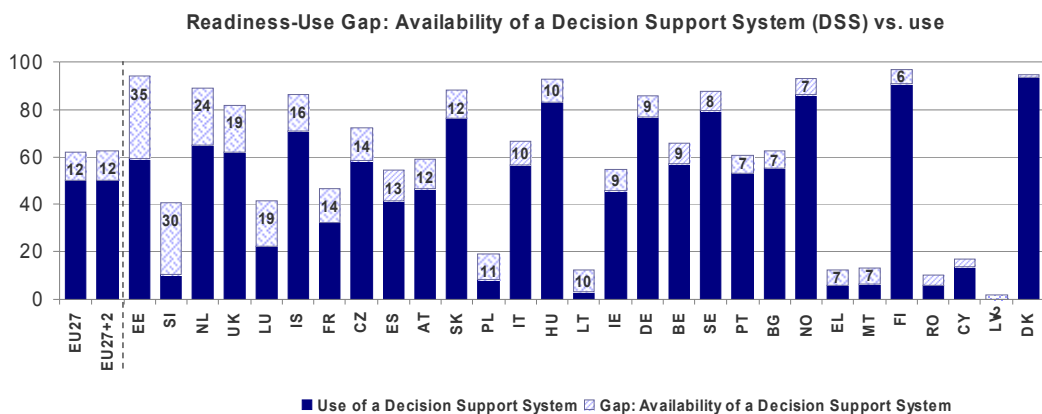|	
Base	All GPs
Indicators	B3a: Availability of DSS for diagnosis, B3b: Availability of DSS for prescribing, B5: DSS giving either general or patient specific advice, (cf. indicator annex for more information), % values.
Source	empirica, Pilot on eHealth Indicators, 2007.

Same as in the case of computers in the consultation room there is also a "Readiness vs. Use Gap" in relation to decision support software. While such software is available to an average 62% of the European GPs, only about 50% actually use it regularly. This average gap of about 12% can be found in nearly all countries, barring minor deviations. In five countries (EE, LU, NL, SI, UK) it is at or above 20 percentage points, i.e. one-fifth or more of the GPs do have a DSS software that they do not use regularly. In Denmark, on the other hand, nearly all GPs that have DSS software also use it. There are no differences in the use of DSS software between GPs of different age groups.

Exhibit 2-16 Use of DSS

DSS: Utilisation of DSS routinely
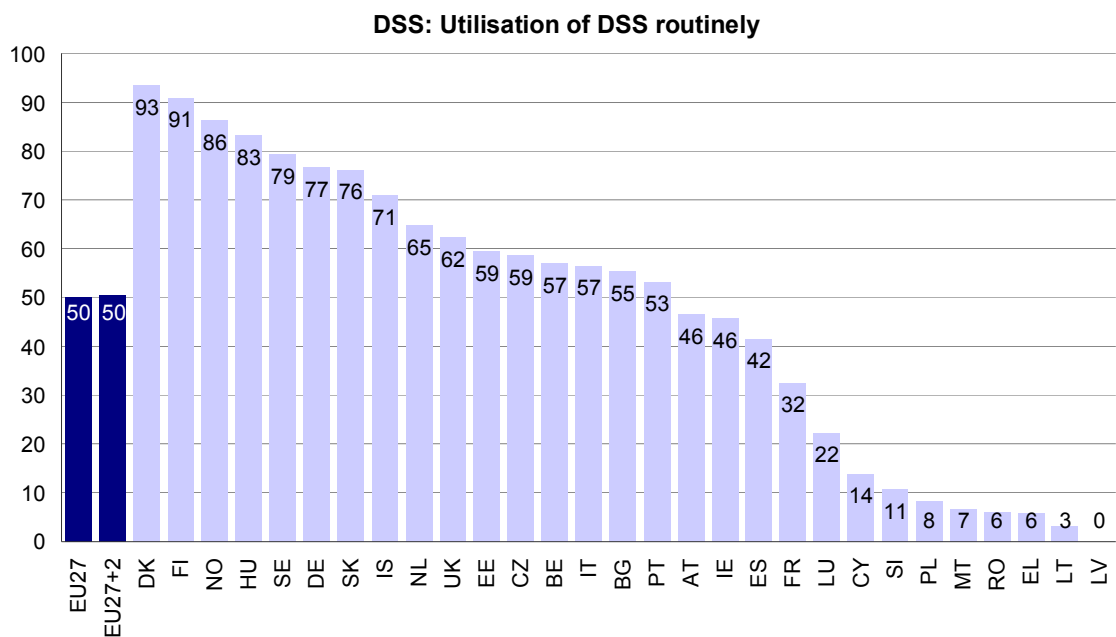
Base	All GPs
Indicator	B4: Use of any DSS for diagnosis or prescribing (cf. indicator annex for more information), % values.
Source	empirica, Pilot on eHealth Indicators, 2007.

Exhibit 2-17 Readiness-Use Gap: DSS availability vs. use

Readiness-Use Gap: Availability of a Decision Support System (DSS) vs. use

■ Use of a Decision Support System ⊡ Gap: Availability of a Decision Support System

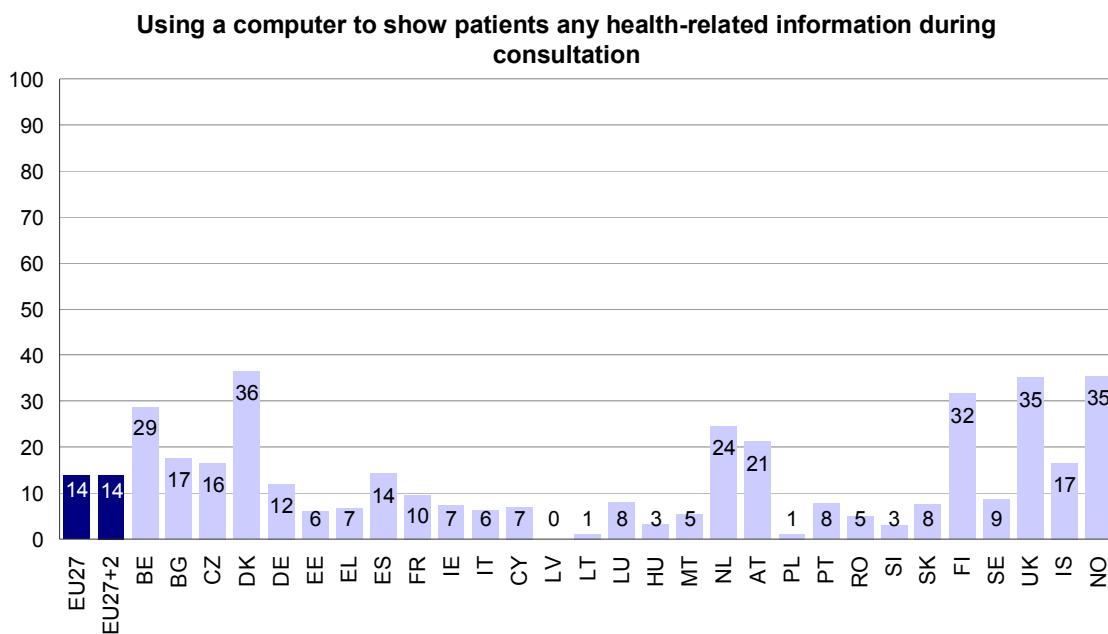| Base	All GPs
Indicators	B3: Availability of any DSS for diagnosis or prescribing, % values. B4: Use of any DSS for diagnosis or prescribing, % values.
Source	empirica, Pilot on eHealth Indicators, 2007.

Showing information during consultation

Showing patients health-related information by means of a computer is clearly something that is done with a consultation room PC today but is not yet very widespread. On average, 14% of the GPs in the EU27 do so regularly (cf. Exhibit 2-18 below). Higher use rates of about one third are reached in Denmark (36%), the UK and Norway (35%), Finland (32%), Belgium (29%), the Netherlands (24%) and Austria (21%). In other countries, computers in the consultation room are largely not used for this purpose at all —Lithuania, Poland (1% each) and Latvia (0%).

Exhibit 2-18 Using a computer to show information to a patient during consultation

Using a computer to show patients any health-related information during consultation

Base	All GPs
Indicator	B6: Use of a computer to show patients any health-related information during consultation (cf. indicator annex for more information), % values.
Source	empirica, Pilot on eHealth Indicators, 2007.

2.2.3 Use of the Internet and dedicated electronic health networks

The Internet as well as other, dedicated types of electronic networks allow GP practices to establish connections to electronic systems of other health actors for the exchange of data. These include laboratories, other GP practices, secondary health actors such as specialists and hospitals, health authorities and insurance companies, pharmacies, but also patients' homes and care homes. Connecting to these health actors via an electronic network can help GPs — among other things — to easier receive analytic results (e.g. from blood sample analysis), to jointly consult with colleagues and specialists, to manage referrals from their own practice to another GP practice or to a hospital and vice versa, to communicate with patients or to monitor them at their home.

The availability of the types of connections sketched above varies between moderate and low on European average, as Exhibit 2-19 below shows. About 21% of European GP practices connect to other primary care actors, i.e. other GPs. Between the two types of connections to secondary health actors — hospitals and specialist practices — there is a noticeable gap. While about one fifth of GP practices connect to hospitals only somewhat more than one tenth (12%) to the same with specialist practices. A similar thing can be observed in relation to connections to health administration actors. A connection to health authorities is available in 17% of the practices, compared to only 3% connecting to insurance companies. Connections having to do with social care purposes — in this case to patients' homes and care homes — are virtually non-existent with shares between about 2% and 3% respectively. A notable exception is found in the case of connections to laboratories: with about 40% of the European GP practices, this is the most frequent connection type. Connection to pharmacies are

considerably less common (available to only about 7% of the practices), a finding that is also confirmed by the comparably low use rates for ePrescribing described in section 2.2.4.

Further analytical results can be summarised as follows:

- A share of connections to both health authorities and insurance companies that is clearly above the average can be found in Estonia, Lithuania and Slovenia, with the latter two performing only moderately well in the overview given above.

- An above-average share of connections to health authorities alone can be found in Denmark, Italy, Poland, Portugal and the United Kingdom. This group contains what can be called eHealth 'frontrunners' (such as DK and UK) as well as average and sub-average performers.

- An above-average share of connections to insurances alone can be found in the Czech Republic, Latvia, the Netherlands, Austria, Slovakia and Finland, with this group having much the same characteristics as the one described beforehand.

- A share of connections to other GPs, hospitals and specialists above the average is found in Belgium, Denmark, Estonia, Spain, the Netherlands, Slovenia, Finland, Sweden and Norway.

This seems to indicate that there is a number of countries with relative strengths in the area of more administrative connections (i.e. to health authorities and insurances) as compared to a group with strengths in relation to medical connections (to other practices and hospitals). Only a few countries (DK, EE, NL, SI, FI) show relative strengths in both areas, if to varying degrees.

Electronic connections to patients' homes and care homes are done to a noticeable extent only in a bare handful of countries: Denmark (45% and 13% respectively), the Netherlands (5% and 7%) and — at least when it comes to care home connections — Finland (18%), Sweden (11%) and Iceland (7%).

	Primary health actors		Secondary health actors	Health administration		Social care			
	Other GPs	Hospitals	Specialist practices	Health authorit-ies	Insurance companies	Patients' homes	Care homes	Labora-tories	Pharma-cies
EU27	20.8	20.3	11.5	17.1	3.2	2.0	1.7	38.8	6.8
EU27+2	20.8	20.9	11.8	17.1	3.2	2.0	1.7	39.2	6.8
BE	24.9	61.5	42.9	9.8	3.2	1.3	2.5	74.4	4.4
BG	11.2	3.9	6.8	7.3	1.0	2.9	0.5	6.8	2.9
CZ	8.9	7.9	4.9	4.9	20.4	4.3	0.0	24.0	1.6
DK	62.1	76.3	70.1	63.6	5.7	44.8	12.6	82.8	77.4
DE	6.3	3.6	8.3	3.6	1.6	2.8	1.6	67.6	2.0
EE	20.7	32.0	10.7	78.0	14.0	2.0	0.7	52.7	10.0
EL	5.1	4.1	3.2	1.3	0.0	0.3	0.3	4.1	2.2
ES	35.4	24.0	16.9	12.9	2.2	0.6	0.6	30.5	3.7
FR	15.2	9.6	13.9	17.9	1.3	0.3	1.0	31.5	1.0
IE	6.8	22.9	2.9	12.6	0.5	1.0	0.5	39.9	0.5
IT	34.5	13.8	3.4	21.0	0.0	1.0	1.4	9.7	0.7
CY	4.2	5.6	6.9	2.8	0.0	0.0	0.0	6.9	1.4
LV	0.0	0.0	0.0	5.1	14.7	0.0	0.0	0.6	0.0
LT	4.6	4.6	3.8	29.3	12.5	0.4	0.4	8.0	2.3

Exhibit 2-19 Connecting to different types of health actors

LU	6.4	11.2	6.4	4.8	0.0	3.2	0.0	38.2	0.0
HU	9.6	9.6	5.2	3.6	0.8	0.0	0.0	12.4	0.0
MT	9.8	13.0	6.5	10.9	1.1	2.2	2.2	9.8	3.3
NL	59.3	71.7	32.6	7.0	29.1	5.4	7.0	71.7	72.1
AT	11.0	31.1	20.4	11.4	11.7	1.7	2.7	25.8	5.4
PL	10.5	6.6	6.3	12.8	2.6	1.7	2.3	10.5	3.7
PT	21.1	19.0	2.8	18.0	0.4	0.0	1.1	1.8	1.8
RO	3.9	0.3	0.7	7.2	3.3	0.3	0.3	2.0	1.0
SI	32.0	8.7	15.5	14.6	32.0	3.9	4.9	20.4	4.9
SK	5.0	3.8	3.4	3.4	8.8	1.9	1.1	5.7	3.8
FI	67.6	73.2	63.6	10.8	6.8	2.0	18.0	89.2	3.2
SE	51.3	43.8	29.2	9.4	0.7	3.0	11.2	68.5	67.0
UK	24.5	50.6	7.4	51.0	0.0	1.6	0.0	77.1	5.1
IS	50.5	46.6	9.7	15.5	1.0	1.0	6.8	68.9	13.6
NO	21.6	74.5	43.6	12.7	1.0	1.0	1.5	78.9	3.4

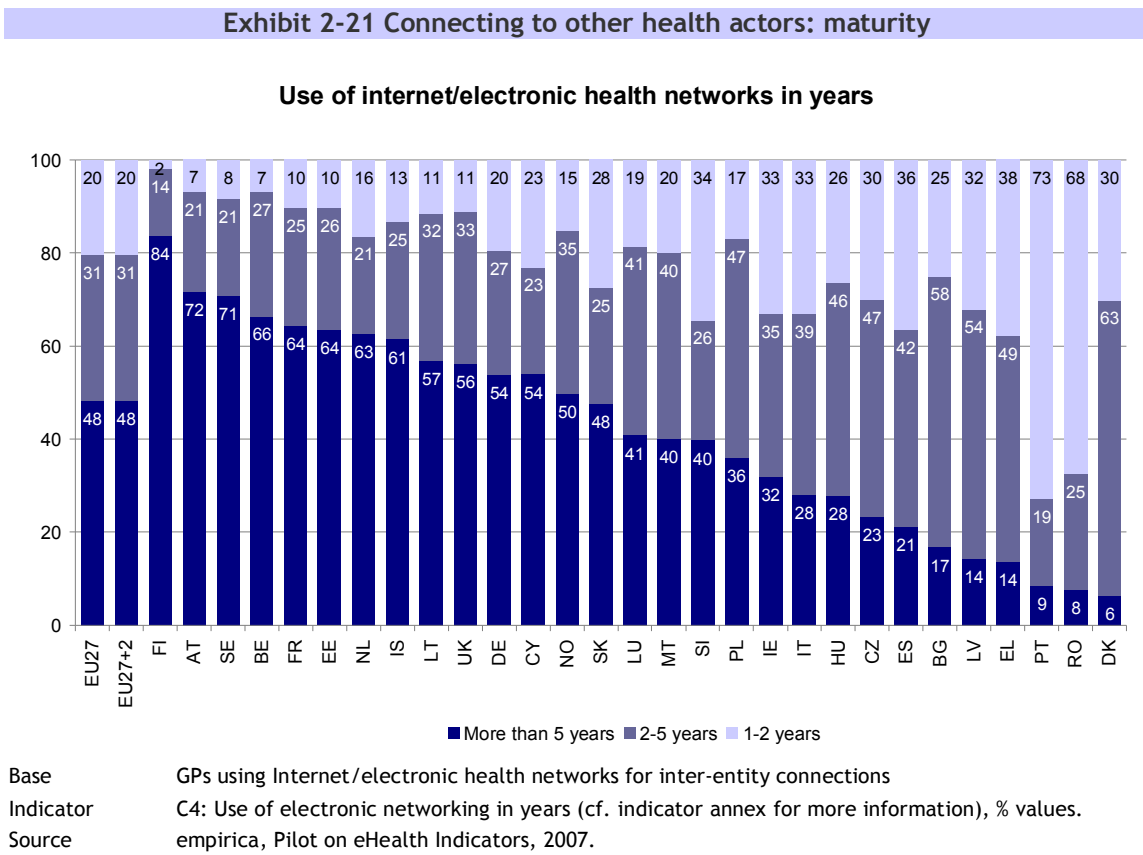|	
Base	All GPs
Indicator	C3: Practice computer system connecting to various organisations via Internet or dedicated electronic network (cf. indicator annex for more information), % values.
Source	empirica, Pilot on eHealth Indicators, 2007.

There is also a difference between practice size-classes in the use of electronic networks for connections to other health actors. On average, single GP practices use electronic networks to a lesser extent (44% connecting to at least one health actor, cf. Exhibit 2-20 below) than practices with four or more GPs (70%). In some countries (Germany, Spain, Ireland, Sweden and Norway) this gap is at about 40 percentage points or higher. Mostly, this can however be seen as a mirror of the Internet size-class gap reported already above. Differences can also be accounted for by the use of other, dedicated electronic networks instead of the Internet.

Exhibit 2-20 Connecting to other health actors by practice size-class

Access to electronic systems of other health actors: Overview by size of practice
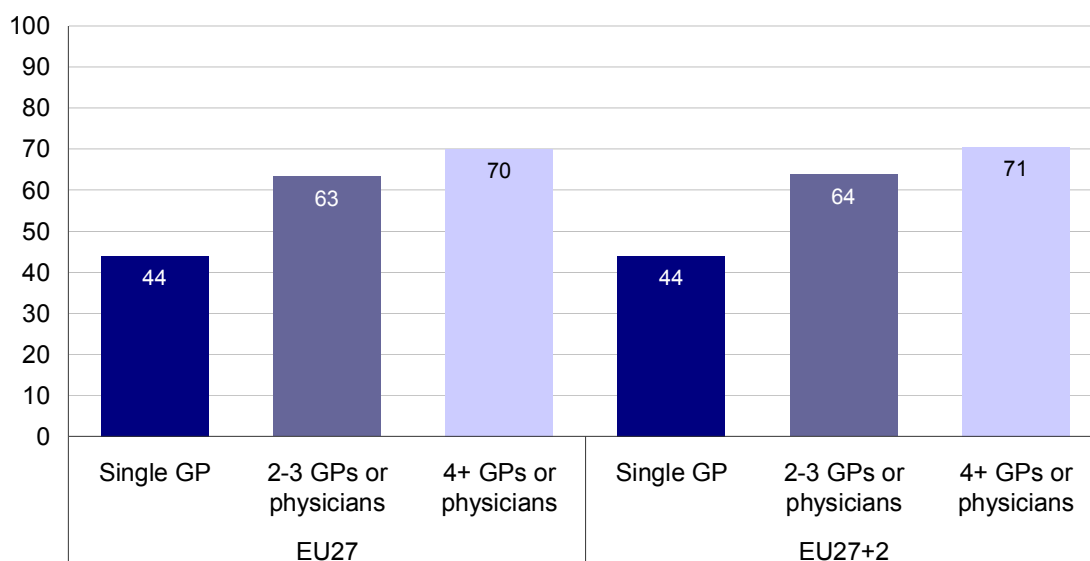
Base	All GPs
Indicator	C3: Practice computer system connecting routinely to various organisations via Internet or

	dedicated electronic network (cf. indicator annex for more information), % values.
Source	empirica, Pilot on eHealth Indicators, 2007.

Experience in connecting to other health actors

Of the practices using either the Internet or electronic health networks to connect to the systems of other health actors about half have been doing so for more than five years (cf. Exhibit 2-21 below). Nearly another third electronically has been using these connections since two to five years and one-fifth since one to two years. Overall, in 11 countries there is a longstanding experience in this kind of network use (more than 50% of GPs using networks for more than five years). On the other hand, there is a group of nine countries where one-third or more of the GPs are relative newcomers. Of particular interest in this regard are Portugal and Romania with 73% and 68% respectively of newcomers. These countries with a comparatively high share of GP practices new to electronic connections are perhaps more likely to experience changes in their use patterns than other countries where these are already better established. The same might also be true — if to a lesser extent — in countries with a large portion of medium-term users, such as Bulgaria, Latvia and Denmark.

Exhibit 2-21 Connecting to other health actors: maturity

Use of internet/electronic health networks in years

| Base	GPs using Internet/electronic health networks for inter-entity connections
Indicator	C4: Use of electronic networking in years (cf. indicator annex for more information), % values.
Source	empirica, Pilot on eHealth Indicators, 2007.

Using electronic networks for professional purposes

Electronic networks can be used for a number of professional purposes, including the search for medication information, ordering of practice supplies, making appointments for patients with other care providers (e.g. a specialist, therapist etc.), contacting patients (via e-mail) on administrative or health-related matters, as well as monitoring a patient from a distance.

Of these, the search for medication information is — with some margin — the most frequent purpose, done by 26% of the EU27 GP practices (cf. Exhibit 2-22 below). Practice supplies are

ordered by about 15% and appointments with other care providers are electronically made by 12%. E-mail exchange with patients for administrative or health purposes does not happen to any significant extent (except in one country, cf. below), while both telemonitoring and the transmission of vital data from patients' homes are virtually non-existent as a professional purpose for network use.

Exhibit 2-22 Using electronic networks for professional purposes
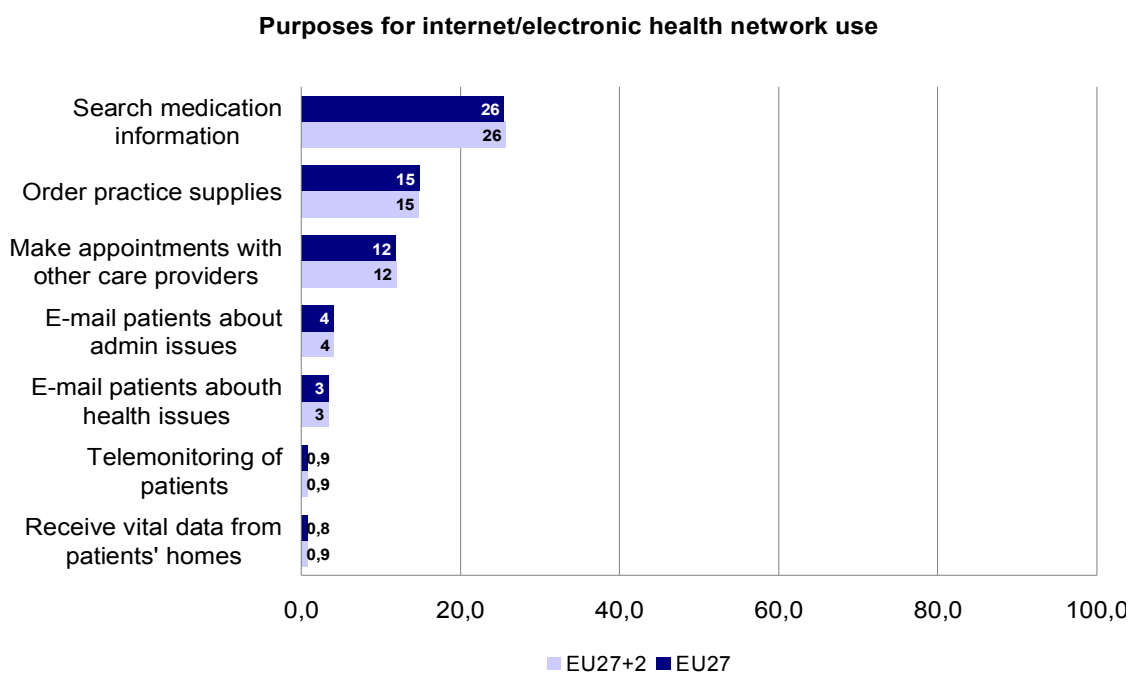
Purposes for internet/electronic health network use

Base	All GPs
Indicator	C5: Using electronic networks routinely for professional purposes (cf. indicator annex for more information), % values.
Source	empirica, Pilot on eHealth Indicators, 2007.

A closer look at the countries reveals that those showing a good performance on indicators previously analysed also tend to perform above average in relation to the use of networks for professional purposes, even if absolute use rates are not always high. This is illustrated — amongst others — by Denmark: Here, e-mail is used rather extensively for communication between the doctor and the patient with about 60% of the GPs doing so. With 6.5% a relatively large — and clearly above average (0.8%) — share of practices also receive vital data from patients in their homes. Other examples include Finland (77% making appointments with other care providers), Sweden (44% electronically ordering supplies, 9% using telemonitoring), the UK (53% making appointments with other care providers) and Iceland (42% making appointments).

Exhibit 2-23 Using electronic networks for professional purposes in detail

	Search medication information	Order practice supplies	Appointments w/other care providers	E-mail patients admin issues	E-mail patients health issues	Telemonitor-ing	Receive patients' vital data
EU27	25.5	14.9	11.9	4.1	3.5	0.9	0.8
EU27+2	25.7	14.8	12.0	4.2	3.5	0.9	0.9
BE	32.8	14.2	5.4	1.9	1.9	0.6	1.3
BG	24.3	10.2	1.9	1.0	0.5	1.0	1.5

CZ	26.3	21.1	3.0	6.2	7.6	0.0	0.0
DK	71.3	50.6	18.4	59.4	58.6	0.4	6.5
DE	18.6	14.2	1.2	1.6	2.8	0.8	1.2
EE	45.3	22.0	10.7	2.0	2.0	0.0	0.7
EL	32.1	5.1	4.1	2.2	3.5	0.6	1.3
ES	24.3	8.0	13.5	8.3	2.2	0.6	0.3
FR	28.8	21.2	6.0	2.0	3.0	0.7	0.7
IE	15.1	10.2	10.7	2.4	1.5	1.5	0.5
IT	20.7	6.9	2.4	1.4	1.7	0.0	0.0
CY	34.7	5.6	4.2	0.0	6.9	0.0	1.4
LV	26.6	2.3	0.6	2.3	1.7	0.6	0.0
LT	9.5	4.6	2.3	1.9	1.5	0.0	0.0
LU	12.8	11.2	3.2	1.6	3.2	0.0	0.0
HU	13.9	3.2	2.8	2.4	1.6	0.0	0.8
MT	25.0	4.3	9.8	5.4	7.6	0.0	1.1
NL	38.4	18.6	17.1	8.1	10.9	3.5	3.5
AT	31.8	20.7	7.4	5.7	6.4	0.7	0.7
PL	12.5	10.5	1.4	2.0	0.9	0.0	0.0
PT	21.5	3.2	16.5	1.8	1.1	1.1	1.1
RO	17.1	3.9	1.0	0.3	1.6	0.3	0.0
SI	9.7	8.7	1.0	1.0	0.0	0.0	1.9
SK	21.1	10.0	0.4	1.9	2.7	0.4	0.0
FI	77.2	28.8	76.8	4.8	7.2	0.8	0.4
SE	51.3	44.2	14.6	11.2	8.2	9.0	2.2
UK	33.9	25.3	52.6	7.0	2.7	1.6	1.2
IS	49.5	17.5	41.7	8.7	6.8	2.9	1.9
NO	43.6	13.2	21.1	6.4	5.4	0.5	2.9

Base	All GPs
Indicator	C5: Using electronic networks routinely for professional purposes (cf. indicator annex for more information), % values.
Source	empirica, Pilot on eHealth Indicators, 2007.

Costs for telemonitoring

When it comes to cost incurred by telemonitoring services there is a strong indication that — in countries where telemonitoring is actually done — costs are not borne directly by the patient in most cases (82% on average). 10% of the GPs say that payment depends on the condition monitored, while 4% and 3% respectively say that the patient must pay the service entirely or at least partly. These figures must however be treated with caution because — as explained above — telemonitoring is currently not widespread and the number of GPs responding to the payment question is accordingly low. Further to this methodological issue, telemonitoring is today often practiced in the framework of pilot or trial projects which do not necessarily have a fixed payment model or are not integrated into existing reimbursement schemes. A clearer indication of how telemonitoring is paid for will only become available when this approach is used more widely and as a regular service.

Exhibit 2-24 Patients paying for telemonitoring services

Payment for telemonitoring services

Base	GPs regularly or occasionally doing telemonitoring
Indicator	C6: Payment for telemonitoring purposes (cf. indicator annex for more information), % values.
Source	empirica, Pilot on eHealth Indicators, 2007.
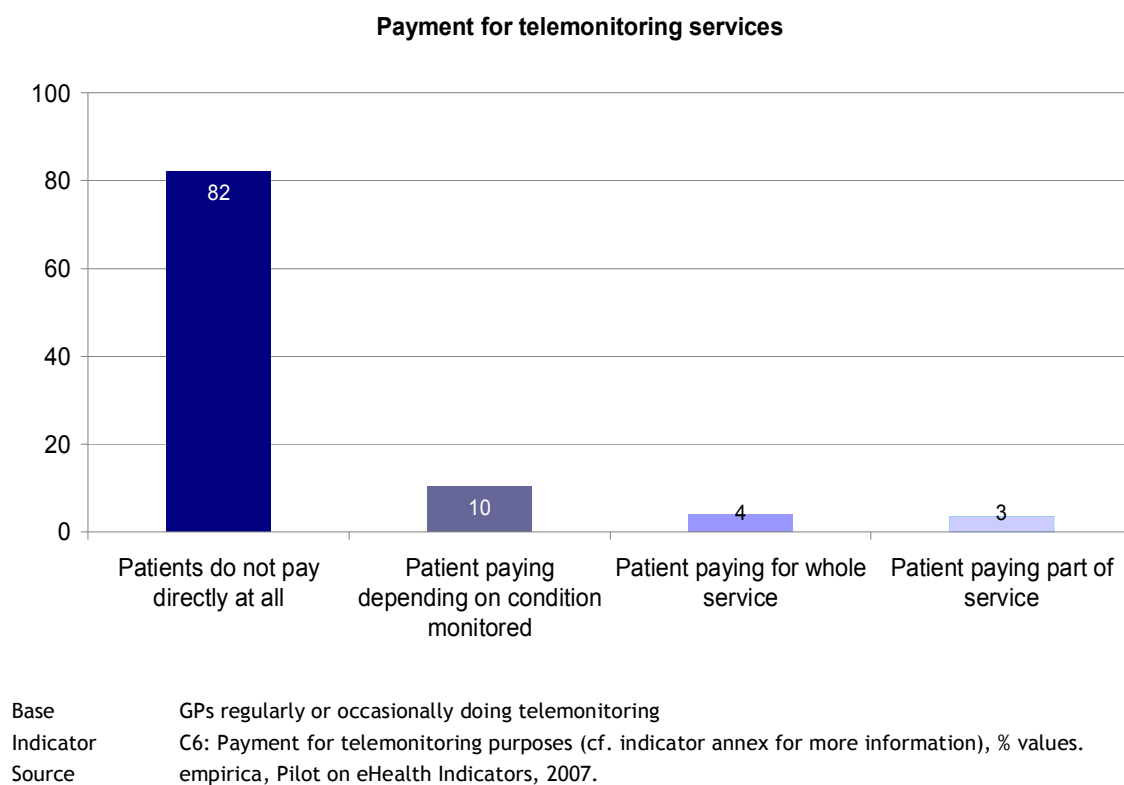
2.2.4   Electronic transfer of patient data

2.2.4.1   Transfer of patient data for administrative and medical purposes

Further to connections to other health actors via electronic networks analysed in the previous section, networks can also be used to electronically transfer patient-identifiable data. Here, too, it is possible to discern applications with either an administrative or a medical focus, including:

- The transfer of administrative patient data to reimbursers or other care providers.
- The transfer of lab results from the laboratory.
- The transfer of medical patient data to other care providers or professionals.
- ePrescribing, i.e. the transfer of a prescription to a pharmacy.

An additional application under observation here is related to the transfer of medical patient data across borders.

As Exhibit 2-25 below shows, electronic transfer of patient identifiable data to at least one health actor is practiced in slightly less than half of the European GP practices. There is again strong variation between the Member States with actual shares ranging from 2% to 98%. The further analysis also shows (cf. below) that there are several countries where patient data exchange is used to a larger extent only for one or two out of the six purposes analysed. In comparison to the use of electronic connections, there are several countries that show markedly lower use rates when it comes to transmitting patient data. Estonia, Italy and Iceland may serve as an example here: in all three countries, there is a difference of more than 20 percentage points absolute (more than 50 percentage points in the case of EE)

between the use of connections to electronic systems of other health actors and the electronic exchange of patient data.
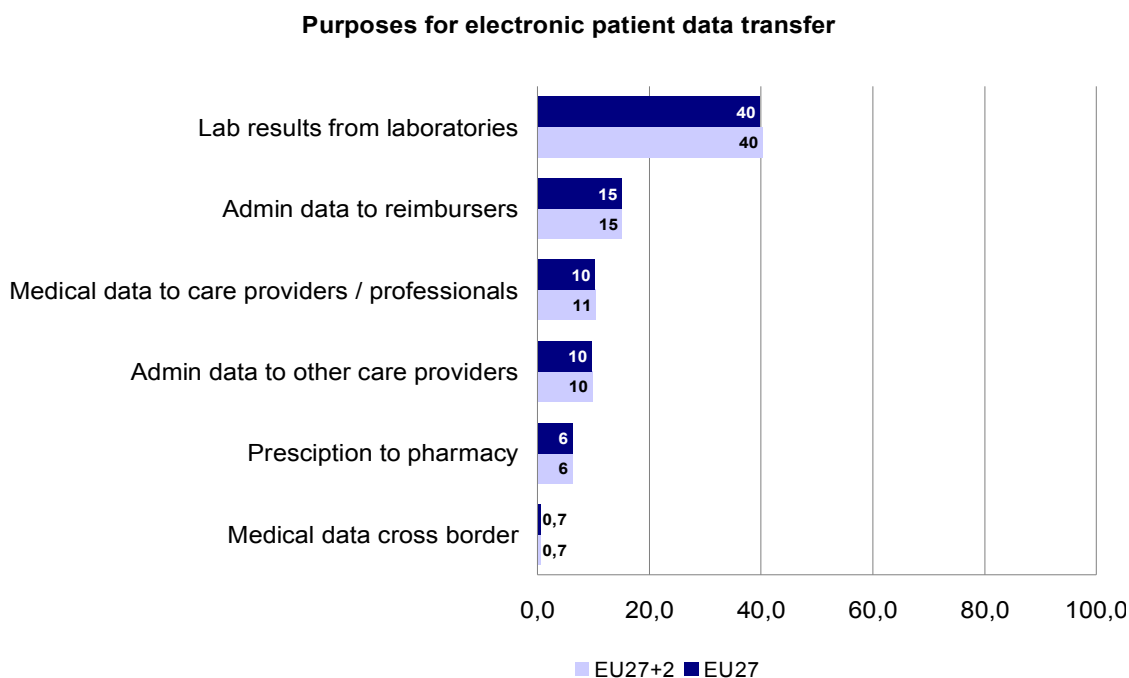
Exhibit 2-25 Electronic exchange of patient data for at least one purpose
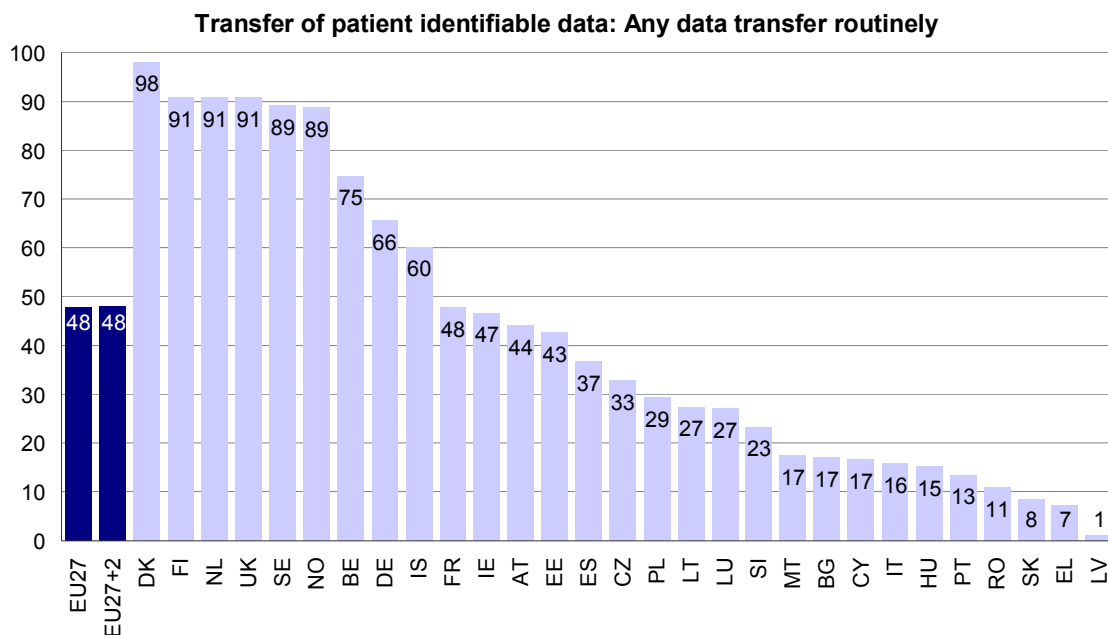
Transfer of patient identifiable data: Any data transfer routinely

Base	All GPs
Indicator	D1: Using electronic networks for transfer of patient data (cf. indicator annex for more information), % values.
Source	empirica, Pilot on eHealth Indicators, 2007.

When looking in some detail at the different purposes for the electronic exchange of patient data, a somewhat ambivalent picture emerges. While the transmission of analytic results from a laboratory to the GP practice occurs comparatively often on average (40%, cf. Exhibit 2-26 below), other types of data are transferred electronically far less often. 15% of the EU27 GP practices transmit administrative patient data to a reimburser, 10% to other care providers. 10% of the practices exchange medical data with other care providers and professionals. ePrescribing is done by 6% of the practices. Exchange of medical patient data across borders occurs even less frequently: on average, less than 1% of the practices reported to do it.

Exhibit 2-26 Electronic exchange of patient data by purpose

Purposes for electronic patient data transfer

Purpose	EU27	EU27+2
Lab results from laboratories	40	40
Admin data to reimbursers	15	15
Medical data to care providers / professionals	10	11
Admin data to other care providers	10	10
Prescption to pharmacy	6	6
Medical data cross border	0,7	0,7

■ EU27+2 ■ EU27

Base	All GPs
Indicator	D1: Using electronic networks for transfer of patient data (cf. indicator annex for more information), % values.
Source	empirica, Pilot on eHealth Indicators, 2007.

Same as in the case of connections to other health actors, there is considerable variation among the different purposes and the 29 countries under observation, which can be seen in the table below (Exhibit 2-27). As has been said above, there are several countries (including Belgium, Germany and Ireland) where the electronic exchange of patient data is used predominantly for only one purpose: transmitting analytic results from a laboratory. And although this is by far the most frequent purpose — done by more than three quarter of the GP practices in seven countries — even here the use rates can be as low as 1% (LV).

This pattern is repeated for all other purposes: while the average share is usually comparatively low, there are a few outstanding countries showing use rates far above this average and a large number of countries that are below average. Exchange of administrative data with reimbursers is done by about 45% of the GP practices in Denmark, the Netherlands and the UK, while in other countries their share is usually not higher than 10%. These disparities are even more drastic in relation to electronic medical and administrative data exchange with care providers. Here, Denmark shows a very high usage rate of about 75% for both purposes, while nearly all other countries are below the 25% or even the 10% level.

ePrescribing can be regarded as a reality in three EU Member States: Denmark, the Netherlands and Sweden. In these countries, electronic transfer of prescriptions to a pharmacy is done by at least three quarter of the practices. Markedly, even in the two frontrunner countries (Denmark with 97% and Sweden with 81%) the more complex features of ePrescribing systems, such as medication mix intolerance and adverse reaction alerts improving patient safety, are not yet implemented in routine practice. ePrescriptions are only at the beginning of their deployment across Europe[1]. Outside the EU, ePrescribing is done at least to some extent in Iceland: here slightly less than 20% of the GP practices deal with

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[1] Cf. "eHealth IMPACT: Study on Economic and Productivity Impact of eHealth 2005 – 2006 (http://www.ehealth-impact.org). Cf. also: K.A.Stroetmann et al.: eHealth is Worth it - The economic benefits of implemented eHealth solutions at ten European sites. European Communities, Luxembourg 2006 (56 pp. - ISBN 92-79-02762-X)

prescriptions with support from ICT solutions. Apart from these four countries (Denmark, the Netherlands, Sweden and Iceland), adoption levels are never higher than 5%. The survey even found seven countries (the Czech Republic, Germany, Latvia, Luxembourg, Malta and Romania) where ePrescribing is not practiced at all by GPs.

When it comes to patient data exchange across borders there is not even one country showing any considerable adoption levels. The highest share can be found in the Netherlands: 4.7% of the GP practices electronically transmit patient data to other countries. In nine EU Member States and Iceland the share is 0. This is not surprising, given that healthcare is explicitly under the jurisdiction of individual Member States, and planned treatment is provided principally in the country of residence.

	Lab results from laboratories	Admin data to reimbursers	Medical data to care providers / professionals	Admin data to other care providers	Prescription to pharmacies	Medical data cross border
EU27	39.8	15.1	10.3	9.7	6.3	0.7
EU27+2	40.2	15.1	10.5	9.8	6.3	0.7
BE	73.5	2.5	12.9	12.9	1.6	0.9
BG	5.3	9.7	3.4	5.8	2.4	1.0
CZ	24.7	12.8	5.6	5.9	0.0	0.7
DK	96.2	47.9	73.6	74.0	97.3	1.9
DE	63.2	3.6	4.0	3.2	0.0	0.0
EE	39.3	5.3	1.3	1.3	0.7	0.0
EL	3.5	2.5	4.4	4.4	1.6	1.9
ES	29.8	2.5	12.6	5.5	3.1	0.9
FR	32.8	26.2	4.6	3.6	1.3	1.7
IE	40.4	15.1	1.9	4.4	0.5	0.5
IT	7.6	1.0	7.2	2.8	0.7	0.3
CY	9.7	2.8	2.8	2.8	0.0	2.8
LV	1.1	0.0	0.0	0.0	0.0	0.0
LT	7.6	20.5	2.7	9.5	1.1	0.4
LU	27.1	0.0	0.0	0.0	0.0	0.0
HU	12.4	4.8	2.4	0.8	0.8	0.0
MT	10.9	3.3	6.5	6.5	0.0	3.3
NL	83.8	45.4	26.0	27.5	71.0	4.7
AT	37.1	18.7	12.4	7.4	2.0	0.7
PL	10.0	22.5	2.3	6.3	0.3	0.0
PT	1.4	5.3	7.7	6.3	2.1	0.4
RO	4.3	1.6	2.0	6.3	0.0	0.0
SI	9.7	13.6	0.0	2.9	1.9	0.0
SK	4.6	4.2	1.1	1.5	0.4	0.0
FI	90.0	7.6	54.8	20.8	0.4	0.4
SE	82.4	8.2	13.1	15.7	80.9	1.5
UK	84.9	43.2	26.5	31.5	5.1	0.4
IS	52.4	1.0	17.5	11.7	18.4	0.0
NO	88.2	18.6	34.8	25.5	2.9	0.5

Exhibit 2-27 Electronic exchange of patient data by purpose in detail

Base	All GPs
Indicator	D1: Using electronic networks for transfer of patient data (cf. indicator annex for more information), % values.

Source   empirica, Pilot on eHealth Indicators, 2007.

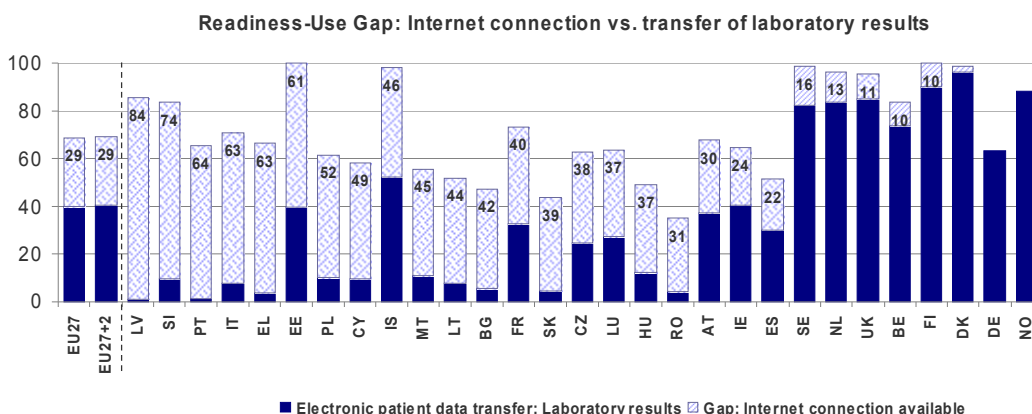## Internet connection vs. electronic patient data transfer

Comparing the use of different types of electronic patient data transfer with readiness, i.e. the availability of an Internet connection, confirms the findings reported above but also shows what use rates could theoretically be possible if existing barriers were tackled and the available infrastructure used.

The gap between the availability of an Internet connection and the use of the Internet for the electronic exchange of patient data was analysed for the three most frequent types of data exchange: transfer of laboratory results, transfer of admin data to reimbursers and transfer of medical data to other carers[1].

For the type of data exchange used most frequently — transfer of laboratory results — the average Readiness-Use Gap is at 29%. In seven countries (the Netherlands, the UK, Belgium, Finland, Denmark, Germany and Norway) the gap is about 10% or lower, down to 0 in Germany and Norway, i.e. here all GP practices that have an Internet connection use it for receiving analytic results from laboratories. In most Member States there is a gap of between about 20% (Ireland, Spain) and 65% (Portugal, Italy, Greece). Larger gaps can be found in Latvia (84%) and Slovenia (74%).

The average gaps for the two other types of data exchange — transfer of admin data to reimbursers and transfer of medical data to other carers — are at 54% and 59%, respectively, showing that basic infrastructure (here: Internet connections) is increasingly less of an issue when compared to the actual use rates for data exchange, which are still fairly low in most countries. Therefore, the pattern largely reflects the use patterns analysed above. It also shows that even those countries with comparatively high use rates — such as Denmark, the Netherlands, Finland and the UK — currently do not tap a considerable share of their eHealth potential in this area. For example, there is a gap of more than 50% in relation to transfer of admin data to reimbursers in the UK, the Netherlands and Denmark as well as a gap of 45% (Finland) and 25% (Denmark) in relation to transfer of medical data to other carers.

Exhibit 2-28 Readiness-Use Gap: Internet connection vs. different types of electronic patient data transfer

Readiness-Use Gap: Internet connection vs. transfer of laboratory results

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[1] The share of practices electronically exchanging patient data may exceed the share of practices having an Internet connection in cases where dedicated network connections not based on the Internet (e.g. direct dial-up connections) are used. Cf. for instance exchange of laboratory data in Germany (done by 63% of the practices) compared to 59% having an Internet connection; i.e. 4% using a dedicated network connection to the laboratory.

Readiness-Use Gap: Internet connection vs. transfer of admin data to reimbursers

■ Electronic patient data transfer: Admin data to reimbursers ▨ Gap: Internet connection available

Readiness-Use Gap: Internet connection vs. transfer of medical data to other carers

■ Electronic patient data transfer: Medical data to other carers ▨ Gap: Internet connection available
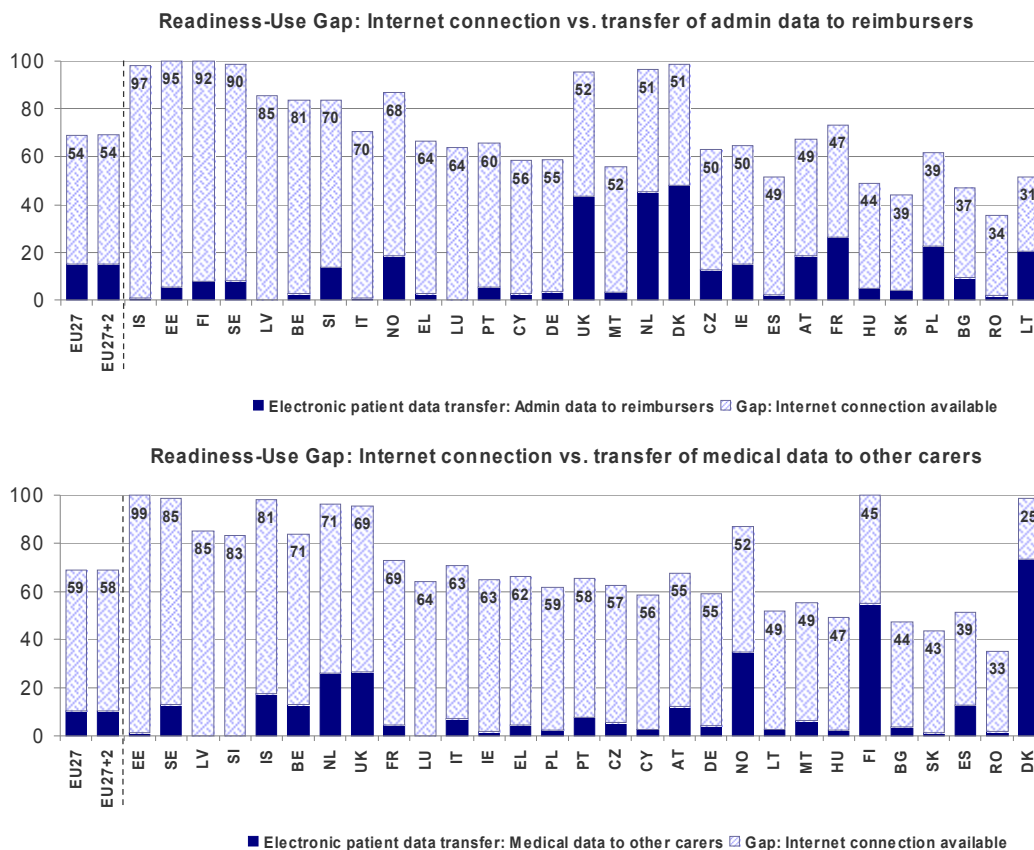
Base	All GPs
Indicators	C1: Internet connection, % values. D1: Using electronic networks for transfer of patient data, % values.
Source	empirica, Pilot on eHealth Indicators, 2007.

2.2.4.2 Interoperability, data security and patient consent

In the electronic exchange of data between two systems, interoperability — i.e. the question whether the two systems can "understand" each other — plays an important role. In the eHealth domain, interoperability problems can hamper the exchange of patient data or even make it impossible.

Overall, slightly less than one third of the 48% of European GP practices that electronically transmit patient data encountered data or system compatibility problems at least once. Mostly, the frequency of occurrence of any problems depends on the intensity of the data exchange. In countries where several types of patient data exchange are used or where the share of practices using them is comparatively high, more problems occur (as in the case of Belgium, the Netherlands, Finland and Sweden). However, other factors also seem to play a role: intensity of patient data exchange in the UK is about as high as in Finland or Sweden and yet only about one third of the GPs encountered interoperability problems as compared to about half in the other two countries.

	Exhibit 2-29 Interoperability problems in patient data exchange

Interoperability problems
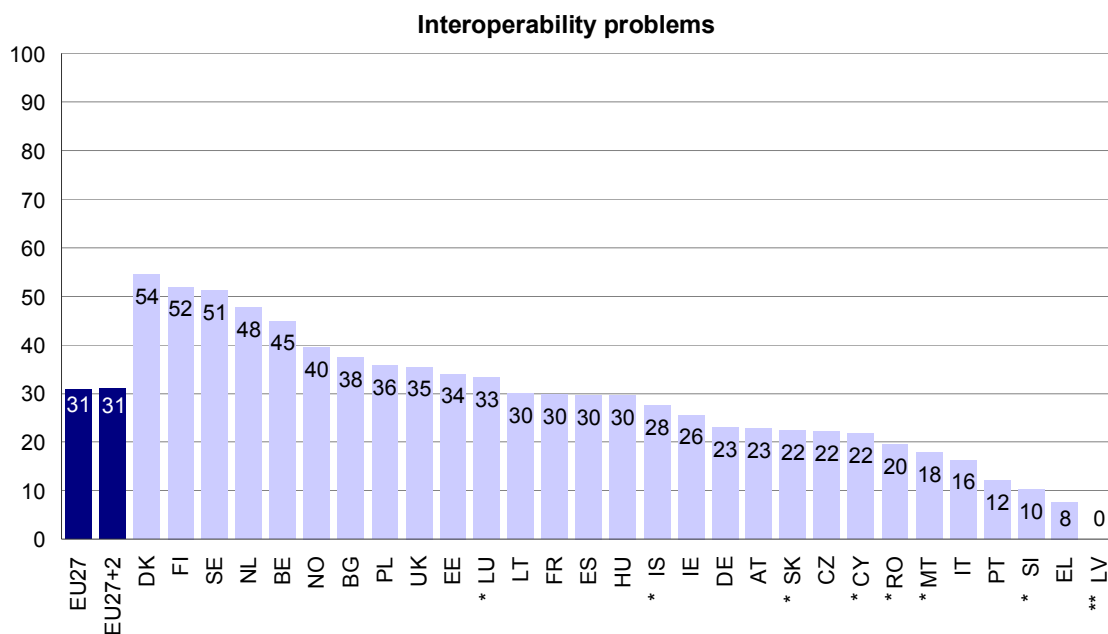
Base	GPs electronically transmitting patient data
Indicator	D3: Practices encountering interoperability problems in patient data exchange (cf. indicator annex for more information), % values.
Notes	* marks countries with 10<=n<50, ** marks countries with n<10.
Source	empirica, Pilot on eHealth Indicators, 2007.

There is a number of different techniques to make electronic patient data transfer secure, including password protection of the system and the transmitted files, encryption of transmitted files and e-mails as well as the use of e-signatures. Of these, password protection can be achieved comparatively easy. A password-protected login is available for all computer operating systems. All it takes is to activate the password login option in the software settings. As Exhibit 2-30 below shows, nearly all (94%) of the European GP practices where patient data are transmitted electronically use this readily available feature. Password protection of files is also technically available in many applications, including standard office software and file compression software (such as ZIP) which is often used to reduce the size of a file prior to transmission. However, only 57% of the EU27 practices that transmit patient data use this technique. Beside the one reason that the password protection feature — although existent — is not used due to intrinsic reasons (such as inconvenience, a lack of skills or ignorance) this can also be due to the fact that software developed specifically for the purposes of a medical practice must not necessarily contain such a feature.

Other than in the case of password protection, both encryption and the use of electronic signatures require a dedicated infrastructure, comprising software, an encryption key and a signature — the latter possibly received from an authorised trust centre. This infrastructure must be present at both ends: on the side of the transmitting as well as of the receiving party. Before the first — encrypted or signed — transmission both parties must establish a connection to exchange the encryption key or the signature. In addition to the infrastructure, both techniques also require some special skills on the user side. The effort necessary to obtain and continuously use electronic signatures can be considered to be higher than that for using encryption. This fact is also reflected in the actual usage data: encryption is used in about 40% of the European GP practices transmitting electronic patient data, whereas e-signatures are used in 19%.

**Exhibit 2-30 Electronic patient data and security**

Use of security features

Feature	EU27	EU27+2
Password protected access	94,0	94,1
Password protection of transmitted files	57	57
Encryption of transmitted files and e-mails	42	42
Use of e-signatures	19	19

■ EU27+2 ■ EU27
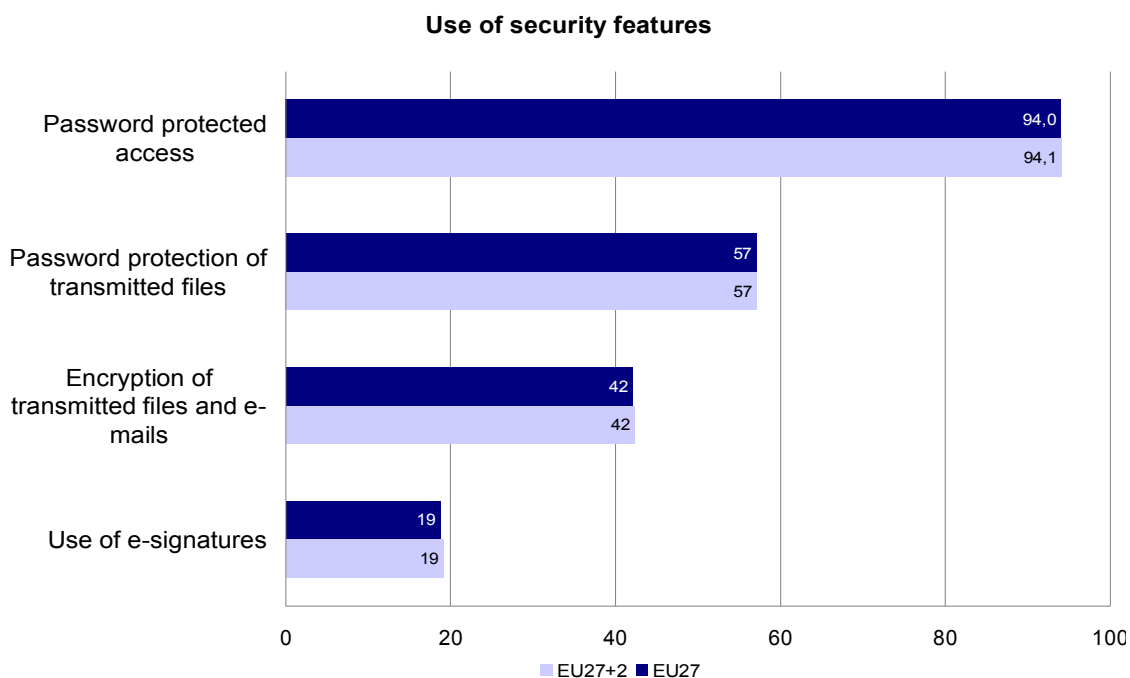
Base	GPs electronically transmitting patient data
Indicator	D4: Use of security features (cf. indicator annex for more information), % values.
Source	empirica, Pilot on eHealth Indicators, 2007.

Patient consent

When it comes to obtaining the patients' consent either for electronic storage or transfer of identifiable data, quite a heterogeneous picture emerges, as can be seen in the exhibit below. On average, half of the European GPs do not ask for their patients' consent for both activities. Slightly less than one quarter obtain oral consent, while the remaining quarter obtains consent in writing. The differences between the countries are considerable: On the one side there is Latvia, where none of the GPs ask for consent in any form. On the other side, all Finish GPs obtain consent, with 18% doing so orally and 82% in a written format. A situation similar to that in Finland can be found in Italy and Slovakia. The reasons for these differences are most likely to be found in the regulative environments of the countries. High shares of GPs asking patients for consent to data storage and transfer will be found in countries where there is a legal obligation to do so, e.g. imposed by data security law. Differences inside a country —between obtainers and not-obtainers as well as between the formats used — may result from a lack of awareness on the side of the GP but also from regulation allowing for different ways of obtaining the consent.

Exhibit 2-31 Obtaining patient consent for data storage and transfer

Type of patient consent obtained for electronic data storage and transfer
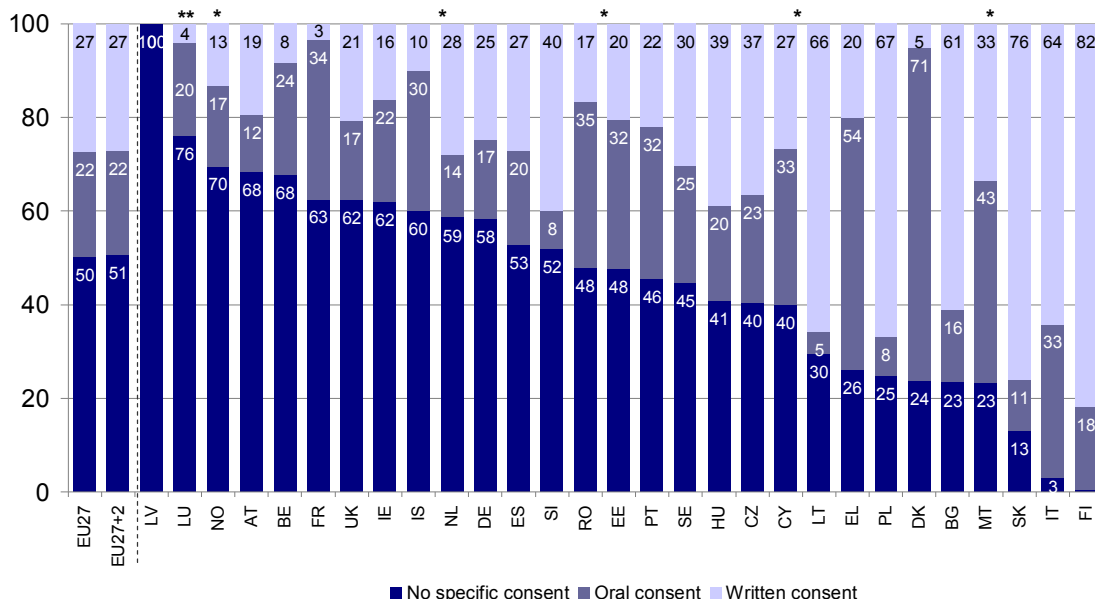
Base	GPs electronically transmitting patient data
Indicator	D2: Patient consent to data storage and transfer (cf. indicator annex for more information), % values.
Note	* marks countries with 10<=n<50, ** marks countries with n<10.
Source	empirica, Pilot on eHealth Indicators, 2007.

2.2.5   ICT use for continuous education

Apart from using computers and the Internet for administrative and medical purposes as described above, ICTs can also be used for education purposes by the GP, in particular for continuous medical education (CME) or continuous professional development (CPD). Exhibit 2-32 shows that this kind of e-learning is rather prevalent among European GPs that use a computer: on average, about 82% of them used their computer or the Internet for CME/CPD in the last 12 months.

There is variation among the Member States but it is not as marked as in many other cases. On the low end of the scale the usage share is at about 60% (e.g. in Denmark, Hungary, the Netherlands and Romania). On the upper end shares can be as high as about 98% (e.g. in Malta, Finland and Iceland).

Exhibit 2-32 GPs and e-learning

		Size of practice	
	Total	Single GP	2-3 GPs or physicians	4+ GPs or physicians
EU27	81.6	76.8	82.7	88.9
EU27+2	81.5	76.8	82.6	88.5
BE	71.5	68.5	77.9	75.0 *
BG	73.0	72.1	76.7	64.7 *
CZ	91.2	93.4	78.6 *	91.3 *

DK	61.2	53.3	68.6	60.7
DE	78.7	75.6	86.4	63.6 *
EE	78.5	70.2 *	86.0 *	79.7
EL	91.2	89.3	95.2 *	95.9 *
ES	91.6	90.7	88.2	93.4
FR	74.7	73.5	77.4	66.7 **
IE	81.5	71.4	89.7	85.0 *
IT	78.8	75.6	85.7 *	87.2 *
CY	92.0	90.6 *	100.0 **	92.9 *
LV	82.7	91.7	62.9 *	61.5 *
LT	93.2	92.9 *	90.2 *	94.5
LU	76.0	72.4 *	78.9 *	100.0 **
HU	63.7	65.7	67.7 *	50.0 *
MT	98.3	97.1 *	100.0 **	100.0 *
NL	65.1	63.9	57.5	76.5
AT	84.4	78.6	82.8 *	97.1
PL	88.4	86.0	85.0	91.3
PT	89.2	86.1 *	79.7	93.8
RO	62.5	61.2	63.6 *	66.7 *
SI	80.0	67.9 *	100.0 **	83.1
SK	81.6	81.8	87.5 *	75.8 *
FI	98.8	94.4 *	100.0 *	99.0
SE	81.9	82.6 *	87.8 *	80.2
UK	95.6	96.9 *	94.5	95.9
IS	97.1	92.9 *	94.1 *	98.6
NO	70.2	75.0 *	76.0	65.0

Base	GPs using computers
Indicator	I1: GPs using the Internet or computers for continuous education (cf. indicator annex for more information), % values.
Notes	* marks countries with 10<=n<50, ** marks countries with n<10.
Source	empirica, Pilot on eHealth Indicators, 2007.

2.2.6   Internet research by patients

The Internet is a source of information, including information on health-related issues. In this way it is used by a growing number of patients to gain a better insight into their own illnesses, their symptoms and treatments.

As the survey data show (cf. Exhibit 2-33 below), general practitioners are often confronted with the outcomes of their patients' information search. Slightly more than 60% of the European GPs say that their patients want to discuss information found on the Internet often or sometimes. About 30% say that this is rarely the case, while only 8% say that it never happened to them. A majority of the GPs also holds the opinion that such a discussion with a professional is necessary: more than 70% state that their patients either misunderstood or misapplied the information they have found often or sometimes. The danger of misunderstanding, however, does not seem to be a reason to neglect health-related information found on the Internet. According to about 60% of the GPs, it is often or sometimes beneficial for their patients. When it comes to information that might help chronically ill

patients in the self-management of their illness, a majority of the practitioners (65%) thinks that this is rarely or never the case. This somewhat ambivalent perception of health-related Internet research of patients — general usefulness on the one hand and the danger of misunderstandings as well as lower helpfulness for the chronically ill — is also reflected in the way GPs recommend health websites to their patients: All in all about one third (32%) of them recommend websites often or sometimes, while 29% do so rarely and nearly 40% never.

Exhibit 2-33 Internet research by patients

Internet research by patients
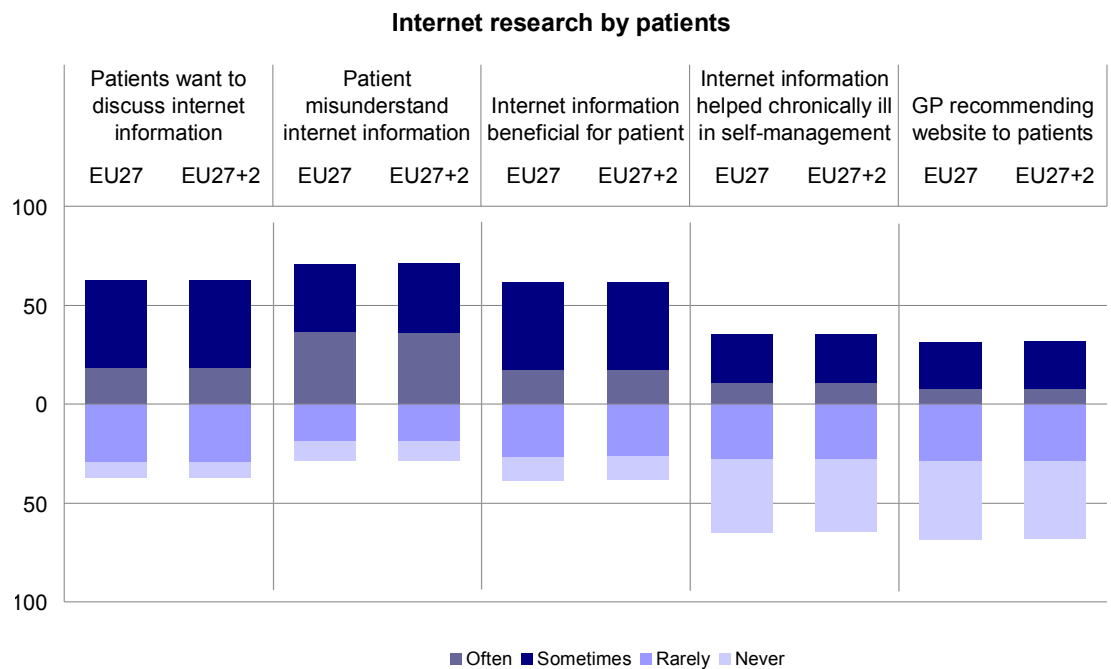
Base	GPs using computers
Indicator	H1 Internet research by patients
Source	empirica, Pilot on eHealth Indicators, 2007.

3   GPs perception of the role of ICT in healthcare

After the analysis of ICT infrastructure in GP practices and its use for eHealth-related purposes, this section deals with the practitioners' perception of what role these ICTs play in their day-to-day work in the practice. Primarily, this concerns the GPs' general attitude towards ICT as well as the question which facilitators and barriers they perceive towards a wider uptake of eHealth.

Key results

On a whole, **European GPs are quite positive about ICT's potential to improve the quality of healthcare services**. On a five-point scale ranging from strong disagreement (-2) to strong agreement (+2), the EU27 average score is 1.3 — i.e. somewhere between partial and strong agreement.

The inclusion of eHealth in the curricula of medical education, more IT training for GPs and the existence of a clinical information network for all health actors are seen as **facilitators for a further spread of eHealth** by most of the GPs. While European GPs on average regard neither a lack of IT support nor cost as serious **barriers to eHealth use**, GPs from countries with low eHealth use levels — Greece, Poland, Romania, Lithuania and Latvia — perceive more and stronger barriers than their colleagues in countries with higher usage rates. A lack of IT training as well as of professional IT support and costs related to the procurement and maintenance of ICT are deemed to hamper the further uptake of eHealth in those countries.

Both the GPs' attitude towards ICT and their perception of facilitators and barriers are independent of the practitioners' age, with older GPs holding the same view as young GPs.

3.1   Attitudes towards ICT use

Quite remarkably, European GPs are positive throughout when it comes to the question whether ICT improves the quality of healthcare services. In other words, a majority of practitioners displays a positive attitude towards eHealth and its inherent potential.

On a five-point scale ranging from strong disagreement (-2) to strong agreement (+2), the EU27 average score is 1.3 — i.e. somewhere between partial and strong agreement (cf. Exhibit 3-1 below). When looking at the general attitude from a country perspective it is interesting to see that in none of the 29 countries under observation a negative attitude is prevalent.

A positive attitude seems to have nothing to do with whether a country is more of an eHealth laggard or a frontrunner. Those countries displaying the least positive attitude (DE, FR, AT) are all average performers in relation to most of the indicators analysed before. At the same time, GPs using eHealth and practising in countries that can be considered eHealth laggards (e.g. EL, CY, RO) show an attitude that is considerably more positive than the EU27 average. A possible explanation can probably be found in the wider impacts of eHealth use on a national level a practitioner perceives (cf. also the following section). In other words, when a practitioner from an average or frontrunner country uses eHealth himself but at the same perceives only limited impacts on the wider health arena around him (e.g. in terms of increased efficiency of the health system, better treatment of patients etc.) he may not be likely to display an overly positive attitude. At the same time a GP practicing in a country

where eHealth is not very common and where he is among the few early adopters may still be able to extrapolate his own positive experiences to the wider field and therefore be very positive.

This reasoning however should not conceal the fact that even in countries such as Germany and France — that show the least positive attitude in comparison — a majority of the GPs active in eHealth by and large agree to the statement that ICTs improve the quality of healthcare.

A GPs' attitude towards the use of ICT in health care seems to be largely independent of his or her age. There are no notable differences between age groups.

Exhibit 3-1 GPs general attitude towards ICT use in health care

ICT improves the quality of healthcare services
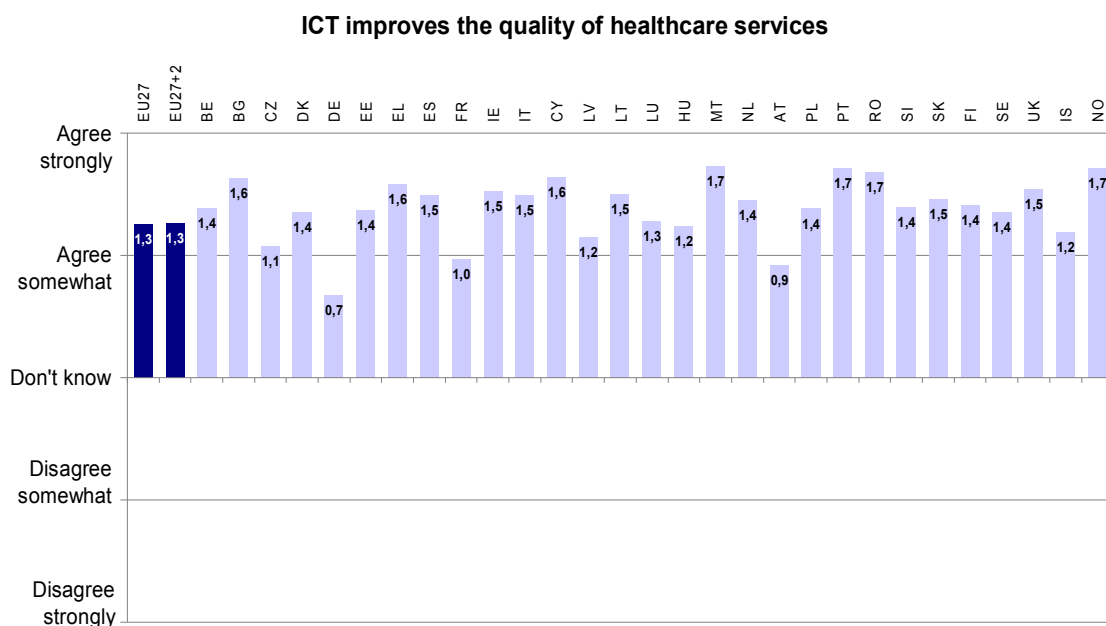
Base	GPs using computers
Indicator	F1a: GPs agreement to the use of software and IT systems improving the quality of healthcare services (cf. indicator annex for more information), score values from +2 = strong agreement to -2 = strong disagreement.
Notes	* marks countries with 10<=n<50, ** marks countries with n<10.
Source	empirica, Pilot on eHealth Indicators, 2007.

3.2 Perception of facilitators and barriers

Among factors that could facilitate the diffusion of eHealth, most European GPs would prefer if eHealth were included in the curricula of medical education (cf. Exhibit 3-2 below). The second most important facilitating factor is related to IT training provided to the GPs themselves. Thirdly, a majority of GPs also regards a better networking of all health actors in order to share clinical information as beneficial. When it comes to telemonitoring — currently used only rarely by European GPs, cf. Exhibit 2-22 — the practitioners on average are moderately positive that it will facilitate their treatment of patient with chronic conditions.

In relation to these facilitators, there is not much difference between the countries. eHealth included in medical education is seen as a less important issue only in Denmark, Luxemburg

and Austria, but even here a majority still agrees somewhat with the idea. This slightly deviant attitude might point to medical education in these two countries already covering some elements of eHealth. Nearly all Maltese and Portuguese GPs think that eHealth should be part of the medical curricula.

As regards the electronic exchange of clinical information, GPs in Germany, Poland, Iceland and Norway are less positive about this than the European average, but still mostly agree to a certain extent. On the other hand, Greek, Lithuanian and Romanian GPs are considerably more positive about this than their European peers. In relation to IT training for GPs, practitioners in Germany, Hungary and the Netherlands see this as a less important issue.

When it comes to potential eHealth barriers, most EU27 practitioners seem — on average — to consider neither a lack of IT support nor cost as a factor that seriously hampers their use of ICT. There are however notable deviations (see also the following paragraph): a majority of GPs in Hungary, Romania, Lithuania, Malta, Poland and Latvia see a lack of support as a barrier to eHealth use, with GPs in Latvia and Hungary also regarding costs as a decisive factor.

Same as in the case of the general attitude, there are no notable differences between age groups in relation to the perception of facilitators and barriers. Older GPs seem to hold the same view as their younger colleagues.

Exhibit 3-2 GPs perception of eHealth facilitators and barriers
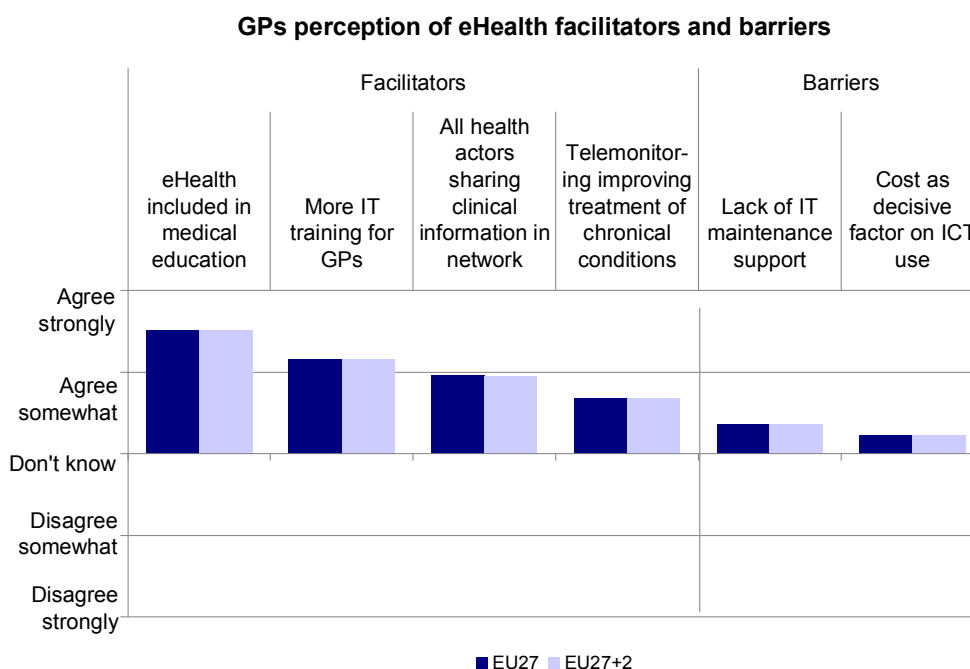
GPs perception of eHealth facilitators and barriers

Base	GPs using computers
Indicator	F1b: GPs perception of various facilitators and barriers to eHealth use (cf. indicator annex for more information), score values from +2 = strong agreement to -2 = strong disagreement.
Source	empirica, Pilot on eHealth Indicators, 2007.

A more detailed analysis of these data shows that GPs from countries with different eHealth use levels tend to differing perceptions of facilitators and — even more so — barriers. Exhibit 3-3 below shows a breakdown by three usage levels (eHealth frontrunner, eHealth average performer and eHealth laggard) used for the eHealth indicator scoreboard presented in section 5.1. There are no significant deviations in relation to the question of including eHealth in medical education. GPs from all three country groups are very much in favour of the idea.

The same is also true for the establishment of a network to share clinical information, although the overall level of agreement is somewhat lower.

When it comes to barriers, however, the perception in the eHealth laggard countries (Greece, Poland, Romania, Lithuania and Latvia) is different from that in the average performer and frontrunner countries. Mostly, GPs in those countries perceive more and stronger barriers than their colleagues in the rest of the EU. A lack of IT training for GPs — although classified as a facilitator below — is probably the strongest of the hindering factors analysed here. A majority of GPs from the laggard countries strongly agrees to the statement that more IT training would help them to make more and better use of eHealth applications. Seen from a different perspective there seems to be a lack of this kind of training, hindering wider uptake. In a similar manner, a lack of IT support as well as costs for the procurement and maintenance of an ICT infrastructure and eHealth applications are seen as barriers by many of the GPs in the laggard countries. The former result is well in line with data reported above (cf. section 2.1.1) indicating that only a minority of GPs in Greece (38%), Latvia (29%), Poland (30%) and Romania (10%) receives IT support from professional service providers — compared to 74% on EU27 average. The data on barriers analysed here seem to indicate that this is rather due to a lack on the supply side — i.e. on support being unavailable to the extent needed — than to a choice made by the GPs.

Exhibit 3-3 Perception of facilitators and barriers by eHealth use
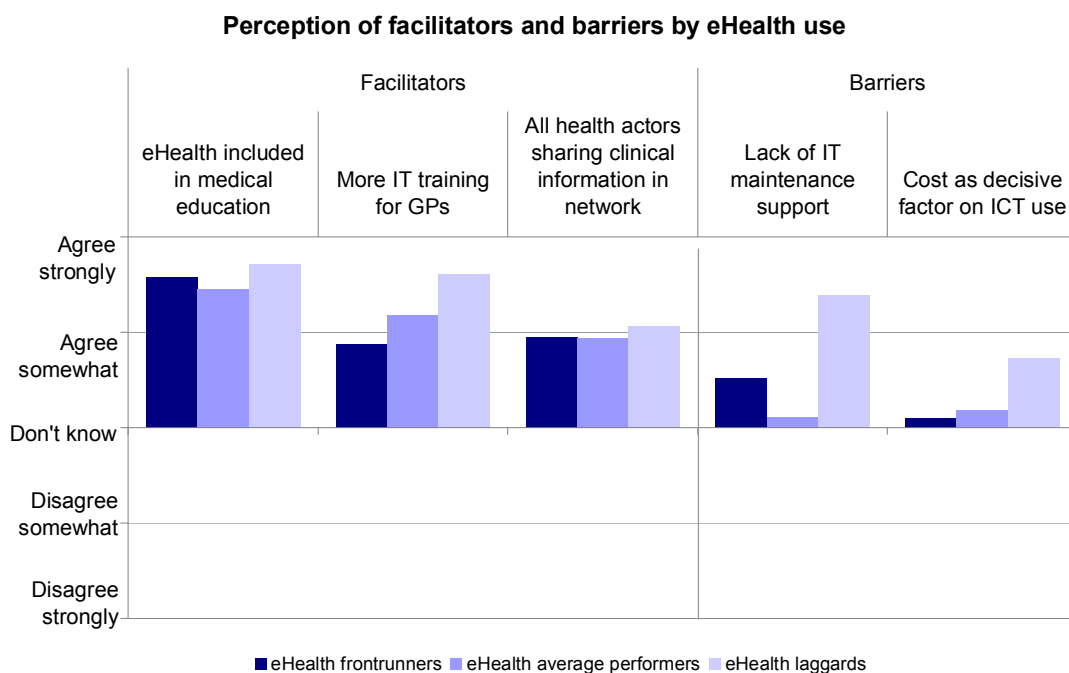
Perception of facilitators and barriers by eHealth use

Base	GPs using computers
Indicator	F1b: GPs perception of various facilitators and barriers to eHealth use (cf. indicator annex for more information), score values from +2 = strong agreement to -2 = strong disagreement.
Source	empirica, Pilot on eHealth Indicators, 2007.

4 GPs perception of impacts of ICT use

Key results

All in all, **European GPs tend to see either positive impacts or no impacts** emanating from the use of eHealth applications and services. Explicitly negative impacts are the exception — occurring to a noticeable degree only in two areas: the doctor-patient relationship and the workload of the practice support staff.

GPs are by and large **positive about impacts on working processes**, both personal ones and the processes of the practice staff. They are more **ambivalent in relation to patient-related and medical impacts**. For every GP being positive about those impacts there is at least one other GP not perceiving any. This is true for quality of diagnosis and treatment, the scope of the services offered by the practices, the average number of patients treated per day and the number of patients coming to the practice.

Same as for the perception of the role of ICT in healthcare, the GPs' perception of impacts of ICT use do not vary between the age groups.

The impact perceptions show quite a clear pattern: the GPs are most positive about the administrative impacts of ICT use in health care, namely impacts in relation to their personal or practice staff working processes (cf. Exhibit 4-1 below). When it comes to patient-related or medical impacts, a more ambivalent picture emerges. For every GP being positive about those impacts there is at least one other GP not perceiving any. This is for instance the case in relation to impact on the quality of diagnosis and treatment decisions: here about half of the GPs see positive impacts as compared to the other half seeing no impacts. In case of doctor-patient relationship and the workload of the support staff — including nurses etc. — between 16% and 37%, respectively, say that the impacts are actually negative, i.e. that the relationship to the patient has deteriorated or that the workload of the support staff has increased.

The latter could indicate that the brunt of additional effort created by ICT use is not borne by the GP but by the other workers in the practice. This is also not contradicted by the perceived improvement of working processes. For the practitioner this may be because he is not burdened with additional work generated by the ICT and for the rest of the practice staff improved working processes might mean that an overall increased workload is simply handled more efficiently. About one-third of the practitioners state that the scope of services offered by the practice actually increased due to the use of IT systems and software.

The last two areas under observation here are the impact on the number of patients treated as well as on the number of patients coming to the practice. Most GPs do not perceive any impact in relation to both areas. In those cases where the number of patients treated went up with the introduction of eHealth solutions this might be due to the improved working processes internal to the practice allowing for a larger number of patients to be received per day.

Similar to the facilitators and barriers analysed above differences between the countries are not very high. GPs from eHealth frontrunner countries — Denmark, the Netherlands, Finland, Sweden and the UK — are somewhat more positive about impacts on personal and staff working processes and also about impacts on the quality of diagnosis and treatment decisions. They perceive a higher increase in the scope of services offered by their practice compared to their colleagues in the other countries. At the same time, negative impacts on the workload of the practice staff are deemed stronger.

Again, the age of the GP does not play a major role and the perception of impacts is largely stable across the age groups.

Exhibit 4-1 GPs perception of eHealth impacts

GPs perception of eHealth impacts 1

GPs perception of eHealth impacts 2
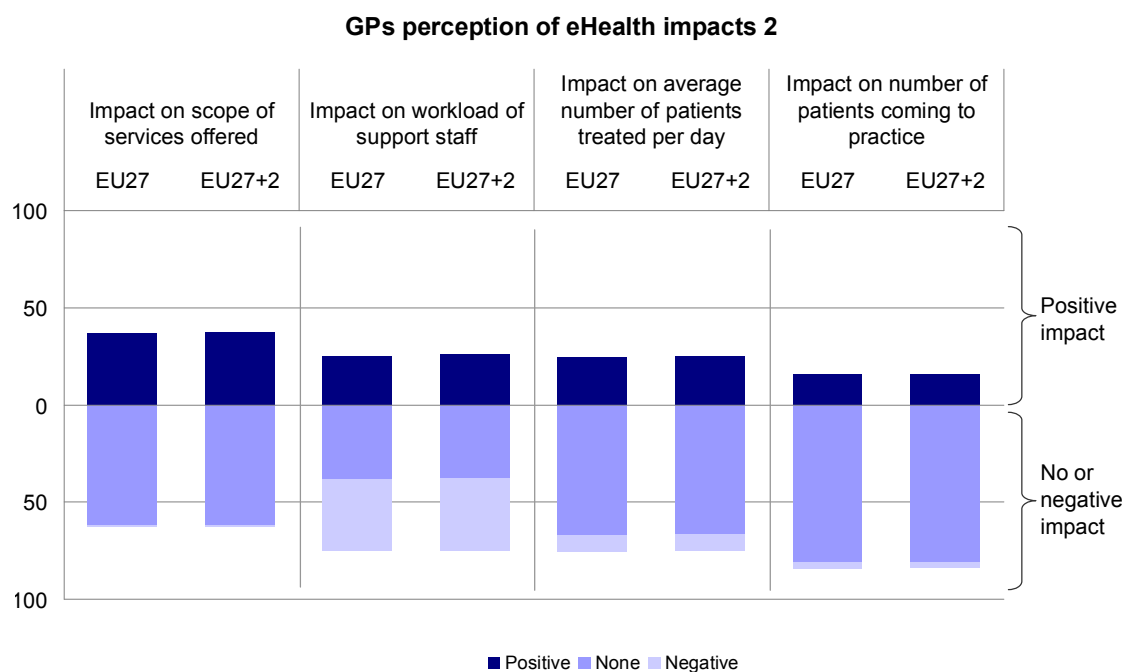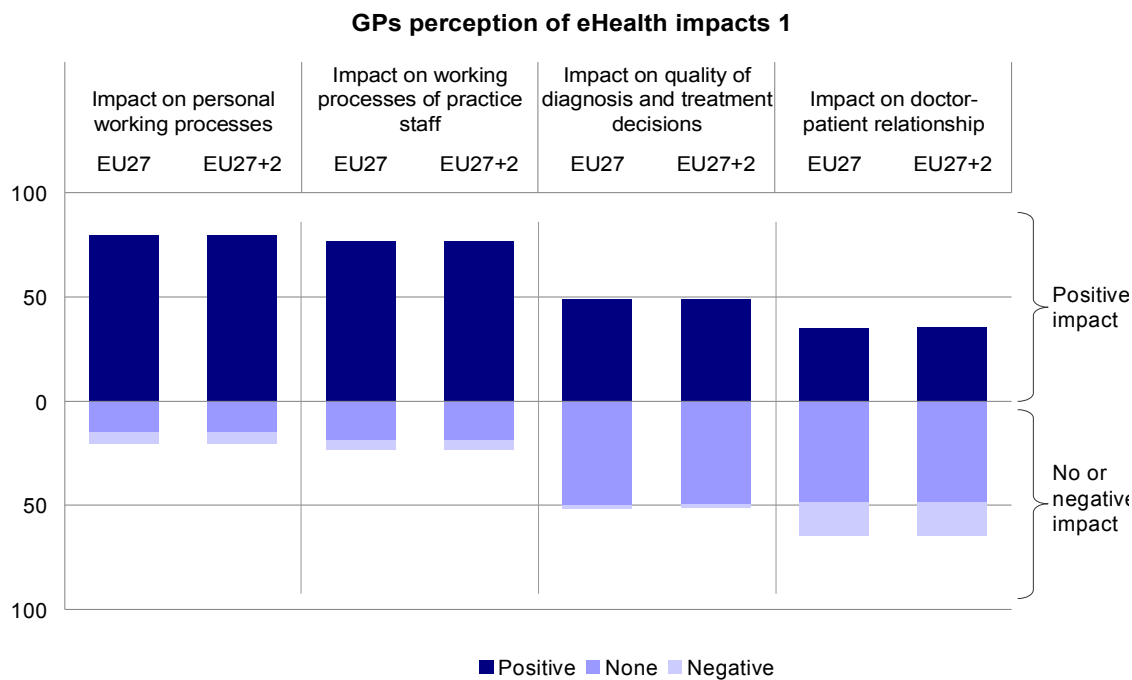
Base	GPs using electronic records, or with access to health networks, or exchanging electronic patient data.
Indicator	G: GPs perception of impact of eHealth in various areas, % values.
Source	empirica, Pilot on eHealth Indicators, 2007.

5 Making sense of eHealth use patterns in the EU Member States

One result from the analysis of the data carried out in the previous sections is that eHealth availability and use in the Member States varies extensively. Structural variables from the survey, such as the size of the GP practices, the GPs' age or their attitude towards eHealth, explain only part of these differences. Accordingly, there must be other influencing factors, most probably stemming from the national level, that have a bearing on eHealth use. One obvious place to look for such factors is in the framework conditions created by the national health systems and the policy makers' attitude towards eHealth. Is eHealth a part of the health system? Is there a national eHealth strategy, preferably including concrete measures at the level of the various actors involved? What types of activities are currently being carried out and since when?

This section draws upon information on eHealth strategies and activities collected for the eHealth ERA project[1] in order to make sense of eHealth use patterns in the EU Member States.

5.1 The eHealth use patchwork

While there are not many differences between the Member States in relation to ICT infrastructure (availability of computers and Internet connections, cf. Section 2.1), the use of the different types of eHealth applications varies considerably. The pattern that emerges is related to the complexity of the eHealth application in question. On the one hand, the more complex the application gets — in terms of the necessary infrastructure, skills needed by the user, the number of actors and the complexity of the processes involved etc. — the more substantial are the differences between the countries. On the other hand, the overall use rates decrease with growing complexity so that the most complex ones — i.e. those involving the electronic transfer of medical patient data across a network — are used to a larger degree only in a couple of countries.

The result is a patchwork pattern of eHealth use graphically depicted in Exhibit 5-1 overleaf.

> **Methodological note: Compound indicators used for the scoreboard**
>
> Compound indicators (CI) were used for the scoreboard and for the spider diagrams found in the country-wise analysis of eHealth policy strategies presented in the following section. Each CI comprises one or more component indicators (for a listing of the component indicators used for each CI cf. section 7.2 in the appendix). When only one component indicator was used, the indicator was standardised to a range of 0 (corresponding to a response rate of 0%) to 5 (corresponding to a response rate of 100%). When more than one component indicator was used, the average value for all components was calculated and standardised to a range of 0 to 5.

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[1] eHealth ERA - Towards the establishment of a European eHealth Research Area (http://www.ehealth-era.org). Cf. also: European Commission: eHealth priorities and strategies in European countries. eHealth ERA report. Luxembourg, 2007.

	Exhibit 5-1 Indicator scoreboard: Patterns of eHealth use in the EU									
	Electronic storage of patient data		Computer use in consultation		Electronic transfer of patient data				Overall eHealth use	
Country	Electronic storage of individual administrative patient data	Electronic storage of individual medical patient data	Use of a computer during consultation with the patient	Use of a Decision Support System (DSS)	Transfer of lab results from the laboratory	Transfer of administrative patient data to reimbursers or other care providers	Transfer of medical patient data to other care providers or professionals	ePrescribing (transfer of prescription to pharmacy)	Average index score	Usage level
EU27	4.0	3.7	3.3	2.3	2.0	0.6	0.5	0.3	2.1	
EU27+2	4.0	3.7	3.3	2.3	2.0	0.6	0.5	0.3	2.1	
DK	4.8	4.8	4.6	3.8	4.8	3.0	3.7	4.9	4.3	eHealth frontrunners
NL	4.9	4.5	4.7	3.7	4.2	1.8	1.3	3.5	3.6	
FI	5.0	4.7	5.0	4.3	4.5	0.7	2.7	0.0	3.4	
SE	4.8	4.1	2.4	4.1	4.1	0.6	0.7	4.0	3.1	
UK	4.8	4.3	4.7	3.1	4.2	1.9	1.3	0.3	3.1	
BE	4.2	4.3	3.8	2.5	3.7	0.4	0.6	0.1	2.4	eHealth average performers
DE	4.6	3.2	3.6	3.2	3.2	0.2	0.2	0.0	2.3	
EE	4.9	3.0	4.7	3.6	2.0	0.2	0.1	0.0	2.3	
HU	5.0	4.6	3.2	3.8	0.6	0.1	0.1	0.0	2.2	
BG	4.7	4.2	3.8	2.1	0.3	0.4	0.2	0.1	2.0	
FR	3.7	4.1	3.6	1.5	1.6	0.7	0.2	0.1	2.0	
AT	4.0	3.7	2.7	2.1	1.9	0.7	0.6	0.1	2.0	
ES	3.4	4.1	3.3	2.1	1.5	0.2	0.6	0.2	1.9	
IT	4.2	3.4	4.1	2.4	0.4	0.1	0.4	0.0	1.9	
IE	3.2	3.6	2.8	1.9	2.0	0.5	0.1	0.0	1.8	
SK	4.5	2.6	3.6	3.2	0.2	0.1	0.1	0.0	1.8	
CZ	3.4	3.4	3.0	2.3	1.2	0.5	0.3	0.0	1.7	
PT	3.7	3.2	3.2	2.3	0.1	0.3	0.4	0.1	1.7	
LU	3.5	3.7	2.9	1.2	1.4	0.0	0.0	0.0	1.6	
CY	2.8	3.8	1.6	0.5	0.5	0.1	0.1	0.0	1.2	
MT	2.5	3.3	1.4	0.5	0.5	0.2	0.3	0.0	1.1	
SI	4.3	1.4	0.9	1.4	0.5	0.4	0.0	0.1	1.1	
EL	2.5	3.2	1.0	0.4	0.2	0.2	0.2	0.1	1.0	eHealth laggards
PL	2.7	2.4	0.5	0.6	0.5	0.7	0.1	0.0	1.0	
RO	2.3	2.2	1.1	0.3	0.2	0.2	0.1	0.0	0.8	
LT	1.9	1.0	0.4	0.4	0.4	0.8	0.1	0.1	0.6	
LV	1.3	2.3	0.1	0.1	0.1	0.0	0.0	0.0	0.5	
NO	4.9	4.5	4.7	4.1	4.4	1.1	1.7	0.1	3.2	
IS	5.0	4.6	4.2	3.2	2.6	0.3	0.9	0.9	2.7	

Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all, white table cell) to 5 (used by all GPs in the country, dark blue table cell).
Source	empirica, Pilot on eHealth Indicators, 2007.

The scoreboard shows that electronic storage of patient data — either for administrative or for medical purposes — is used to quite some extent in a majority of the EU27 Member States as well as in Iceland and Norway. Countries with an index score of less than 2 on any of the two indices are Latvia, Lithuania and Slovenia, whereby in Slovenia the difference between the index for storing medical patient data (1.4) and administrative data (4.3) is significant. This is in line with the health insurance card introduced across the country in 2000, resulting in the widespread computerisation of Slovenian GP practices and introducing digital storage of administrative patient data.

When it comes to the use of computers during consultation, the pattern starts to become more fragmented. While computers in the consultation room and — to a lesser extent — Decision Support Systems (DSS) are used in most of the GP practices in Denmark, the Netherlands, Finland, the UK, Estonia and also Italy, the same is an exception rather than the rule in Slovenia, Greece, Poland Lithuania and Latvia.

As regards the most advanced applications under observation here — i.e. those having to do with electronic patient data transfer — the transfer of lab results is the only application used to a greater extent in some countries. This includes again Denmark, the Netherlands, Finland, Sweden and the UK, but also Belgium, Hungary, Germany, France and Slovakia. The transfer of administrative patient data to reimbursers and other care providers is done most frequently in Denmark, the UK and the Netherlands, as is the transfer of medical patient data to other care providers, which is also practised by a comparatively high share of GPs in Finland. ePrescribing can be considered a reality in only three countries: Denmark, Sweden and the Netherlands. Apart from those countries, there are many where the electronic transfer of prescriptions to pharmacies is not done at all.

From the eHealth use data included in this scoreboard, Denmark, the Netherlands, Finland, Sweden and the UK emerge as the European frontrunners in eHealth use by General Practitioners. Within this group, Denmark takes a leading role as the only Member States where all of the applications analysed here are utilised to a large extent.

On the other side there is a group of countries where either the use of eHealth at large or the use of advanced applications still leaves considerable room for improvement. This group consists of Greece, Latvia, Lithuania, Poland and Romania.

In between there is the large group of average performers, consisting of the remaining 15 Member States. Here, countries show either an average performance on most of the indicators analysed — such as in the case of France or Austria — or they can be considered "specialists" in relation to one or two types of applications where they perform outstandingly well while being sub-average in other areas. One example for this is Estonia with high usage rates for storage of administrative patient data and use of computers in consultation, but low shares of GP practices transmitting administrative data, medical data and prescriptions. Another example is Slovenia, where only the storage of administrative patient data is done by a majority of the practices while all other application areas show comparatively low usage rates.

5.2 National eHealth strategies and eHealth use

A political eHealth strategy can today be found in all EU Member States, either as a dedicated approach or as part of larger initiatives, e.g. targeting the health system as a whole or the eGovernment domain. The strategies however vary in their maturity and in the scope of activities they apply. As indicated above, the information on eHealth strategies used here was collated in the framework of the eHealth ERA project.

Both parts — maturity and scope — must be taken into consideration in order to better understand the actual eHealth use among General Practitioners. Together they form what can be called the sophistication level of an eHealth strategy.

From an analysis of eHealth strategies in the EU, it emerges that…

- …strategy maturity ranges from one year to more than ten years. While some countries turned to a dedicated eHealth strategy only recently — sometimes developed from earlier and wider Information Society or health system action plans — in others second or third generation strategies can be found.

- …the scope of the activities carried out either directly under the auspices of a strategy or in parallel varies to some extent. In some Member States the particular focus is still very much on the development of suitable eHealth infrastructures, while others are deeply involved in setting up their own Electronic Health Record systems, in some cases building on precursor projects of limited scope. However, even in countries with relatively new strategies the aim is often high — i.e. for the implementation of EHRs and fully networked health information systems.

Overall, the current eHealth strategy sophistication level matches well with the actual eHealth use among General Practitioners found by this study. In some countries, such as Denmark or France, there is a longstanding eHealth tradition while at the same time eHealth use is either high (DK) or average (FR). In other countries, such as Latvia, eHealth has arrived on the agenda only recently and use is therefore not yet very widespread. A third example is Estonia, where there is a high use of certain eHealth applications — mainly for data storage and consultation support — which can be explained by a rather mature legislation obliging primary carers to use computers, while attention has been given to electronic patient data transfer only recently and usage rates are therefore still rather low.

In the following, a more detailed comparison of eHealth use and eHealth strategy sophistication for all 29 countries under observation is provided.

Belgium

Belgium is among the quite advanced average eHealth performers in the EU27. In terms of infrastructure, Belgium is on a par with the EU27 average concerning the use of computers. Belgium scores above the European average when it comes to Internet connectivity and broadband connection. As regards the storage of patient data, the computer use in consultation, electronic patient data transfer and the use of Decision Support Systems Belgian usage rates exceed the average rates of the EU27 as well.

Exhibit 5-2 eHealth use in Belgium
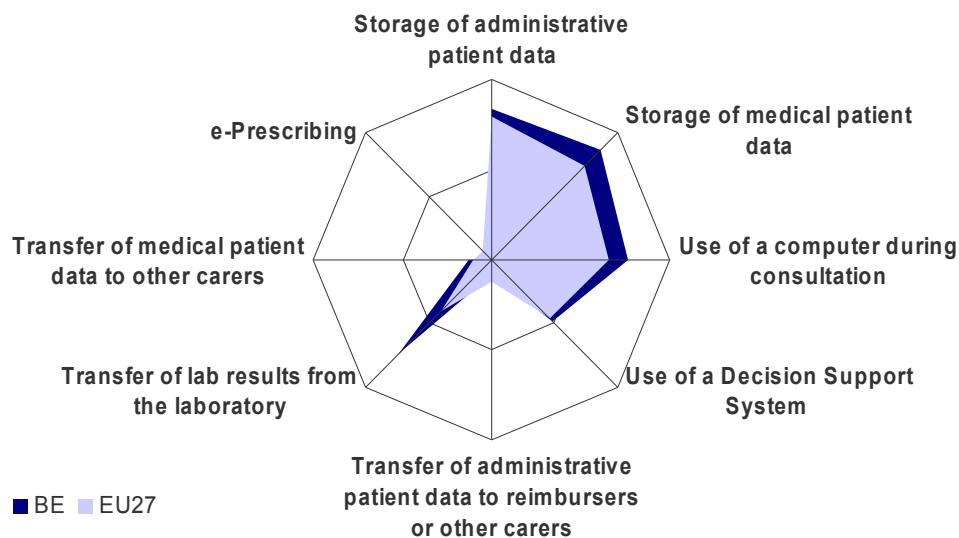
Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

Several ministries are responsible for Belgian eHealth policy because of the country's federal system giving municipalities competence for health and welfare. The Ministry of Health and the Secretariat of State for Informatics are responsible for a national eHealth strategy. Legislation exists in areas of patient's rights, data protection and certification of patient record related software.

The "Telematics Commission" was implemented in 2000 and issued recommendations for exchanging and sharing health information. The exchange is today only between hospitals and insurance funds via the SIS card scheme operating since 1998. The introduction of a new card (the citizen eID) began in September 2004 and will be completed in 2009 to replace other cards. Then it will be possible for General Practitioners to get access to centrally stored information. Corresponding with the data presented here today almost all GPs store the patient data on their own.

The "Health Telematics" law is under discussion since 2006 but has not been adopted yet. Nevertheless there is already today a well developed electronic health infrastructure on the regional level which is available primarily for hospitals.

Major eHealth developments are planned for the coming years. The "Summarised Electronic Health Record" (Sumehr) that is already available at the ambulatory care level is going to be implemented nationwide in all sectors. An ePrescribing project has only recently entered the pilot phase which explains why it is not yet in use in Austrian GP practices.

Belgian policy strategies with eHealth relevance

Health telematics law is under discussion since 2006

Bulgaria

Bulgaria is among the solid average eHealth performers in the EU27. In terms of infrastructure, Bulgaria scores well concerning the use of computers. When it comes to Internet connectivity and broadband connections however, Bulgaria scores slightly below the

European average. While the storage of patient data is quite common in Bulgaria, electronic patient data transfer is not even at the beginning of its development. A high percentage of Bulgarian GP practices make use of a computer for consultation purposes and the use of Decision Support Systems is quite common.

Exhibit 5-3 eHealth use in Bulgaria

Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

Taking current policy activities as an indicator, Bulgaria seems to stand at the very beginning of a strategic policy response to eHealth questions. In April 2006, the Bulgarian government presented its first National Strategy on Health, including specific references to ICT use in the health system. As of 2007, this strategy has not yet been adopted. An action plan is currently under development that includes dispositions for pilot projects aiming at the establishment of a national eHealth system. According to the Bulgarian government, the priority project will be the implementation of eHealth cards, hospital information system and of an EHR.

Notwithstanding this seemingly low maturity level of eHealth policy, basic ICT use in Bulgarian GP practices - including the electronic storage of patient data and the use of computers in consultation - is already fairly much advanced.

On the other hand General Practitioners cannot transfer electronic patient data because Bulgaria does not have a centralized data store or a nationwide EHR. Only some hospitals and physicians use special software for this purpose.

Bulgarian policy strategies with eHealth relevance
National Strategy for eHealth Implementation (2006)

Czech Republic

In terms of infrastructure, 82% of the Czech GP practices use a computer and 63% of the practices are connected to the Internet. Around 40% of the Czech GP practices use a broadband connection. These figures, that are only slightly below the EU27 averages, place the Czech Republic in a group of weaker average performers. The Czech Republic displays its

best eHealth performance in the area of patient data storage, the use of a computer for consultation purposes and the use of a Decision Support System (DSS). All three eHealth applications are used by around 70% of the Czech GP practice. These figures are below the EU27 averages for the storage of patient data and above the EU27 average for the use of DSS.

Exhibit 5-4 eHealth use in Czech Republic
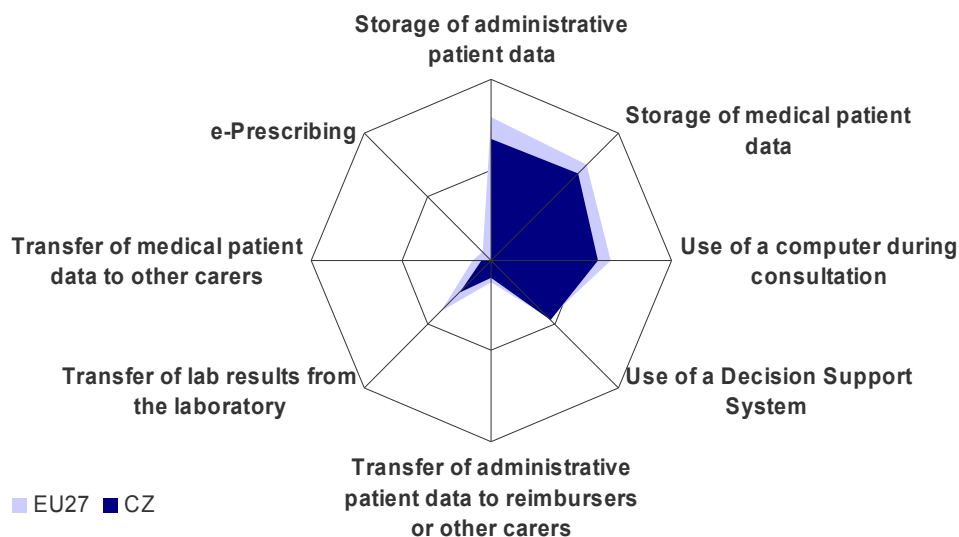
Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

eHealth is on the Czech policy agenda since 2002. The most recent step to promote the deployment of ICT in general was taken in 2007 by the Ministry of Informatics by presenting the strategic document "National Plan eEurope+ Czech Republic" which includes a subsection on eHealth. The plan's main goal is to enhance the capabilities and activities of health care professionals (such as GPs) with regard to the use of ICT. The survey shows that this policy seems to already have had an impact on the use of local EHRs and the use of a PC for consultation purposes, two eHealth applications that are already used by about two thirds of the GP practices in the Czech Republic.

The government is currently planning to build an electronic public health network. The lack of a powerful and efficient network infrastructure so far explains why use rates for electronic patient data transfer (and for medical data transfer in particular) in the Czech Republic are currently rather low.

Another strand of Czech eHealth policy is the implementation of an EHR system. The system will include ePrescribing and eMessaging and is envisaged to improve the affordability and quality of the work of GPs. Besides the national eEurope+ plan, the legislation of the Czech Republic concerns particularly the development of data protection and authorized digital signatures. The government plans to provide medical professional registries and ePrescribing services embedded in the harmonization process on the EU-level considering the community directives on data protection, electronic commerce or electronic signatures.

Czech policy strategies with eHealth relevance

National Action plan eEurope+ Czech Republic (2002)

Denmark

Denmark can be regarded as the European frontrunner concerning the availability of ICT infrastructure as well as when it comes to the use of eHealth among General Practitioners. Both computer and Internet are available in virtually all Danish GP practices and only an absolute minority (8%) does not resort to broadband connections.

In all three use categories under observation (Electronic storage of patient data, Computer use in consultation, Electronic transfer of patient data), usage rates in Denmark are among the highest found in the EU27, Iceland and Norway. As regards patient data transfer, Denmark is the top performer including in the area of ePrescribing which otherwise is done to a larger extent only in Sweden and the Netherlands.

Exhibit 5-5 eHealth use in Denmark
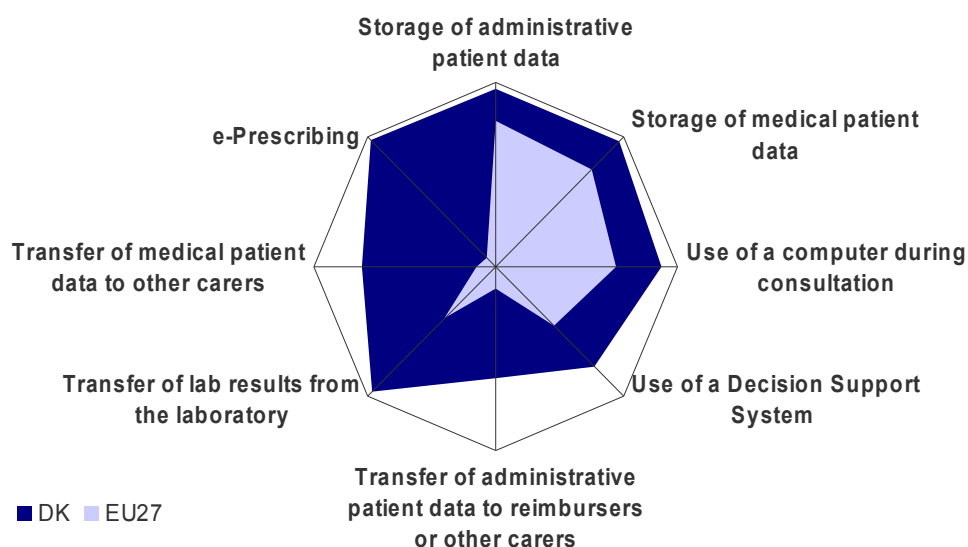
Indicators   Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).

Source   empirica, Pilot on eHealth Indicators, 2007.

Denmark has a history of dedicated eHealth strategies (cf. below) ranging back to 1996, when a strategy for the development of Electronic Patient Records (EPRs) was launched. The third and most recent generation came about in 2003 and comprises 29 initiatives jointly borne by a number of different actors (including the Ministry for Interior and Health, the National Board of Health, the Association of County Councils and the Copenhagen Hospital Corporation, MedCom and the Danish Standards Association). A core element of the strategy is the development and ultimate implementation of Electronic Health Records. Future plans encompass the extension of the existing ePrescribing scheme to arrive at a personal medication profile stored on a national prescription server, the making available of patient data across county boundaries on a look-up basis and the expansion of cross-border networks. In the latter area, Denmark is already active in the Baltic eHealth project for telemedicine across national borders in the Baltic Sea Region.

Other factors having a bearing on eHealth use include a fiscal agreement between the government and the county hospital owners requiring the use of Electronic Health Records in all Danish hospitals since 2005, the existence of a Danish Healthcare Data Network (VPN via Internet) based on a precursor county/local authority intranet, as well as the National Health Portal Sundhed.dk providing a single access point to Danish healthcare services for citizens and professionals.

| **Danish policy strategies with eHealth relevance** |
| --- |
| National Strategy for Information Technology in the Healthcare System (2003 - 2007) |
| National Strategy for Information Technology in Hospitals (1999) |
| Strategy for the development of Electronic Patient Records (1996) |

Germany

Germany is among the solid average eHealth performers in the EU27. The use of a computer in GP practices in Germany is virtually universal. When it comes to Internet connectivity and broadband connections however, Germany scores slightly below the European average (around 60% and 40% of GP practices respectively).

While the storage of patient data is very common in Germany (more than 90% store admin as well as medical data). German GP practices do not yet routinely transfer administrative data, but already two-thirds of the practices routinely transfer laboratory results; a figure far beyond the EU27 average of 40%. A large number of German GP practices make use of a computer during the consultation and also the use of Decision Support Systems is quite common.

Exhibit 5-6 eHealth use in Germany
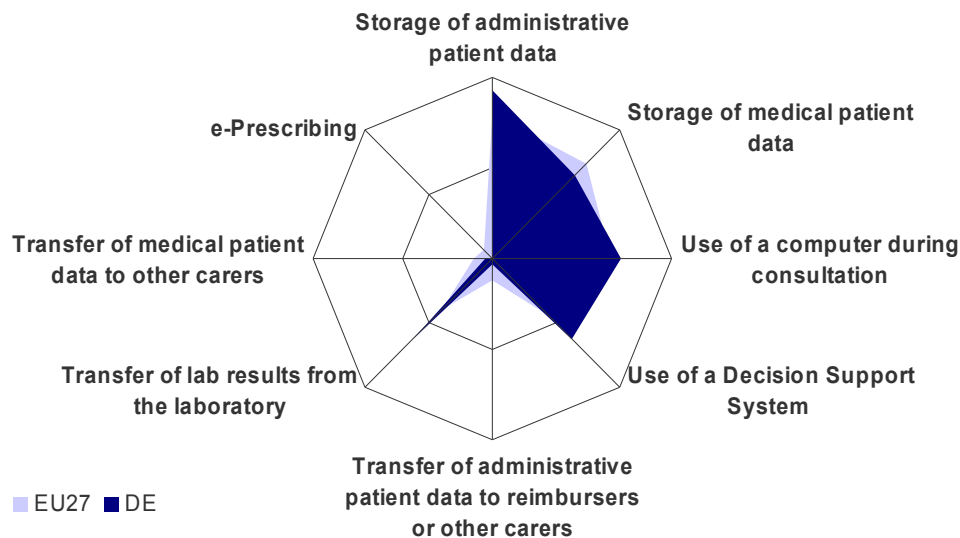
Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

The Law for the Modernization of Statutory Health Insurance from 2003 provided the legal basis for the implementation of an eHealth reform. In addition to this, a German eHealth Strategy Paper was introduced in July 2005. The eHealth strategy covers the establishment of an ICT infrastructure including ePrescribing and of a private electronic patient record. This ICT infrastructure is to result in a nationwide standardized system that allows for the transfer of administrative and medical data between General Practitioners and other care providers. The fact that these activities are still at the planning stage explains why there is currently very low prevalence of medical patient data transfers.

Germany is planning to introduce an Electronic Health Card (Gesundheitskarte) that will necessitate certain institutional changes. Implementation is planned for 2008 or 2009. The

health card scheme includes the electronic transmission of drug prescriptions and a private electronic patient record. A number of pilot projects have already been launched and many applications exist already on a regional level in the form of smaller networks.

German policy strategies with eHealth relevance
German eHealth Strategy (2005)

Estonia

In the areas of storage of administrative data and the use of computers in consultation with the patient, Estonia can be compared with top EU performers such as Denmark, the Netherlands and the UK. In other areas — namely use of DSS and electronic transfer of lab results — the country is at or even above average. Weaker performances are only found in the remaining areas of patient data transfer — i.e. transfer of administrative and medical data as well as ePrescribing.

Exhibit 5-7 eHealth use in Estonia
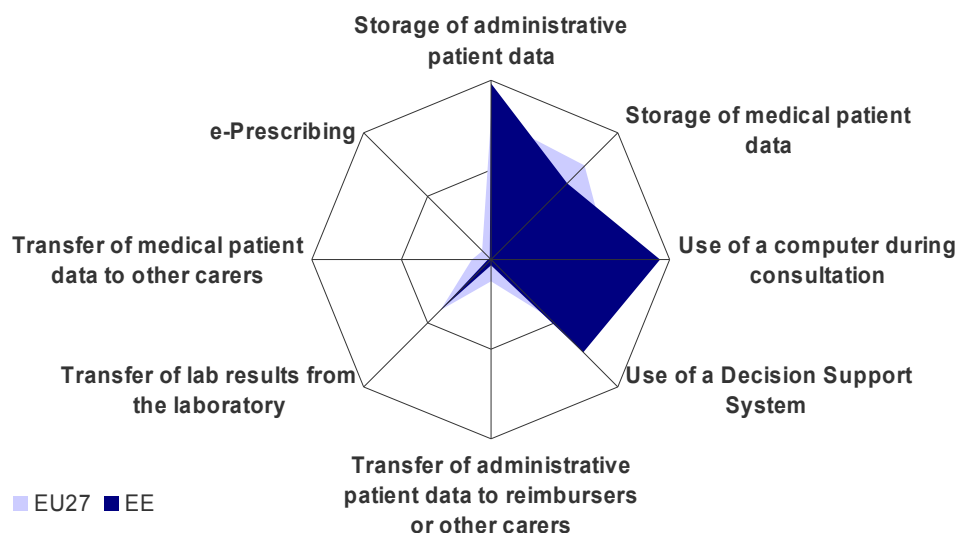
Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

The history of the Estonian eHealth strategies (cf. below) seems to be well in line with the factual eHealth use by GPs today. The country has one rather mature eHealth strategy launched in 2000 by the Ministry for Social Affairs. In the same year, the Ministry issued a regulation obligating all primary care practices to procure computers and Internet connections. Since 2001, all claims for reimbursement sent to the Estonian Health Insurance Fund (EHIF) must be in electronic format. The first regulation in particular might well explain the high usage rates for computer-based eHealth applications in Estonian GP practices. In relation to the latter it should however be noted that "electronic format" does not in the first place mean data transmission via Internet but also comprises the use of diskettes or CD-ROMs sent by ordinary mail or courier.

Electronic patient data transfer via network was covered only recently under the new EHR project which is still ongoing. The full EHR is planned to be operational by the end of this year. It will therefore be interesting to further monitor developments in Estonia in this area

to see whether the country will show an equally good performance here as it did for patient data storage and computer use in consultation.

Estonian policy strategies with eHealth relevance
Electronic Health Record Project of Estonia (2005 - 2008)
eHealth strategy of the Estonian Ministry for Social Affairs (2000)

Greece

Greece shows its best eHealth performance in the area of patient data storage. Yet even here usage rates lie below the EU27 average. While computers are used in consultation to some extent, Decision Support Systems are still rather the exception than the rule. Patient data transfer has as yet not very much arrived on the agenda of Greek GPs.

Exhibit 5-8 eHealth use in Greece
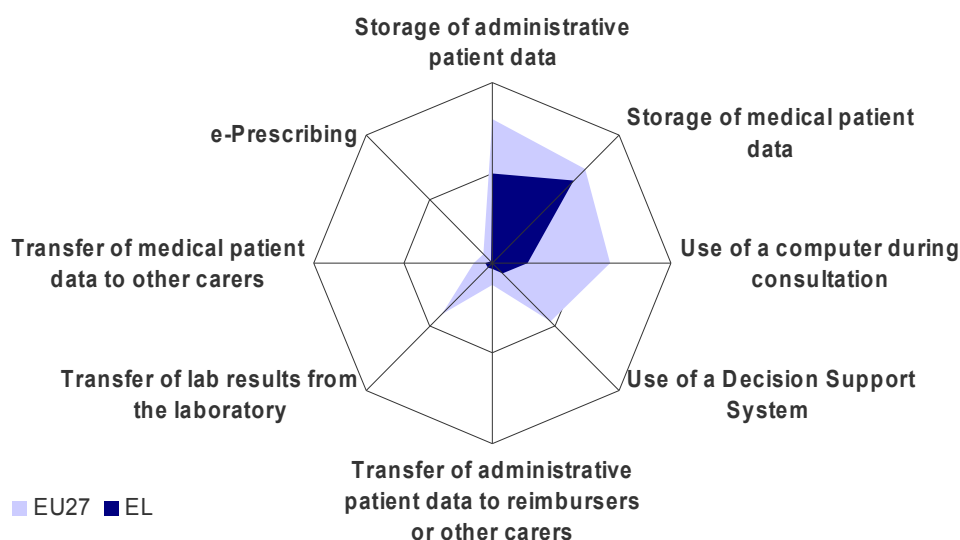
Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

A national eHealth Roadmap for Greece was inaugurated in June 2006 (cf. below), following up on a review of the national 2002 - 2006 ICT Action Plan. The roadmap's main goal is to set up a National Health Information System implementing — among other things — Electronic Health Records. The eHealth Roadmap spans a ten years timeframe, with pilot implementations and demonstrations planned for the 2007 - 2012 period. This plan may partly explain current eHealth usage rates in particular in relation to patient data transfer, as the necessary networking infrastructure — including standards, a national health portal, health insurance smart cards, various electronic information systems etc. — will only become available on a wider scale in the coming years.

Greek policy strategies with eHealth relevance
National eHealth Roadmap 2006 - 2015
National 2002 - 2006 ICT Action Plan

Spain

Spain is an average eHealth performer in the EU27. In terms of ICT infrastructure (computer, Internet, broadband), Spanish GP practices are slightly less well equipped than their European peers on average. While the storage of medical patient data and the use of computers in consultations are quite common in Spain, the electronic transfer of patient data is only at the beginning of its development. Around two-thirds of Spanish GP practices store electronic patient data and use a computer for consultation purposes as well. A Decision Support System is however only referred to in one out of two GP practices.

Exhibit 5-9 eHealth use in Spain
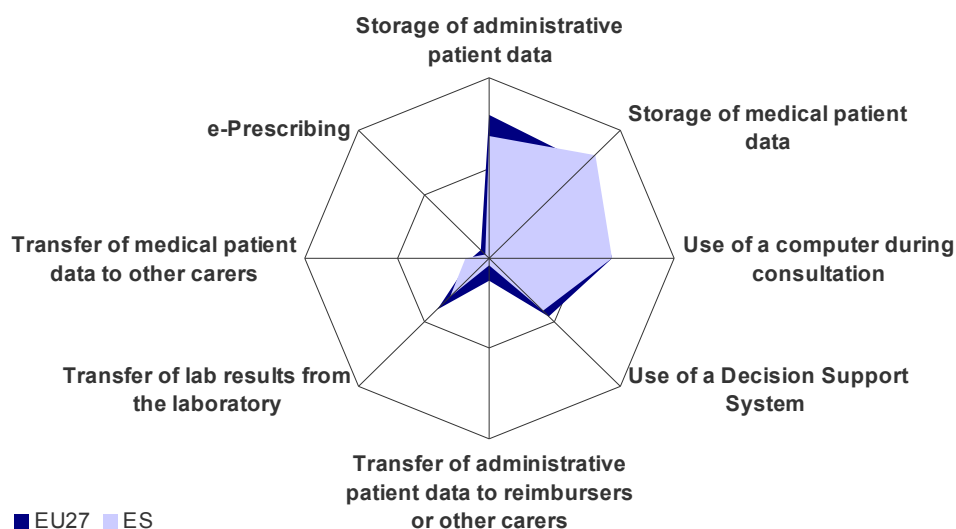
EU27 ES

Indicators   Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).

Source   empirica, Pilot on eHealth Indicators, 2007.

There are currently two strands of policy initiatives with a bearing on eHealth in Spain: the Plan for Quality in the National Health System — decided on in 2006 — and a number of pilot initiatives aiming to improve ICT use in the health sector. As part of the wider Information Society strategy "Plan Avanza", the Spanish eGovernment formulated a strategic plan called "Health online" that aims to increase the use of ICT by adapting the human resources policy to the changing service needs in the 2006-2010 timeframe.

Because of the strongly decentralized Spanish health care system, the regional health authorities run numerous initiatives for improving their healthcare services. This has led to the existence of numerous different systems of ePrescribing, telemedicine or electronic health records in almost all Spanish regions, each with a varying range of services as well as of actual use rates. Some success in relation to ICT use General Practitioners is visible, as Spain is among the solid average performers in the field, with moderate to above-average usage rates in the areas of patient data storage, computer use in consultation and also the transfer of lab results. Use of more advanced electronic patient data transfer schemes is however still relatively low.
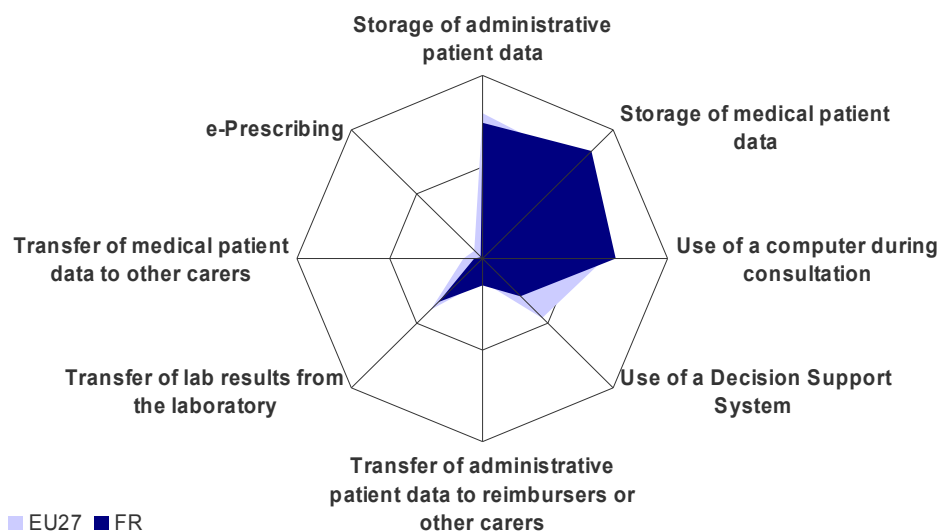
Spanish policy strategies with eHealth relevance

Strategic plan "Health online" as part of the wider Information Society strategy "Plan Avanza" (2005)

France

France is among the solid average eHealth performers in the EU27. As regards the storage of patient data and the computer use in consultation, the country is close to the EU27 average. Decision Support Systems are used to a lesser extent than in other countries of the EU. The situation is very much the same in relation to electronic patient data transfer. Here too, French usage rates are either at or slightly below average.

Exhibit 5-10 eHealth use in France

Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

Despite not having a dedicated eHealth policy strategy document bearing that name, France has a long history of health-related legislation affecting eHealth deployment. This includes laws on data protection, telemedicine, eHealth service provision, health IT product liability and — more recently — Electronic Health Records. Among those, the law organising a secure electronic health infrastructure was enacted in 1996. Since 2004 and the Healthcare Insurance Act, there is a workgroup (GIP DMP) dealing with the planning and implementation of EHRs and — since 2007 — with an ePrescribing scheme. One aim of the EHR scheme is to bring together the various local and regional projects dealing with electronic patient data under one, national framework.

There exist a number of eHealth-related activities under the wider national health system reform strategy. Current activities include smart cards, both for identification of health professionals and insurance status verification of patients, a national health portal and several application development projects.

As can be seen from the usage data, activities carried out so far have been rather successful in spreading eHealth use at least among General Practitioners. The upcoming development of a dedicated eHealth strategy — to be formulated by the Mission pour l'Informatisation du Système de Santé, an eHealth department of the cabinet — as well as the activities of the GIP DMP might help to streamline the large array of activities and to create further impetus in the area of electronic patient data transfer. Noting that, the recent turmoil caused by a negative result of an analysis on the overall impact of the DMP architecture can well delay developments.

French policy strategies with eHealth relevance
National strategy for the optimisation and reengineering of the healthcare system, including several eHealth-related action plans
Various legislation with a bearing on eHealth, including the Healthcare Insurance Act (2004) which provides a legal framework for health IT standards and covers the creation of Electronic Health Records

Ireland

Ireland is among the average eHealth performers in the EU27. In terms of infrastructure however, Ireland scores slightly below the European average rates. Around two-thirds of GP practices in Ireland store administrative patient data and use local EHRs. The transfer of electronic patient data is much less common: only around 40% exchange medical data and even less (17%) transfer administrative data. Average use rates are also attained for the use of computers during the consultation with the patient and the use of Decision Support Systems.

Exhibit 5-11 eHealth use in Ireland
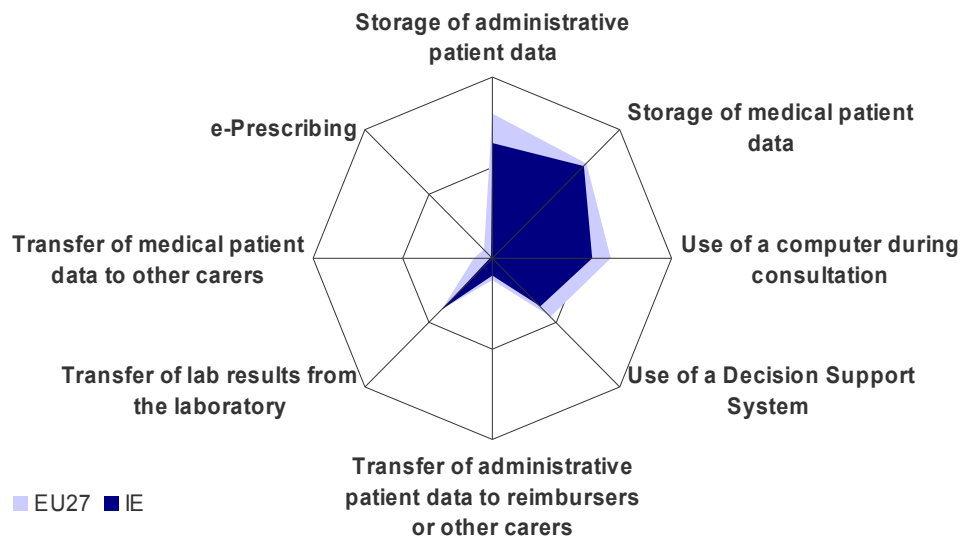
Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

The Health Service Executive (HSE), established in the context of a wider health care reform is the institution responsible for all health and social care services.

Ireland's current eHealth strategy "National Health Information Strategy" (NIHIS) was implemented in 2004, based on an earlier document called "Embedding the e in Health". The strategy aims at the modernization of the ICT infrastructure in the health sector and the implementation of new services over the coming year. In the 3rd phase of the strategy, planned to begin in 2009, an Electronic Health Record will be implemented. The long-term time planning of the strategy seems to be one reason why the actual use of ICT among General Practitioners — in particular in relation to electronic patient data transfer — is currently on an average level.

The HSE in the south of Ireland developed its own ICT strategy which received the European Commission's "Best practice in eService Delivery" award. An integrated patient management system and a website with information, access to services and interaction are the core elements of this strategy.

Irish policy strategies with eHealth relevance
"Embedding the e in health" (2004)
National Health Information Strategy (2004)

Italy

Italy is among the average eHealth performers in the EU27. The availability of ICT infrastructure in Italian GP practices (computer, Internet, broadband) corresponds to the average readiness in the EU 27. While the storage of patient data is quite common in Italy, the use of electronic patient data transfer is only at the beginning of its development. Both the use of a computer for consultation purposes and the use of Decision Support Systems are quite well established in Italian GP practices and therefore also slightly more common in Italy than in the EU27 in general.

Exhibit 5-12 eHealth use in Italy
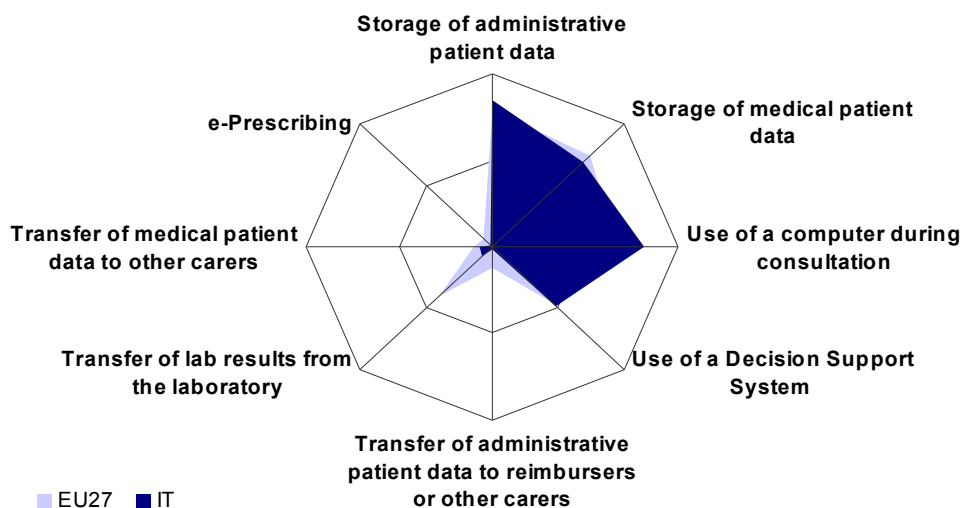
Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

In 2001, the New National Healthcare Information System (NSIS) was initiated to oversee and monitor all healthcare service levels. The main goal of this framework was to create a homogenous individual healthcare information record. The second step on the way towards this goal was the development of the so-called "National Healthcare Service's Bricks" in 2004, i.e. a toolkit to ensure the interoperability of health information systems developed by local healthcare administrations. The "bricks" programme aims to share methodologies for measuring quality, efficiency and appropriateness of the Regional Healthcare Services and to ensure a common language to classify and codify concepts in a uniform manner.

Due to the strongly decentralized Italian health care system, a permanent eHealth board (TSE) was introduced in 2004 for the coordination of national and regional eHealth policies. The TSE published 2004 the paper "Shared Policy for eHealth" and 2006 the "Architectural strategy for eHealth" guidelines in compliance with the European Union eHealth Action Plan. The design of the national architecture for eHealth is envisaged to result in a system that makes clinical information available everywhere while taking into account the Italian federal structure as well as existing legacy systems. Italy is making efforts to push forward its eHealth strategy. Therefore, achievements in the area of administrative and medical patient data

transfer are expected in the next years, which are today on a comparatively low level according to the data gathered for this study.

Some important pilots regarding eHealth were launched in the last years, such as a General Practitioners network for eHealth services (including 13500 GPs) and telemedicine.

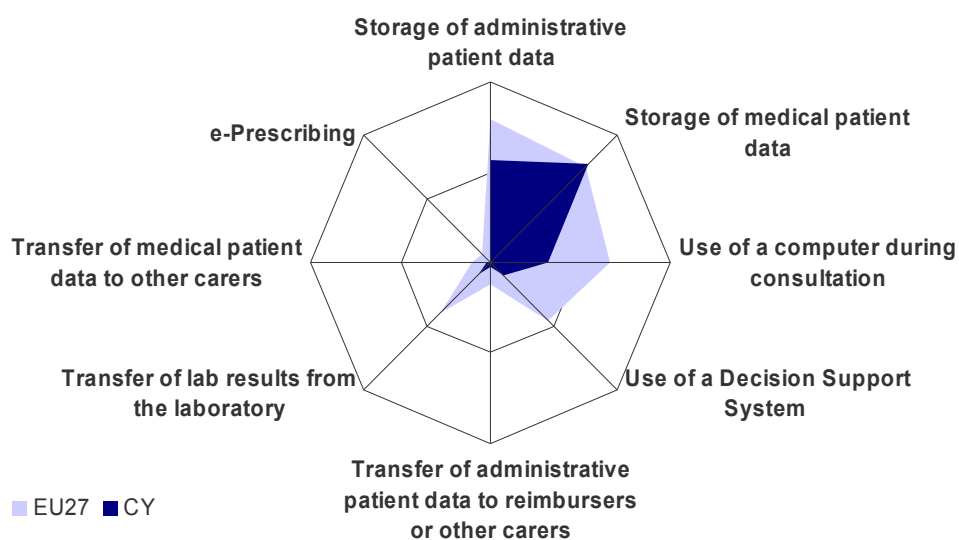| Italian policy strategies with eHealth relevance |
| --- |
| "Shared Policy for eHealth" (2004) |
| "Architectural strategy for eHealth" (2006) |

Cyprus

In terms of infrastructure, Cyprus shows a very basic level of equipment as only 69% of GP practices own a computer, 58% are connected to the Internet and 32% have access to a broadband Internet connection.

Today the use of ICT by Cypriotic GPs is on a rather low level. Cyprus displays its best eHealth performance in the area of patient data storage (57% of the GPs) and use of a computer for consultation purposes (32%). With regard to the storage of administrative data, Cyprus comes very close to EU27 averages and when it comes to the storage of the different medical data types Cyprus even attains the same level as the EU27 as a whole. Decision Support Systems however are not yet very common in Cyprus.

Exhibit 5-13 eHealth use in Cyprus

Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

The government strategy for eHealth is a new item on the political agenda of Cyprus. Since the country's eHealth infrastructure is still on a comparatively low level the government aims to increase the computer use in primary care and to optimize medical procedures by standardization of medical terminology and classification and coding of diagnoses. Today the use of ICT by GPs is on a rather low level, about 57% of all GPs store patient data and only one third use a computer during consultation according to the usage data. Other applications such as a national health monitoring system and the introduction of an EHR are also part of the eHealth strategy in Cyprus.

The Cyprus government is currently making some efforts to implement a nationwide health information system. In 2004 the government commissioned the development of software applications to provide an integrated Health care Information System (HCIS), which was two years later accepted and ready for use. The system includes many applications and modules to increase the quality and efficiency of procedures, working paperless and providing remote medical services. The HCIS currently focuses on hospitals and outpatient departments but there are plans to also open it up to General Practitioners and to allow them to access hospital patient record systems. The system is already implemented in some hospitals and will be completed in 2010 so that all hospitals and medical centres will have access to it.

Cyprus policy strategies with eHealth relevance
Cyprus government strategy for eHealth

Latvia

Latvia is one of two countries — together with Lithuania — where eHealth is used only to a limited extent. Of all applications under observation here, storage of patient data either for administrative or for medical purposes is done most often. Usage rates however are still below average. Computer use in consultation occurs to a very low extent, while electronic patient data transfer is virtually non-existent among Latvian GPs.

Exhibit 5-14 eHealth use in Latvia
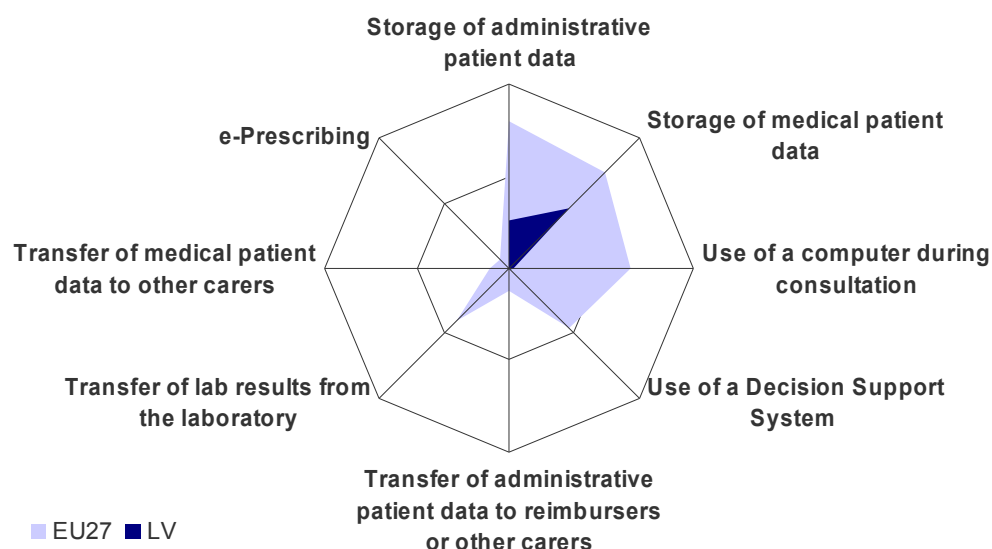
Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

The history of eHealth in Latvia is a young one. Activities started as recently as 2005, in concert with a wider Information Society action plan. Accordingly, the main concern is with the creation of a suitable IT infrastructure not only for eHealth but for a range of e-services.

In terms of eHealth this includes the establishment of electronic health insurance cards and EHRs, improved networking of health care institutions, standards development, but also the deployment of an electronic signature system and the improvement of digital literacy among health professionals.

Due to the early stage of eHealth developments in Latvia, higher usage rage than those currently encountered cannot be expected. As in the case of all "newcomers", it will however be interesting to revisit eHealth use in a few years to see whether the activities started now are effective.

| Latvian policy strategies with eHealth relevance |
| --- |
| National eHealth Action Plan |
| Concept "eHealth in Latvia" (2005) |
| e-Latvia 2005 - 2008, wider national Information Society strategy dealing also with eHealth |

Lithuania

Among the East European Member States, Lithuania is one of two countries — together with Latvia — where eHealth is used only to a limited extent. Of all eHealth applications under observation, storage of patient data either for administrative or for medical purposes is used most often. Usage rates are however still far below the EU27 average. Computer use in consultation occurs to a very limited extent, while electronic patient data transfer is used in extremely few Lithuanian GP practices.

Exhibit 5-15 eHealth use in Lithuania
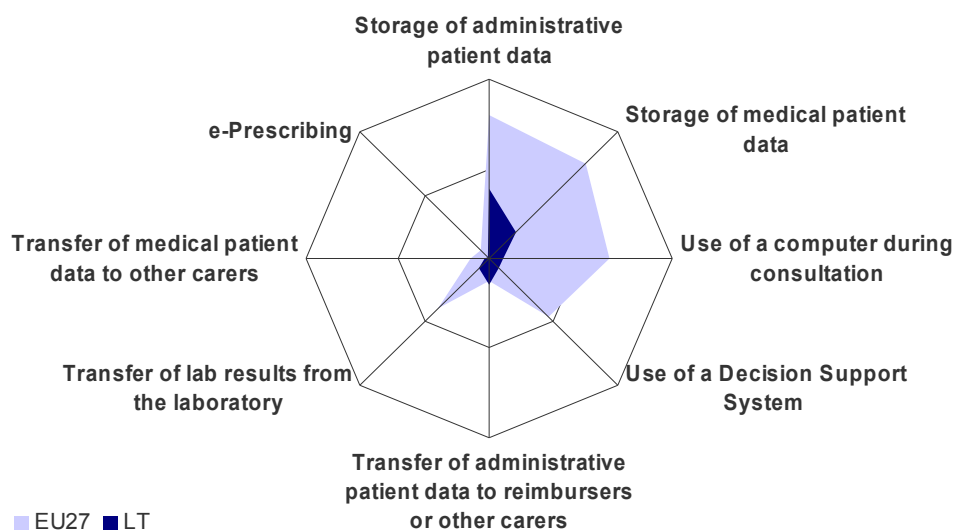
Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

Still in the beginning of an eHealth infrastructure Lithuania promotes the modernization of its healthcare system using ICT. The Ministry of Health is responsible for the development of eHealth policy in Lithuania. It published the strategy document "eHealth Strategy for 2005-2010" and — with assistance of the World bank — a project named "Lithuanian eHealth Strategy and Program – Year 2004-2010" was begun. Both projects aim to develop a patient-centred eHealth Information System. The leading research centre is the Telemedicine Centre of the Kaunas University of Medicine. It prepares policy recommendations for health care and governments institutions.

Because computerization and networking is on a low level, the strategies focus in the establishing of an ICT infrastructure. Visible impacts on GP practices are comparatively low at

the moment, a fact which is probably due to the low level of maturity of the measurements undertaken so far.

| Lithuanian policy strategies with eHealth relevance |
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| Lithuanian eHealth Strategy and Program – year 2004 - 2010 (2004) |
| eHealth strategy for 2005 - 2010 |

Luxembourg

In terms of eHealth infrastructure and use rates Luxembourg can be regarded as one of the average performers. The availability of infrastructure components in Luxembourg presents a slightly unusual picture: while use rates for computer and Internet stay at a comparatively low level (80% and 64% respectively, both figures being situated below EU27 averages), broadband connections are quite common. They are used in 62% of the Luxembourgish GP practices, which means that only 2% of the practices use narrowband. Broadband can therefore be regarded as the common form of Internet access in Luxembourg.

When it comes to the use of eHealth solutions, Luxembourg displays its best results in the areas of administrative and medical data storage as well as with relation to the use of a computer for consultation purposes. For all of these three indicators Luxembourg however still scores below the EU27 averages. The transfer of electronic patient data is virtually non-existent among GPs in Luxembourg.

Exhibit 5-16 eHealth use in Luxembourg
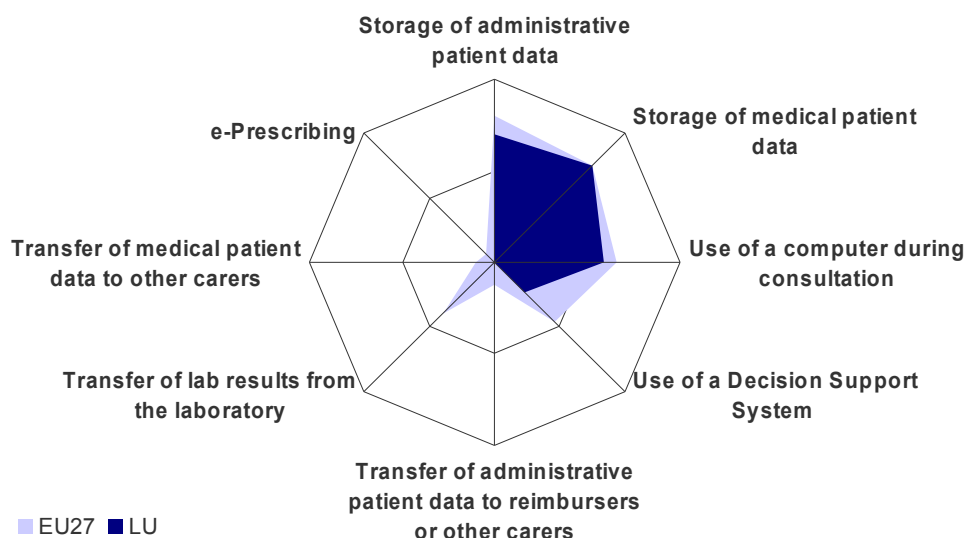
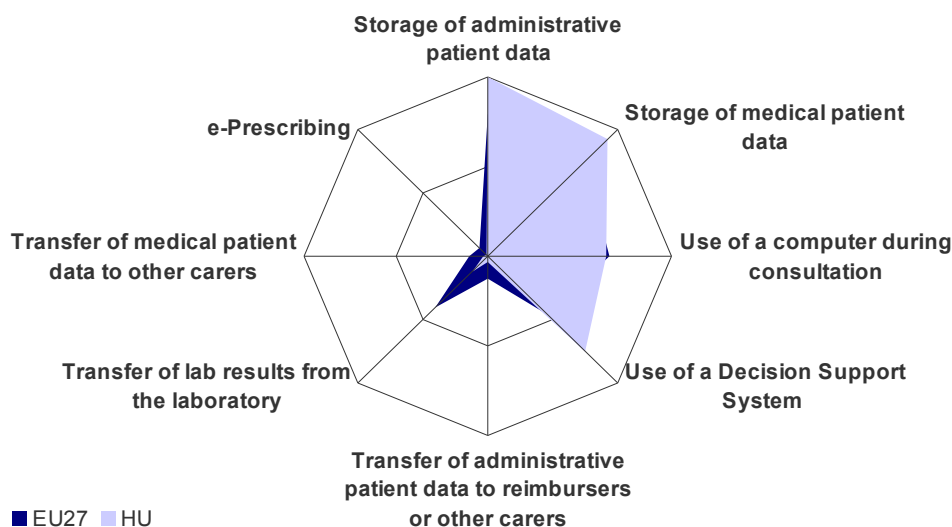| Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

Luxembourg looks back on a number of eHealth projects realized in the past years, however without the guidance of a central eHealth strategy. In response to this situation the Ministry of Health set up a national eHealth working group in 2005 including representatives of various ministries, hospital associations and research centres. The main task of this working group was to come up with a national eHealth strategy that was published in 2006 and approved by the Governmental Council in the same year.

The strategy includes among other things the creation of a national Public Health Portal, support for better sharing of information by implementing an Electronic Health Card and support for the development of a key documentation management application, which shall result in an electronic patient record. Further projects are also planned in the field of ePrescribing. Another key concern —stemming from the high number of foreign commuters in Luxembourg — is the exchange of health-related data with neighbouring countries. If these projects are implemented as planned, major developments in the area of eHealth are to be expected during the upcoming years.

Hungary

Hungary is among the average eHealth performers in the EU27. While the use of computers in Hungarian Pc practices can be regarded as universal, only around half of the practices are connected to the Internet. This figure stays below the EU27 average, as does the rate of broadband connections (36% vs. 48%). All Hungarian GP practices store electronic administrative patient data and nearly all practices report storing at least one type of medical patient information as well. The transfer of either medical or administrative data is however not yet a reality. The use of a PC for consultation purposes (84%) and the use of Decision Support Systems (93%) are well established: Hungary stores at or above EU27 averages with regard to both indicators.

Exhibit 5-17 eHealth use in Hungary

| Indicators | Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country). |
| Source | empirica, Pilot on eHealth Indicators, 2007. |

eHealth policy activities initiated by the Hungarian Ministry of Health are aligned with the European Commission's eHealth Action Plan. The implementation of the Hungarian eHealth Programme started in January 2004. It followed on the Hungarian Information Society Strategy (HISS) of 2002 and the HISS for Health and Social Affairs in 2003. The program addresses several eHealth issues, such as the elaboration of eApplication data models and communication standards, ePrescribing or electronic patient records and the development of evidence-based medical knowledge bases. The high use rate of local EHRs among Hungarian GP practices might be attributed to the first effects of these eHealth policy programmes. Other areas such as ePrescribing, and electronic data exchange between hospitals, GPs and

care providers, are planned to be expanded in the near future. In some regions, European projects were launched to connect all levels of healthcare and provide eHealth services.

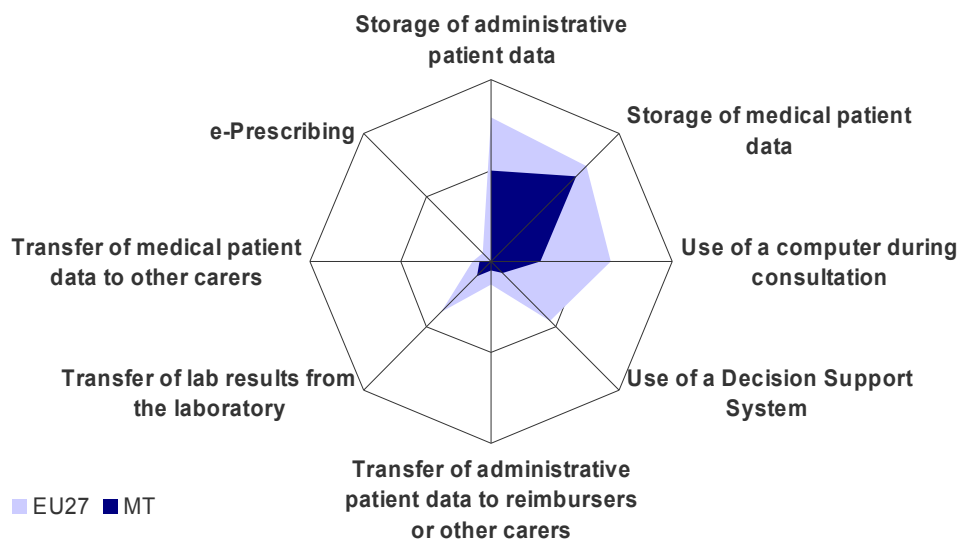| Hungarian policy strategies with eHealth relevance |
| --- |
| Hungarian IS strategy for health and social affairs (2003) |
| National eHealth Programme (2004) |

Malta

Malta has to be considered a weak average performer in terms of eHealth as it scores below the EU27 average with regard to most indicators included in the survey.

Malta shows a very basic level of infrastructure availability as only 65% of GP practices own a computer and 55% are connected to the Internet. Quite astonishingly though, nearly all practices that are connected to the Internet use a broadband connection for this purpose: this pertains to 51% of all Maltese GP practices. While Malta scores rather low in comparison to the other EU27 Member States with regard to computer and Internet use, it holds a solid mid field position for broadband connections.

Malta shows its best eHealth performance in the area of medical and administrative patient data storage and the use of a computer for consultation purposes. Yet even here usage rates lie quite far below the EU27 averages. Decision Support Systems are still rather the exception than the rule. Patient data transfer has yet not very much arrived on the agenda of Maltese GPs: only 15% of the practices routinely transfer medical patient data and only 7% exchange administrative data electronically.

Exhibit 5-18 eHealth use in Malta

Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

The issue of eHealth is new on the political agenda in Malta. Recently however many projects and reforms have been planned. In 2005 a national eHealth Vision was formulated by the Ministry of Health, the Elderly and Community Care. One year later, it was approved by the government and fed into a public consultation process in order to receive feedback from the different stakeholders involved in the provision of health care services.

In order to broaden the scope of online health services the government launched several projects that are to enable health professionals to build and maintain standardized information websites. Another innovation in Malta is the eHealth Portal that offers many eHealth services including an online application for the European Health Insurance Card or an online patient referral system.

The most important eHealth project in Malta is the Integrated Health Information System (IHIS). The system is based on the precursor Patient Administration System (PAS) used by several hospitals today, and provides a basis for a national EHR. The new system will be expanded to be used not only by hospitals but also by other healthcare providers and patients. These projects – if realized according to plan - may well contribute to an increase in the storage and transfer of electronic patient data which are used today to a very limited extent only.

| Maltese policy strategies with eHealth relevance |
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| National eHealth Vision and Strategy (2006) |
| National ICT Strategic Plan |
| National Broadband Strategy |

The Netherlands

The Netherlands can be regarded as one of the European frontrunners in eHealth use among General Practitioners. In most areas under observation (use of local and networked EHRs, exchange of administrative patient data, and computer use in consultation), usage rates are well above the averages found in the EU27, Iceland and Norway. When comparing the overall use of eHealth solutions in the EU27, the Netherlands come in second, being ranked only by the absolute frontrunner Denmark.

With relation to infrastructure, the Netherlands are well positioned with virtually all GP practices being equipped with a computer, 97% of practices being connected to the Internet and 82% of these GP practices using a broadband connection. As regards patient data transfer, the Netherlands are one of the top performers, including the area of ePrescribing which otherwise is done to a larger extent only in Sweden and Denmark.

Exhibit 5-19 eHealth use in the Netherlands
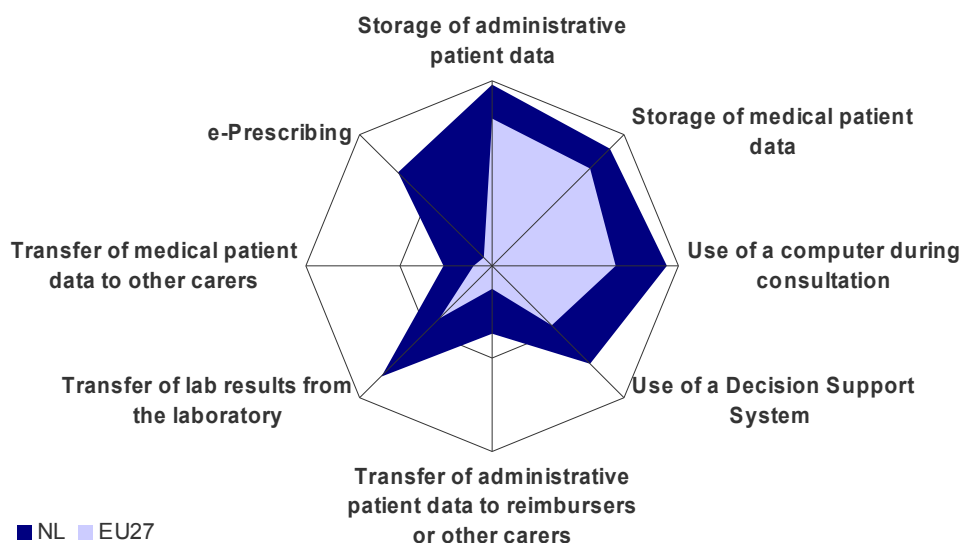
Indicators   Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging

	from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

eHealth in the Netherlands is on a very high level, both regarding the actual usage levels and the political framework conditions. The National IT Institute for Healthcare (NICTIZ) and the Dutch government have made a lot of effort to extend the use of ICT in the healthcare sector in recent years. One step was the founding of the foundation for nationwide electronic communication and exchange of medical data in the healthcare sector.

The Netherlands has been rather successful in spreading eHealth use among General Practitioners. Almost all GPs store individual patient data and use a computer during consultation. With the realization of AORTA — the national infrastructure for healthcare installed in 2006 — secure and reliable exchange of medical data is now available to all Dutch GPs and positive impacts on their daily work can be expected soon. As a part of the AORTA infrastructure, an Electronic Health Record as well as an Electronic Medication Record were implemented and are now available to all healthcare providers.

An Electronic General Practitioners Record (WDH) was introduced taking into account that many Dutch General Practitioners work only part time and patient data are often not available to other GPs caring for the same patient. With the WDH the summary of a patient's history can be recorded by the GP allowing other practitioners to access it. The EMD/WDH implementation was tested under laboratory conditions and pilots were launched in the environments of the healthcare providers in seven selected regions.

Dutch policy strategies with eHealth relevance

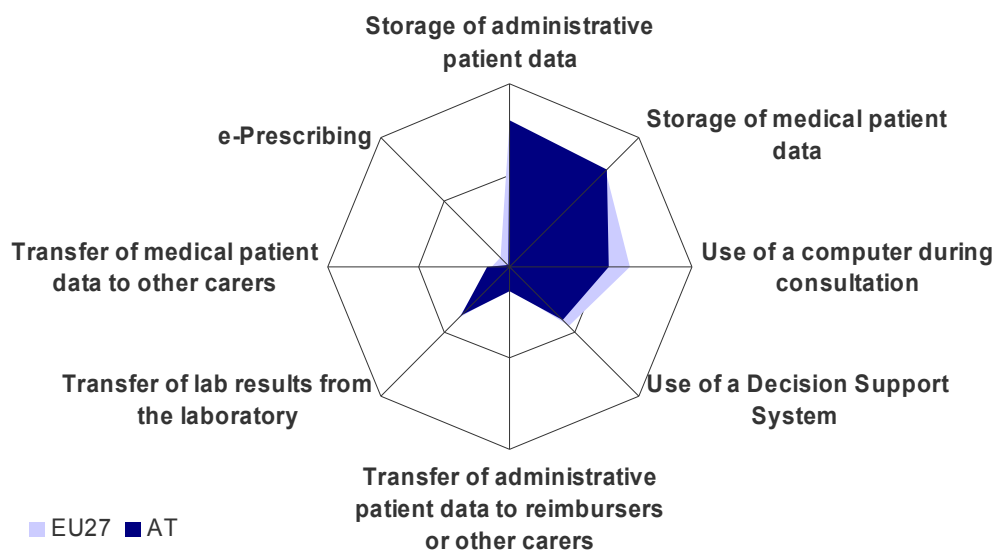Legislation on the Electronic Health Records (as of 2007: yet to be passed in parliament)

Austria

Austria is among the solid average eHealth performers in the EU27. In terms of infrastructure, Austria is on par with the EU27 average concerning the use of computers and the use of the Internet. When it comes to broadband connections, Austria scores slightly below average.

In regard to the storage of patient data, the computer use in consultation and the use of electronic patient data transfer in the country is close to the EU27 average. The use of Decision Support Systems is on average.

Exhibit 5-20 eHealth use in Austria

Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

Within Austria's federal system there are several regional eHealth solutions already implemented. The Ministry of Health is the main actor of the national eHealth strategy. The "Health Telematics Act", a part of the Health Reform 2005 and the "E-Government Act" 2004 provide the legal framework for eHealth in Austria. In 2006 a draft National eHealth Strategy was presented by the Austrian eHealth committee. The data presented in this study seem to suggest that the eHealth activities of the Austrian government do have some impact among General Practitioners. In particular, the use of computers during consultation and the electronic storage of administrative and medical patient data is fairly advanced.

A core element of the National eHealth strategy is the consistent refinement of the Health Insurance Card system. With the Austrian Citizen Card Austria is a frontrunner in eIdentity implementations. 12,000 General Practitioners use the system since the rollout in 2005. In the near future, the hospital information system will be integrated in the Health Insurance Card system.

An eMedication system that is currently offered on a voluntary basis will be extended to also include ePrescribing. The new system is based on the network and security infrastructure of the e-card system. General Practitioners have not used the new system yet.

The National Electronic Health Record of Austria (ELGA) is currently at an early stage with work focusing on creating the necessary regulatory framework conditions for such a scheme.

Austrian policy strategies with eHealth relevance

Austrian eHealth Strategy 2006

Poland

Poland has to be considered rather a laggard in terms of eHealth as it scores below the EU27 average with regard to most indicators included in the survey.

In terms of infrastructure, Poland shows a rather basic level of equipment as 72% of GP practices own a computer, 62% are connected to the Internet and 32% have access to a broadband Internet connection.

Poland shows its best eHealth performance in the area of patient data storage. Yet even here usage rates lie below the EU27 average. Computers are used for consultation purposes only to an extremely low extent. Decision Support Systems are still rather the exception than the rule. Patient data transfer has as yet not very much arrived on the agenda of Polish GPs.

<div align="center">Exhibit 5-21 eHealth use in Poland</div>
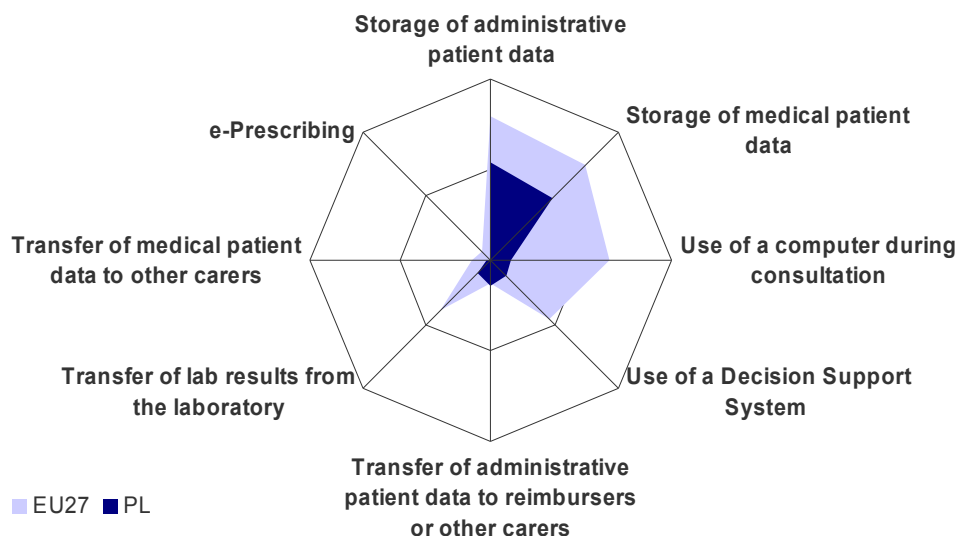
Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

eHealth has been on the agenda of the Polish government since 2004. Before that, there existed only a World bank project completed in 2001 and a Polish project to develop a registry of health services, based on the use of electronic health insurance cards.

In terms of a policy strategy, an internal document named "Poland – eHealth Strategy for 2004-2006" was drawn up in 2004 which was followed — one year later — by the "Strategy of information infrastructure development in health care and introduction of the European Health Insurance Card". The latter aims at developing a health information technology infrastructure, establishing central databases and registers of medical data and improving access to healthcare information like electronic patient registration and web portals.

There are also activities to improve interdisciplinary cooperation on eHealth issues. One step towards this goal is the establishment of a Centre for Healthcare Information Systems, supervised by the Ministry of Health in collaboration with Polish telemedicine centres in Kajetany, Anin, Poznan and Krakow. The rather high number of eHealth-related activities that are currently ongoing gives rise to the hope that actual usage levels — also among General Practitioners — will increase in the coming years.

Polish policy strategies with eHealth relevance

Poland – eHealth Strategy for 2004-2006 (2004)

Strategy of information infrastructure development in health care and introduction of the European Health Insurance Card (2005)
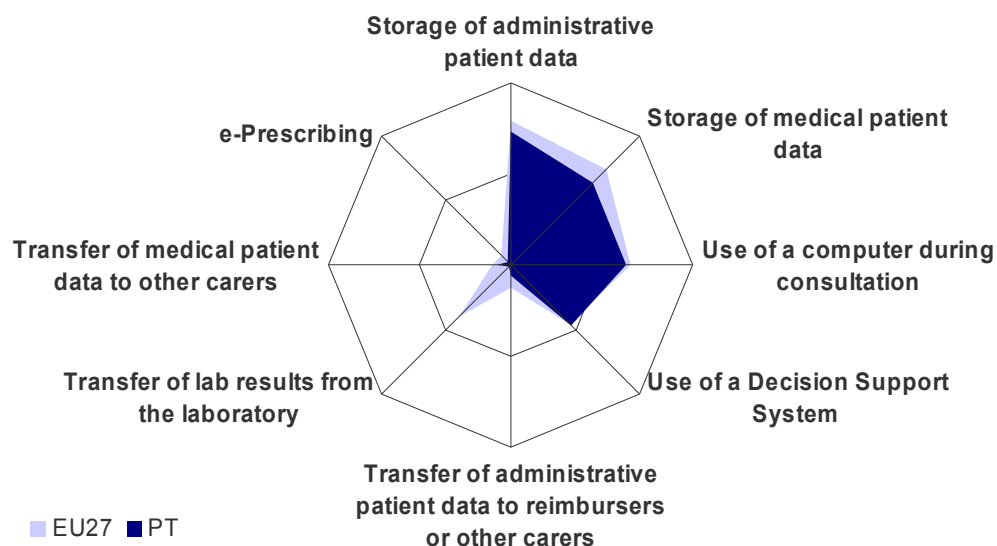
National Programme of Development (2005)

Portugal

Portugal can be regarded as an average eHealth performer in the EU27. In terms of infrastructure, Portugal is on par with the EU27 average concerning the use of computers and the use of the Internet. Broadband connections are however slightly less common in Portugal than in Europe on average.

When it comes to the actual use of eHealth applications, Portugal displays its best results for the use of computers for consultation purposes (64%), the use of Decision Support Systems (60%) and the storage of administrative patient data 74%). No shares however exceed European averages. The transfer of patient data is much less common, with regard to these indicators Portugal has to be considered one of the laggards.

Exhibit 5-22 eHealth use in Portugal

Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

The National Health Plan defines the guiding principles of healthcare provision in Portugal. There is currently no dedicated legal framework for eHealth. Regulatory measures with a bearing on this field are limited to data protection laws and publicity and medication marketing guidelines. The latest governmental initiative was the National Action Plan for the Information Society, which addresses a number of eHealth issues. The improvement of the communication infrastructure in the health sector, the enhancement of online health services and the introduction of a user card for patients are the main objectives of the Portuguese eHealth policy.

A lack of infrastructure may also be the reason for the fact that up until now only very few GP practices transfer administrative and medical patient data. The Portuguese government has become aware of this issue and is currently taking steps to facilitate data exchanges by setting up a national health information network.

Several eHealth Internet portals have already been implemented and some pilots for telemedicine and teleconferencing have been launched. In a second step, online health services are to be established, aiming to improve the communication between patients and doctors by using web-based applications to assist continuous monitoring of chronic diseases

and treatment follow-up. As in most EU countries, telemonitoring in Portugal today is rather a concept than a reality with only about 1% of the GPs doing so.

The Portuguese electronic identify card (eID) will replace five existing cards and the data will be stored in the National Data Centre. Another future activity will be the implementation of a nationwide ePrescribing scheme.

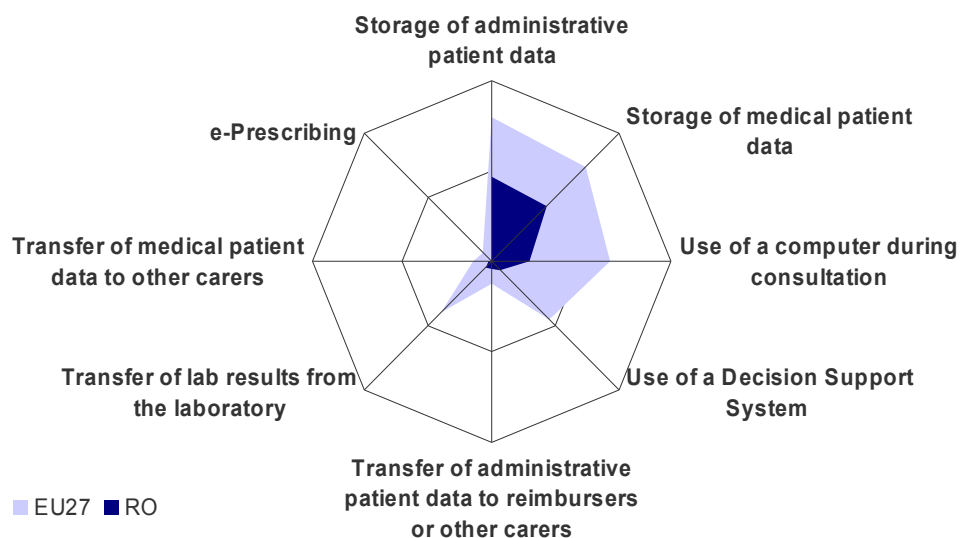| **Portuguese policy strategies with eHealth relevance** |
| --- |
| National Action Plan for Information Society (2003) |

Romania

In comparison to the other European countries, Romania has to be considered one of the laggards – both with regard to the availability of ICT infrastructure and with regard to the use of eHealth solution in Romanian GP practices.

In terms of infrastructure, Romania shows a very basic level of equipment as only 66% of GP practices own a computer, 35% are connected to the Internet and 5% have access to a broadband Internet connection. The use levels for Internet and broadband are the lowest of all EU27 Member States.

Romania shows its best eHealth performance in the area of patient data storage and the use of a computer for consultation purposes. Yet even here, usage rates lie quite far below the EU27 averages. Decision Support Systems are still rather the exception than the rule. Patient data transfer has as yet not very much arrived on the agenda of Romanian GPs: only 5% of the practices routinely transfer medical patient data and only 8%

Exhibit 5-23 eHealth use in Romania

Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

The recent eHealth strategy of 2005 calls for an effort to develop an integrated health information system, including electronic patient records while maintaining the interoperability with the existing health information system. It also aims to introduce real-

time decision support tools, which are currently not used by Romanian GPs to any larger extent as can be seen from the survey data.

The low level of ICT infrastructure availability combined with the lack of interoperability standards and integrated health care networks are highly explanative of the low level of use of eHealth solutions in Romania – especially as far as data transfers are concerned. The eHealth projects planned by the Romanian government might enhance the use of eHealth solutions in the future.

In 2006 the Ministry of Public Health passed the Health Reform Law to establish an integrated information system for public health management. A general practitioner information system already exists which includes computerized health records and patient identification measures. 75% of the hospitals apply ICT procedures. As can be seen from the data presented here, the use of ICT by GPs is however still considerably lower than in hospitals.

The Centre for Health Computing and Statistics (CHCS) was restructured into a "National Centre for Organising and Ensuring the Health Information System" which is to become the coordinator of the Romanian healthcare IT policy.

A main future goal is the establishment of a stakeholder working group focused on minimum standards for EHRS and other eHealth applications. There are also new ePrescribing and telemedicine projects which are envisaged to create an impact on the ICT use of Romanian GPs.

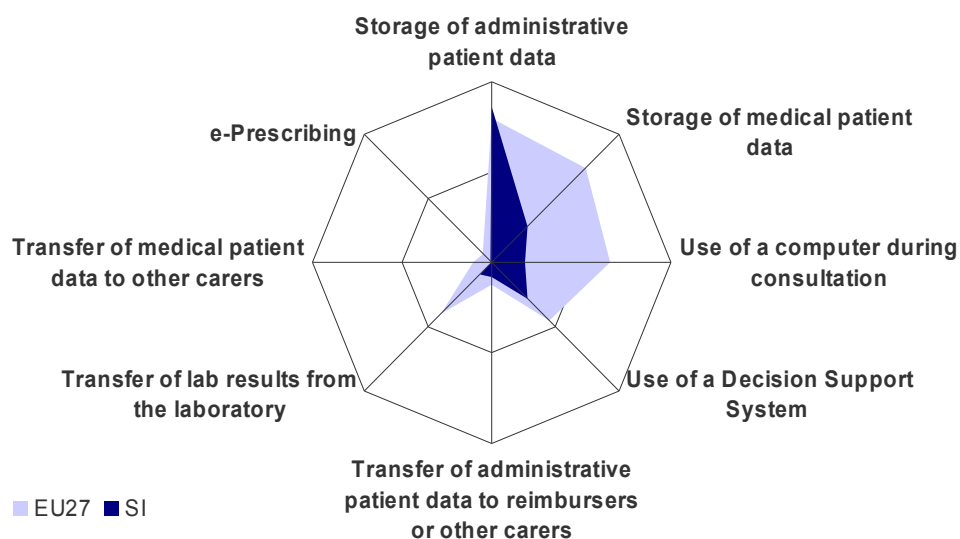| Romanian policy strategies with eHealth relevance |
| --- |
| eHealth strategy (2005) |
| Health Reform Law 95/2006 |

Slovenia

Slovenia shows a somehow unusual pattern of eHealth infrastructure and use rates. While in terms ICT infrastructure Slovenia can be considered a solid average performer, it scores well below average for the use of eHealth applications – an exception made for the electronic storage of administrative patient data, which is comparatively well established.

In terms of infrastructure, Slovenia scores rather well: 97% of GP practices own a computer, 83% are connected to the Internet and 54% have access to a broadband Internet connection. These shares are all at or above EU averages. When compared to the other East European countries, Slovenia is outnumbered only by Estonia.

The use rates for eHealth applications however are all considerably lower. With the exception of the storage of administrative patient data all usage rates lie below the EU27 average. Computers are used for consultation purposes only to an extremely low extent, especially when compared to their comparatively high availability. Decision Support Systems are quite well established: they are used in 40% of Slovenian GP practices. The transfer and exchange of electronic patient data has not yet arrived on the agenda of Slovenian GPs.

Exhibit 5-24 eHealth use in Slovenia

Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

The rather low use rates attained by Slovenian GPs in the area of eHealth application can be partially explained by the fact that Slovenian eHealth strategy is relatively new. The government published the "eHealth 2010 – Strategic plan for the Slovenian health sector informatisation" as late as December 2005. The goals have been derived from the "Action plan for a European eHealth Area". The strategy therefore aims at the exploitation of efficient, flexible informatics in order to support the national healthcare system.

A first step towards nationwide eHealth interoperability is seen in the development of the national health portal, providing safe and reliable exchange of medical data. The portal will be adjusted in order to connect to similar systems all over Europe. A basic infrastructure for a future national electronic health record is to be established. The national EHR system in Slovenia will be implemented in two phases and is planned to be accomplished by 2010.

A National Health Informatics Council has been established in 2006 with the aim to promote ICT use in the health system in general and to foster the establishment of appropriate standards in particular. Several projects have been completed and many activities supporting eHealth are currently underway. One project being implemented is the National Insurance Card System which aims to improve the quality of health care services as well as the communication between physicians and healthcare institutions.

Slovenian policy strategies with eHealth relevance

"eHealth2010 – Strategic plan for the Slovenian health sector informatisation" (2005)

Slovakia

Slovakia can be regarded as one of the slightly weaker average eHealth performer in the EU27. Computer availability in GP practices is as high in Slovakia as in the EU27 on average. When it comes to Internet connectivity (44%) and broadband connections (15%) however, Slovakia belongs to the laggard countries. In comparison to the other EU Member States Slovakia is last by one –only Romania displays lower availability of Internet and broadband connections.

While the storage of patient data is averagely well developed in Slovakia, the transfer of electronic patient data has not yet arrived in Slovakia at all. Average use rates are reached in regard to the use of computers during the consultation with the patient and the use of Decision Support Systems.

Exhibit 5-25 eHealth use in Slovakia
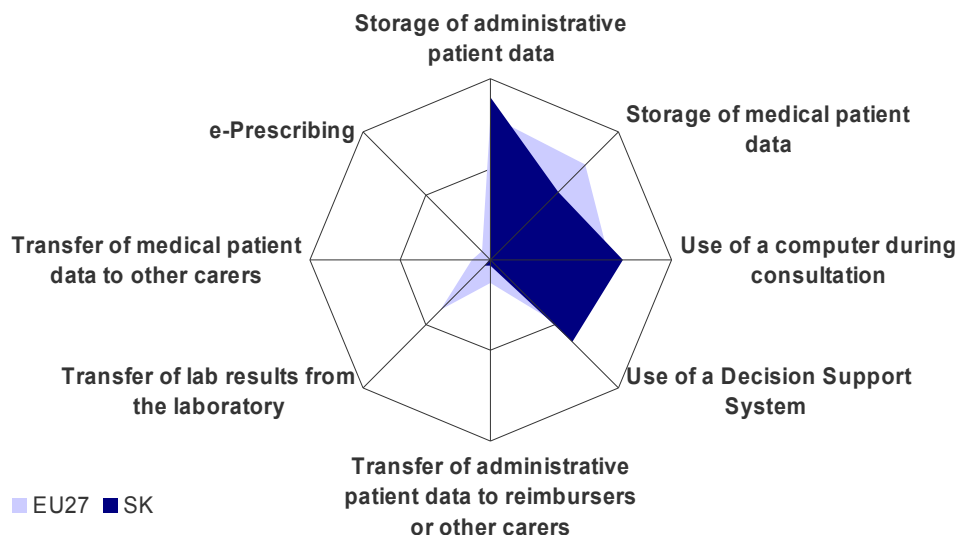
Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

The "New Healthcare System" program initiated by the Ministry of Health included the approval of the eHealth Roadmap and the Action Plan for 2006. The program resulted in the foundation of the "National Health Information Centre" (NHIC). The NHIC is supervised by the Ministry of Health via the eHealth committee, which works as a consultation organ and coordinator for developing eHealth strategies.

The Slovakian eHealth strategy aims at the development of the National Healthcare Information System, a national healthcare portal, as well as an ePrescribing system that is to include a patient medication record combined with a decision support system. Some of these components have been introduced recently while others are not yet implemented. This uneven implementation of the strategy is reflected in the survey that exposed high use rates for electronic data storage while at the same time the transfer of electronic data remains underdeveloped.

Slovakian policy strategies with eHealth relevance

eHealth Roadmap and the Action Plan for 2006 (2006)

Finland

Finland can be regarded as one of the frontrunner countries in eHealth use among General Practitioners. In all areas under observation (use of local and networked EHRs, exchange of medical patient data, and computer use in consultation), usage rates are among the highest found in the EU27, Iceland and Norway. The only area under observation, which is only averagely well developed, concerns the exchange of administrative patient data. ePrescribing is not made use of by Finnish GPs.

Exhibit 5-26 eHealth use in Finland

Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

The decentralized Finnish health care system has been dealing with eHealth issues for quite some time. Already in 1996 Finnish legislature forced the horizontal integration of services and a systematic networking of information. The Strategy for the Utilization of Information and Communication Technologies in Welfare and Health was established in the same year and updated in 1998. The update included the adoption of digital patient and client records.

Nationwide interoperability on a very high level between healthcare organizations is a Finnish characteristic. Health information is transferred using broadband networks. All service providers are connected to the Internet. eServices include the transfer of images, eReferrals, laboratory results and among other things the use of ICT in consultation. In these fields the impact on the daily ICT use of GPs is very high as the data from the survey show.

EHR systems are used by most primary care centres to document medical data. The National Program for Securing the Future of Health Care 2002 is not concluded until now. It will result in the implementation of a nationwide EHR system including an electronic medical data archive.

The National Insurance Agency (KELA) is very well connected and there is an electronic communication between KELA and pharmacies. This does currently not include administrative patient data transfer for GPs, which is in line with the findings of this study. A similar situation can be found in relation to ePrescribing: while KELA is hosting a national ePrescribing database, GPs are currently not included in this system and usage rates are accordingly low. In the wake of several pilot projects there are however some ongoing activities that aim to provide a legal framework for ePrescribing, which will also include GPs.

Finnish policy strategies with eHealth relevance

Strategy for the Utilisation of Information and Communication Technologies in Welfare and Health (published in 1996, updated in 1998)

National Program for Securing the Future of Health Care (2002)

Finnish eHealth roadmap

Sweden

Sweden can be regarded as one of the European frontrunners in eHealth use among General Practitioners. With regard to data storage, as well as in relation to the networked exchange of medical data, usage rates are well above the averages found in the EU27, Iceland and Norway.

With respect to infrastructure, Sweden is exceptionally well positioned with virtually all GP practices being equipped with a computer, 99% of practices being connected to the Internet and 88% of these GP practices using a broadband connection. As regards patient data transfer, Sweden is one of the top performers, especially in the area of ePrescribing which otherwise is done to a larger extent only in Denmark and the Netherlands.

Exhibit 5-27 eHealth use in Sweden
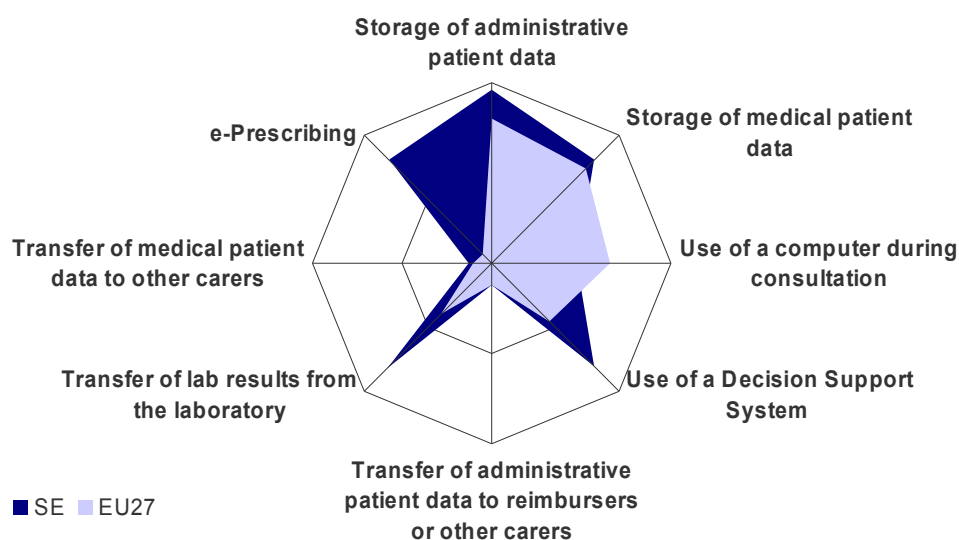
Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

Despite the absence of a national eHealth strategy for many years, Sweden has been fairly successful in spreading eHealth use among General Practitioners as a result of the cooperation between national and regional authorities.

A National High Level Group for eHealth was established in 2005 and presented the first National eHealth Strategy including social care in 2006. The objectives are the creation of a common information infrastructure, the accomplishment of laws and regulations and the facilitation of interoperable, supportive ICT systems. The strategy was approved by the government and implementation plans will follow.

A joint telecommunication network, called Sjunet, was implemented in 2002 and connects all hospitals, primary care centres, county councils and pharmacies. It won the eEurope award for eHealth in 2003. The system allows the secure and reliable exchange of patient data. Sjunet supports different eServices including video conferencing, telemedicine and ePrescribing.

Swedish policy strategies with eHealth relevance

eHealth strategy (2006)

United Kingdom

The United Kingdom can be regarded as one of the European frontrunners in eHealth use among General Practitioners. In all areas under observation (use of local and networked EHRs, exchange of administrative patient data, and computer use in consultation), usage rates are among the highest found in the EU27, Iceland and Norway. The infrastructure availability is very high in the United Kingdom, as both computer and Internet connections are nearly universal in British GP practices. This applies to local storage of medical and administrative patient data as well. While nearly all GP practices (89%) transfer some sort of medical patient data, only around half of the practices transfer administrative data. An absolute exception is ePrescribing, which is not yet established: neither in the United Kingdom, nor in the EU27 as a whole.

Exhibit 5-28 eHealth use in the UK

Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

In the UK each of the four constituent countries has its own separately administered health service. The UK Department of Health is responsible for the overall eHealth policy of England, the Department of Health Social Services and Public Safety (DHSSPS) for Northern Ireland, the Scottish Executive Health Department for Scotland and the Welsh Assembly Government for Wales. The service offered by the National Health Service (NHS) in each country is the same but the administrative arrangements are different. The cooperation between the four health services is close to ensure the same quality of care for every citizen.

In all four countries the implementation of an Electronic Health Record (EHR) is a key component of the health information system. At present there exist only elements of electronic care records in ICT system in various different locations. The storage of administrative and medical data is already implemented and is used by almost all GPs according to the presented data. The new EHR will contain structured data, text and images and each patient will have access to his own health record.

The care information web based system for laboratory test results is advanced, particularly in Scotland, and almost all General Practitioners have access to it. While the use of electronic data exchange is already fairly above the European average, further improvements can be expected in the near future, when GP systems will be connected to the Electronic

Registration system allowing exchange of administrative data between the Central Services Agency and GP practices.

ePrescribing was introduced in England in 2005 and the scheme is planned to be extended to the whole UK. Up to now, usage rates among GPs are still comparatively low.

British policy strategies with eHealth relevance
British National Programme for IT (NPfIT 2002) in England
Legal regulations existing in the area of data protection (1998), telecommunications (2003) and digital signatures (2005) in England
"Delivering for Health" Scotland 2006
"Informing Healthcare" Wales 2003

Iceland

Iceland is one of the frontrunners of ICT use among General Practitioners. This concerns both the availability of ICT infrastructure (computer, Internet) and the use of ICT for different eHealth-related purposes.

Iceland scores well above average concerning the storage of electronic medical and administrative patient data, the use of computers during consultations and the transfer of laboratory results. The only area under observation, which is only averagely well developed, concerns the exchange of administrative patient data. Noticeable is the comparatively high prevalence of ePrescribing in Iceland, which is used by nearly one fifth of the practitioners. This high use rate can be attributed to a seven year ePrescribing project that has been launched a couple of years ago and provided for the nationwide implementation of ePrescribing in 2007.

Exhibit 5-29 eHealth use in Iceland
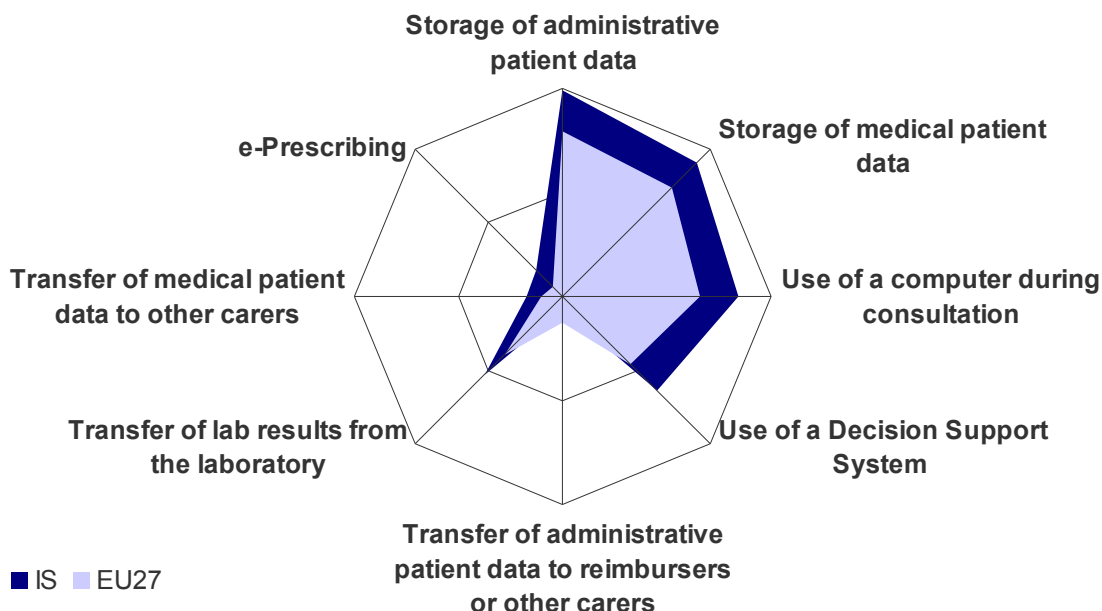
Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

The small country developed an eHealth strategy as a part of the "eGovernment Information Society 2004-2007 strategy". It included electronic transactions between the State Social Security Institute, healthcare providers and the public, the introduction of electronic patient records and the establishment of a Healthnet to link all institutions within the sector. Other activities are planned by the Ministry of Health and Social Security to improve the structure of the healthcare system and enhance the quality of healthcare services.

The Ministry has published minimum data sets for an Electronic Health Record system, a factor that has surely contributed to the comparatively high storage rates for electronic patient data in Iceland.

Icelandic policy strategies with eHealth relevance
eGovernment Information Society 2004-2007 strategy

Norway

Norway is one of the frontrunners of ICT use among General Practitioners. This concerns both the availability of ICT infrastructure (computer, Internet) and the use of ICT for different eHealth-related purposes.

In all areas under observation (use of local and networked EHRs, exchange of administrative patient data, and computer use in consultation), usage rates are among the highest found in all 29 countries included in the survey.

Exhibit 5-30 eHealth use in Norway
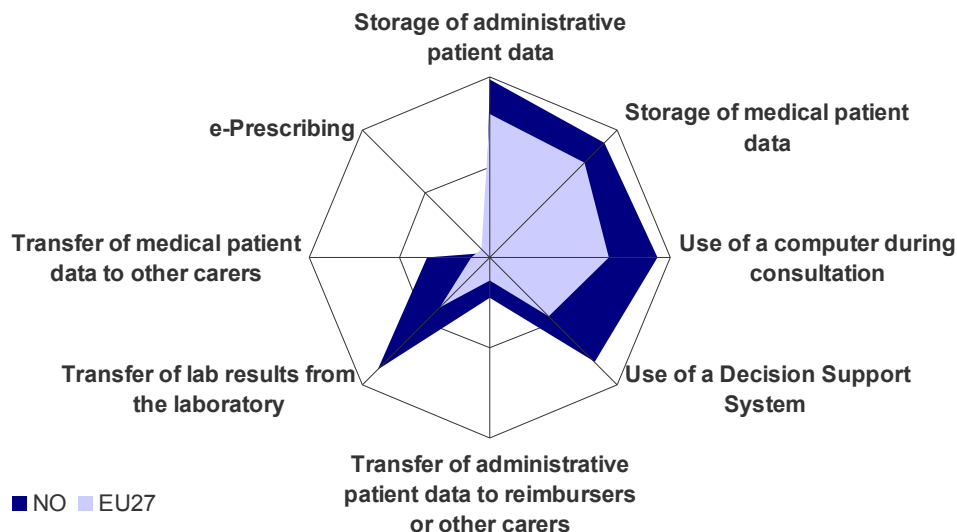
Indicators	Compound indicators of eHealth use (cf. indicator annex for more information). Index scores ranging from 0 (not used at all) to 5 (used by all GPs in the country).
Source	empirica, Pilot on eHealth Indicators, 2007.

The history of eHealth in Norway goes back to 1997 when the government published the eHealth strategy "More health for each bIT". The strategy paper was followed by "Say @h!" and the latest strategy Te@mwork 2007. The Ministry for Health and Care Services aims to prepare clearly specified implementation programs, steps and measures. The electronic infrastructure is well advanced and can be used for telemedicine and Electronic Data Interchange. Norway has a wide experience in structural exchange of information via

electronic messaging. According to the data presented here, electronic data storage, computers in consultation and transfer of lab results are used to a very high degree. Other modes of electronic data exchange — ePrescribing in particular — are used only to a lesser extent.

A national eGovernment portal serving all sectors is planned and an EHR research project started at the University of Trondheim. Furthermore, Norway is going to implement ePrescribing —called eResept in Norwegian — allowing for the transfer of electronic prescriptions to pharmacies from GPs and hospitals and also including an ePrescribing database.

Norwegian policy strategies with eHealth relevance
"More health for each bIT" (1997)
"Say @h!" (2001)
"Te@mwork 2007 (2004)

6   eHealth use in the EU 2002 - 2007

> **Note:** This section includes comparisons of the Eurobarometer Flash 126 survey from 2002 with those from the current survey from 2007. For comparability reasons, it is restricted to a comparison and analysis of the results for the former 15 EU Member States. Please bear in mind that the figures are not directly comparable due to the use of slightly different approaches and methodologies.

Key results

In the past five years, the **share of GPs active in eHealth** in the former EU15 **has increased**. As regards **ICT infrastructure**, the share of practices that use a computer has gone up from 81% in 2002 to 90% in 2007. The Internet — or dedicated GP networks — are nowadays used by 72% of the EU15 GPs, as compared to 63% in 2002.

Continuous education and the search for prescribing information were and are the most frequent use case for an Internet connection. The latter was done by 35% in 2002 and has nearly doubled to 62% today.

Electronic patient data transfer is becoming ever more prevalent, even if actual use rates among the EU15 countries still leave some room for improvement, depending on the application under observation. The share of GPs engaging in patient data transfer went up from 17% to 63% in the past five years. Transfer of laboratory results such as blood sample or ECG data occurs more often today (54%) than it did five years ago (11%). Transfer of administrative patient data to reimbursing organisations and to other health care providers each went up to 22% from 6% and 5% respectively in 2002. In relation to transfer of medical patient data there has been an increase from 8% to 28%. ePrescribing was done by about 3% of the EU15 GPs in 2002 and is done today by about 11%.

A comparison with the 2007 results for all 27 EU Member States shows that **the enlargement of the Union did not have much impact** — neither positive nor negative — on the developments in the past five years. The 2007 figures for the EU15 are in most cases nearly identical to the EU27 figures. Deviations of 5 percentage points and more can be found in relation to the search for prescribing information and the general transfer of patient data.

One aim of this study is to provide a year 2007 update of the data on eHealth use by General Practitioners gathered via the Eurobarometer Flash 126 in the year 2002. The Eurobarometer survey covered the EU15 Member States; 3,512 GPs were interviewed. Key indicators have been taken up again in this 2007 survey to gain an understanding of the dynamics of eHealth use in those 15 countries. The thematic areas covered for a comparison are:

- ICT infrastructure (here understood as the use of computers and the Internet)
- Selected purposes for Internet use or for the use of dedicated GP networks
- Electronic transfer of patient data

Overall, the share of GPs in the former EU15 Member States that engage in eHealth has increased over the past 5 years. This holds true for all three areas mentioned above.

Computer use was already rather widespread in the EU15 in 2002 with 81% of the practices using at least one computer (cf. Exhibit 6-1 below). This share has gone up to 90% in 2007 in

the EU15, and computer availability seems to be nearing the saturation level, i.e. a level where (nearly) all GP practices are equipped with a computer — at least in the 15 old Member States. Similar results become apparent when looking at the Internet connections of GPs. However, the share of practices that are connected to the Internet — or use a dedicated GP network — is still lower than that of the computer-using ones: 72% in 2007 as compared to 63% in 2002. The share of practices that have a website has remained largely stable (25% in 2002 and 29% in 2007). In light of the increase of Internet use this may point to factors other than connectivity having an influence on the decision to operate a practice website — such as legal obligations in relation to advertisement/marketing.

Among the purposes for the use of the Internet or dedicated GP networks — apart from the electronic transfer of patient data (see below) — continuous education was relatively widespread already in 2002 (45%) and has increased further to 82% (including also computer use for e-learning) today. This can be seen as a good indication of the growing usefulness of digital media in general and the Internet in particular when it comes to keeping abreast of recent medical, scientific, administrative or other developments that are of interest to GPs. Among those purposes that are closer related to medical work the search for medication information needed for prescription — e.g. new drug information or contra-indications — has also increased to a noticeable extent from 35% in 2002 to 62% in 2007. This shows that there is more and/or better information available on the Internet today and that GPs are nowadays more aware of what the web has to offer in this area.

As has been said repeatedly above, the use of ICT for the electronic transfer of patient identifiable data can be considered as one of the most advanced and therefore also most interesting — in a research sense — eHealth applications. This analysis shows that it is also becoming increasingly prevalent among GPs in the EU15 countries, although today's use rates in many areas still leave some room for improvement.

The share of EU15 GPs engaging in any type of electronic data exchange has gone up from 17% in 2002 to 63% in 2007, an increase of not quite 50 percentage points. The type of data transferred most often today is the same as it was five years ago: laboratory results, e.g. blood sample data or ECG results. The share of GPs exchanging these data has risen from 11% to 54%. The transfer of administrative data both with reimbursing organisations and with other health care providers occurs less frequently when comparing it to the 2007 usage (22% each), which was at 6% and 5% respectively in 2002. It should be noted that the 2002 indicator specifically dealt with transfer of administrative patient data to secondary care providers — i.e. to hospitals without a specific research focus. If this question was understood correctly by the respondents of the Eurobarometer Flash survey it can be supposed that the actual 2002 use rate is even lower than the figure given here. In relation to the transfer of medical patient data to other care providers there has been an increase of 20 percentage points from 2002 (8%) to 2007 (28%). As regards ePrescribing this was done by about 3% of the EU15 GPs in 2002 and is done today by about 11%.

The Internet offers several ways of interaction with the patient, be it by means of e-mail — e.g. to clarify administrative issues such as appointments or to discuss health-related questions — or of dedicated telemonitoring activities — i.e. the transfer of vital data such as blood-pressure values. E-mail exchange with patients has substantially increased in the EU15 with 27% of the GPs using it in 2007, compared to 6% in 2002. In relation to telemonitoring there is a clear indication that this is not done to any greater extent today (6%) or was done five years ago (2%). The 2002 figure must be treated with some caution as it not only covers telemonitoring in a narrower sense but also comprises e-mail communication for telemedicine purposes. The actual use rate in 2002 might therefore be even lower than indicated here.

Data security is of some concern when it comes to the electronic transfer of sensitive patient data. One way to not only secure the data that are transmitted — i.e. by encryption — but also to identify the sender — by electronic signing — is the use of an e-signature. Today, e-

signatures are used by 18% of the EU15 GPs which is an increase when compared to the situation in 2002 (2%) but at the same time still leaves some room for improvement. The relatively high complexity of using an electronic signature — obtaining it from a trust centre, incorporating it into the practice's communication processes, paying the necessary fees etc. — may be one reason for the still relatively low spread of this security technique. The issue of obtaining a patient's consent to data storage or transfer seems to be receiving less attention today than it did five years ago. The share of GPs obtaining consent either orally or in writing decreased slightly. Reasons for this may be found in changing legal obligations such as data security law.

A final indicator included in the 2002 - 2007 comparison deals with the use of Electronic Health (Care) Records or EH(C)Rs — i.e. the electronic storage of patient data in a structured way so that they can be used for administrative purposes — such as reimbursement — and also for the medical processes in the practices — e.g. keeping track of prescriptions. This kind of data storage is today very widespread among GPs in the EU15 countries: 84% (administrative data) and 85% (medical data) respectively do so. According to the 2002 Eurobarometer Flash data, only 6% of the GPs used EHCRs in 2002. Some caution must however be exercised when interpreting this 2002 figure: It is unclear whether the respondents fully understood the question, correctly associating the term "Electronic Health Care Records" — or the variations used for explanation during the survey — with the type of patient data storage described above.

A comparison with the 2007 results for all 27 EU Member States shows that the enlargement of the Union did not have much impact — neither positive nor negative — on the developments in the past five years. The 2007 figures for the EU15 are in most cases nearly identical to the EU27 figures. Deviations of 5 percentage points and more can be found in relation to the search for prescribing information and the general transfer of patient data. The reason for this is twofold, related to the availability of basic ICT infrastructure in the 12 New Member States on the one hand and their use of eHealth applications on the other hand. As has been said above (cf. section 2.1 above) infrastructure is today less of an issues than it was in the past. Computers can be found in nearly all GP practices in Europe (87% on average), as can Internet connections (69%). The infrastructure situation in the New Member States is similar to that in the rest of the Member States, which explains the nearly identical values for the EU15 and the EU27 given below. When it comes to eHealth use, a different patterns becomes visible, as graphically depicted in the indicator scoreboard presented in section 5.1. There are considerable variations between all Member States, with some of them showing high use rates for most of the applications under observation and some showing low rates. This holds true for the New Member States as well: countries such as Estonia, Hungary and Bulgaria are among the solid average performers in the EU, while Poland, Romania, Lithuania and Latvia must be classified as laggards. Due to this, the average use rates again differ to only some extent from the use rates in the EU15 countries, explaining for the similar figures in relation to eHealth use presented below. Further to this, a methodological effect also plays a role here: eHealth use indicators of the 2007 survey contained answer options for relative usage frequencies (regular use, occasional use) which were not included in the 2002 Flash Eurobarometer survey. To allow for a comparison, both 2007 answer options were used to calculate the frequencies for the comparison, resulting in slightly higher figures than those used in the remainder of this report, which are based only on high relative frequencies of use (answer option "regular use").

Exhibit 6-1 Comparison of eHealth use in the EU15 2002 - 2007					
Indicator 2002	**Result 2002 (EU15)**	**Trend 2002-2007**	**Result 2007 (EU15)[1]**	**Result 2007 (EU27)[1]**	**Indicator 2007**
ICT infrastructure					
Use of a computer (desktop or notebook) in the practice	81%	↗	90%	87%	Computer use
Computer connected to the Internet or a dedicated GP network	63%	↗	73%	69%	Internet connection
Practice website	25%	⇨	29%	28%	Practice website
Purposes for Internet / GP network use					
Access to information for own continuing education[2]	45%	⇧	82%	82%	GPs using the Internet or computers for continuous education
Search for prescribing information	35%	⇧	62%	56%	Using electronic networks to search for prescribing information, new drug information or contra-indications
Electronic transfer of patient data					
Send/receive patient identifiable data	17%	⇧	63%	57%	Using electronic networks for transfer of patient data
Receive results from laboratories or other diagnostic procedures (e.g. ECG)	11%	⇧	54%	46%	Using electronic networks to receive laboratory reports electronically
Submit patient care reimbursement claims	6%	↗	22%	21%	Using electronic networks to exchange of administrative data with reimbursing organisations
Transfer administrative data to secondary care providers[3]	5%	↗	22%	20%	Using electronic networks to exchange of administrative data with other health care providers
Transfer medical data with other medical care providers	8%	↗	28%	24%	Using electronic networks to exchange medical data with other health care providers and professionals
Transfer of prescription via Internet to dispensing pharmacist	3%	↗	11%	9%	Using electronic networks to transfer prescriptions electronically to dispensing pharmacist
Exchange e-mails with the patient	6%	↗	27%	24%	Using electronic networks routinely to interact with patients by e-mail about health related or administrative issues
Offer any form of telemedicine services to your patients, such as home monitoring via Internet or e-mail[4]	(2%)	⇨	4%	4%	Using electronic networks routinely to provide telemonitoring services to patients at their home
Use of electronic signatures in communicating patient medical data via Internet or GP network	2%	↗	18%	19%	Use of security features: e-signatures
Patient consent to data transfer (obtained either orally or in writing)	54%	⇩	47%	50%	Patient consent to data storage and transfer (obtained either orally or in writing)
Use of an Electronic Health Care Record (EHCR)[5]	(6%)	⇧	84% [85%]	87% [81%]	Electronic storage of identifiable administrative [in brackets: medical] patient data

Indicators	For information on the indicators of the 2002 Flash Eurobarometer and on the indicators from this study that were used for the comparison cf. indicator annex. Base: all GPs.
Notes	Trend 2002 - 2007: ⇩ decrease of 5% or more; ⇨ no relevant changes; ↗ increase between 5% and 24 percentage points; ⇧ increase of 25 percentage points or more. [1] eHealth use indicators of the 2007 survey contained answer options for relative usage frequencies (regular use, occasional use) which were not included in the 2002 Flash Eurobarometer survey. To allow for a comparison, both 2007 answer options were used to calculate the frequencies showed here. [2] The 2007 indicator covers the use of both the Internet and of computers for e-learning. [3] The 2002 indicator covers only secondary care providers (theoretically defined as hospitals without specific research focus, i.e. excluding university hospitals).

Source	empirica, Pilot on eHealth Indicators, 2007.

Change in use patterns of more advanced eHealth users

The 2002 - 2007 comparison given above shows that the number of EU15 GPs using eHealth has increased moderately or strongly depending on the applications under observation. When looking in more detail at changes in the use patterns among GPs practicing electronic patient data transfer, a somewhat different picture emerges and use rates tend to be much more stable in this group when compared to the dynamics of the wider GP arena.

In relation to a majority of the indicators in question there is no noticeable change of use patterns of the more advanced eHealth users among the GPs from 2002 to 2007 (cf. Exhibit 6-2 below). In particular, this concerns the transfer of administrative patient data to reimbursers and other care providers, the transfer of medical patient data to other care providers, ePrescribing and e-mail exchange with patients. Only the use rates for receiving laboratory results (66% in 2002 and 85% in 2007) and for e-signatures (13% to 18%) have increased among those EU15 GPs practicing data transfer.

A possible explanation for this is that GPs react on developments external to their practice when deciding to opt for a new eHealth application. When — for example — considering the exchange of laboratory results, a GP might decide to procure the necessary software and to adapt the internal processes involved to do so because

- the laboratory he or she works with now offers an online data exchange service, and

- this online service comes for a lower fee than data exchange by snail-mailing data media or printed files, or

- another incentive is offered by the laboratory, or

- the laboratory makes a complete switch-over to online exchange and no longer offers any other means.

A reimbursing organisation requiring the GPs to file claims electronically is another example for this type of influencing factor related to the communication partner. Apart from this, GPs may also learn from good practice use cases observed in neighbouring practices and decide to engage in the same kind of activity that has been successfully introduced by a colleague. Even peer pressure might play a role here in that a GP adopts certain applications in order to not be cut of from developments he observes among fellow practitioners. None of these influencing factors can of course be directly deduced from the survey data available for this study. It can however be noted that external influencing factors — in this case national eHealth strategies — have been shown to play an important role when it comes to explaining differences in eHealth adoption between the Member States (cf. Section 5.2). An observation that also points to the fact that GPs are prone to external influencing factors in relation to eHealth.

The explanation sketched above also helps to explain the mostly stable use patterns both among GPs newly using electronic patient data exchange — i.e. those that introduced data exchange between 2002 and 2007 — and among GPs who are already active in this area since 2002 or before — i.e. the more advanced users. In the past five years the "newcomers" reacted to external influencing factors motivating them in one way or another to engage in patient data exchange. When doing so they choose applications that are either the most profitable

ones or those where the external pressure is highest. More concretely, these are probably the ones where the overall use rates in 2002 and today were and are highest, i.e. data exchange with laboratories and medical data exchange with other carers, as well as — albeit to a lesser extent — e-mailing with patients and administrative data exchange. The more advanced users on the other hand may have reacted to external factors when deciding for patient data exchange prior to 2002 but did not adopt new applications to any larger extent later on, with the only possible exception of exchange with laboratories.

This application — i.e. electronic exchange of laboratory results — might merit a closer look as it is the only one showing a notable increase over the past five years. If the explanation outlined above is true this would mean that there has been a change in the quality/quantity of the services available or in GPs motivation to use them. Motivation in this context can be understood either in a way that the practitioners are increasingly required to use such services or that they perceive stronger benefits than before.

Exhibit 6-2 Use patterns of GPs practicing electronic patient data exchange

Indicator 2002	Result 2002 (EU15)	Trend 2002-2007	Result 2007 (EU15)	Indicator 2007
Receive results from laboratories or other diagnostic procedures (e.g. ECG) [2]	66%	↗	85%	Using electronic networks to receive laboratory reports electronically
Submit patient care reimbursement claims [2]	38%	⇨	34%	Using electronic networks to exchange of administrative data with reimbursing organisations
Transfer administrative data to secondary care providers [3]	32%	⇨	35%	Using electronic networks to exchange of administrative data with other health care providers
Transfer medical data with other medical care providers [2]	46%	⇨	44%	Using electronic networks to exchange medical data with other health care providers and professionals
Transfer of prescription via Internet to dispensing pharmacist [2]	17%	⇨	18%	Using electronic networks to transfer prescriptions electronically to dispensing pharmacist
Exchange e-mails with the patient [2]	36%	⇨	37%	Using electronic networks routinely to interact with patients by e-mail about health related or administrative issues
Use of electronic signatures in communicating patient medical data via Internet or GP network [2]	13%	↗	18%	Use of security features: e-signatures

Indicators	For information on the indicators of the 2002 Flash Eurobarometer and on the indicators from this study that were used for the comparison cf. indicator annex. Bases for the calculation of the indicators vary according to the bases used for reporting of the 2002 results. Individual bases are given in the note for each indicator.
Notes	Trend 2002 - 2007: ⇨ no relevant changes; ↗ increase between 5% and 24 percentage points; ⇧ increase of 25 percentage points or more The questionable indicators on telemonitoring and Electronic Health Records were omitted for this second comparison due to the methodological issues raised above. [1] Base: GPs using the Internet [2] Base: GPs engaging in electronic patient data transfer [3] Base: GPs engaging in electronic patient data transfer. The 2002 indicator covers only secondary care providers (theoretically defined as hospitals without specific research focus, i.e. excluding university hospitals)
Source	empirica, Pilot on eHealth Indicators, 2007.

ANNEX

7 Indicators used

7.1 Indicators of the 2007 survey

Indicator no.	Indicator name	Question wording	Base
R4	Computer use	Does your practice/ department of general practice use computers?	All GPs
A1	Electronic storage of individual administrative patient data	Does your practice electronically record and store individual *administrative* patient data?	All GPs
A2	Electronic storage of identifiable patient data	Does your practice record and store electronically the following kinds of patient identifiable data? a) Symptoms or the reason for encounter b) Medical history c) Basic medical parameters such as allergies d) Vital signs measurements e) Diagnoses f) Medications g) Laboratory results h) Ordered examinations and results i) Radiological images j) Treatment outcomes	GPs storing administrative patient data
A3	Structured data entry	Do you enter the medical data into the computer using an interface with structured data entry fields?	GPs storing individual patient data
A4	Coded data entry	Do you enter medical data coded according to any classification into the computer or un-coded plain text data, or both?	GPs storing individual patient data
B1	Computer access during consultation	Do you have access to a computer in the consultation room?	All GPs
B2	Computer use during consultation	Do you use the computer during consultations?	All GPs
B3	Availability of any DSS for diagnosis or prescribing	Does your practice have a software system that supports you with diagnosis or with prescribing??	All GPs
B3a	Availability of DSS for diagnosis	Does your practice have a software system that supports you with diagnosis?	All GPs
B3b	Availability of DSS for prescribing	Does your practice have a software system that supports you with prescribing?	All GPs
B4	Use of any DSS for diagnosis or prescribing	Do you use that software system regularly, occasionally or not at all?	All GPs
B5	DSS giving either general or patient specific advice	Does this software system give patient-specific advice based on the data you have stored about an individual patient or is it general advice, or both?	All GPs
B6	Occasional or routine use of a computer to show patients any health-related information during consultation	Do you use a computer to show patients any health-related information during consultation?	All GPs
C1	Internet connection	Does your practice have access to information on the Internet?	All GPs
C2	Internet connection bandwidth	What type of connection to the Internet does your practice have? (1) Dial-up Modem (2) ISDN connection (3) DSL connection (4) Other broadband	All GPs
C3	Practice computer system connecting routinely to various organisations via Internet or dedicated electronic network	To which of the following organisations or persons is the computer system of your practice connected, either via Internet connection or a dedicated electronic network?	All GPs

Indicator no.	Indicator name	Question wording	Base
		(1) other GPs (2) specialist practices (3) hospitals (4) laboratories (5) pharmacies (6) care homes (7) patients' homes (8) health authorities (9) insurance companies (10) suppliers (11) others (12) none of these (13) Don't know / NA	
C4	Use of electronic networking in years	For how many years has your practice been using these kinds of Internet links or electronic health networks?	GPs using Internet/electronic health networks for inter-entity connections
C5	Using electronic networks routinely for professional purposes	Does your practice use the Internet or electronic health networks for any of the following professional purposes? a) to search for prescribing information, new drug information or contra-indications b) for ordering supplies for your practice c) for making appointments at other care providers for your patients d) to provide telemonitoring services to patients at their home e) to receive automatically any vital signs data from patients' homes f) to interact with patients by email about health related issues? g) to interact with patients by email about administrative issues such as making an appointment with you.	All GPs
C6	Payment for telemonitoring purposes	You said that you provide telemonitoring services to patients at their homes. Do the patients contribute to the cost? (1) Yes, they pay for the whole service (2) Yes, patients pay part of the bill (3) Yes, depending on the condition monitored (4) No, patients do not directly pay for any part of the service (5) Don't know / NA	
D1	Using electronic networks for transfer of patient data	Does your practice use the Internet or electronic health networks for the following kinds of exchange of patient data? a) to exchange *administrative* patient data with other health care providers? b) to exchange *administrative* patient data with reimbursing organisations c) to exchange *medical* patient data with other health care providers and professionals? d) to transfer prescriptions electronically to dispensing pharmacists? e) to receive laboratory reports electronically? f) to exchange medical patient data with any health care provider in other countries?	All GPs
D2	Patient consent to data storage and transfer	How does your practice obtain the patients' consent for patient data storage and transfer? Is it written, orally or is no specific consent	GPs electronically transmitting patient data

Indicator no.	Indicator name	Question wording	Base
		obtained?	
D3	Practices encountering interoperability problems in patient data exchange	When your practice exchanges patient data electronically do you ever encounter data or system compatibility problems?	GPs electronically transmitting patient data
D4	Use of security features	Please tell me whether you use any of the following security techniques in your practice. a) Password protected access b) Password protection of sent or received files c) Encryption of sent or received files and e-mails d) E-signatures	GPs electronically transmitting patient data
F1a	GPs agreement to the use of software and IT systems improving the quality of healthcare services	Please tell me whether you agree strongly, agree somewhat, disagree somewhat or disagree strongly with the following statement: The use of software and IT systems improves the quality of healthcare services	GPs using computers
F1b	GPs perception of various facilitators and barriers to eHealth use	Please tell me whether you agree strongly, agree somewhat, disagree somewhat or disagree strongly with the following statements. a) the use of software and IT systems in health should be included in the medical education b) to really benefit from IT, all health actors have to share clinical information in a network c) IT systems would be more used if GPs were provided with more training. d) Your practice would need better support with the maintenance of your IT system e) The cost of IT is ultimately the decisive factor on the use of ICT	GPs using computers
G	GPs perception of impact of eHealth in various areas	In what ways has the use of information technology systems changed the work in your practice? Has it had a positive influence, a negative influence, or no change at all on… a) your personal working processes b) the working processes of your practice staff c) on the quality of diagnosis and treatment decisions d) on the doctor-patient relationship Has the use of information technology systems and software increased, decreased or not influenced… a) the average number of patients you can help in one day b) the workload on your support staff, for instance nurses c) the number of patients who come to your practice d) the scope of services offered by your practice	GPs using electronic records, or with access to health networks, or exchanging electronic patient data.
H1	Patients' Internet research	How often has the following occurred recently with regard to health related information patients found on the Internet? Has it occurred often, sometimes, rarely or never? a) Your patients wanted to discuss the	

Indicator no.	Indicator name	Question wording	Base
		information during consultation. b) Your patients misapplied or misunderstood the information. c) The information patients found was beneficial for your patients. d) Chronically ill patients told you that the Internet is helping them in the self-management of their illness. e) How often have you recommended specific websites to your patients?	
I1	GPs using the Internet or computers for continuous education	Have you used the Internet, or computers for your continuous medical education (CME) or continuous professional development (CPD) during the last 12 months?	GPs using computers
J5	Professional IT support	Does your practice get support or maintenance for its IT system and applications by a professional service provider?	GPs using computers

7.2 Compound indicators used for eHealth scoreboard

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

7.3 Indicators of the 2002 survey used for time series comparison

Indicator no.	Indicator name	Question wording
1	Use of a computer (desktop or notebook) in the practice	Do you use any of the following in your practice…? a) PC b) Macintosh c) PC/Mac Laptop (notebook) d) PDA (Personal Digital assistant)
2	Computer connected to the Internet or a dedicated GP network	Is this equipment connected to the Internet or to a dedicated general practitioners network?
3b	Search for prescribing information	Do you use the Internet or a General Practitioners network for searching for prescribing information, including new drug information and contra-indications?
3c	Access to information for own continuing education	Do you use the Internet or a General Practitioners network for accessing information for your continuing education?
3f	Send/receive patient identifiable data	Do you use the Internet or a General Practitioners network for sending and/or receiving patient identifiable data?
4a	Submit patient care reimbursement claims	Do you use these exchanges to submit patient care reimbursement claims?
4a	Submit patient care reimbursement claims	Do you use these exchanges to submit patient care reimbursement claims?
4b	Transfer administrative data to secondary care providers	Do you use these exchanges to transfer administrative patient data to a secondary care provider?
4c	Transfer medical data with other medical care providers	Do you use these exchanges to transfer patient medical data to other medical care?
4c	Transfer medical data with other medical care providers	Do you use these exchanges to transfer patient medical data to other medical care?
4d	Receive results from laboratories or other diagnostic procedures (e.g. ECG)	Do you use these exchanges to receive results from laboratories and other diagnostic procedures (e.g. ECG)?
4d	Receive results from laboratories or other diagnostic procedures (e.g. ECG)	Do you use these exchanges receive results from laboratories and other diagnostic procedures (e.g. ECG)?
4e	Exchange e-mails with the patient	Do you use these exchanges for exchanging emails with patients?
4e	Exchange e-mails with the patient	Do you use these exchanges for exchanging emails with patients?
4f	Offer any form of telemedicine services to your patients, such as home monitoring via Internet or e-mail	Do you use these exchanges to offer any form of telemedicine services to your patients, such as home monitoring via Internet of e-mail?
4g	Transfer of prescription via Internet to dispensing pharmacist	Do you use these exchanges for electronic prescribing (transfer of prescription via Internet to dispensing pharmacist)?
4g	Transfer of prescription via Internet to dispensing pharmacist	Do you use these exchanges for electronic prescribing (transfer of prescription via Internet to dispensing pharmacist)?
6	Use of electronic signatures in communicating patient medical data via Internet or GP network	Do you use electronic signatures in communicating patient medical data via the Internet or a General Practitioners network?
6	Use of electronic signatures in communicating patient medical data via Internet or GP network[2]	Do you use electronic signatures in communicating patient medical data via the Internet or a General Practitioners network?
7	Use of an Electronic Health Care Record (EHCR)	Do you use an Electronic Health Care Record (EHCR) [also known as Electronic Patient record, Electronic Medical record, Computer Based Patient record]?

7.4 Indicators of the 2007 survey used for time series comparison

Indicator	Indicator name	Question wording

no.		
R4	Computer use	Does your practice/ department of general practice use computers?
A2	Electronic storage of identifiable patient data	Does your practice record and store electronically the following kinds of patient identifiable data?
C1	Internet use	Does your practice have access to information on the Internet?
C5a	Using electronic networks to search for prescribing information, new drug information or contra-indications	Does your practice use the Internet or electronic health networks for any of the following professional purposes? To search for prescribing information, new drug information or contra-indications
C5d	Using electronic networks routinely to provide telemonitoring services to patients at their home	Does your practice use the Internet or electronic health networks for any of the following professional purposes? To provide telemonitoring services to patients at their home
C5f	Using electronic networks routinely to interact with patients by e-mail about health related or administrative issues	Does your practice use the Internet or electronic health networks for any of the following professional purposes? To interact with patients by email about health related issues?
D1	Using electronic networks for transfer of patient data	Does your practice use the Internet or electronic health networks for the following kinds of exchange of patient data? a) to exchange *administrative* patient data with other health care providers? b) to exchange *administrative* patient data with reimbursing organisations c) to exchange *medical* patient data with other health care providers and professionals? d) to transfer prescriptions electronically to dispensing pharmacists? e) to receive laboratory reports electronically? f) to exchange medical patient data with any health care provider in other countries?
D1a	Using electronic networks to exchange administrative patient data with other health care providers	Does your practice use the Internet or electronic health networks for the following kinds of exchange of patient data? To exchange *administrative* patient data with other health care providers?
D1b	Using electronic networks to exchange of administrative data with reimbursing organisations	Does your practice use the Internet or electronic health networks for the following kinds of exchange of patient data? To exchange *administrative* patient data with reimbursing organisations
D1c	Using electronic networks to exchange medical data with other health care providers and professionals	Does your practice use the Internet or electronic health networks for the following kinds of exchange of patient data? To exchange *medical* patient data with other health care providers and professionals?
D1d	Using electronic networks to transfer prescriptions electronically to dispensing pharmacist	Does your practice use the Internet or electronic health networks for the following kinds of exchange of patient data? To transfer prescriptions electronically to dispensing pharmacists?
D1e	Using electronic networks to receive laboratory reports electronically	Does your practice use the Internet or electronic health networks for the following kinds of exchange of patient data? To receive laboratory reports electronically?
D4d	Use of security features: e-signatures	Please tell me whether you use any of the following security techniques in your practice. E-signatures
E1	Practice website	Does your practice have its own website and/or is it represented on a joint website operated by a third party?
F1a	GPs agreement to the use of software and IT systems improving the quality of healthcare services	Please tell me whether you agree strongly, agree somewhat, disagree somewhat or disagree strongly with the following statement: The use of software and IT systems improves the quality of healthcare services

8   General practitioner survey questionnaire

No.		Filter	Var	Indicator	Filter	Question	Answers
Introduction and Screening[1]							
S1	Intro 1	ALL	S1	Intro 1	ALL	<u>At reception/switchboard:</u> Good morning/good afternoon. My name is ... . I am calling for ... [name of institute]. Together with empirica we are currently conducting a scientific survey for the European Commission among general practitioners in all countries of the European Union. The topic is the use of information and communications technologies. I would like to talk to the or one of the general practitioners present. **INT.: NOTE: If there is more than one practitioner present** I would like to talk to the one, whose last name comes first in the alphabet. **INT.: NOTE: THIS PERSON SHOULD BE A GENERAL PRACTITIONER.** **INT.: ADD, IF NECESSARY:** Your participation is very important to us, because your practice / institution / organisation has been selected through a statistical procedure that will result in a representative selection of general practitioners in [COUNTRY] **INT.: ADD, IF NECESSARY:** The interview will last approx. 10 minutes **INT.: ADD, IF EXPLICITLY ASKED FOR:** The survey is carried out on behalf of the European Commission.	(1) put through to target person ⇒ CONTINUE (2) target person currently unavailable ⇒ MAKE APPOINTMENT FOR CALLBACK (3) no such person ⇒ TERMINATE (4) refusal to participate ⇒ TERMINATE
S2	Intro 2	ALL	S2	Intro 2	All	<u>At Target Person:</u> Good morning/good afternoon. My name is ... . I am calling for	(1) yes, interview now ⇒ CONTINUE

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[1]   These headers are not read in the telephone interview process.

No.		Filter	Var	Indicator	Filter	Question	Answers
						... [name of institute]. Together with empirica we are currently conducting a scientific survey for the European Commission among general practitioners in all countries of the European Union. The topic is the use of information and communications technologies. Can I just check: Are you a general practitioner in your practice / institution / organisation and can we do the interview now? **INT.: NOTE: THIS PERSON SHOULD BE A GENERAL PRACTITIONER.** **INT.: ADD, IF NECESSARY:** Your participation is very important to us, because your practice / institution / organisation has been selected through a statistical procedure that will result in a representative selection of general practitioners in [COUNTRY] **INT.: ADD, IF NECESSARY:** The interview will last approx. 10 minutes **INT.: ADD, IF EXPLICITLY ASKED FOR:** The survey is carried out on behalf of the European Commission.	(2) yes, but no time at the moment ⇒ MAKE APPOINTMENT FOR CALLBACK (3) no, other person responsible <u>at this location</u> ⇒ ASK TO BE PUT THROUGH TO THAT PERSON, RESPECTIVELY ASK FOR CONTACT DETAILS. AT NEW TARGET PERSON START AGAIN WITH QUESTION S2. (4) no, other person responsible <u>at another location</u> ⇒ ASK FOR CONTACT DETAILS. AT NEW TARGET PERSON START AGAIN WITH QUESTION S2. (5) refusal to participate ⇒ TERMINATE
R1	Age	ALL	AGE	Age	All	How old are you?	Age given: I__I__I 2-digit numerical [DK/ NA]
R2	Number of physicians	ALL	SIZ1	Number of physicians	All	How many physicians work at your practice/ institution, including yourself? **INT: both GPs and Specialist Practitioners, including part-time physicians at your practise or institution**. <u>INT</u>**: If unclear, say:** **"institution" means a health center, hospital, policlinic etc.**	Number of physicians given: I__I__I__I 3-digit numerical [DK/ NA]
R3	Number of	If R2>1	SIZ2	Number of	If SIZ1>1	How many of them are GPs, including yourself?	Number of GPs given:

No.		Filter	Var	Indicator	Filter	Question	Answers
	GPs			GPs		**PROGR.: CHECK** **Answer in R3 must be <= Answer R2!** **IF NOT RE-ASK R3.**	I_|_|_|_| 3-digit numerical [DK/ NA]
R4	Computer access	ALL	COM	Computer access	all	Does your practice/ department of general practice use computers? <u>INT Note</u>: If unclear, say: **"department of general practice" means the unit of the institution the GP works for (in case of health center, hospital or policlinic etc.** **PROGR.: NOTE:** **Please also record those interviews that end at this point (Pos 2 or 3) of the screener and <u>add them to the final data</u>, so that the client can get a sense of the incidence and the relation to the size of the practice.** **I.e. Record QUOTA FAILURES (R4, Pos. 2 or 3) of ALL CONTACTS incl. answer given at R1, R2, R3.**	(1) Yes (2) No → **END** (3) Don't know / NA → **END**
Modul A: Computer use, storage of patient data							
A1	Electronic administrative patient data storage	ALL	APD	Electronic administrative patient data storage	If COM=1	Does your practice electronically record and store individual *administrative* patient data?	(1) Yes (2) No (3) Don't know / NA
A2a	Medical patient data details		MPDa			Does your practice record and store electronically the following kinds of patient identifiable data? **INT.: READ OUT. ONE ANSWER PER ITEM.** a) Symptoms or the reason for encounter	**FOR EACH:**
A2b			MPDb	Medical patient data details	If COM=1	b) Medical history	
A2c		ALL	MPDc			c) Basic medical parameters such as allergies	(1) Yes, routinely
A2d			MPDd			d) Vital signs measurements	(2) Yes, occasionally
A2e			MPDe			e) Diagnoses	(3) No
A2f			MPDf			f) Medications	(4) Don't know / NA
A2g			MPDg			g) Laboratory results	
A2h			MPDh			h) Ordered examinations and results	
A2i			MPDi			i) Radiological images	
A2j			MPDj			j) Treatment outcomes	
A3	Structured data entry	If any of A2a-j= 1 or 2	SDE	Structured data entry	If any of MDPa-j= 1,	Do you enter the medical data into the computer using an interface with structured data entry fields?	(1) Yes (2) No

No.		Filter	Var	Indicator	Filter	Question	Answers
					2		(3) Don't know / NA
A4	Coded data entry	If any of A2a-j= 1 or 2	CDE	Coded data entry	If any of MDPa-j= 1, 2	Do you enter medical data coded according to any classification into the computer or un-coded plain text data, or both?	(1) coded data entry (2) un-coded plain text data (3) both (4) Don't know / NA
Modul B: Computer use in the consultation process							
B1	Access during consultation	ALL	CCO	Access during consultation	If COM=1	Do you have access to a computer in the consultation room?	(1) Yes (2) No (3) Don't know / NA
B2	Use during consultation	If B1=1	UDC	Use during consultation	If CCO = 1	Do you use the computer during consultations?	(1) Yes, routinely (2) Yes, occasionally (3) No (4) Don't know / NA
B3a	Decision support software	ALL	DSSa	Decision support software	If COM=1	Does your practice have a software system that supports you with …(Item) **INT.: READ OUT. ONE ANSWER PER ITEM.** a) diagnosis?	**FOR EACH:** (1) Yes (2) No (3) Don't know / NA
B3b			DSSb			b) with prescribing?	
B4	Decision support software	if either B3a=1 OR B3b=1	DSSu	Decision support software	if either DSSa=1 or DSSb=1	Do you use that software system regularly, occasionally or not at all?	(1) regularly (2) occasionally (3) not at all (4) Don't know / NA
B5	Patient specific support	if (either B3a=1 or B3b=1) <u>AND</u> if any of A2a-j= 1 or 2	PSS	Patient specific support	if either (DSSa=1 or DSSb=1) and If any of MDPa-j= 1, 2	Does this software system give patient-specific advice based on the data you have stored about an individual patient or is it general advice, or both?	(1) patient specific (2) general advice (3) both (4) Don't know / NA
B6	Patient education	ALL	PED	Patient education	If COM=1	Do you use a computer to show patients any health-related information during consultation? **INT: If asked, say:** **"show" has the meaning of "illustrate", i.e. the GP uses the computer together with the patient to show them something or demonstrate something as an advice.**	(1) Yes, routinely (2) Yes, occasionally (3) No (4) Don't know / NA
Modul C: Internet and health network use							
C1	Internet access	ALL	INT	Internet access	If COM=1	Does your practice have access to information on the Internet?	(1) Yes (2) No (3) Don't know / NA
C2	Type of Internet connectivity	If C1=1	CON	Type of Internet connectivity	if INT=1	What type of connection to the Internet does your practice have? **INT.: READ OUT. MULTIPLE ANSWERS POSSIBLE.**	**Multiple answers possible between (1) and (5)** (1) Dial-up Modem

No.	Filter	Var	Indicator	Filter	Question	Answers
					INT: Do not read, read further explanation only if necessary. Explanation in [ ]-brackets only if still unclear: 1 [dial-up access over normal telephone line)], 3 [xDSL, ADSL, SDSL etc], 4 [e.g. cable, leased line (e.g. E1 or E3 at level 1 and ATM at level 2), Frame Relay, Metro-Ethernet, PLC - Powerline communication, etc., may also be wireless], 5 [e.g. analogue mobile phone, GSM, GPRS, UMTS, EDGE, CDMA2000 1xEVDO].	(2) ISDN connection (3) DSL connection (4) Other broadband connection (5) Mobile Internet connection while on the move or outside the practice (6) Don't know type of connection
C3	Access to other health institutions' systems	ALL	HIS	Access to other health institutions' systems	If COM=1	To which of the following organisations or persons is the computer system of your practice connected, either via Internet connection or a dedicated electronic network? **INT.: READ OUT. MULTIPLE ANSWERS POSSIBLE.** **INT.: IF UNCLEAR, SAY:** **This means that only registered persons have access with their own password. We do not mean simple access to the websites of these organisations or persons.**	**Multiple answers possible between (1) and (11)** (1) other GPs (2) specialist practices (3) hospitals (4) laboratories (5) pharmacies (6) care homes (7) patients' homes (8) health authorities (9) insurance companies (10) suppliers (11) others (12) none of these (13) Don't know / NA
C4	Duration of use	If any of C3 Pos. 01-10	EHND	Duration of use	If any of HIS a-j	For how many years has your practice been using these kinds of Internet links or electronic health networks?	(1) 1-2 years (2) 2-5 years (3) More than 5 years (4) Don't know / NA
C5	Internet Uses					Does your practice use the Internet or electronic health networks for any of the following professional purposes? **INT.: READ OUT. ONE ANSWER PER ITEM.**	
C5a		If C1=1 OR any of C3 Pos. 01-10	INUa	Internet Uses	If INT=1 or any of HIS a-j	a) to search for prescribing information, new drug information or contra-indications	**FOR EACH:** (1) Yes, routinely (2) Yes, occasionally (3) No (4) Don't know / NA
C5b			INUb			b) for ordering supplies for your practice	
C5c			INUc			c) for making appointments at other care providers for your patients	
C5d			INUd			d) to provide telemonitoring services to patients at their home	
C5e			INUe			e) to receive automatically any vital signs data from patients' homes	
C5f			INUf			f)to interact with patients by email about health related issues?	
C5g			INUg			g) to interact with patients by email about administrative	

No.	Filter	Var	Indicator	Filter	Question	Answers
					issues such as making an appointment with you.	
C6	Payment for telemonitoring	If C5d=1 or 2	INUe_Pay	Payment for telemonitoring	IF INUd = 1 or 2	You said that you provide telemonitoring services to patients at their homes. Do the patients contribute to the cost? **INT.: IF YES, READ OUT ANSWER OPTIONS.** **INT: If asked, say: payment includes any element of the service itself, the software or the hardware to operate the service.**	(1) Yes, they pay for the whole service (2) Yes, patients pay part of the bill (3) Yes, depending on the condition monitored (4) No, patients do not directly pay for any part of the service (5) Don't know / NA
Modul D: Electronic transfer of patient data						
D1a	Patient data transfer	If C1=1 OR any of C3 Pos. 01-10	PDTa	Patient data transfer	If INT=1 or any of HIS a-j	Does your practice use the Internet or electronic health networks for the following kinds of exchange of patient data…[Item] **INT.: READ OUT. ONE ANSWER PER ITEM.** a) to exchange **_administrative_** patient data with other health care providers?	**FOR EACH:** (1) Yes, routinely (2) Yes, occasionally (3) No (4) Don't know / NA
D1b			PDTb			b) to exchange **_administrative_** patient data with reimbursing organisations	
D1c			PDTc			c) to exchange **_medical_** patient data with other health care providers and professionals?	
D1d			PDTd			d) to transfer prescriptions electronically to dispensing pharmacists?	
D1e			PDTe			e) to receive laboratory reports electronically?	
D1f			PDTf			f) to exchange medical patient data with any health care provider in other countries?	
D2	Consent	If any of D1a-f=1 or 2	CEX	Consent	If any of PDTa-f=1 or 2	How does your practice obtain the patients' consent for patient data storage and transfer? Is it written, orally or is no specific consent obtained?	(1) Written (2) Oral (3) No specific consent obtained (4) Don't know / NA
D3	Inter-operability medical data	If any of D1a-f=1 or 2	IOP	Inter-operability medical data	If any of PDTa-f=1 or 2	When your practice exchanges patient data electronically do you ever encounter data or system compatibility problems?	(1) Yes (2) No (3) Don't know / NA
D4a	Awareness of security features	If any of D1a-f=1 or 2	SECa	Awareness of security features	If any of PDTa-f=1 or 2	Please tell me whether you use any of the following security techniques in your practice. **INT.: READ OUT. ONE ANSWER PER ITEM.** a) Password protected access	**FOR EACH:** (1) Yes (2) No (3) Don't know
D4b			SECb			b) Password protection of sent or received files	
D4c			SECc			c) Encryption of sent or received files and e-mails	
D4d			SECd			d) E-signatures	

No.	Filter	Var	Indicator	Filter	Question	Answers
Modul E: Practice website						
E1	Website	ALL	WEB	Website	If COM=1	Does your practice have its own website and/or is it represented on a joint website operated by a third party? **INT: If unclear, say:** **simple entries in online yellow pages do not count here.**	(1) Yes (2) No (3) Don't know / NA
Modul F: Attitudes, motivation and barrier						
F1a	Attitudes, motivation and barriers		ATTa			Please tell me whether you agree strongly, agree somewhat, disagree somewhat or disagree strongly with the following statements. **INT.: READ OUT. ONE ANSWER PER ITEM.** a) the use of software and IT systems improves the quality of healthcare services	**FOR EACH:**
F1b		ALL	ATTb	Attitudes, motivation and barriers	If COM=1	b) the use of software and IT systems in health should be included in the medical education	1) agree strongly (2) agree somewhat (3) disagree somewhat (4) disagree strongly (5) Don't know / NA / haven't thought about it yet.
F1c			ATTc			c) to really benefit from IT, all health actors have to share clinical information in a network	
F1d			ATTd			d) IT systems would be more used if GPs were provided with more training.	
F1e			ATTe			e) Your practice would need better support with the maintenance of your IT system	
F1f			ATTf			f) The cost of IT is ultimately the decisive factor on the use of ICT	
F1g			ATTg			g) the use of tele-monitoring will in the future allow physicians to treat people with chronic conditions better	
Modul G: Perceived impacts						
G1a	Impact of ICT and eHealth	If any of C3 Pos. 01-10 **OR** any of D1a-f =1 or 2 **OR** any of A2a-j= 1 or 2	IMPa	Impact of ICT and eHealth	If any of any of HIS a-j mentioned or any of PDTa-f =1 or 2 or any of MPDa-j= 1,2	In what ways has the use of information technology systems changed the work in your practice? Has it had a positive influence, a negative influence, or no change at all on … [item] **INT.: READ OUT. ONE ANSWER PER ITEM.** a) your personal working processes	**FOR EACH:** (1) positive (2) negative (3) no influence (4) Don't know / NA
G1b			IMPb			And has it had a positive, a negative, or no influence at all on b) the working processes of your practice staff	
G1c			IMPc			c) on the quality of diagnosis and treatment decisions	
G1d			IMPd			d) on the doctor-patient relationship	
G2e	Impact of ICT and eHealth	If any of C3 Pos. 01-10 **OR** any of D1a-f =1 or 2 **OR**	IMPe	Impact of ICT and eHealth	If any of any of HIS a-j mentioned or any of PDTa-f =1 or 2 or any of	Has the use of information technology systems and software increased, decreased or not influenced. .. [item] **INT.: READ OUT. ONE ANSWER PER ITEM.** e) the average number of patients you can help in one day	**FOR EACH:** (1) increased (2) decreased (3) no influence (4) Don't know / NA
G2f			IMPf				

No.		Filter	Var	Indicator	Filter	Question	Answers
		any of			MPDa-j= 1,2	f) the workload on your support staff, for instance nurses	
G2g		A2a-j= 1 or 2	IMPg			g) the number of patients who come to your practice	
G2h			IMPh			h) the scope of services offered by your practice	
Modul H: Internet research by patients							
H1a	Patients' Internet research	ALL	PIRa	Patients' Internet research	If COM=1	Some patients use the Internet to search for information about their conditions. How often has the following occurred recently with regard to health related information patients found on the Internet: **INT.: READ OUT. ONE ANSWER PER ITEM.** a) Your patients wanted to discuss the information during consultation	**FOR EACH:** (1) often (2) sometimes
H1b			PIRb			b) Your patients misapplied or misunderstood the information.	(3) rarely
H1c			PIRc			c) The Information patients found was beneficial for your patients	(4) never (5) Don't know / NA
H1d			PIRd			d) chronically ill patients told you that the Internet is helping them in the self-management of their illness	
H1e			PIRe			e) How often have you recommended specific websites to your patients?	
Modul I: Use of ICT for CME/CPD							
I1	Continuous education via Internet	ALL	CEIa	Continuous education via Internet	If COM=1	Have you used the Internet, or computers for your continuous medical education (CME) or continuous professional development (CPD) during the last 12 months?	(1) Yes (2) No (3) Don't know / NA
Modul J: More respondent and practice demographics							
						We now have only a few short questions left for our statistics	
J1	Sex	ALL	SEX	Sex	If COM=1	*Taken by interviewer*	(1) Male (2) Female
J2	Location	ALL	LOC1	Location	If COM=1	*Community name taken from address info*	_____ *(string)*
J3	Location	ALL	LOC2	Location	If COM=1	*Community name taken **from address info** and matched with **Eurostat classification** list (code A, B, C)*	((1) (A) Densely populated area (2) (B) Intermediate area (3) (C) Thinly populated area (rural)
J4	Number of Patients	ALL	PAT	Number of Patients	If COM=1	Has the number of patients of your practice been decreased, stable or growing over the past two years?	(1) decrease (2) stable (3) growing (4) Don't know / NA
J5	Maintenance contract	ALL	SMC	Maintenance contract	If COM=1	Does your practice get support or maintenance for its IT system and applications by a professional service provider?	(1) Yes (2) No (3) Don't know / NA
		ALL			All	These were all the questions we had. Thank you very much indeed for your co-operation.	

No.		Filter	Var	Indicator	Filter	Question	Answers
		ALL			All	One final question: May we contact you again for a follow-up survey in the future? **INT.: IF YES, asked:** For this purpose could you provide us your e-mail address. **INT.: Make sure you record the correct e-mail address.**	(1) Yes (2) No (3) NA If yes: e-mail: _____ *(string)*