

## **ICT and Electronic Business in the Health and Social Services Sector in the EU**

An e-Business Sector Impact Study by the  
European *e-Business W@tch*

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## Introduction

European policy is, in a number of areas, including economic, innovation and SME policies, increasingly focused on promoting the business techniques and new ways of working which will provide the economic and social foundation of the information society in Europe. To help policy makers define their programmes, and to monitor the effectiveness of these policies, some indication of progress and of areas requiring active support is essential. At the same time, many areas of European business lack information about the speed of technological update in European markets, which they expect to have a strong impact on their global competitiveness.

Despite the increasing number of studies and market research projects from numerous international authors and research organisations on electronic business and especially on electronic commerce, there is still a lack of reliable empirical information on the factors affecting and the extent, scope, nature of the speed of e-business development in Europe at the sectoral level in an internationally comparative framework. This report aims to provide such information for the insurance and pension-funding sector.

This report has been published in the framework of the "European e-Business Market Watch" (the "*e-Business W@tch*"). This is a market observatory established by the European Commission, DG Enterprise, in January 2002. During the first 18 months period, the *e-Business W@tch* monitors and assesses the maturity of electronic business in 15 industry sectors across all EU Member States, including seven manufacturing and eight service sectors. The sectors and the publication schedule for these reports are as follows:

	Sector	1 <sup>st</sup> Issue Report	2 <sup>nd</sup> Issue Report
1	Food, beverages, tobacco	August 2002	January 2003
2	Publishing, printing and audio-visual services	October 2002	April 2003
3	Manufacture of chemicals and chemical products	August 2002	January 2003
4	Manufacture of Metal products	October 2002	April 2003
5	Manufacture of machinery and equipment	October 2002	April 2003
6	Manufacture of electrical machinery and electronics	October 2002	April 2003
7	Manufacture of transport equipment	August 2002	January 2003
8	Retail	October 2002	April 2003
9	Tourism	October 2002	April 2003
10	Credit institutions, investment firms, leasing enterprises	August 2002	January 2003
11	Insurance and pension-funding services	August 2002	January 2003
12	Real estate activities	October 2002	April 2003
13	Business Services	October 2002	April 2003
14	Telecommunications and computer related services	August 2002	January 2003
15	Health and social work	August 2002	January 2003

The research presented in these Sector Reports is intended to help to benchmark progress and to assess how electronic business development can be further enhanced at the European level or at Member State level with the objective of strengthening the competitiveness of European businesses. While the main target of the first series of sector reports (published in August 2002) was to provide a thorough portrait of the background and challenges related to e-business in the sectors, this report focuses on presenting the results of a recent survey:

Most of the data presented in this report are based on the European e-Business Survey, a cornerstone of the monitoring activities of the *e-Business W@tch*. The fieldwork of this enterprise survey was carried out by INRA Germany GmbH in co-operation with its international partner organisations in June and July 2002 using computer-aided telephone interview (CATI) technology. The decision-maker in the enterprise targeted by the survey was normally the person responsible for ICT within the company, typically the IT manager. Alternatively, particularly in small enterprises without a separate IT

unit, the managing director or owner was interviewed. In total, more than 9,200 interviews with decision-makers in European enterprises were conducted. The survey included all sectors and all Member States, but only in the four largest states (Germany, France, Italy and UK) were all sectors covered. The survey for the *health and social services sector* was carried out in the following seven countries: Belgium, France, Germany, Ireland, Italy, Finland, and the UK.

Further methodological information is provided in the annex. More information about the *e-Business W@tch* in general is available at [www.ebusiness-watch.org](http://www.ebusiness-watch.org).

# Health and Social Services: Sector Profile & e-Business

## 1 Economic profile

### 1.1 Introduction

Concerning e-business<sup>1</sup> applications, *health and social services* is a particularly interesting sector. On the one hand,

- it is a leading sector as far as economic impact, growth and employment relevance is concerned;
- has already been for quite some time under considerable cost containment pressure and is expected to come under even more pressure in coming years due to an ageing society with a projected negative impact on the economic basis of our society, on taxes and social security systems.

On the other hand, healthcare

- has the lowest penetration of ICT applications and Internet business solutions; but,
- is expected to provide the greatest cost savings potential from e-business applications of all service sectors; and,
- has been forecast to lead – due to its innovative power and (future) holistic applications for wellness and sustainability – the next (6th) Kondratieff wave of economic growth and prosperity.

The health and social services sector in the EU is both heterogeneous and complex, with a wide variety of participants and types of “businesses” catering to a similarly varied and complex set of “customers”. This chapter:

- defines the sector and the focus of analysis;
- presents key economic indicators – employment and expenditure – for major participants in this field: hospitals, office-based doctors and health centres, and social work;
- briefly discusses national structures and the public/private mix in Member States;
- reviews EU policy issues;
- outlines longer-term trends which will fundamentally impact on the development of our economies and societies, and which will have particularly pronounced implications for the health sector, and
- reviews some basic information on the European healthcare ICT market.

### 1.2 Definition and focus

In section N "Health and social work" of NACE (Rev. 1; similar to ISIC Rev. 3) division 85 "Health and social work" comprises three groups: *human health activities* (85.1), *veterinary activities* (85.2) and *social work activities* (85.3). The *e-Business W@tch* health sector reports concentrate on those sub-sectors where networking with other health institutions is of particular importance and where ICT ("e-health") can be expected to play a relatively more important role. In particular, they focus on *hospital activities* (85.11), *medical practice activities* (85.12) and *social work activities* (85.3).

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<sup>1</sup> In this sector also sometimes named *e-health* applications, a term usually used in a somewhat different way, mainly focusing on customer-facing and less on back-office services.

## Human health activities

Human health activities (N 85.1) represent an extremely complex and varied environment for the application of information and communication technologies (ICTs). Whereas ICT systems and services supporting primarily administrative, logistic and to some extent individual professional activities are routine, applications in fields related to medical information exchange, communications amongst health organisations and with patients/citizens, and remote delivery of healthcare services have generally not yet progressed beyond the experimental and pilot stage. Considering this situation and the wide variety of health service providers, the analyses will focus on the two key actors in this field:

### a) Hospital activities (85.11)

Hospitals are essentially small to medium-sized organisational/business enterprises. There are about 15,000 hospitals in Europe, of which about 8,000 are acute/general hospitals, 6,000 are long-term/rehabilitation hospitals and 1,000 are psychiatric hospitals. They vary widely in size. The "average" hospital has about 200 beds, with four or five departments and more than 30 doctors and 100 nurses. There are a lot of small hospitals (about 40% have fewer than 100 beds and a further 21% have between 100 and 199 beds) and many of these are in rural areas. The majority of hospitals are publicly owned and/or publicly financed (87%), with a growing minority of private hospitals (13%).

According to NACE, this class comprises medical care activities and accommodation activities; it "includes short- or long-term hospital activities of general or specialised hospitals, sanatoria ... The activities are chiefly directed to in-patients."

### b) Medical practice activities (85.12):

Defined by NACE, "these activities can be carried out in private practice, group practices and in hospital out-patient clinics."

Office-based doctors (and other non-hospital services) are typically small or even micro enterprises. Outside of the hospital sector there are in Europe almost 350,000 General Practitioners (GPs), organised into about 190,000 GP practices, and 8,000 primary care centres as well as more than 120,000 specialist practices.

This class excludes paramedical activities such as those of midwives, nurses and physiotherapists (included in 85.14).

## Social work activities

*Social work activities* (N 85.3) constitute again an extremely heterogeneous and diverse group. It divides into social work activities *with accommodation* (85.31) and social work activities *without accommodation* (85.32). It covers a wide variety of institutions and types of services, many of which have little economic relevance. Organisations providing social (care) services to, or at, the client's home are a key segment within this group, and as the European population is ageing, this segment is also expected to grow in proportion.

## 1.3 Structure and economic indicators

### 1.3.1 Healthcare services model and key actors

The health and social work sector is characterised by a wide variety and very large number of actors, and by their diverse and complex relationships and interactions. These, at the same time, provide a wide open field for potential e-business applications, but also imply many barriers and obstacles.

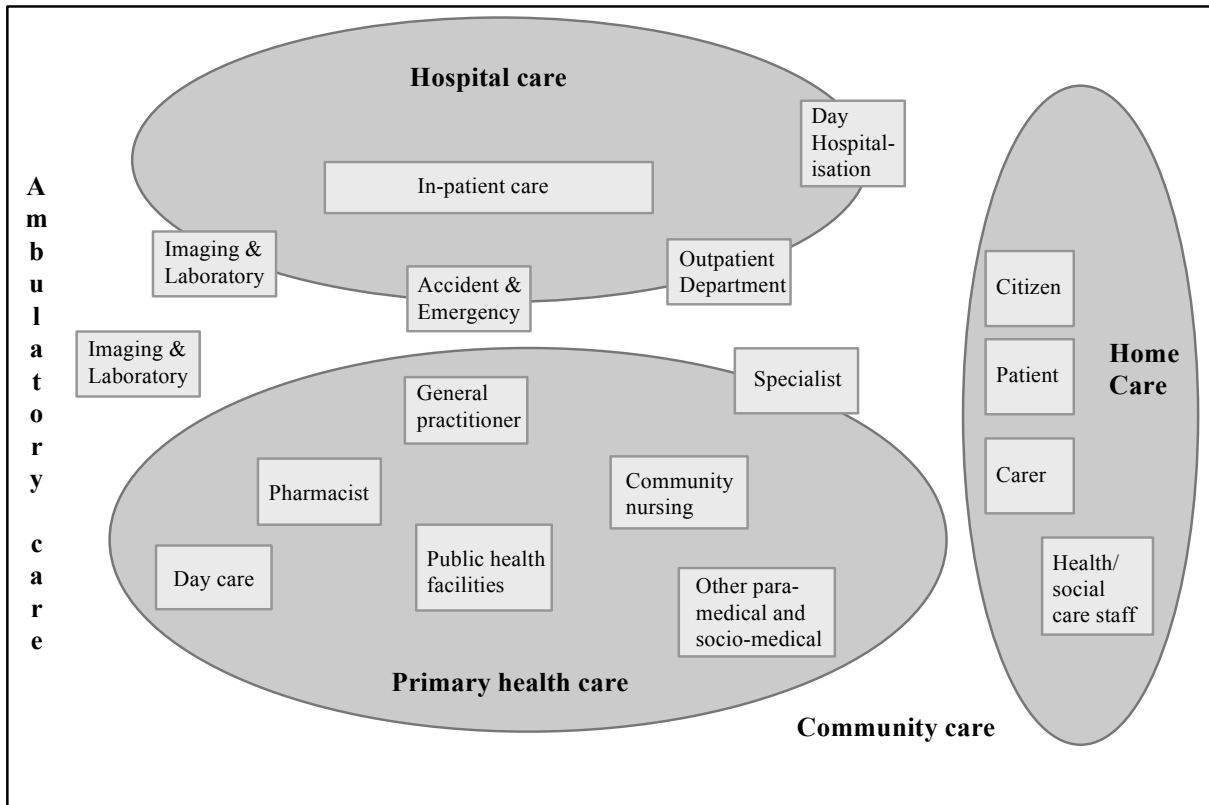
### Generic model of healthcare services

Figure 1-1 presents a schematic model of the structure and organisation of healthcare service provision in a "typical" European country. It indicates a number of levels at which healthcare services can be structured or organised. The extent to which there are clear and/or rigid boundaries between the identified sectors and levels varies across Member States.

One common distinction is between primary and secondary levels of healthcare. The term primary care is usually used to refer to the range of services provided outside the hospital by general practitioners and a variety of other players such as dentists, community pharmacists and community nurses. The concept is often used to denote locally-based services that are available to everyone, including points of contact for initial consultations by patients needing advice or treatment, ongoing care in the home or community and preventative services. Primary care services typically act as gatekeepers for referral to secondary care involving more specialist treatment.

Another distinction is often made between care provided in institutional residential settings (mainly in-patient hospital care) and ambulatory care (care provided on a non-residential basis, including primary care services and hospital out-patient services). Ambulatory care outside of hospitals is often referred to as community care. Apart from care in formal settings such as doctors' offices, it also includes care delivered to, or in, the home.

Figure 1-1: Schematic model of healthcare services



## Hospitals

Hospitals form a central part of the healthcare systems in all European countries, typically involving between 35% and 50% of total healthcare expenditure. A variety of different functions can be defined for hospitals:

- in-patient care;
- out-patient care;
- accident & emergency;
- diagnostic imaging and pathology (laboratory testing);
- professional and technical education;
- research;
- prevention and health promotion.

There are a number of issues, trends and changes in the hospital sector that have relevance for later analysis. Some of the main ones are:

- cost containment through changes in financing and reimbursement arrangements;
- reduction in length of stay;
- movement of care and procedures to settings outside of the hospital;
- improved co-ordination with services outside of the hospital;
- efforts to rationalise technology and other high cost facilities;
- consolidation of hospitals into larger establishments;
- development of community and local hospital facilities;
- increased competition amongst hospitals.

## Medical practice activities

Office-based doctors, health centres and other establishments

For non-hospital or ambulatory services the main delivery settings are doctors' offices, community health centres and a variety of other forms of establishment. These services are provided by a wide range of medical, paramedical and social service professionals. Some of the main ones are:

- doctors (general practitioners – GPs – and specialists);
- dentists;
- nurses;
- pharmacists;
- physiotherapists;
- occupational therapists;
- social workers;
- home carers (trained and untrained).

Traditionally, fairly clear boundaries have tended to be defined between "medical" and "social" services. This often resulted in poor communications across the sectors and a lack of co-ordination and continuity of care for patients. In many countries there are now moves to better integrate the medical and social aspects. The ageing population and the desire to reduce expensive and inappropriate institutional and/or in-patient care are encouraging this. Home care by social care professionals and by non-professionals is becoming increasingly important, although services are still underdeveloped in many countries.

There have been a number of trends and changes in non-hospital healthcare services that are relevant for ICT developments. These include:



- *Older people*, in particular, make higher usage of healthcare services; there are now almost 80 million European citizens aged 60 years or older (21% of the population), including more than 2 million aged 90 years or older; more than 24% of households have a person aged 65 years or older living in them, with about half of these involving an older person living alone.
- At any point in time there are large numbers of patients needing specific *health and care support at home*; this may be after hospital discharge (about 60 million per year) or because of on-going chronic disease (more than 20 million people have one or more disease such as cancer, diabetes, chronic obstructive respiratory disease, ischaemic heart disease or cerebrovascular disease), or because of difficulties in leaving home due to disability (more than 7 million people).

### 1.3.2 Employment relevance

In the following, data available on employment in the sector under consideration are presented. Though relatively complete data covering all Member States are available only for 1998 or earlier, they nevertheless provide a good first assessment of the labour market relevance and importance of this sector.

#### Overall employment in health and social services

The data in Table 1-2 on the next page show that the health and social services sector employs almost 10% of the active European labour force, i.e. it is a key sector in terms of its relevance for employment and the labour market in the Union. In some northern countries the values are significantly higher, with 19% in Sweden and 17% in Denmark. At the other end are southern countries like Portugal with 4.1%, Greece with 4.7% and Spain with 5.4%. These differences probably reflect a strong north-south gradient in terms of social service employment; when looking at the data for healthcare professionals, the differences are much more moderate. Remarkable also is the high proportion – almost one third – of professional employment in the sector, which furthermore underlines the key importance of this sector for employment in the EU.

#### Hospital employment

Hospitals are the major employers in this sector, with about one third of overall employment and more than 40% of professional employment. Table 1-1 provides estimations of hospital employment in Europe for total employment, and for doctors and nurses separately.

**Table 1-1: Hospital employment (1997 or latest available year)**

	<b>Total employment</b>	<b>Doctors</b>	<b>Nurses</b>
EU 15	5,000,000	550,000	1,500,000

Source: Estimations derived from WHO, 2000; OECD, 1999

Table 1-2: Employment in the health and social care sector: professional and total employment, all Member States, 1998

Country	Total employment									
	Healthcare, veterinary, social care									
	Healthcare professionals									
Physicians	Dentists	Pharmacists	Nurses and Midwives	Physiotherapists	Total	% of total employment	Total	% of total employment	Total	% of total employment
B	40,291	7,106	14,772	:	25,009	87,178	2.26	417,000	10.81	3,857,000
DK	:	4,857	2,404	39,542	:	46,803	1.75	456,000	17.02	2,679,000
D	287,032	62,277	47,322	785,000	22,558	1,204,189	3.39	3,389,000	9.54	35,537,000
EL	44,753	11,947	8,767	38,778	:	104,245	2.63	185,000	4.66	3,967,000
E	171,494	16,133	46,761	192,598	2,336	429,322	3.26	716,000	5.44	13,161,000
F	191,700	39,457	58,839	373,938	49,341	713,275	3.17	2,355,000	10.48	22,469,000
IRL	8,102	1,713	2,649	59,010	1,294	72,768	4.86	114,000	7.62	1,496,000
I	335,786	31,437	60,974	262,002	:	690,199	3.39	1,291,000	6.34	20,357,000
L	1,299	257	292	3,164	278	5,290	3.09	12,000	7.02	171,000
NL	46,101	8,172	2,922	197,183	27,823	282,201	3.81	987,000	13.33	7,402,000
A	30,110	3,619	4,337	71,849	:	109,915	3.03	291,000	8.03	3,626,000
P	31,087	3,322	7,505	37,747	:	79,661	1.67	198,000	4.16	4,764,000
FIN	15,436	4,833	7,462	111,447	9,484	148,662	6.82	305,000	14.00	2,179,000
S	24,610	7,667	5,967	73,562	7,858	119,664	3.03	756,000	19.16	3,946,000
UK	:	25,801	:	534,206	15,206	575,213	2.14	2,938,000	10.93	26,883,000
EU	1,227,801	228,598	270,973	2,780,026	161,187	4,668,585	3.06	14,410,000	9.45	152,494,000

Source: Eurostat, Labour force survey, Chronos database

### 1.3.3 Economic importance

Apart from its fundamental importance for the health and well-being of European citizens, the healthcare sector is also important from an economic point of view. Table 1-3 shows that in 1997<sup>2</sup> the total expenditure in the healthcare sector was more than 620 billion euro, representing more than 8% of GDP<sup>3</sup>.

*Table 1-3: Healthcare expenditure in the EU (1997)*

	Total expenditure M euro	Total expenditure as % of GDP	Public expenditure M euro	Public expenditure as % of total expenditure	Public expenditure as % of GDP	Total expenditure per capita Euro (ppp)	Public expenditure per capita Euro (ppp)
B	16,284	7.6	14,261	87.6	6.7	1,634	1,431
DK	12,017	8.0	10,075	83.8	6.7	1,865	1,564
D	197,985	10.7	152,551	77.1	8.3	2,231	1,719
EL	9,105	8.6	5,252	57.7	5.0	1,118	645
E	34,734	7.4	26,437	76.1	5.6	1,102	839
F	118,351	9.6	87,852	74.2	7.1	1,915	1,422
IRL	4,293	6.3	3,293	76.7	4.9	1,239	950
I	76,712	7.6	53,646	69.9	5.3	1,484	1,038
L	967	7.0	888	91.8	6.4	2,183	2,004
NL	27,390	8.5	19,897	72.6	6.2	1,753	1,274
A	15,029	8.3	10,967	73.0	6.0	1,767	1,290
P	7,050	7.9	4,230	60.0	4.7	1,051	630
FIN	7,863	7.4	5,975	76.0	5.7	1,412	1,073
S	17,341	8.6	14,451	83.3	7.2	1,616	1,347
UK	77,309	6.8	65,425	84.6	5.8	1,291	1,093
EU 15	622,430	8.0	475,200	76.3	6.1	1,577	1,221
US	966,712	13.9	448,737	46.4	6.5	3,827	1,776
JAP	264,809	7.2	211,555	79.9	5.7	1,588	1,269

Source: Eurostat, 2001

It can also be seen from Table 1-3 that expenditure per capita varies significantly across countries. Total expenditure per capita in 1997 (adjusted for purchasing power) averaged 1,577.4 Euro and ranged from a low of 1,051 Euro in Portugal to a high of 2,231 Euro in Germany. Public expenditure per capita averaged 1,221.3 Euro and ranged from 630 Euro in Portugal to 2,004 Euro in Luxembourg.

### 1.3.4 National structures of healthcare systems

#### The public-private mix in financing

The nature of the European healthcare sector as regards the public-private mix in financing and delivery of services is an important factor to consider. This context seems to have a quite considerable influence on the propensity and also the financial ability to invest in e-business solutions.

Most of the healthcare expenditure in Europe is by the public sector, although the extent of public-private mix varies considerably by Member State. Overall, public expenditure averaged 76.3% of total

<sup>2</sup> The last year for which a complete set of figures is available.

<sup>3</sup> The unweighted average across countries is just over 8%. This increases when weighted for the differences across countries in GDP levels and in the respective proportions taken up by healthcare expenditure.

expenditure<sup>4</sup>, with the proportion varying from 57.7% in Greece to 91.8% in Luxembourg. Behind these global figures there is also considerable variability in the ways that the public and private components are actually funded.

In the different Union Members, social insurance, general taxation, private insurance and out-of-pocket co-payments by patients are involved in varying mixes. Overall, four main clusters of countries can be defined (cf. Table 1-4). Typically, countries have systems that are mainly based either on general taxation or on compulsory social insurance. Various supplementary systems are also commonly in place, involving different mixes of private voluntary insurance, direct out-of-pocket payments by consumers and, for the social insurance countries, top-ups from general taxation.

**Table 1-4: The main clusters of countries as regards financing models**

Country	Predominant system of finance	Main supplementary system of finance
Finland, Greece, Ireland, Italy, Sweden, Spain, UK	Public: Taxation	Private voluntary insurance, direct payments
Denmark, Portugal	Public: Taxation	Direct payments
Austria, Belgium, France, Germany, Luxembourg	Public: Compulsory social insurance	Private voluntary insurance, direct payments, public taxation
Netherlands	Mixed compulsory insurance and private voluntary insurance	Public taxation, direct payments

Source: SATS, 2001

### Public-private mix in healthcare delivery

With respect to the public-private mix in the delivery of healthcare services, quite a varied situation prevails both across and within Member States. In some countries, the public sector is the main player in all aspects of service delivery, including ownership of hospitals and employment of doctors. In other countries, private sector (for-profit and/or non-profit) organisations have a central role. In many cases, a large number of doctors are self-employed and work in private practice.

## 1.4 The healthcare sector in European policy

Though health and social care is still a national responsibility, the European Union has also impacted on this sector over the years, particularly in fields related to Information Society technologies.

The Community's role in public health has expanded over time and health policy, per se, has been increasing in importance at European level. This is reflected in the revised provisions in the Amsterdam Treaty (Article 152) and in the subsequent Communications on health policy by the Commission<sup>5</sup>.

Independent of mainstream Community healthcare policy, the evolution of the internal market also has significant implications for the healthcare sector. At present, the bulk of healthcare provision and expenditure in Europe occurs within national boundaries. However, there has been a sizeable amount of cross-border activity for quite some time, and this will open up new opportunities for e-business services.

It is likely that the evolution of the single market will facilitate and encourage increased transnational healthcare. For example, the European Court has already made two important judgements as regards the rights of citizens of one country to seek services in another country and to have these reimbursed

<sup>4</sup> Unweighted average

<sup>5</sup> Communication on the development of Public Health policy in the European Community, COM (98) 230 Final, April 15 1998; Communication on the Health Strategy of the European Community, COM (2000) 285 Final, May 16 2000.

by their home country<sup>6</sup>. These judgements are showing that the rights of European citizens and the internal market for services are beginning to coalesce in a newly pan-European healthcare market.

The Community strategies and actions in relation to the Information Society have been consolidated within the eEurope initiatives. The first eEurope communication in December 1999<sup>7</sup> included attention to the healthcare sector. There it was stated that "secure services have to be developed linking hospitals, laboratories, pharmacies, primary care centres and homes of people in order to meet the double challenge of improving the quality and accessibility of healthcare whilst constraining overall costs". The follow-up Communication in early 2000<sup>8</sup> included an ambitious set of five proposed actions and targets for health online/eHealth to be realised by the end of 2002. These objectives were further developed in the eEurope2005 action plan.<sup>9</sup>

A full realisation of all of these proposals across all Member States will, of course, provide an important stimulus for the further development of e-business in the healthcare sector.

## 1.5 Longer-term trends

Population ageing is consistent across the globe. At the start of the twenty-first century, the world population included about 600 million people aged 65 and older (10% of the world population), triple the number recorded 50 years earlier (or 8% of the world population in 1950). By mid-century, there will be some 2 billion older persons (21%), once again a tripling of this age group in a span of 50 years.<sup>10</sup>

An ageing population has considerable implications and expected impacts on a wide variety of socio-economic factors and processes, such as economic growth, capital markets, pension systems, but also on technical progress and innovations, education and human capital, family and household structures - and last, but not least, on the health and social care system. It implies that the prevalence of chronic diseases will grow and the number of disabled persons rise. "Evidence of age-related rationing of health interventions has been documented in some countries in the European Region. ... One can expect that the age-related rationing would become more prominent because of the pressures on the health systems created by the increasing proportion of older people."<sup>11</sup>

On the other hand, "much of the economic contribution of the older population goes unrecognised. Older people make substantial contributions in unpaid work in such areas as agriculture, informal care giving and services. Many European economies depend on these activities, but include few of them in their assessment of gross national product, often leaving the contributions made by older citizens

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<sup>6</sup> European Court of Justice: Case C-120/95 [Nicolas Decker v Caisse de maladies des Employés Privés] 28 April 1998; Case C-158/96 [Raymond Kohl v Union des Caisses de Maladie] 28 April 1998.

<sup>7</sup> eEurope: An information society for all. Communication on a Commission Initiative for the Special European Council of Lisbon. March 23-34 2000. COM (1999) 687 final

<sup>8</sup> eEurope: An information society for all. Draft Action Plan. Prepared by the European Commission for the European Council in Feira, June 19-20.

<sup>9</sup> European Commission: eEurope 2005: An information society for all. Brussels, 28.5.2002. COM(2002) 263 final.

<sup>10</sup> See, e.g., Eurostat and European Commission (2001): *The social situation in the European Union 2000*, Brussels; Population Division of the United Nations (2001), Department of Economic and Social Affairs (DESA): *World Population Prospects - The 2000 Revision - Highlights*, New York; for detailed data by country, Population Division of the United Nations (2001), Department of Economic and Social Affairs (DESA): *World Population Prospects: The 2000 Revision, vol. I, Comprehensive Tables*, New York. For EU data: European Commission (1998). *Demographic Report - 1997*. Luxembourg, Office for Official Publications of the European Communities and McMorow, Kieran and Roeger, Werner (1999): *The Economic Consequences of Ageing Populations* (A comparison of the EU, US and Japan). Economic Papers of the Directorate-General for Economic and Financial Affairs, No. 138. Brussels, Belgium: European Commission

<sup>11</sup> World Health Organization (2002): *The European Health Report 2002*. WHO Regional Office for Europe, Copenhagen (WHO regional publications, European Series, No. 97), p. 62.

unnoticed and undervalued.”<sup>12</sup> Europe will indeed need considerably more informal carers if health and care systems are to remain sustainable.<sup>13</sup> The fastest growing population segment are those 80 years and older, who are also most in need of supportive care at home and in institutions.

Traditionally, there has been a tendency to draw fairly clear boundaries between "medical" and "social" services and between hospital and ambulatory care. Often this has resulted in poor communication across the sectors, with a lack of co-ordination and continuity of care for patients. In many countries there are now moves to better integrate the medical and social aspects. The ageing of the population and the desire to reduce expensive and inappropriate institutional and/or in-patient care are encouraging this. Home care by social care professionals and by non-professionals is becoming increasingly important.

The health sector is today already one of the leading sectors of all industrialised societies. It is to be expected that health in a wider, holistic sense - by encompassing wellness, personal development, environmental protection, biotechnology and the like - will further develop into *the* new leading industry of the 21st century.

## 1.6 The European healthcare ICT market

It was estimated that the European Healthcare Information Society Technology (HIST) market amounted to approximately 11 billion Euro<sup>14</sup> in 2001, which would account for less than 2% of the total western European ICT market of about 643 billion Euro p.a.<sup>15</sup> Considering the economic relevance of the health sector for the EU with total expenditure of more than 8% of GDP, this HIST market value is very low and amounts to about 1.6% of the overall EU healthcare market estimated at 700 billion Euro for 2001<sup>16</sup>. In the hospital sector, for example, the level of total annual IT investment is estimated at only 1.2% of all expenditures as compared to 2.5% in the USA<sup>17</sup> and up to 10% (for ICT) and more in other information-intensive sectors such as financial services<sup>18</sup>. Also for the USA, it is estimated that “with a 50% penetration, Healthcare has the lowest penetration of Internet business solutions,”<sup>19</sup> but at the same time it is assessed that this sector may have the greatest upside with regards to cost savings in the future.<sup>20</sup>

Considering the relevance of the health sector for economic activity and employment, this state of affairs may be surprising. But when reflecting on the earlier discussions, a variety of factors come to mind which help to explain this situation: the wide variety and complexity of national healthcare

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<sup>12</sup> Ibid.

<sup>13</sup> Eurostat and European Commission (2001): *The social situation in the European Union 2000*, Brussels, p.46.

<sup>14</sup> Calculation based on Deloitte & Touche (2000), p. 187: “The global market for HIST is estimated at 33 billion Euro in 1999, with Europe [Western ?] accounting for 23%. With an annual growth rate of 20%, it is likely to increase [globally] to 65 billion Euro in 2002.”

<sup>15</sup> EITO (2002): *European Information Technology Observatory 2002* (10<sup>th</sup> ed.), Frankfurt/Main, pp. 53 ff. Western Europe is defined as EU plus Switzerland and Norway. For Europe (Western and Eastern Europe) the value for 2001 is 673 billion, of which the HIST market share would be 1.6% only.

<sup>16</sup> Eurostat (2001), Key data on Health 2000, see *Table 1-12* above. The value for 1997 was 622 billion Euro. Assuming an annual growth rate of 3%, the value for 2001 is 700 billion Euro.

<sup>17</sup> Deloitte & Touche (HIST study, 2000): *The Emerging European Health Telematics Industry – Health Information Society Technology-based Industry Study*, on assignment of European Commission-Directorate General Information Society, p. ii.

<sup>18</sup> PwC Consulting (2001): *E (Health) Transformation: Managing healthcare in a networked world*. London, p. 5, estimate a value of 2-3% for ICT in the health sector.

<sup>19</sup> Varian, Hal et al. (2002): *The Net Impact Study – The Projected Economic Benefits of the Internet in the United States, United Kingdom, France and Germany* (V.2.0) at <http://www.netimpactstudy.com> (June 2002)

<sup>20</sup> Litan, R. and Rivlin, A. (2001) *The Economic Payoff from the Internet Revolution*. Brookings Task Force on the Internet. Washington, D.C.: The Internet Policy Institute, Brookings Institute Press.

systems, the varying and shifting public/private mix of delivery and financing, the size structure of the establishments, the complexity of communications relationships, the wide variety of business partners and the particular type of customers. All of these and additional factors render an analysis of the sector particularly challenging, and the dearth of detailed information and hard facts on ICT and e-business applications in this sector confirms this.

## 2 Usage of ICT and e-business

This chapter will first review key results from the initial *e-Business W@tch* report for the health and social services sector. It summarises major data, trends and insights - thus setting the scene for the discussion of the new results which became available from the recent *e-Business W@tch* representative market surveys. These later sections will cover topics like readiness of and infrastructure available in health and social work institutions, human resources, the availability of customer-facing and back-office applications, and a general assessment of impacts and barriers as well as of the perspectives for e-business.

### 2.1 ICT and e-business - the first report

Deployment of e-business applications has only recently started in the health sector. It will continue to be a never-ending stream of work, and implementation and diffusion will never be “complete”. “Adoption of Internet business solutions, while driven by specific firm-level needs, seems to have followed a common progression across most organisations. Across all industries, adoption rates for E-Marketing, Customer Service & Support, and E-Commerce solutions were higher, suggesting that most organisations tackled customer-facing solutions first before focusing on back-office solutions.”<sup>21</sup> This also holds for the health sector.

#### 2.1.1 Customer-facing solutions

##### Hospitals

Hospitals in most EU Member States are currently already well equipped with access equipment, access to advanced networks and access to the Internet. In other words, the (technical) basis for developing e-business applications is in most instances in place.

The percentage of hospitals actively engaging in customer-facing applications such as e-marketing on the world wide web (WWW) varied widely across the EU (Table 2-1) in 1999. Whereas for Finland (100%), Portugal (100%) and Sweden (80%) the expert estimates were very high, the values for most Member States were only around 30% or lower. However, cursory evidence and discussions in professional journals indicate that e-marketing, i.e. presence of a website, with sometimes the first steps integrated towards customer service and support, is fast gaining hold amongst many hospitals in Europe. In the UK, with a centralised National Health Service (NHS), NHS Direct is a prime example of this.

##### **NHS-Direct**

*The UK National Health Service NHS-Direct service is a 24 hours a day, seven days a week, 365 days a year service providing information and advice to members of the public calling through a single national telephone number. Callers seeking medical advice are assessed by nurses using advanced computer clinical decision support software to*

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<sup>21</sup> Varian, Hal et al. (2002): The Net Impact Study – The Projected Economic Benefits of the Internet in the United States, United Kingdom, France and Germany (V.2.0) at <http://www.netimpactstudy.com/>, p. 20.

*provide consistent clinical criteria. There is also an associated on-line service – a website providing healthcare information and a guide to common symptoms. NHS Direct is the world's largest provider of telephone healthcare advice, receiving 3.5 million calls in 2000-01 and costing £80 million to run – with call volumes set to double in 2001-02. The full-time equivalent of 1,150 highly qualified nurses in 22 call receiving sites provide advice to callers.*

<http://www.nhsdirect.nhs.uk>

On the other hand, e-commerce activities in the sense of “selling” health, e.g. hospital beds for a certain therapy, will both for ethical reasons and rules of professional code of conduct remain limited to niche applications.

**Table 2-1: E-marketing of hospitals in %, EU, 1999**

Country	B	DK	D	EL	E	F	IRL	I	L	NL	AUT	P	FIN	SWE	UK
Hospitals with WWW presentation	30	65	>30		<70	5	30	15	30	28		100	100	80	<25

Source: SATS, 2001 (based on expert estimates)

Customer service and support, like communications with patients<sup>22</sup> and family members, and e-commerce applications seem to be more or less absent. Even though a faster rate of diffusion may be expected in future, it will take quite some time for citizens and patients to make use of such services in substantial quantities.

### Physicians/primary care centres

Physicians and primary care centres in most Member States were also already relatively well equipped with access equipment in 1999. Access to advanced networks and to the Internet was also growing.

Nevertheless, e-marketing by GPs is very much in its infancy. Although the data in Table 2-2 refer to 1999, we estimate that in most Member States the establishment by GPs in 2002 of a web page, the very first step of customer-facing applications, is still below 20% – if at all such a value has been attained in the meantime. For primary care centres, usually considerably larger entities, the values are much higher and for Finland and Sweden already 100%.

Customer service and support, like communications with patients and their family members, or e-commerce applications, were insignificant. And, similar to hospitals, the actual usage by patients (or their family members) of the little bit of customer services offered seems to be very low.

**Table 2-2: Primary care establishments' WWW presence on the Internet (in %, EU, 1999)**

Country	B	DK	D	EL	E	F	IRL	I	L	NL	AUT	P	FIN	SWE	UK
GP practices	0	10	20			0	1	10	0	<1	<1		>50	40	<2
Primary care centres					<10			60				100	100		

Source: SATS, 2001 (based on expert estimates)

<sup>22</sup> In the USA in 2000, 65% of hospitals already had a website, but only 2% offered appointment scheduling or patient access to records. See Anderson, HJ. (2000): CIOs Forecast a Boom in Internet Activity”, in Internet Healthcare Magazine, May/June.

Despite the fact that physicians usually have a much closer relationship to their patients than hospitals, the latter were considerably more advanced towards customer-facing applications. Being a micro establishment in most cases, neither the time nor the expertise is available to doctors to invest more into such services.

### Home and social care providers

Home care covers a wide variety of services. These range from acute care for patients leaving the hospital to care for the chronically ill (mostly older), the frail, the old or the disabled. This is a very large and rapidly growing market.

As regards access to telecommunications networks providing more bandwidth than the ordinary telephone network (PSTN), ISDN is most common among European Care providers: 45% of the establishments surveyed by *SeniorWatch* in 2001 were connected to it. For DSL<sup>23</sup> and cable modems<sup>24</sup> shares are much smaller. Just about 10% used these networks already.

When it comes to utilisation of ICT in the context of customer-facing solutions and home care delivery, support of mobile care staff has been the most important application area for European home care providers to date, and mobile telephones have become an indispensable piece of equipment. Over 80% of European care establishments had already equipped their field staff with this technology by 2001. Mobile computers, on the other hand, were in their initial stage of uptake amongst service providers. About one quarter of establishments applied lap-tops in the field, and some 12% applied hand held computers (PDAs).

More than half of the provider organisations were already present in the world wide web (Figure 2-1), and almost 20% planed to set up their own website shortly (or 40% of those who did not yet have one).

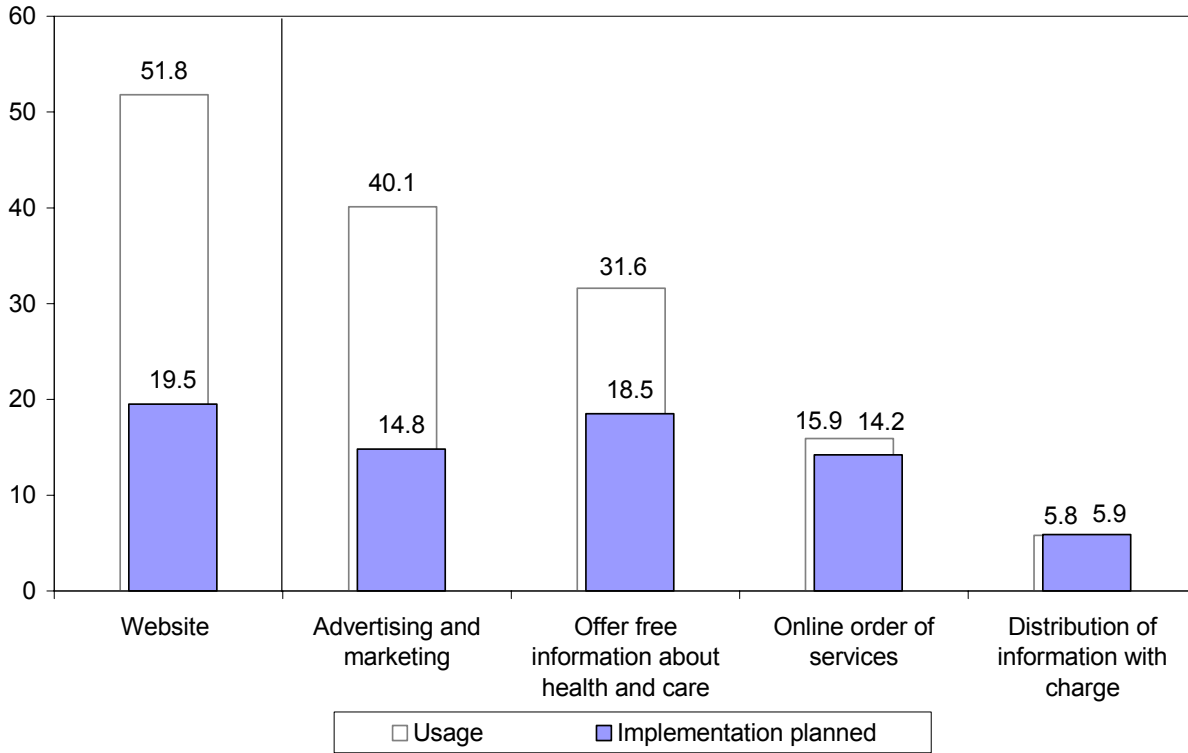
Those organisations which already maintained their own website utilised it predominantly for advertising purposes and for providing cost-free information on healthcare in general (Figure 2-1). However, online-ordering of care services as well as provision of information for a fee will gain in importance during the next years. About 30% of the care establishments surveyed can be expected to offer online-ordering of services by the end of 2003, and some 10% will offer information for payment.

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<sup>23</sup> DSL (Digital Subscriber Line) is a digital technology for bringing high-bandwidth information to homes and small businesses over ordinary copper telephone lines.

<sup>24</sup> A cable modem is a device that enables a PC to be hooked up to a local cable TV line and receive data at about 1.5 Mbps. This data rate far exceeds that of the prevalent 28.8 and 56 Kbps telephone modems and the rate of Integrated Services Digital Network (ISDN) (up to 128 Kbps) and is about the data rate available to subscribers of Digital Subscriber Line (DSL) telephone service. A cable modem can be added to or integrated with a set-top box that provides a TV set with channels for internet access.

**Figure 2-1: Implementation of websites by EU care providers (%) and content intended, 2001 to 2003**



Source: SeniorWatch, 2002, DMS

All of this indicates that service organisations providing home care to older people had by 2001 recognised the potential which e-business applications offer to improve their services, to streamline delivery processes and to gain competitive advantage. Although the European market for advanced telecare – particularly when targeting the citizen and patient – is still in its infancy, the market potential is considerable – not least in view of demographic developments.

### Citizens/patients

Customer-facing solutions need customers to address. As revealed by market surveys, at present there exists a wide gap between potential demand and successful applications in the health and care markets.

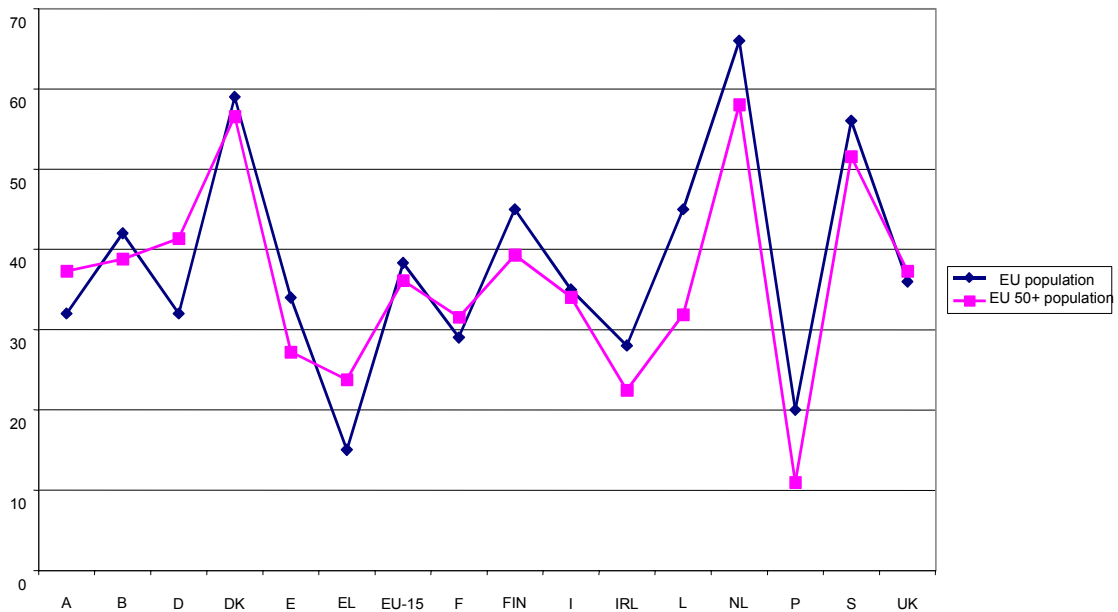
Large random market surveys undertaken by Gallup<sup>25</sup> in Autumn 1999 for the CEC yielded important data with respect to the availability of a PC or equivalent at home. The situation varies considerably across the Union: from 65% in Sweden to 11% in Greece. Nevertheless, this indicates that this type of equipment is already present in a significant – and rapidly growing – portion of all EU households. Data from the ECATT survey indicate that about another 15% of all households planned to invest in a PC during 2000 and 2001.<sup>26</sup>

Recent data from Eurostat and the SeniorWatch surveys confirm this situation (see Figure 2-2). It is interesting that penetration rates for the 50+ population closely follow penetration rates which can be observed for the European overall population, with PC penetration rates in 50+ households tending to be slightly lower than across the overall population in most Member States. However, in some EU-countries PC penetration rates in 50+ households are even higher than in an average household.

<sup>25</sup> Gallup Europe (2000): *The situation of telecommunications services in the regions of the European Union – Residential report*, for the European Commission, April.

<sup>26</sup> See ECATT website: [www.ecatt.com](http://www.ecatt.com) "Benchmarking Electronic Commerce and Telework Trends in Europe"

**Figure 2-2: Computer at home among the EU 50+ population and among the general EU population by Member State (in %), 2001**



Source: SeniorWatch, 2002, and Eurostat: Information Society Statistics – Pocketbook 2002

Consumer interest in on-line health information and e-health and e-care services is growing, in spite of the fact that the majority of households do not yet have access to the Internet. A Eurobarometer survey in 1998 looked at levels of interest in a variety of online services.<sup>27</sup> This included online healthcare, defined as "getting a doctor's advice on a health problem online on a computer, for example receiving explanations about an x-ray or blood test". Here online healthcare ranked third in terms of the percentage of people (42%) who said that they were interested in the service.

More recent and more detailed data are available from the *SeniorWatch* surveys sampling the 50+ population. Quite independent of access to telecommunications and information/entertainment devices and their usage, the interest in various e-health applications is considerable (see Table 2-3) though declining considerably with age. General health information meets with the greatest interest, though with increasing age (and morbidity) interest becomes more focused on individual, currently relevant health issues and electronic communications with the physician about these. In spite of its wide application in telemedicine, video telephony achieves the lowest values; older people are simply not yet familiar with this technology.

**Table 2-3: Interest in e-health applications (%) by age and computer literacy, 2001**

Interested in:	information about health issues on the Internet	Information about on-going medical treatment displayed on computer or TV screen	Getting a doctor's advice on a health problem by e-mail	Getting a doctor's advice on a health problem by video-telephone	
Total	38	30	27	22	
Age					
50 – 59	52	39	33	27	
60 – 69	38	31	28	23	
70 – 79	25	20	19	16	
80+	15	18	14	13	
IST	The digitally	15	15	14	12

<sup>27</sup> European Commission (1998): *Eurobarometer* 50.1 – Autumn 1998.

interest	challenged				
	The technologically open minded	38	31	28	26
	The old age beginners	45	35	31	26
	The experienced frontrunners	61	44	37	27

Source: SeniorWatch, 2001

These data indicate that there is indeed an already quite considerable *potential* market for customer-facing e-business solutions in the health and social services sector. The European population – below and above the age of 50 – covers a broad range of involvement in IST applications, of relevant skills, attitudes, and usage patterns. And a quite considerable part of the older population – the prime target group in this field – is actively involved in IST-related activities. IST users – even at an experienced and advanced level – are not as rare among the older population as public discussion often suggests. Among many non-users too, there is eminent interest in learning more about and making use of various products, services and applications.

### 2.1.2 Back-office solutions

Here also, the health sector showed one of the lowest penetration rates of all sectors. Internet technology-based solutions offer the promise of providing substantial cost reductions and improvements in productivity with respect to healthcare’s basic *administrative processes and business functions*. A core component in any of such activities must be the Electronic Health Record – EHR – (or Electronic Medical Record – EMR) integrating all relevant information on a patient. “The holy grail of connectivity is the transformation of the current paper-based medical record into an electronic medical record that is accessible to all necessary providers and possibly to the patient.”<sup>28</sup>

In principle, the Internet is regarded as *the* means to provide the necessary *connectivity*, offering lower costs, improved functionality, a greater potential for networking and for sharing complex data. Moreover, outsourcing of these ICT activities to application service providers (ASP) would also allow micro establishments to participate. Initially seen as a perfect solution for the health industry with its multitude of different care service providers, many of which are capital-starved, the uptake has been very slow up to now: “Crowned early in the e-health age – in other words last year [2000] – as the information technology heir apparent, ASPs are suffering from an identity crisis.”<sup>29</sup> Lack of standardisation, security and privacy concerns, costly interfaces to integrate such systems with existing practice and hospital management systems, and the danger of being totally dependent on an external provider – many of whom have already failed – are the main barriers to the success of this model.

#### **Medexonline**

*Medexonline, UK is the leading European provider of e-health technology solutions delivered on a hosted application service provider (ASP) basis and via a “marketplace” platform. Medexonline specialises in web-based applications with rich e-business functionality for all buyers and sellers of medical devices, equipment, pharmaceutical and non-medical products, insurers, wholesalers, distributors, primary care groups, high street pharmacies and chemist groups addressing the inefficiencies of communication and connectivity in the healthcare supply chain. Medexonline helps organisations to reduce costs, improve efficiencies, increase margins, extend brands, enhance customer intimacy, and*

<sup>28</sup> Danzon, P M, Furukawa, MF: *Healthcare: Competition and Productivity*, p. 195, in: Litan, R. and Rivlin, A. (2001) *The Economic Payoff from the Internet Revolution*. Brookings Task Force on the Internet. Washington, D.C.: The Internet Policy Institute, Brookings Institute Press, p. 208.

<sup>29</sup> Lutz, S. and Henkind, S.J. (2001): *e-essentials – The Role of ASPs*, in: *Healthplan*, May/June, pp. 78-80.

*sustain long-term business relationships. Medexonline is exclusively partnered with leading healthcare specialists including KPMG Consulting, KPMG Consulting's Microsoft Dot.com practice, International Hospitals Group (IHG) and Espicom, the leading European healthcare business intelligence service.*

<http://www.medicalexchange.co.uk>

Healthcare *supplies* are a major cost factor for all care service providers. They include medical and surgical items, pharmaceuticals, office furniture and supplies, food, cleaning services etc. The British NHS Logistics Authority records 27,000 product lines in its e-catalogue, and a larger hospital may buy up to 100,000 items per year. It has been estimated that 6-13% of total supply chain costs or billions of Euro could be saved through e-business solutions. In the USA, many start-up as well as established companies have invested in this market, but so far their services have not yet caught on. After surveying the market in summer 2000, PricewaterhouseCoopers summarised their findings: "We found more e-procurement companies marketing a service than hospitals using it. A shake-out looms for the estimated 50 companies that now market e-procurement services."<sup>30</sup> For Europe, their surveys revealed a similar situation: "In many European countries, hospitals have a high level of awareness about e-procurement and its potential, but limited readiness and little to no real activity to date."

#### ***NHS Logistics Authority***

*NHS Logistics was formed on 1 April 2000, as the main supply route for consumable products into the NHS. With an annual turnover of £560 million, the current catalogue service offering contains over 27,000 product lines. All 26 million transactions each year are processed electronically. The national IT logistics system interfaces with all trust financial systems, aggregates demand across the whole of the NHS in England and holds extensive information about demand patterns, products, suppliers and performance.*

*Logistics OnLine provides the set of e-commerce solutions available from NHS Logistics, which now offer a fully automated process from order to payment through e-ordering, e-catalogue, and e-billing, along with supporting management information for every aspect of activity. By September 2002, all NHS trusts will receive electronic bills, resulting in the elimination of double handling of invoices; a reduction in paper work; fewer calls to suppliers; a secure alternative solution to storage of paper invoices and minimum disruption to the payment cycle.*

<http://www.logistics.nhs.uk>

In the *home care* sector, a great degree of readiness to move forward to start implementing back-office solutions can be observed, and the picture of a sector in a dramatically changing ICT situation emerged. We would not be surprised if e-business solutions took hold here faster than in the two other sectors analysed. Cost pressures, the ageing of our societies, an expansion of private chains of home care organisations, seamless care processes originating in the health sector, and increasing competition are all factors which will contribute to these developments.

## **2.2 Status and plans for e-business applications**

This section will present and discuss new results which became available from the recent *e-Business W@tch* representative market surveys. It will cover topics such as readiness of, and infrastructure

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<sup>30</sup> E-Procurement (2000), p. 1

available in, health and social work institutions, human resources, the availability of customer-facing and back-office applications, and an overall assessment and outlook for e-business applications.

### **2.2.1 The e-Business W@tch health and social work survey**

For the 15 economic sectors covered by the project, almost 10,000 interviews with decision-makers in European enterprises were conducted during the summer of 2002. These “enterprises”, organisations or institutions, were the units from which stratified samples were drawn. Any one of them may have one or several *establishments*, i.e. single identifiable units at a particular address. To allow for comparisons between sectors, only *one* general questionnaire was developed and applied in an identical version across all sectors, i.e. it was not possible to take into account any specific considerations vis-à-vis the health sector in general or any of the national healthcare systems.

The surveys included all sectors and all Member States, but due to the limitations on funding of these representative surveys only in the four largest states (France, Germany, Italy and UK) were all sectors covered. *All cross-sector comparisons of key e-business figures are therefore based on these EU4* which represent more than 60% of the market volume in any of the 15 sectors, and in most sectors actually more than 70% of the European Union.

The survey for the *health and social work sector* was carried out in seven countries: Belgium, France, Germany, Ireland, Italy, Finland, and the UK. Altogether decision-makers (usually the head of the IT/DP department or a senior management person, or in smaller institutions the managing director/owner) of 635 “enterprises” were sampled, about 100 in each of the larger countries and around 60 in both Finland and Ireland. Two criteria, number of employees (< 50, 50 - 249, 250+) and NACE codes (85.11, 85.12, 85.3) were used to stratify the samples.

*If not indicated otherwise, figures are presented as employment-weighted data.* This means that figures should be read as “enterprises comprising ... % of employees”. The reason for using employment-weighting is that in all sectors there are many more micro enterprises than non-micro enterprises. Therefore enterprise-weighted (but also unweighted) figures would effectively represent mainly the smallest firms and blur the economic importance in terms of market volume or number of employees. Only when presenting data for different size classes of organisations unweighted figures are shown.

Whereas the comprehensive data for the EU and the cross sector comparisons can be regarded as fairly representative, all other figures must be looked at with some caution. The large variety of types of health and social work services covered by NACE N 85, the differences in health system structures across Member States, the resulting differences in organisational size (cf., e.g., out-patient services provided by health trusts in the UK with sometimes many thousand employees and single doctor offices in various countries) all imply that a detailed analysis of more dis-aggregated figures from such a relatively small sample must be undertaken with great caution, and can render only qualitative indications of trends and tendencies rather than conclusions based on quantitative analyses.

### **2.2.2 Readiness and infrastructure**

The basic application of computers, here defined as *personal computers* (desktop computers and/or notebooks), has now become virtually ubiquitous in the health and social work sector. When looking at the data in Table 2-4 this holds for all seven countries surveyed: between 95% and 100% of all organisations use such computers. Only for the UK is a slightly lower figure of 93% reported, but this may reflect the presence of mainframe (legacy) computer systems still in use in some large health trusts. This probably also explains why more than 98% of the smaller organisations (< 50 employees) and “only” 96% of the largest ones (250 + employees) use personal computers. Similarly, differences between the three NACE divisions (85.11 Hospital activities; 85.12 medical practice activities; 85.3 social work activities) are negligible. When comparing these data with those reported for earlier years, it can be seen that physicians (in their medical practice) and social work organisations have by now

more or less closed the gap - when compared to hospitals - and that computers are as common a device as the telephone.

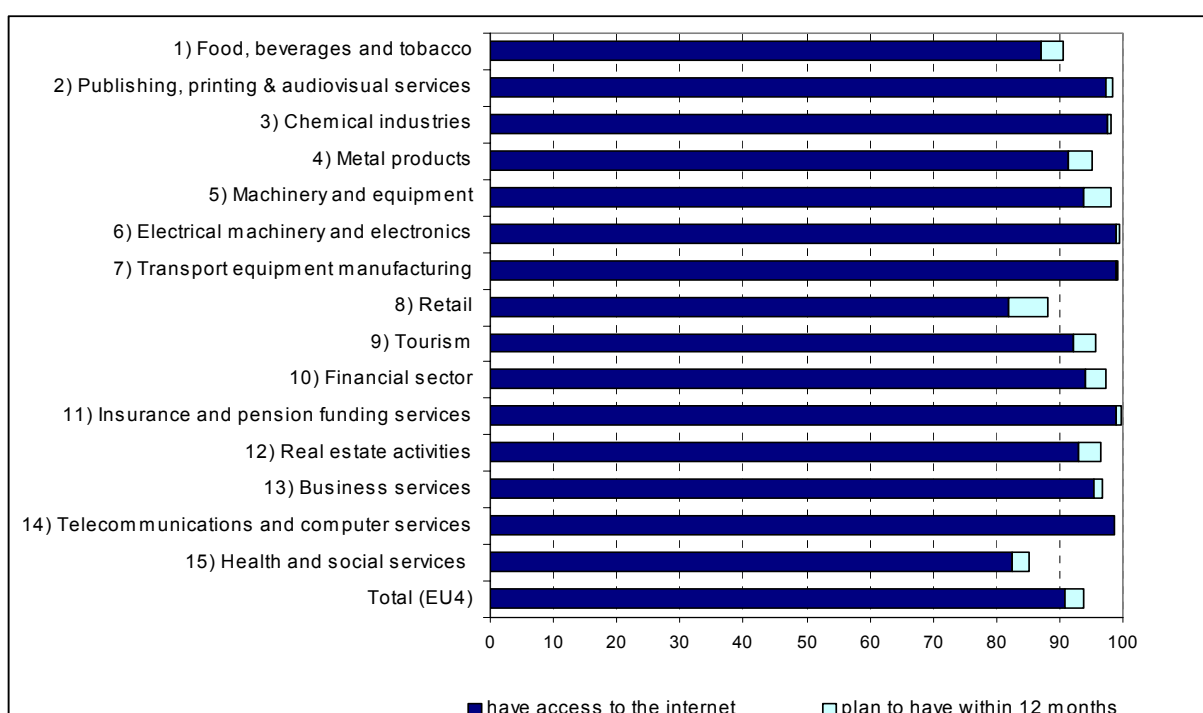
**Table 2-4: Usage of personal computers by country (2002)**

Member State	Use of personal computers in %
Belgium	99
Germany	100
France	100
Ireland	95
Italy	97
Finland	95
United Kingdom	93
Total	<b>98</b>

Source: e-Business W@tch (2002)

Another indicator of readiness is access to the *internet*. Chart 2-1 provides comparative data across all 15 sectors surveyed by *e-Business W@tch*. For the health sector (sector 15), a value of 82.5% has been measured, indicating that organisations employing more than 82% of all employees in this sector had access to the internet in 2002; 3% planned to get an internet access within the coming twelve months. Here, too, the health sector has made considerable progress in recent years (again particularly general practitioners and specialists in private practice, and social work organisations – hospitals were already well advanced). But at the same time the observation that the health sector is lagging behind almost all other sectors still holds.

**Chart 2-1: Internet access - comparison between 15 sectors surveyed (2002)**



Computational base: all enterprises, incl. "don't know" / "n. a." (EU4, employment-weighted).

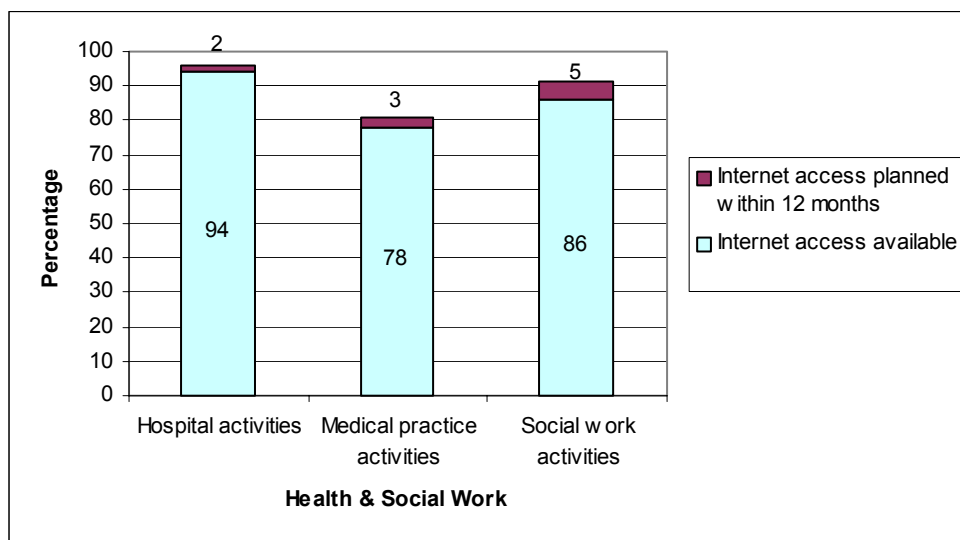
"Planning" means within 12 months.

Source: e-Business W@tch (2002)

When looking at the data by sector classes, we see that by 2003 hospitals will have reached a value of 96% for internet access, whereas social work organisations approach 91% and medical practices 82%. These figures reflect the fact that smaller organisations have a lower propensity to obtain

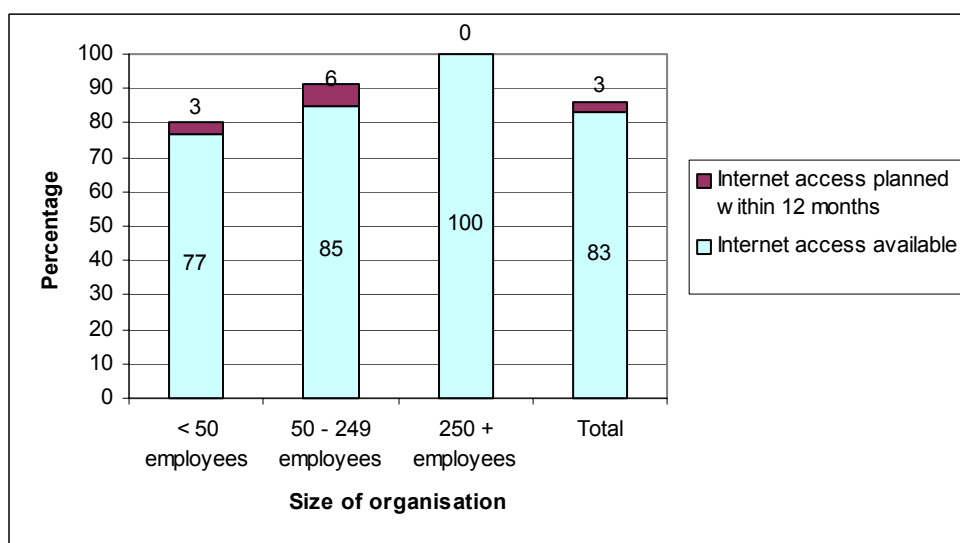
internet access, see Figure 2-4. Whereas those with up to 50 employees will reach a value of 80% by 2003, those with 250+ employees already in 2002 all had internet access.

**Figure 2-3: Access to internet services by health sector class (2002)**



Source: e-Business W@tch (2002)

**Figure 2-4: Access to internet services by size of organisation (2002)**



Source: e-Business W@tch (2002)

When considering telecommunications network access, a considerable improvement with respect to modern, digital access modes can again be observed since 1999. Of those organisations which avail themselves of internet services, about 30% still use analogue dial-up modems, but medical practices in particular (around 40%; hospitals and social work almost 30%) use as an alternative or in addition ISDN, and around 25% of all medical organisations already DSL. To a considerable extent (27%) (larger) hospitals in particular even have fixed connections (predominantly with a bandwidth of 2 Mbit/s and more).

**Table 2-5: Telecommunications network access mode for internet services by health sector class in % (2002)**

Health & Social Work	Analogue dial-up modem	Digital connections		
		ISDN	DSL	Fixed connection

Hospital activities	29	28	25	27
Medical practice activities	32	39	23	11
Social work activities	31	30	27	10

Base: only organisations with internet access; multiple answers possible.  
Source: e-Business W@tch (2002)

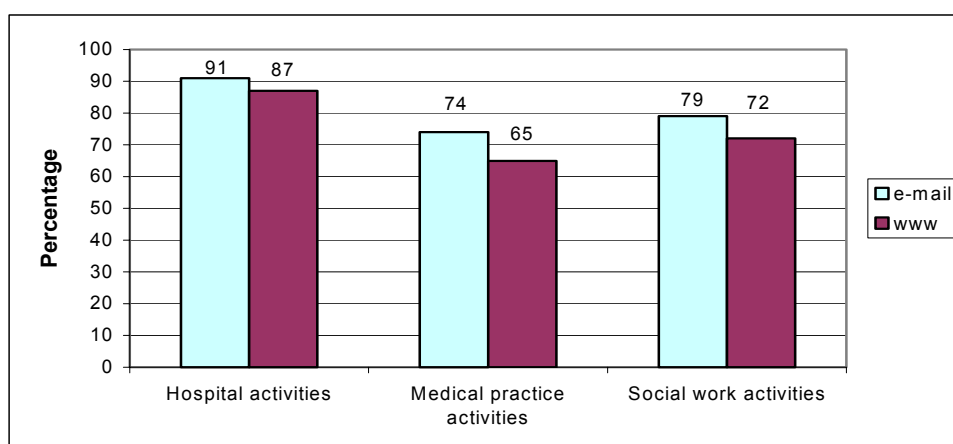
There exists a strong relationship between organisation size and telecommunications network access mode (cf. Table 2-6): amongst those organisations which have access to internet services, the highest values for analogue dial-up modem and ISDN have the smallest organisations (respectively 31% and 53% of them), while the largest organisations with 250+ employees dominate DSL connections (40%) and fixed connections (36%).

**Table 2-6: Telecommunications network access mode for internet services by size of organisation in % (2002)**

Size of organisation	Analogue dial-up modem	Digital connections		
		ISDN	DSL	Fixed connection
< 50 employees	31	53	15	4
50 - 249 employees	23	40	30	9
250 + employees	15	33	40	36
<b>Total</b>	<b>26</b>	<b>47</b>	<b>23</b>	<b>13</b>

Base: only organisations with internet access; multiple answers possible.  
Source: e-Business W@tch (2002)

**Figure 2-5: Usage rate of e-mail and WWW services by health sector class in % (2002)**



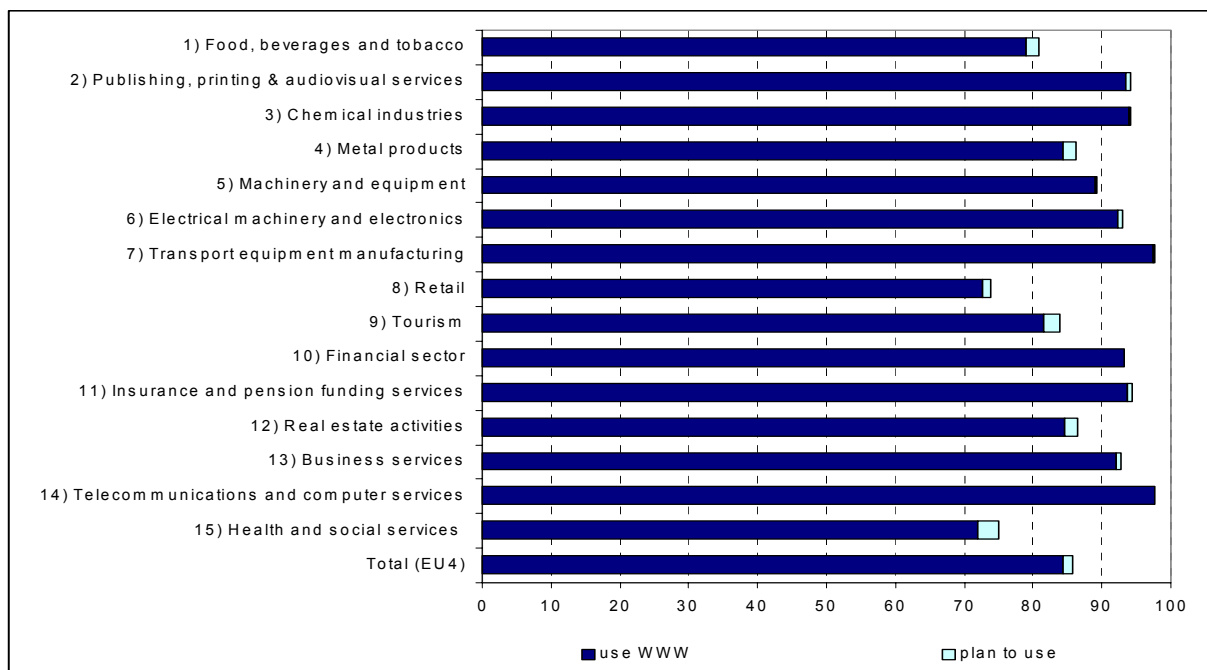
Base: only organisations with internet access.  
Source: e-Business W@tch (2002)

As is well known from survey research, owning a computer or having access to the internet does not necessarily imply that the computer or the internet are actually used. Figure 2-5 shows that of those health sector organisations using computers and having access to the internet hospitals show the highest usage rate both for *e-mail* and *world wide web* (WWW) services with 91% and 87% respectively, followed by social work organisations with 79% and 72%; medical practice organisations reach only values of 74% and 65%. When considering size of organisation (data not shown here), again a remarkable difference shows up: From those with up to 49 employees, only about two-thirds make use of e-mail (with a slightly lower value for the WWW), whereas for the largest size class (250+) this data is close to 95%.

Concerning usage of the WWW, Chart 2-2 provides comparative data across all 15 sectors surveyed by *e-Business W@tch*. For the health sector (sector 15), a value of 72% has been measured, indicating that organisations employing 72% of all employees in this sector made use of the WWW in 2002; and 3% planned to take up usage of the WWW within the coming twelve months. Compared to

earlier data, the health sector has made considerable progress here in recent years too, but at the same time the observation that the health sector is lagging behind all other sectors still holds. The European average for all sectors is around 85%, and 8 out of the 15 sectors already show values beyond 90%.

**Chart 2-2: Usage of the world wide web - comparison between 15 sectors surveyed (2002)**



Computational base: all enterprises, incl. "don't know" / "n. a." (EU4, employment-weighted).

"Planning" means within 12 months.

Source: e-Business W@tch (2002)

The data reported so far tell us only something about *whether* an organisation makes use of modern ICT and related services, but nothing about the actual extent of usage across the organisation both for internal and external communications. Here internal and external networking may provide us at least with some hints about the desired information. Overall, more than 50% of all organisations have implemented a local area network (LAN), and about two thirds of these already base it on internet protocols (i.e. they have a so-called intranet). And whereas only less than 2% of all organisations plan to newly implement a LAN (a growth rate of slightly more than 3% p.a.), more than 8% plan to change to intranet technology (a growth rate of 25%). As can be seen in Table 2-7, hospitals are leading here with 75% whereas social work organisations, with close to 40%, are far behind. This probably not only reflects different size structures of organisations within these sector classes, but also the fact that many social workers are less "localised" and spend a large amount of time e.g. at a client's home. Networking via mobile communications is therefore of much greater importance for them. Similar considerations and trends also apply to wide area networking (WAN), but on a much lower level, cf. Table 2-7; for the total health sector, the figure is around 22%. Not surprisingly, medical practice (21%) and particularly social work (9%) organisations use WANs to a much lesser extend (hospitals 38%) due to their organisational and site structure with usually no or very few separate establishments except in countries where larger health trusts and care organisations are common. In line with these considerations is the fact that 92% of the organisations with 250+ employees already use a LAN and 71% a WAN, whereas for those with up to 49 employees these values are 39% and 6% respectively. When taking these data in perspective, it appears that many health sector organisations still have quite some way to go to enable *all* their employees to avail themselves of the advantages and efficiencies of fast, easy internal and external communications as well as exchange of information and data.

**Table 2-7: Implementation of LANs and WANs by health sector class in % (2002)**

Health & Social Work	Local area network (LAN)		Wide area network (WAN)	
	All	of these with internet protocol (intranet)	All	of these with internet protocol (extranet)
Hospital activities	75	55	38	30
Medical practice activities	47	35	21	12
Social work activities	39	25	9	6
<b>Total</b>	<b>53</b>	<b>34</b>	<b>22</b>	<b>15</b>

Source: e-Business W@tch (2002)

In summary, when assessing the above data, we observe that in a relatively short time period since the late 1990s the ICT technologies and services infrastructure of medical organisations has dramatically improved by 2002, and that a majority of them avail themselves e.g. of internet services such as e-mail or the WWW, albeit not yet for the majority of their employees. Remarkable is also the fact that there exist large discrepancies, particularly between micro organisations and large units, with (large) hospitals being the most advanced ones, and the medical practice and social work establishments sometimes far behind.

But, in spite of the observed dramatic changes, the health sector, when compared to other industrial or service sectors, is still lagging behind all other sectors in virtually all of these fields. And, what is perhaps more disturbing, there are no indications that the health sector will catch up on these developments. Rather, when considering the evidence obtained when asking decision-makers in these organisations about their plans in the foreseeable future (next 12 months), one gets the impression that the dynamic of these change processes has largely withered, and no notable improvement in the data surveyed can be expected in the near future.

### 2.2.3 Human resources

Besides an adequate, well-developed ICT infrastructure, human capital is probably an even more important resource necessary for implementation and diffusion of ICT-based applications and services.

Table 2-8 compares the size classes of organisations with the relative *size of the ICT department* measured as the number of full-time equivalent employees in this department per thousand employees in the overall organisation. We see that the relative size of the ICT department is dramatically larger in the smallest when compared to the very large organisations. Several considerations may help us to explain this result: When maintaining an ICT infrastructure, the economies of scale are considerable; larger organisations can afford to employ more specialist ICT personnel, thereby reducing the overall effort required; and larger organisations can resort more to external consulting and support services, including centrally provided ICT infrastructures and services in centralised national health services with large health trusts, as in the UK.<sup>31</sup>

**Table 2-8: Relative size of ICT department by size of organisation (2002)**

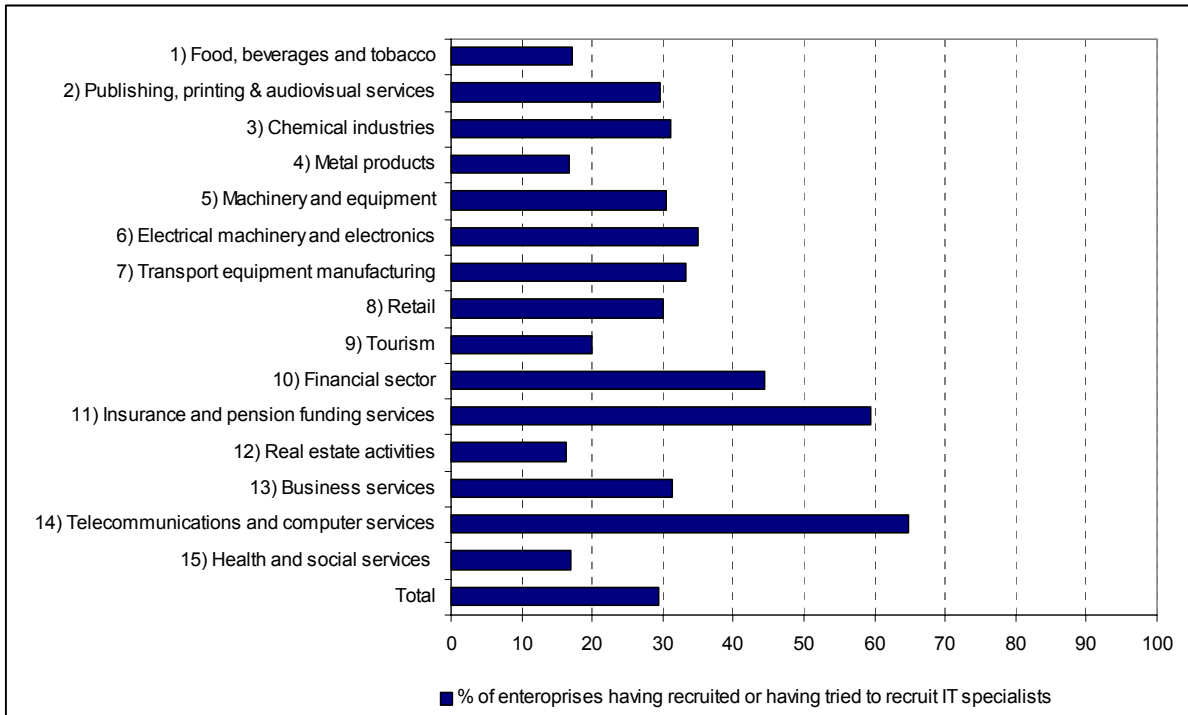
Size of organisation	Full-time ICT employees per thousand employees
< 50 employees	110.5
50 - 249 employees	28.5
250 + employees	3.5

Source: e-Business W@tch (2002)

<sup>31</sup> Note that these are initial ad hoc explanations which would need more detailed research for confirmation or refutation.

When comparing the health sector (sector 15) with all other sectors (cf. Chart 2-3) we see that “during the last 12 months” only around 17% of all health-related organisations undertook *recruitment* efforts - compared to almost 30% for the European average and up to 60% and more in the insurance and ICT sectors. Only four other sectors - food, metal products, tourism, and real estate – show comparatively low figures of between 16% and 19%, whereas all other sectors show values of around 30% or more - more or less double the health sector value.

**Chart 2-3: Recruitment efforts for ICT personnel within the past 12 months - comparison between 15 sectors surveyed (2002)**



Computational base: all enterprises, incl. "don't know" / "n. a." (EU4, employment-weighted).  
 Source: e-Business W@tch (2002)

**The NHS PCT Jobs for Healthcare Professionals site . . .**

. . . is a county directory for UK healthcare professionals, listing medical jobs and NHS nursing vacancies in UK National Health Service offered by NHS Primary Care Trusts (PCTs) and primary care groups (PCGs) in England, Scotland, Wales and Northern Ireland.

<http://www.primarycarejobs.co.uk/>

UK healthcare medical jobs and NHS nursing vacancies in healthcare organisations in England, Scotland, Wales and Northern Ireland are offered online at:

<http://www.healthjobs.uk.com/> , <http://nhsjobs.matrix-zero.org/>

When recruiting or attempting to recruit ICT personnel, the health sector in 2002 - in line with all other European sectors - was also still faced with considerable problems in finding suitable employees with special ICT skills. And as becomes obvious when looking at Table 2-9, this correlates positively with the overall size of the organisation, indicating that larger organisations are indeed looking for more specialised ICT expertise than the smaller ones who probably are more in need of ICT “generalists” with a more basic training. And the large organisations are much more actively looking for such personnel: during recent months, only 7% of the very small ones, but 47% of the very large ones have been looking for such personnel.

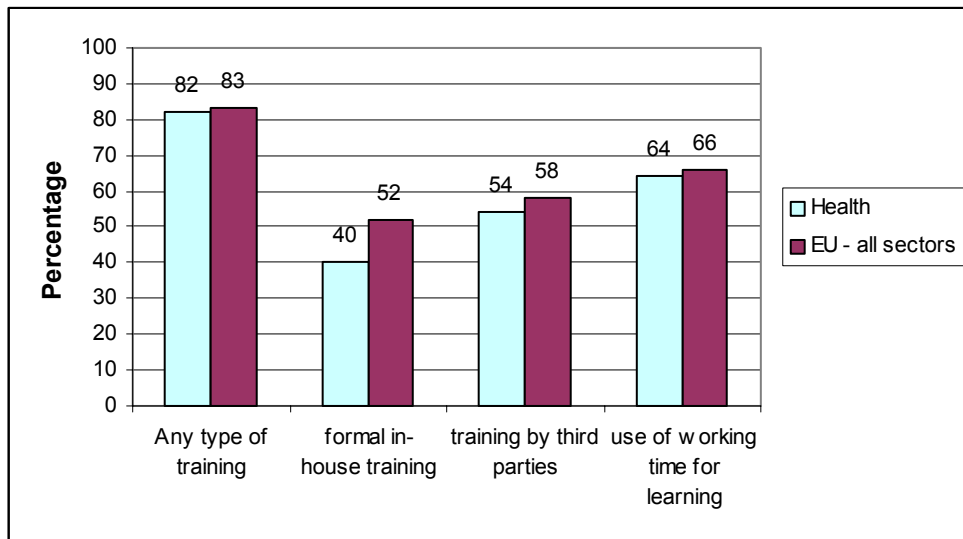
**Table 2-9: Percentage of organisations experiencing difficulties in recruiting ICT specialists by size of organisation (2002)**

Size of organisation	% of organisations experiencing great or some difficulties
< 50 employees	30
50 - 249 employees	36
250+ employees	56
<b>All</b>	<b>47</b>

Base: All organisations which undertook recruitment efforts within the past 12 months.  
 Source: e-Business W@tch (2002)

When considering the support of employees in acquiring computer or ICT networking skills, the health sector, with around 82% of all organisations offering such support, lags somewhat behind the European average (but is slightly ahead of some other sectors, particularly tourism, with 74% and retail with 76%) as can be seen in Figure 2-6. Within the health sector, permitting employees to use some of their working time for learning shows the highest values (94% for large organisations, and for the smaller ones 54%), whereas formal in-house training - probably due to the organisational efforts and the cost involved - is mainly a prerogative of the larger organisations with around 80% of them offering this to their employees, but only 26% of the smallest ones.

**Figure 2-6: % of organisations supporting the acquisition of ICT skills - the health sector compared to European average (2002)**



Source: e-Business W@tch (2002)

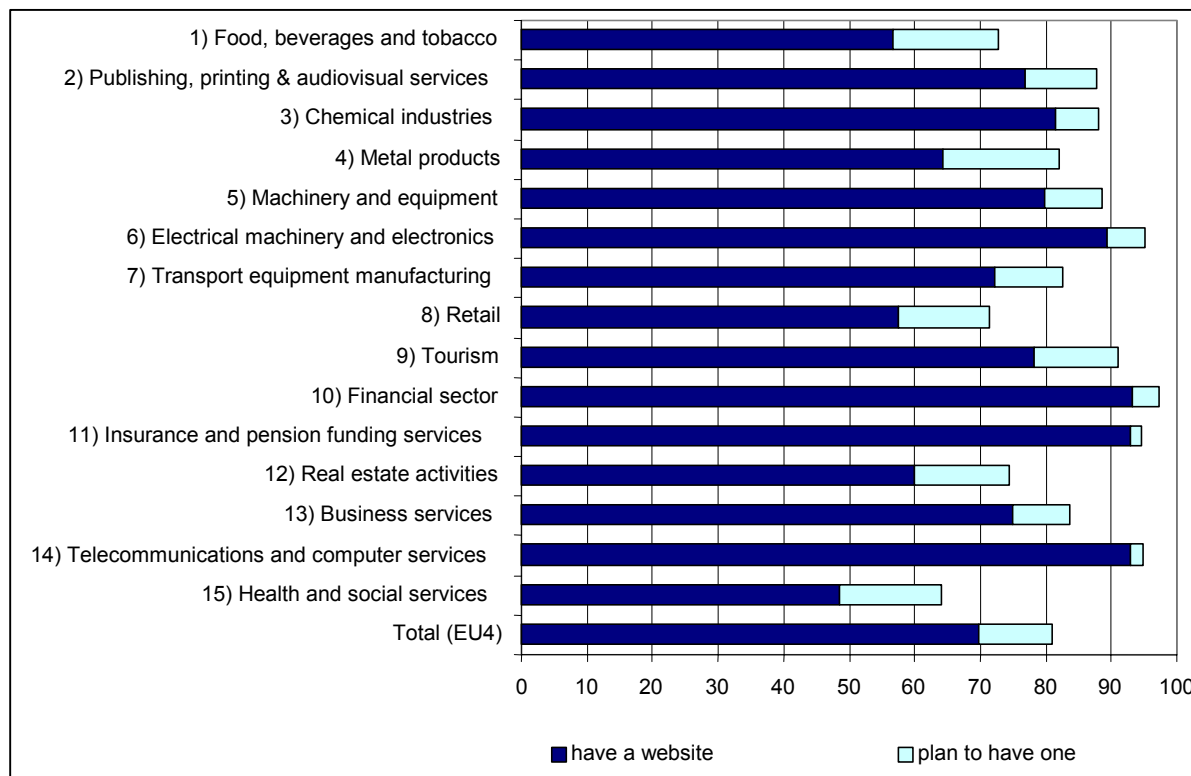
When reviewing the human resources data above for the three health sector classes: hospitals, medical practice, and social work - not presented here - no notable differences except for size-related differences with respect to the hospital sector show up. In summary, it seems that in the whole health and social work sector human ICT capital issues receive less attention than in most other sectors of our economies, and that the smaller organisations in particular are in great danger of being left behind.

### 2.2.4 Customer-facing solutions

Usually, establishing its own website is an organisation's first step of towards customer-facing e-business solutions. As Chart 2-4 indicates, the medical sector lags considerably behind all other sectors in this respect, and even the planned large expansion by about 15% (or a growth rate of 32% within 12 months) will not change this situation as all other sectors with lower values boost similar growth rates. The main thrust will come from the smaller organisations (see Table 2-10) which

presently show much lower values than the large ones. The social work class in particular will grow by 55% to reach a value in 2003 of almost 70%, whereas the hospitals will reach a value of 78% and the medical practice class almost 60%.

**Chart 2-4: Percentage of enterprises having their own website - comparison between 15 sectors surveyed (2002)**



Computational base: all enterprises (EU4, employment-weighted). "Planning" means within 12 months.  
Source: e-Business W@tch (2002)

**Table 2-10: Having a website (%) by size of organisation (2002)**

Size of organisation	Own website already	Own website planned within 12 months
< 50 employees	37	17
50 - 249 employees	53	21
250 + employees	82	11

Source: e-Business W@tch (2002)

Of those organisations maintaining their own website, the majority (54%) have outsourced this activity to an external service provider, relatively independent of organisational size or health sector class. Very few (about 18%) already use a content management system which allows, e.g., different departments to access the website and update information on their organisation presented there. Only amongst the very large organisations (250+ employees) have 38% implemented such a system, and with 62% making use of external support, a high degree of professionalism can be noted.

***allcures.com – an online pharmacy***

*allcures.com is the first, fully operational online pharmacy in the UK. It is much more than an Internet shop, it offers a wealth of information and advice on health issues, medical problems and different treatments to enable customers to make the most informed choices possible.*

*Customers are asked to suggest improvements or offer their own product recommendation to other customers. In this way allcures.com hopes the customer base will evolve into a true e-community.*

<http://www.allcures.com/>

About 95% of all organisations providing a website use it (also) for presenting information on their various services; this again holds for all sector classes and sizes of organisations.

In the medical and social work sector, more advanced e-commerce activities in the sense of “selling” health and wellness, e.g. hospital beds for a certain therapy to consumers/patients, will both for ethical reasons and rules of professional code of conduct remain limited to niche applications. Therefore it is not surprising that in our sample of medical organisations surveyed only 6% said that they engage in “selling” online (compared to 17% for all sectors in the EU and, e.g., 46% for the insurance sector). And only 1.5% indicated that they will start e-commerce activities within the next 12 months (compared to an EU average of 9.5% and values between 7% and 24% for other sectors lagging behind such as the health sector).

Given such a small sample of organisations selling online (6% of 635) - covering all seven countries surveyed, all organisation sizes, and all three health sector classes - a more detailed quantitative analysis of results becomes rather meaningless, and even indications of qualitative tendencies should be considered with great caution. The vast majority of organisations started selling online only recently (two years ago or less), the main medium is their own website, but electronic market places are also important sales locations. Usage of mobile e-commerce platforms such as WAP or GPRS services is virtually absent, and EDI-based services are of little relevance either. Only a few of the organisations selling online have incoming orders fully integrated into a back-end system, and these are mostly large organisations. It is somewhat more common that an online order triggers an internal e-mail, but this does not apply to the majority of organisations. Enabling customers to pay online for services obtained/products purchased is not uncommon, and the number of organisations providing after-sales-services online is comparatively large; both observations hold particularly for large organisations.

When comparing the combined average data obtained from all organisations selling online in our sector with the average values for all EU sectors, the results obtained are usually somewhat or even considerably higher, indicating that the very few organisations in this sample are quite advanced in their activities - but not at all typical for the overall medical and social work sector.

### **Moorfields Eye Hospital**

*Moorfields Eye Hospital NHS Trust employs over 1000 people working in over 10 sites. It is the oldest and largest specialist eye hospital in the world and offers a comprehensive and seamless ophthalmic service that is internationally renowned. Patients can change or cancel their appointment online, send enquiries and complaints, ask for support etc. The Patient Advisory Liaison Service (PALS) provides confidential on-the-spot advice and support to help the patients sort out any concerns they may have about the care the hospital provides, guiding them through the different services available at Moorfields.*

<http://www.moorfields.co.uk/ForPatients/ChangeAppointments>

<http://www.moorfields.co.uk/ForPatients/PALS/Contactus>

As mentioned above in section 2.2.1, to allow for comparisons between sectors, only one general questionnaire was developed and applied in an identical version across all sectors. As a consequence, the design of the surveys did not allow for any specific considerations vis-à-vis the health sector to be taken into account, e.g. questions dealing with information exchange between physicians and their patients, making online appointments, obtaining information and advice concerning a particular health condition etc.

### **Chatting with the doctor . . .**

*A private clinic for prostate therapy in Heidelberg, Germany offers patients the opportunity to chat with a doctor on Tuesdays from 12 a.m. to 1 p.m. They can also ask online for a phone call to arrange an appointment.*

<http://www.prostata-therapie.de/chat/chat.cgi>

### **NetDoctor . . .**

*. . . is an European e-health company with a presence in seven leading Internet markets: UK, Germany, Austria, Denmark, Norway, Sweden and France. NetDoctor offers individual care and health services for consumers, doctors and chronic sufferers. Over 500 healthcare specialists from around Europe work with NetDoctor in creating high quality information and services. The localised NetDoctor sites and communities offer daily health news, facts about diseases, treatments and healthy living, a drug database, 250+ discussion rooms, interactive health tests, "Ask the Doctor" services, live events, wireless services and much more. NetDoctor also has a special set of websites for health professionals under the brand NetDoctor Pro and has developed a community platform for in-depth NetDoctor sites catering to special interest groups (asthma sufferers, diabetics and pregnant women).*

e.g. <http://www.netdokter.de> , <http://www.netdoctor.co.uk>

## **2.2.5 Back-office applications**

The term back-office applications covers ICT-based and e-business solutions for both internal administrative processes and relationships to external suppliers, contractual partners (such as insurance funds) and auxiliary services. In this subsection, three topics will be covered: ICT-based and e-business solutions relating to human resource aspects, procurement issues, and advanced e-business back-office applications.

## Human resources

One indication of the “readiness” of an organisation for such applications is the availability of access to internet-based services by its office workers. As the data in Table 2-11 indicate, e-mail as an efficient means of internal communications has already reached a level of 90% in the large organisations, but smaller ones also use it to a considerable extent. When considering its usage for external communications, the majority of office workers in around 45% of even the smallest organisations can avail themselves of e-mail services. Access to the world wide web is somewhat more limited, particularly in the largest organisations. Remote access to the organisation’s own computer systems is of little relevance in the majority of institutions; but in those organisations having more than 250 employees more than 60% already enable their workers to access the system remotely.

**Table 2-11: Majority of office workers with access to internet services by size of organisation in % (2002)**

Size of organisation	e-mail for internal communication	e-mail for external communication	World wide web
< 50 employees	30	45	39
50 - 249 employees	47	50	47
250 + employees	90	80	66
<b>Total</b>	<b>45</b>	<b>53</b>	<b>46</b>

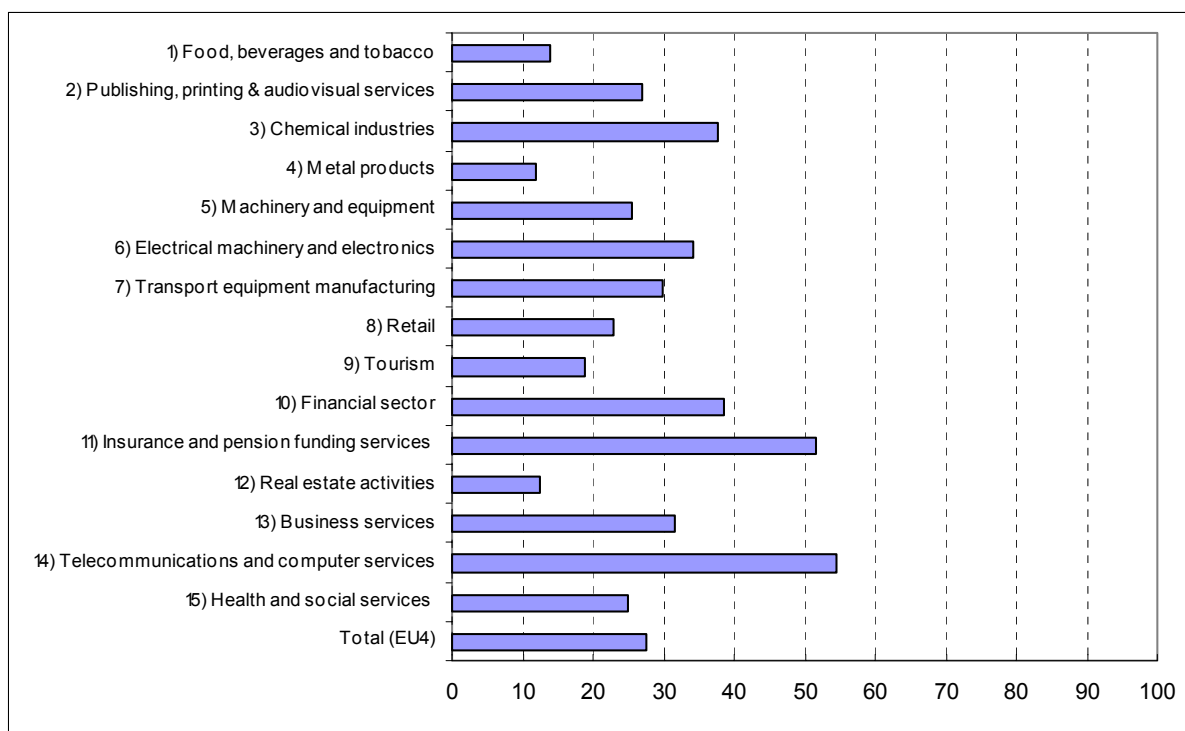
Source: e-Business W@tch (2002)

But access to and application of ICT-based solutions is not only of key importance for office workers. Probably unlike any other sector, human capital is *the* key input factor in the health field. Even in large, diversified or in privately run hospitals personnel costs reach values of between 60% and 65% of all costs, and in psychiatric institutions the value approaches 80%.<sup>32</sup> In other words, acquisition, training and management of human resources is a key success factor for any medical or social work institution. In the light of this it is perhaps not surprising that in the health sector about 25% of all organisations already post job vacancies on special internet boards - a value considerably larger than in many other sectors (see Chart 2-5). Here for once this sector reaches almost the EU average of 27.5%.

In the hospital class, 40% of institutions already post job vacancies on internet boards; social work with 30% and medical practices with 20% also use this means to recruit new personnel. In addition the smallest organisations, with less than 50 employees are with 19% active in this field.

Another potentially very relevant application field is the tracking of working hours of staff members. Here the health sector with a value of 18% lags the EU average of 26%, and compared to such sectors as electronics, insurance or ICT, which all show values of around 47%, our sector is still far behind.

<sup>32</sup> See Statistisches Bundesamt (1999): Kostennachweis der Krankenhäuser (Cost data for hospitals) 1997-Fachserie 12, Reihe 6.3. Stuttgart, Metzler-Poeschel.

**Chart 2-5: Organisations posting job vacancies on the internet - comparison between 15 sectors surveyed (2002)**

Computational base: all enterprises (EU4, employment-weighted).

Source: e-Business W@tch (2002)

### **BUPA**

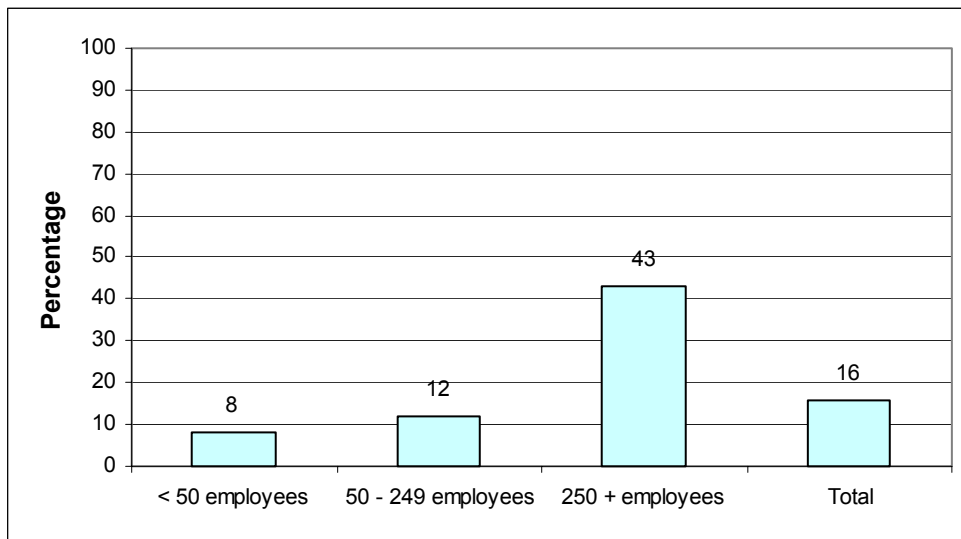
*BUPA, a broad-based health and care organisation with 36 private hospitals and over 230 care homes throughout the UK and healthcare providers in Spain, Hong Kong, Thailand, Ireland, the Middle East and India, offers a job database for opportunities in everything from administration to therapy. BUPA Nursing is one of the UK's leading nurses agencies, recruiting nurses and care workers for a diverse range of clients. BUPA Healthcare Recruitment finds employment in the UK for overseas nurses within private hospitals, BUPA care homes and the NHS.*

<http://www.bupa.co.uk>

A further aspect in this context is e-learning, i.e. the application of ICT and internet-based techniques for learning, training and continuing education. With 16% of all organisations active in applying such techniques, the health sector is ahead of some other sectors and close to the European average of 19%. The difference between the three classes of organisations is not particularly striking, but again size of organisation is a key determining factor as Figure 2-7 shows.

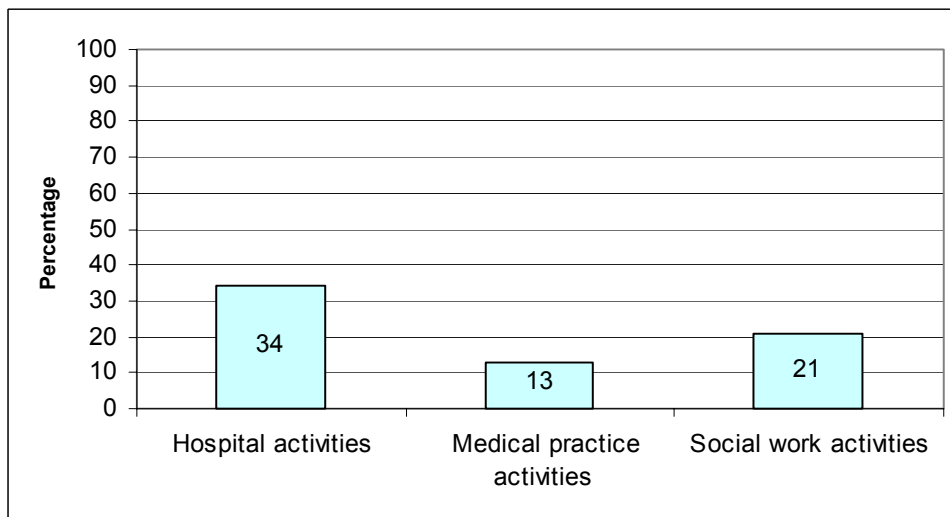
On a more advanced level, online-based human resources management systems are a key application in this context. Here, too, the situation is very similar to the one discussed above for advertising job vacancies on the internet and for e-learning. With a value of 21% the health sector comes close to the EU average of 23% - and it is ahead of sectors such as food, metal production, retail, tourism, and real estate. Size is again the determining factor within the sector; 57% of the largest organisations make already use of such systems, but only 9% of the small ones. And, as Figure 2-8 indicates, this application is most prevalent with 34% in the hospital field, followed by 21% for social work institutions.

**Figure 2-7: Application of e-learning by size of organisation in % (2002)**



Source: e-Business W@tch (2002)

**Figure 2-8: Usage rate of human resources management systems by health sector class in % (2002)**



Source: e-Business W@tch (2002)

## Procurement

As mentioned above in section 2.1.2, healthcare supplies are another major cost factor for all medical and care service providers. For the USA, it has been estimated that 6-13% of total supply chain costs (estimated at \$100-200 billion) could be saved through e-business solutions<sup>33</sup>, and similar values can be expected for Europe, i.e. savings of billions of Euros.

<sup>33</sup> E-Procurement (2000), PricewaterhouseCoopers *HealthCast 2010 – E-Health Quarterly*, August 2000, p. 4; see also Litan, R. and Rivlin, A. (2001), pp. 214-216.

**DocCheck online-shop**

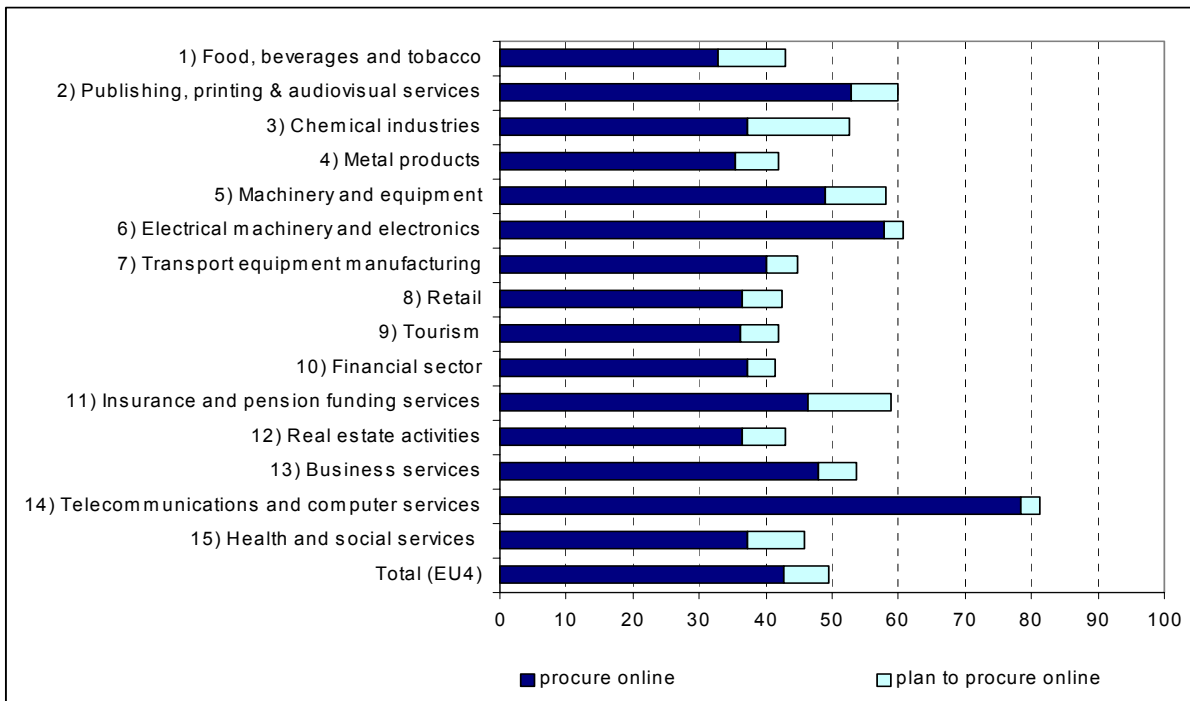
The DocCheck online-shop is an online shop for practice supplies for doctors; it offers about 15,000 products for the doctors' office. The free DocCheck password grants access to "doctors-only" areas of many medical Websites. Pharmaceutical companies and medical institutions who want to inform about drugs or treatment methods on the Internet have to recognise legal restrictions. In some countries, it is forbidden by law to advertise drugs directly to non-professionals. This often requires the site to have password protection. Indeed, many pharmaceutical companies control access to their websites with passwords, provided only to registered medical professionals.

Many practitioners find this restriction irritating and time-consuming. Added to the irritation is that every site uses a unique password, so that the poor practitioner could quickly amass a large collection of difficult to remember passwords. One solution to this problem is DocCheck from Germany. DocCheck works by granting practitioners one password that enables them to view the content of all websites registered with DocCheck. The system validates the eligibility of the practitioner by receiving a validation request on a headed notepaper or blank prescription form.

<https://www.doccheck.com/shop/>, <http://www.doccheck.com/>

Chart 2-6 shows that online procurement is rapidly catching on in Europe with around 50% of all enterprises expected to be active in this field by 2003, and the health sector with 46% (37% in 2002 plus 9% planning to purchase online within the next 12 months) is again ahead of many other European sectors and close to the EU average of 50%.

**Chart 2-6: Percentage of enterprises procuring online - comparison between 15 sectors surveyed (2002)**



Computational base: all enterprises (EU4, employment-weighted).

"Planning" means within 12 months.

Source: e-Business W@tch (2002)

In the health sector, online procurement has grown consistently and strongly in recent years, from 13% of all organisations already procuring online for more than 2 years to 29% for at least one year

and 37% in 2002 to 46% expected for 2003. And, as Figure 2-9 shows, the smaller organisations, although slower to start, have been catching up recently.

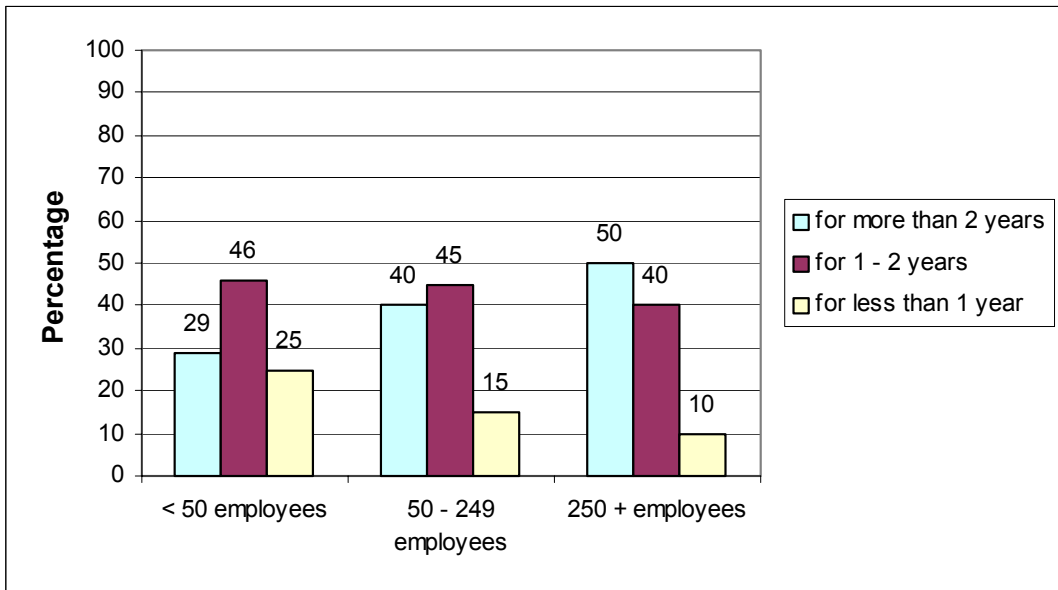
**NHS Logistics Authority**

NHS Logistics was formed on 1 April 2000, as the main supply route for consumable products into the NHS. With an annual turnover of £560 million, the current catalogue service offering contains over 27,000 product lines. All 26 million annual transactions are processed electronically. The national IT logistics system interfaces with all trust financial systems, aggregates demand across the whole of the NHS in England and holds extensive information about demand patterns, products, suppliers and performance.

Logistics OnLine provides the set of e-commerce solutions available from NHS Logistics, which now offer a fully automated process from order to payment through e-ordering, e-catalogue, and e-billing, along with supporting management information for every aspect of activity. By September 2002, all NHS trusts will receive electronic bills, resulting in the elimination of double handling of invoices; a reduction in paper work; fewer calls to suppliers; a secure alternative solution to storage of paper invoices and minimum disruption to the payment cycle.

<http://www.logistics.nhs.uk>

**Figure 2-9: Dynamics of online procurement by size of organisation (2002)**



Base: All organisations purchasing online in 2002.  
Source: e-Business W@tch (2002)

### **Global Healthcare Exchange**

*Global Healthcare Exchange BVBA (GHX), Brussels, is a neutral trading exchange through which hospitals are purchasing both medical and non-medical products more easily, quickly and accurately than ever before. GHX is open to all members of the supply chain, with connectivity solutions specifically adapted to the needs of large, mid-sized and small suppliers and hospitals alike – to improve efficiencies and add value throughout the healthcare supply chain. It is a privately held company founded in March 2000 in Westminster, USA and its global membership now includes more than 100 supplier members and over 800 hospital members.*

<http://www.ghx.com>

However, in terms of more sophisticated e-business techniques in this field, it again becomes obvious that the health sector tends to lag behind most other sectors. In usage of online techniques for the management of capacities and/or inventories, the health sector with 14% still almost matches the European average of 16% and shows a better value than 5 other sectors. But this is almost exclusively due to large organisations with 250+ employees which chalk up a value of 40% compared to only 6% for those with 50 - 249 employees and 4% for the small organisations. When it comes to the exchange of electronic documents with suppliers beyond "simple" e-mail exchange, the health sector lags behind all other sectors and reaches a value of 33% compared to an EU average of 47%. Here the size of the organisation within the health sector is of considerably less relevance with values of 26%, 38% and 47% respectively for the lower, middle, and upper size classes. The same observations hold for the percentage of organisations with access to the extranet of at least one of their suppliers, partners or customers: at only 12% the value is considerably lower than for any other sector, and not even half the EU average of 27%. Here again larger health organisations dominate with 33% - which at the same time implies that the hospital class with 27% is far ahead of social work with 14% and medical practice with 10%.

### **vamedis AG**

*vamedis AG is a European provider of IT-based solutions for the optimisation of business transactions between hospitals, suppliers and other service providers to the healthcare industry. It is the result of a merger between Glomedix and vamedis, two companies that made a name for themselves as providers of e-procurement solutions for the healthcare market. Behind vamedis AG are seven renowned manufacturers of medical supplies, establishing the company as an international presence, with experience and competency in the healthcare industry. The company links a large number of hospitals, suppliers and manufacturers. In addition to its successful subsidiaries in UK and France, it plans to open more offices in Switzerland and Austria shortly. Global Healthcare Exchange (GHX), Brussels has entered into an agreement with vamedis\* AG. Under the terms of this agreement Munich-based vamedis\* becomes a shareholder with representation on the Board of GHX and GHX will acquire vamedis\*\* browser-based technology. As a result, vamedis\*\* suppliers will become members of GHX, increasing the range of suppliers and products available through its e-procurement platform.*

<http://www.vamedis.net>

## **Advanced e-business back office applications**

Based on the data reported and discussed in the two preceding subsections one might expect that the health and social work sector is already well on its way towards more advanced e-business back-office

applications. And when considering the wide variety and complexity of internal administrative and management tasks and of external relationships with a large number of very diverse actors and partners (cf. e.g. Figure 1-1 and Figure 1-2 above), a large potential for improving workflow and communications and, at the same time, cost reduction seems likely.

However, when reviewing the data surveyed on quite a diversity of e-business solutions this expectation cannot be confirmed. The values obtained for, e.g.,

- participation in e-marketplaces (business-to-business internet trading forums) with 3% (4% plan to do so within the next 12 months),
- the implementation of Supply Chain Management - SCM -systems (2%; 2% planned),
- usage of knowledge management software solutions (8%; less than 1% planned),
- applications of Customer Relationship Management - CRM - systems (4%; 1% planned),
- drawing on Application Service Providers - ASP - (9%; 3% planned) or
- implementing Enterprise Resource Planning - ERP - systems (5%; 1% planned)
- are too low for any meaningful further analysis.

#### **AdActus Care Technologies**

*AdActus Care Technologies Inc., a Canadian company, provides Information and Communications Technology solutions (ICTs) for the community health marketplace. The company is focused on the provision of technology at the point of care in the community, whether this is in people's home, residential care facilities, or community clinics.*

*AdActus Outreach is a combination of ICTs designed to provide and capture information at the point of care and integrating this with a back-office management system. It uses handheld computers (PDAs), a community health management software package accessed by a PC, and secure message exchange software.*

*Homecare workers are provided with a palmtop computer that*

- enables wireless, POTS and Network data exchange;
- provides visit information in the field;
- collects completed service information;
- integrates these data with financial packages;
- supports billing.

*It connects to an office infrastructure software which provides for*

- client and staff management;
- scheduling of visits;
- a central repository for all information.

<http://www.adactuscare.com>

#### **Med2Med – a B2B market place for healthcare**

*Med2Med, based in Germany, is a business-to-business market place for the healthcare sector. It is a co-production of an internet-service-provider and doctors and helps suppliers to reach new customers and develop an online business without heavy investment in either website design or advertising. It's completely free, up to the point of a successful sale, when Med2Med takes a minimal commission fee.*

<http://www.med2med.net/>

Given such small samples – mostly covering again all seven countries surveyed, all organisation sizes, and all three health sector classes - a more detailed quantitative analysis of results cannot be

justified. And comparisons with the combined average data from all organisations in our sector with the average values for all EU sectors are also of little use. There, too, the data obtained are usually still very low, with two exceptions: for customer relationship management systems - of little relevance for the majority of health sector players for the reasons discussed earlier - EU-wide values of 17% implemented and 6% planned were reported, and for enterprise resource planning systems values of 20% and 3% respectively were obtained.

Low ICT investment rates and an “immature value chain” are surely a first explanation of this situation: “The players who make up the value chain – physicians, hospitals, drug companies and laboratories – do not yet, by and large, use information technology tools and Net-enabled data transfer systems to interact with one another or share knowledge.”<sup>34</sup>

## 2.3 Potential and perspectives for e-business applications

In theory ICT applications and e-business solutions present an enormous opportunity - and challenge - for both industrial and service enterprises. Increases in the long-term growth rate of whole economies have even been attributed to these technologies, and further advances are expected.<sup>35</sup> In this section some of the barriers perceived by decision-makers in the health and social work sector which need to be overcome to promote the further diffusion of such solutions will be reviewed, and their subjective assessment of impacts and the future importance of e-business will be reported on.

### 2.3.1 Barriers and impact

#### Barriers

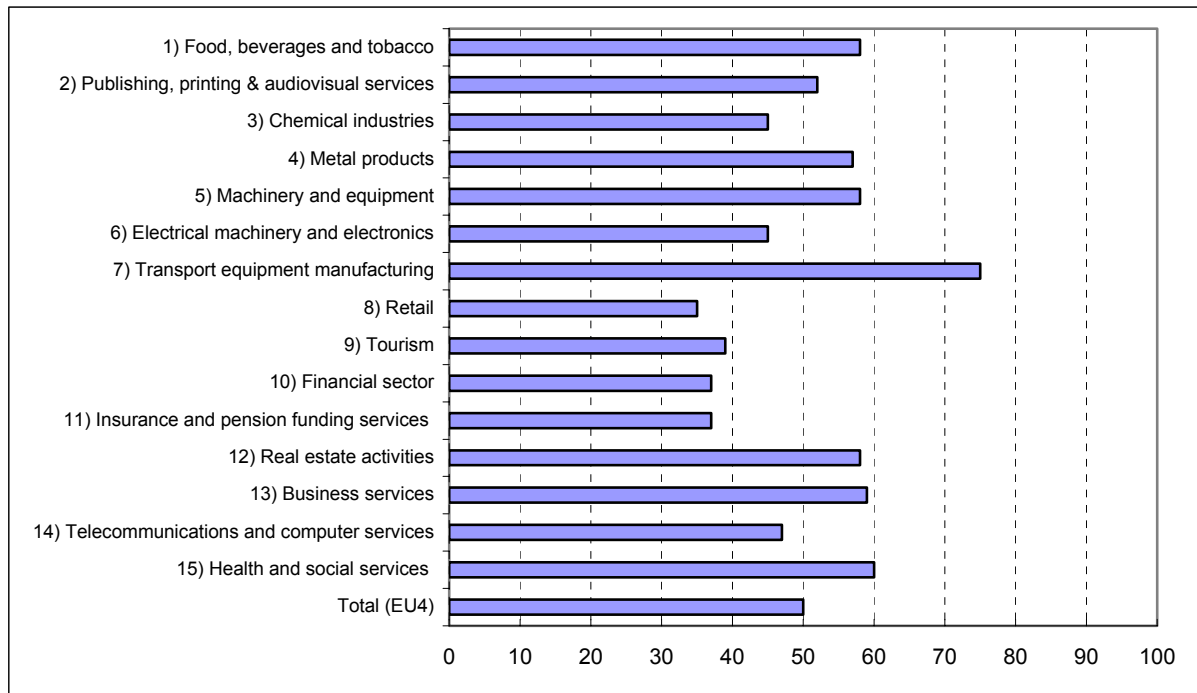
When asked about their assessment of various barriers commonly put forward about *selling online*, health sector executives do not vary to a large extent from assessments voiced in other sectors. 51% agree strongly or somewhat that only a few of their customers currently have online access, compared to 42% for the EU average - which is probably a very realistic assessment when remembering that the age and income structure of health and social work sector clients is quite different from the “average consumer”. On the other hand, it is perhaps surprising that data privacy or data security concerns of clients are assumed by only 51% compared to 57% for the European average. Whether this reflects particularly high security standards in the health sector, real experience with clients or a perception different from decision-makers in other sectors remains unclear. The processing of payments for online sales (33% versus 38% EU average) or the handling of delivery processes (22% versus 31%) are not assessed as major barriers. However, and not surprisingly, a considerable majority agrees strongly (60%) or somewhat (12%) that many of the goods and services of this sector do not lend themselves to be sold online. When compared with all other sectors (see Chart 2-7), the strong support for this item is the second strongest of all sectors, only surpassed by the assessment in the transport equipment sector with 75%. In contrast to this the barrier “the revenue potential of online sales is still low” is rated at 28%, considerably below the EU average value of 35%.

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<sup>34</sup> PwC Consulting (2001): *E (Health) Transformation: Managing healthcare in a networked world*. London, p. 5.

<sup>35</sup> Cf. Litan, R. and Rivlin, A. (2001) *The Economic Payoff from the Internet Revolution*. Brookings Task Force on the Internet. Washington, D.C.: The Internet Policy Institute, Brookings Institute Press, or Varian, Hal et al. (2002): *The Net Impact Study - The Projected Economic Benefits of the Internet in the United States, United Kingdom, France and Germany (V.2.0)* at <http://www.netimpactstudy.com/> and the literature cited there.

**Chart 2-7: Perceived barriers to sales online: products not suitable / revenues too low - comparison between 15 sectors surveyed (2002)**

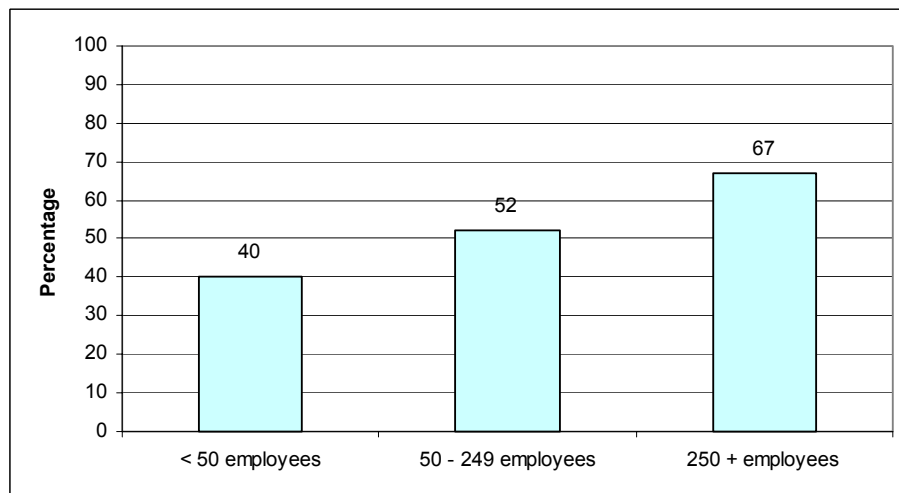


Computational base: all enterprises (EU4, employment-weighted).

Source: e-Business W@tch (2002)

Opinions on most of these issues are fairly evenly distributed across size or activity classes of organisations. Only in one instance was a rather unexpected distribution of assessments observed. When asked whether “adapting corporate culture to e-commerce is difficult”, only 40% of decision-makers in the smaller organisations (up to 49 employees) agreed strongly or somewhat, but 52% in the next size class and even 67% in those with 250+ employees (see Figure 2-10). In view of the fact that in most instances the largest organisations are far ahead of the smaller ones with concrete ICT and e-business implementations this is a particularly striking result - or it reflects the difference between mere opinions (small companies) and an assessment based on concrete experience.

**Figure 2-10: Adapting corporate culture as an e-commerce barrier by size of organisation (2002)**



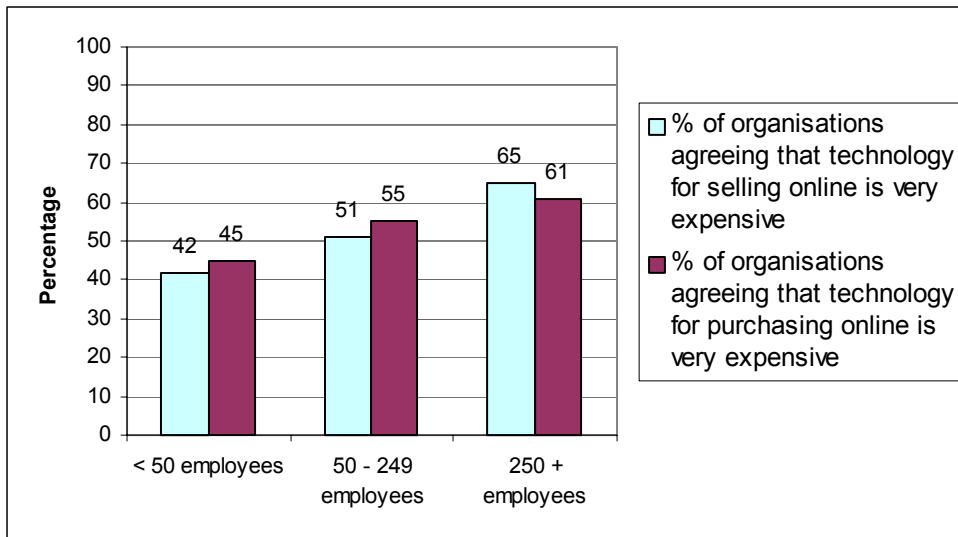
Source: e-Business W@tch (2002)

With respect to barriers to *procuring online* the situation is very similar: health and social work sector decision-makers usually agree somewhat less often completely or at least somewhat than the

European average that certain issues are presently barriers to the further expansion of ordering supplies online. For the statement that “for most of the products or services we need, purchasing requires face-to-face interaction with suppliers” we registered a value of 54% for the health sector and 61% for the EU average. That their preferred suppliers do not sell online argue 44% (versus 55%), and that the suppliers’ technical systems are incompatible with their own ones 24% (versus 33%). For the issue that the cost advantage is insignificant the votes are similar - 47% versus 45%. Interestingly enough, when they buy products or services online themselves, health sector managers are more concerned about data protection and security than the European average: 58% to 54%; for large health sector organisations this value reaches 74%.

An interesting topic is the cost of the technology needed for online sales or procurement. With values of around 50% for both items (“Implementing the necessary technology is very expensive” - *selling* online as well as *purchasing* online) and for both the health sector and the EU average this must be regarded as a barrier which needs attention. And this issue correlates with size of organisation. As can be seen in Figure 2-11, the concerns rise with larger institutions. Again the question arises whether this reflects more advanced or complex software systems or whether it is rather an assessment based on concrete experience more prevalent in large organisations.

**Figure 2-11: Cost of technology as an e-commerce barrier by size of organisation (2002)**



Source: e-Business W@tch (2002)

### Impacts

Due to the small sample of health and social work organisations actually *selling online* (6%), a detailed analysis of their statements is not warranted. But we can note that the majority of these few recorded positive impacts on a variety of aspects: 78% report very positive or fairly positive effects on their sales area, 69% on the quality of their customer services, 67% on their sales volume, 61% on the number of customers, 54% on the efficiency of their internal business processes, and 48% on the costs of logistics and inventory. Most of these values are considerably above the European average for all sectors. It seems that these few innovators reap considerable benefits from their entrepreneurial behaviour and an early start in a new market.

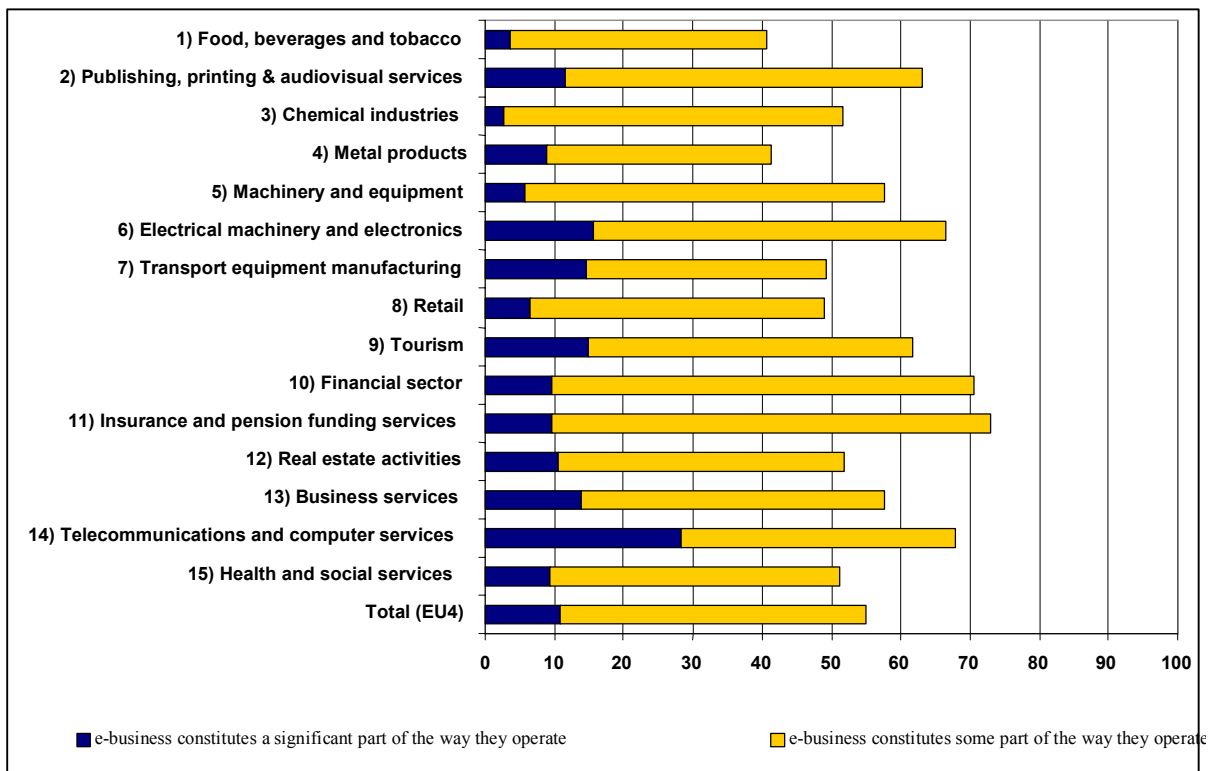
When looking at the impact of *online procurement*, we can base our analysis on a much larger sample - about 37% of all health organisations already entertain such activities. Their overall assessment is fairly positive as the following data show: 59% state that procuring online has a very positive or fairly positive effect on their procurement costs (versus 58% for the EU average), 42% report positive effects on their relations to their suppliers (versus 43%), 51% were able to improve the efficiency of their internal business processes (versus 62%), and 37% reduced the costs of logistics and inventory (versus 44%). These assessments hold across the three health sector classes with relatively little

variation, and also amongst the size classes the reported values are surprisingly uniform with at times somewhat more positive values for the larger organisations.

### 2.3.2 Overall assessment and outlook

So far, we looked at a wide variety of specific ICT and e-business aspects. Now, to summarise chapter, we will briefly present and discuss some overriding assessments by the decision-makers interviewed. When asked about the situation *today*, only 9% said that e-business solutions already constitute a significant part of the way their organisation operates, and for 42% it affects at least some part of their operations. As can be seen in Chart 2-8, this assessment is almost identical to the EU average, but somewhat ahead of sectors such as food, metal products, transport equipment, and retail. Not surprisingly, it correlates with size; large organisations (250+ employees) record values of 16% and 52% respectively.

**Chart 2-8: Significance of e-business today - comparison between 15 sectors surveyed (2002)**



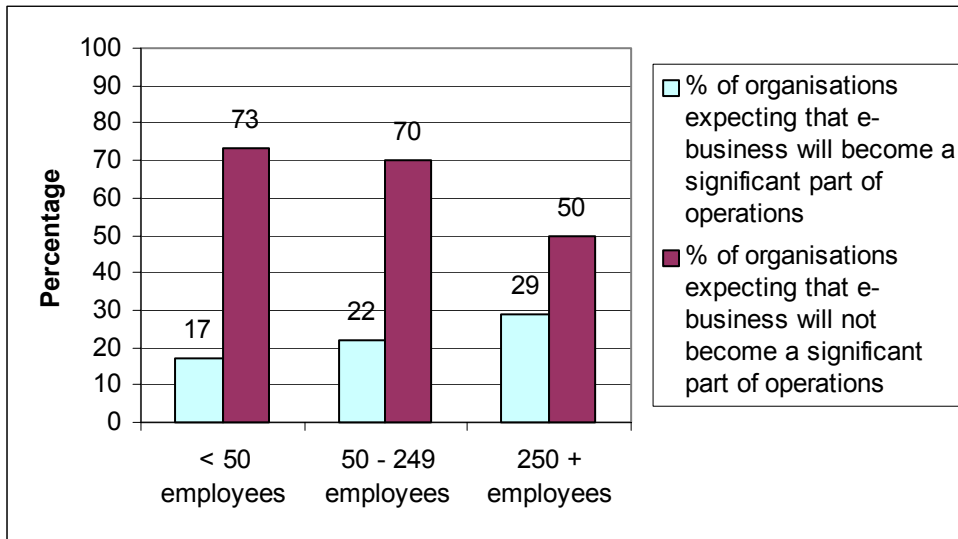
Computational base: all enterprises (EU4, employment-weighted).

Source: e-Business W@tch (2002)

However, even with those organisations which agree that e-business has already had a significant or at least some impact on their operations these changes seem to be as of yet of minor relevance. The largest changes are seen vis-à-vis internal work processes (13%: significant change; 13% some change), organisational structure (7% and 14%), relationships to suppliers (3% and 15%), and customer relationships (3% and 14%). All of these values are generally somewhat higher for larger organisations.

For an assessment of developments to expect in the near future, it is important to note that of the almost 50% of organisations for which e-business does not yet constitute a part of the way the organisation operates, only 20% expect that it will constitute a significant part of their operations within the next 2 years, whereas 68% foresee no change in this respect. Again this correlates with size - cf. Figure 2-12 – i.e. we can expect larger organisations to continue to progress towards wider applications of e-business solutions faster than smaller ones in future.

Figure 2-12: Expected significance of e-business within 2 years by size of organisation (2002)



Source: e-Business W@tch (2002)

Of those organisations which agreed that e-business constitutes at least some part of the way they operate, 13% are very satisfied and 80% fairly satisfied with the overall effects and successes of these activities (EU averages 14% and 72% respectively). This level of satisfaction holds across size classes.

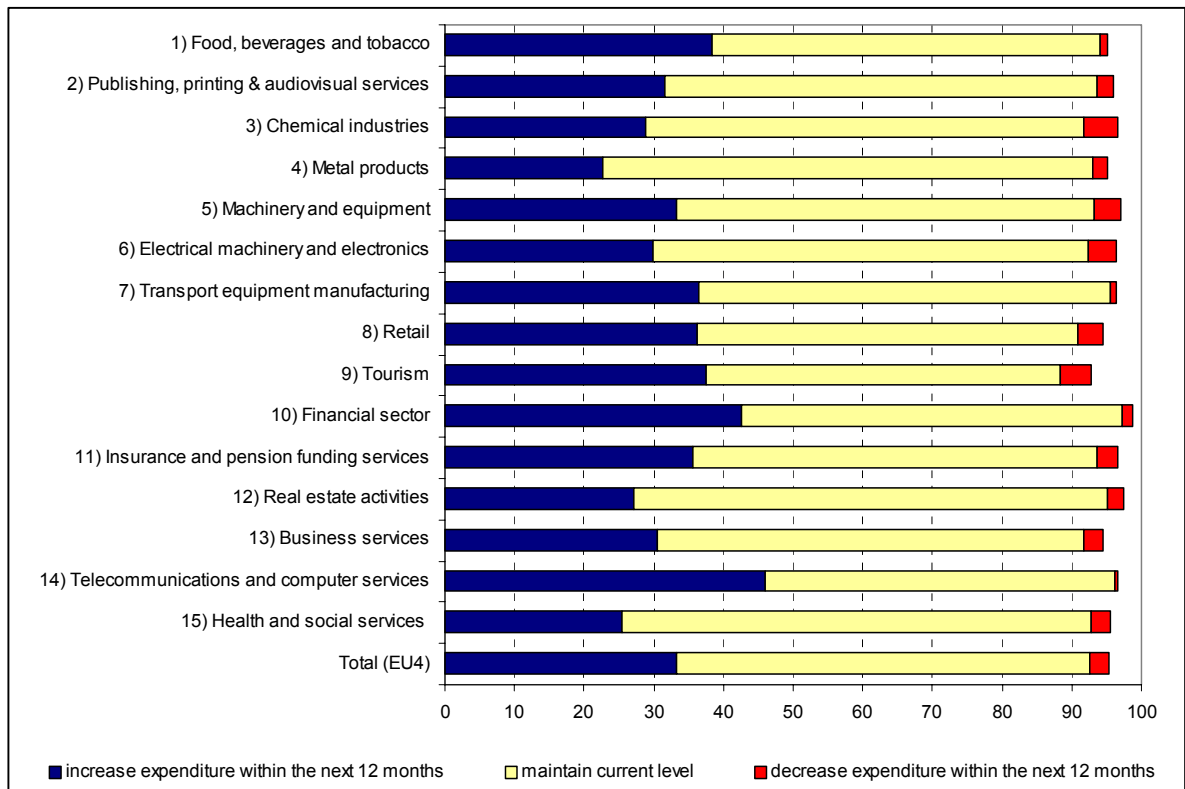
Finally, when asking all organisations about their expected increases or decreases of expenditures on e-business technologies within the next 12 months, we again obtain a by now very familiar picture: with only 26% of decision-makers expecting increases (EU average 33%) but 67% a maintenance of current levels of spending (EU 59%), the health sector trails behind almost all other EU sectors, see Chart 2-9. The data by size class also show the familiar result: 21% of the smaller organisations plan increases, but 39% of the large ones.

**Atuline Virtual Hospital**

*Atuline Virtual Hospital is the first European virtual hospital supervised by authorities. Atuline provides online medical consultation and electronic prescription to both individuals and for the use of healthcare providers. Atuline medical experts can be contacted in English, German or Finnish whenever and wherever needed. Anyone can become a user of the Virtual Hospital, while it can be designed for local healthcare providers via a local network to help them create a local patient-to-physician network and make use of the latest technology. A patient's record is compiled in the form of an e-health account, which might contain X-rays, digital photos and doctor's prescriptions. The electronic prescription can be picked up, after verification, at any pharmacy in Europe that is part of the Atuline service. The services employ a Novo developed authentication method originally developed for use in Internet banking.*

<http://www.atuline.com>

**Chart 2-9: Future expenditure on e-business - comparison between 15 sectors surveyed (2002)**



Computational base: all enterprises (EU4, employment-weighted).

Source: e-Business W@tch (2002)

## 3 Summary and conclusions – policy implications

### 3.1 Summary of main findings

#### Sector characteristics

The European human health and social work activities sector is a very heterogeneous and complex one covering a wide variety of actors and types of “businesses” catering to a similarly varied and complex set of “customers”. It is characterised by a wide variety of national healthcare systems, varying and shifting public/private mixes of healthcare delivery and financing, a size structure which is dominated by micro establishments, a great number of heterogeneous communications relationships with a wide variety of business partners, and a particular type of customer, the majority of whom are either very young or older, often disabled and chronically ill or frail patients.

#### Economic relevance

In 1997 - the latest year for which comprehensive data were available - total expenditure in the EU healthcare sector was more than 620 billion Euro, representing more than 8% of GDP. The sector employs almost 10% of the active European labour force, i.e. it is a key sector of the labour market in the Union. In some northern countries the values are significantly higher, with 19% in Sweden and 17% in Denmark. Remarkable also is the high percentage – almost one-third – of professional employment in the sector.

Taking into account the economic relevance of the sector with more than 8% of GDP and 10% of employment, the European Healthcare Information Society Technology (HIST) market amounting to approximately 11 billion Euro in 2001 is very low, accounting for less than 2% of the total western European ICT market of about 643 billion Euro p.a.

#### Longer-term trends

The European population is ageing at an accelerating rate. This will have considerable impacts on a wide variety of socio-economic factors and processes, such as economic growth, capital markets, pension systems, but also on technical progress and innovations, education and human capital, family and household structures - and last, but not least, on the health and social care system. The prevalence of chronic diseases will grow and the number of disabled persons rise. “One can expect that the age-related rationing [of healthcare interventions] would become more prominent because of the pressures on the health systems created by the increasing proportion of older people.”<sup>36</sup>

On the other hand, health in a wider, holistic sense - by encompassing also wellness, personal development, environmental protection, biotechnology and the like - may further develop into *the* new leading industry of the 21st century.

#### Status of e-business applications

##### Readiness and infrastructure

In recent years the health sector has made considerable progress towards accessing more advanced, digital telecommunications networks via ISDN, DSL or fixed connections, and access to internet services has equally improved. Hospitals show usage rates of around 90% for both e-mail and WWW services, social work organisations reach values of 80% for e-mail and 72% for WWW access, and medical practices 74% and 65% respectively. The larger the number of employees of an organisation, the higher are these values. But in spite of this change, the health sector still lags behind most other European sectors. Implementation rates of LANs and WANs are also increasing considerably, with

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<sup>36</sup> World Health Organization (2002): The European Health Report 2002. WHO Regional Office for Europe, Copenhagen (WHO regional publications, European Series, No. 97), p. 62.

larger organisations and in particular hospitals (75% for LANs, 38% for WANS) leading the way. Social work institutions, probably due to their less localised activities, report considerably lower data.

### **Human resources**

Besides an adequate, well-developed ICT infrastructure, human capital is probably an even more important resource necessary for implementation and diffusion of ICT-based applications and services. When comparing the recruitment efforts for ICT personnel during the last 12 months, only around 17% of all health-related organisations undertook such efforts - compared to almost 30% for the European average and up to 60% and more in the insurance and ICT sectors. Only 7% of the small institutions, but 47% of the large ones have been recruiting. The health sector - in line with all other European sectors in 2002 - was also still faced with considerable problems in finding suitable employees with special ICT skills. This correlates positively with the overall size of the organisation, indicating that larger organisations are looking for more specialised ICT expertise than the smaller ones who probably are more in need of ICT "generalists" with basic training. It seems that in the health and social work sector human ICT capital issues receive less attention than in most other sectors of our economies, and that particularly the smaller organisations are in great danger of being left behind.

### **Customer-facing solutions**

Usually a website is the first step of an organisation towards customer-facing e-business solutions. With close to 50% the medical sector considerably lags behind all other sectors, and even the planned expansion by about 15% (or a growth rate of 32% within the next 12 months) will not change this situation, as all other sectors with lower values boost similar growth rates. The main thrust will come from the smaller organisations which presently show much lower values than the large ones. In the medical and social work sector, more advanced e-commerce activities in the sense of "selling" health will both for ethical reasons and rules of professional code of conduct remain limited to niche applications. Of the medical organisations surveyed only 6% said that they engage in "selling" online (compared to 17% for all sectors in the EU and, e.g. 46% for the insurance sector). These very few organisations are quite advanced in their activities - but not at all typical for the overall medical and social work sector. For methodological reasons - to allow for comparisons between sectors, only *one* general questionnaire was developed and applied in an identical version across all sectors. It was not possible to take into account specific considerations vis-à-vis the health sector, e.g. questions dealing with information exchange between physicians and their patients, making online appointments, obtaining information and advice concerning a particular health condition etc.

### **Back-office applications**

Taking into account specific characteristics of the health sector, e-business solutions relating to human resource aspects, procurement issues, and advanced e-business back-office applications were discussed. Unlike any other sector, *human capital* is *the* key input factor in the health field. Even in large, diversified hospitals, personnel costs reach values of between 60% and 65% of all costs, and in psychiatric institutions the value approaches 80%. It is therefore perhaps not surprising that in the health sector about 25% of all organisations already post job vacancies on special internet boards, a value considerably higher than in many other sectors. Hospitals reach a value of 40% here. Another interesting aspect is e-learning: with 16% of all organisations active in applying such techniques, the health sector is also ahead of some other sectors in this area and close to the European average of 19%. On a more advanced level, online-based human resources management systems are a key application. Here, too, with a value of 21% the health sector comes close to the EU average of 23%. Size is again the determining factor within the sector: 57% of the largest organisations make use of such systems, but only 9% of the small ones.

*Procurement* of supply and services concerns the second largest cost factor. Online procurement has grown consistently and strongly in recent years, and will continue to do so: the health sector with 46% (37% in 2002 plus 9% planning to purchase online within the next 12 months) is again close to the EU average of 50%. However, when looking at somewhat more sophisticated e-business techniques such as implementing online techniques for the management of capacities and/or inventories or access to

the extranet of suppliers, the health sector tends to lag behind most other sectors - with the exception of its larger institutions.

When considering the wide variety and complexity of internal administrative and management tasks and of external relationships with a large number of very diverse actors and partners, a large potential for improving workflow and communications and, at the same time, cost reduction through advanced e-business applications is likely. However, our data show that - in line with most other sectors and types of applications - so far only marginal numbers of health organisations participate in e-marketplaces, apply Supply Chain Management (SCM) or Enterprise Resource Planning (ERP) systems, or draw on the services of Application Service Providers (ASP).

### Perspectives for e-business solutions

A variety of issues hamper the wider application of e-business solutions. When asked about their assessment of various barriers commonly raised about *selling online*, health sector executives do not vary much from assessments voiced in other sectors. A considerable majority of 72% agrees strongly or somewhat that many of the goods and services of this sector do not lend themselves to be sold online. 51% regard as a barrier that only a few of their customers have online access yet, data privacy or data security concerns of clients are assumed by 51%. The processing of payments for online sales (33%), the low revenue potential (28%) or the handling of delivery processes (22%) are not assessed as major barriers.

On the other hand, those few actually *selling online* (6%) report in a large majority (78%) very positive or fairly positive effects on their sales area, on the quality of their customer services (69%), on their sales volume (67%) and on the number of customers (61%). It seems that these few innovators reap considerable benefits from their entrepreneurial behaviour and an early start in a new market.

With respect to barriers to *procuring online*, 54% regarded face-to-face interaction with suppliers as relevant, 44% argued their preferred suppliers do not sell online, and 24% mentioned that the suppliers' technical systems are incompatible with their own ones. 47% believe that the cost advantage is more or less insignificant. When buying products or services online, health sector managers are more than the European average concerned about data protection and security, 58% to 54%; for large organisations this value reaches even 74%.

When considering the impact of *online procurement*, the overall assessment is fairly positive: 59% state that procuring online has a very positive or fairly positive effect on their procurement costs, 42% report positive effects on their relations to their suppliers, 51% were able to improve the efficiency of their internal business processes, and 37% reduced the costs of logistics and inventory.

However, in spite of these relatively positive impacts, the overall assessment is rather sobering. Even for those organisations which agree that e-business has already had a significant (9%) or at least some (42%) impact on their operations these changes seem to be as yet of minor relevance. And for an assessment of developments to expect in the near future, it is important to note that of the almost 50% of organisations for which e-business does not yet constitute a part of the way the organisation operates, only 20% expect that it will constitute a significant part of their operations within the next 2 years, whereas 68% foresee no change in this respect. This correlates with size, i.e. we can expect larger organisations to continue to progress towards wider applications of e-business solutions faster than smaller ones in future. And these impressions of an only slowly developing e-business culture are further confirmed by the observation that only 26% of decision-makers foresee increases (EU average 33%), but 67% only a maintenance of current levels of e-business spending (EU 59%), values with which the health sector trails behind almost all other EU sectors.

## 3.2 Economic implications

If indeed applications of information and communications technologies, internet and e-business solutions are fast becoming essential tools for both economic activity and the social fabric of our societies, then the survey results reported above give reason for hope and for concern at the same

time. Hope, because some institutions are already well into taking advantage of e-business solutions and reaping considerable economic benefits from this, and concern because the sector as a whole, in spite of its economic significance, is trailing behind almost all other economic sectors, and no signs of a change of this situation are discernable.

**Some organisations, particularly larger ones such as hospitals, health trusts or community centres, are already well on their way towards taking advantage of ICT and e-business solutions and thereby improving their competitive position in a highly regulated, but increasingly competitive market. They could become the hubs of local and regional e-business networks.**

Currently, key hurdles for advanced applications in the health sector are technical infrastructure issues - legacy medical and task-specific information systems, stand-alone systems for various administrative tasks, or investments in EDI, and mainframe computers rather than client-server platforms. At the same time, "the European HIS [Hospital Information Systems] market is predicted to grow by a compound annual growth rate of 4.5%, from \$2.69 billion in 2001 to \$3.2 billion in 2005. The small growth in the market masks a fuller picture of dramatic changes that are about to impact on the hospital information system market and healthcare provision across Europe."<sup>37</sup> A key trend is the development of *Integrated Healthcare Communications Systems* (IHCS), "a more integrated healthcare information system where hospitals play a crucial role."<sup>38</sup>

**The trend towards *Integrated Healthcare Communications Systems* (IHCS) by providing the much needed healthcare system (inter-)connectivity could become a key driver for e-business developments in the health sector and, at the same time, will provide a new challenge to European ICT providers.**

Whereas the basic technical telecommunications and public infrastructure, including physical networks, generic interoperable services and adequate security, are in place in most Member States, a crucial layer comprising servers and services for sharing both patient clinical and back-office information and thereby providing the missing connectivity is largely lacking, as is the upper layer of (interconnected) e-business applications to support simple and complex patient care processes, the management of facilities and the (quality) control of health systems. IHCSs focus on these aspects or support them, and thereby can be expected to become *the* economic driver for e-business diffusion.

In the USA, the *Health Insurance Portability and Accountability Act* (HIPAA) requires the establishment of national standards for electronic healthcare transactions and national identifiers for providers, health plans, and employers. It also addresses security and privacy aspects. Adopting these standards will have a fundamental impact on the efficiency and effectiveness of the US healthcare system by mandating the widespread use of electronic health data exchange.<sup>39</sup> This has become a determinant incentive for American HIS suppliers to improve their systems in order to provide the required connectivity and, at the same time, meet security standards. These developments will have a decisive impact on future e-business developments in the American health sector.

Against this background it becomes mandatory for European suppliers to meet this competitive challenge, to take advantage of this window of opportunity, and to offer similarly advanced applications to their clients in Europe and abroad.

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<sup>37</sup> "Hospital Information Systems Enter New Period of Growth", Content-Wire, 5 Nov. 2001: <http://www.content-wire.com/vertical/vertical.cfm/ccs=120&cs=993> (Sept., 2002)

<sup>38</sup> "Hospital Information Systems Enter New Period of Growth", Content-Wire, 5 Nov. 2001: <http://www.content-wire.com/vertical/vertical.cfm/ccs=120&cs=993> (accessed Sept. 17, 2002)

<sup>39</sup> Cf. Lutz, S. and Henkind, S.J. (2001): *e-essentials - The Role of ASPs*, in: Healthplan, May/June, pp. 78-80. For further implications see also Young, J. and Burghard, C.(2001): *Sorting out the Payer Internet Care Management Market*, Gartner Research: [www.scis.ecu.edu.au/online/gartner/research](http://www.scis.ecu.edu.au/online/gartner/research) (June 2002): "By 2004, 70% of comprehensive e-commerce (administrative) solutions vendors serving the healthcare payer market will consolidate or partner with care management vendors (0.8 probability)."

**For e-business solutions to gain wider acceptance more quickly in the health sector, specific characteristics of this sector such as the conservative outlook of many of its players must be taken into account by software and service providers.**

From user requirements and innovation diffusion studies in the medical arena it is well known that this sector is a very conservative one.<sup>40</sup> Although new e-health technologies and e-business solutions will only develop their full potential when work flow and care processes have been "re-engineered" to take full advantage of the new possibilities, initially it is mandatory to take fully into account existing institutional and organisational frameworks in order to avoid user rejection and organisational resistance.

**For society to reap the full benefits of improved health networking economics, public interventions to reach a critical mass may be warranted.**

Individual benefits from e-business applications for health sector players are also a function of health networking economics. Initially, as with other network activities, time and costs required may outweigh perceived benefits. A critical mass is needed for the balance to tilt, and the greatest benefits will accrue to all, the health sector participants and society too, when as many actors as possible participate and thereby reap the savings resulting from improved e-business solutions and connectivity, greater efficiency, better services and, most importantly, better health and care outcomes for the costs incurred. Taking into account the largely public structure of many national health systems as well, this implies that the overall (national) "e-health and e-business system" must function, only then a win-win situation for all concerned will arise, thus providing the needed stimuli for a faster diffusion of new applications.

**In the context of present trends and foreseeable developments, smaller organisations will lose out on e-business developments.**

It became quite obvious from our earlier analysis of survey data that the smaller organisations in the health and social work sector are already to a very considerable extent lagging behind average development trends in the sector - which in turn lags behind most other sectors in most aspects of e-business applications. And both the plans of these smaller organisations and their expectations and assessments indicate that this situation will worsen in the near future. Whether and what impact this may have on sector structures, competitive situations, employment, regional supply and ubiquitous and adequate access by all citizens to healthcare services is beyond the present study, but it definitely needs attention and more detailed analysis.

**The impacts, benefits and costs of e-business implementations in their various contexts need convincing evidence and "proof of concept", also supported by best practice examples.**

Much had been expected from the developments of the "new economy", and the promises have been overwhelming. Our research presented some evidence - based on the subjective assessment of the interviewees - that indeed positive impacts and economic benefits may accrue to those organisations which venture into this new field. However, scepticism about these benefits and whether the efforts involved will indeed be fruitful seem to prevail. The highly regulated environment of most national health system structures and the frequent absence of a competitive environment are probably also important factors influencing this. Convincing evidence and best practice examples to stimulate public discussions and to prompt actors in the field to follow suit should be one of the major measures to positively influence these developments.

**E-business developments can help to overcome the static structure of national health systems and stimulate the evolution of a European health market.**

In spite of all efforts at the EU level, cross-border activities in the health market are marginal to date. As e-business can lead to more transparency and more competition, a widening of the markets served and easier communications across national borders, it could - together with changes in the regulation

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<sup>40</sup> Klecun-Dabrowska, Ela, and Cornford, Tony: The organising vision of telehealth. ECIS 2002 Proceedings, Gdansk, Poland, June 06-08, pp. 1206-1217.

of national healthcare markets - contribute towards the development of a truly European healthcare services market. Initially, stimulating market development from the side of supplies needed by healthcare providers may be the most promising route.

### 3.3 Policy implications

**National and European strategies and policies for the development of an e-health and e-business infrastructure can become key drivers of change. Allowing benefit/cost stimuli to work, and supporting competition to provide quality-oriented patient-centred service delivery processes will speed up the implementation of e-business applications. This will also allow health systems to better cope with new challenges arising from medico-technical progress and the ageing of societies.**

As our analysis has shown, the health sector - in spite of its economic significance - is lagging behind all other sectors with respect to the application of e-business solutions. Besides its diversity and complexity, the highly regulated environment, the small number of private players compared to public or not-for-profit institutions active in most national systems, and the resulting absence of a truly competitive environment may all contribute to this situation.

On the other hand, all national health systems suffer from increasing costs and political pressures to constrain these. In this context, internet and e-business solutions are highly relevant because they represent the single most important technology of this generation for health system players to cut costs, improve cooperation and service, deliver seamless, patient-focused care and improve medical outcomes.

Currently, it seems that more centralised national healthcare systems like the NHS in the UK are most advanced in planning for and piloting e-business solutions. Although our survey data do not yet reflect this, our case studies presented above and the strategy papers available from the British NHS support such an assessment. Adapting such policy measures to the respective national context and supporting them with accompanying measures at the European level should help to alleviate the lagging performance of the health sector vis-à-vis other European sectors.

As data presented for the home care sector indicate, private for-profit organisations show a higher propensity to invest in and apply ICT solutions. The same seems to hold for the hospital sector in spite of it being financed to a large extent from public or social security funds. Cost pressures, the ability to raise funds in the capital market even for large investments, and a higher incentive to operate in an efficient manner all contribute to this. As competition reaches the medical market in Europe and purchasing of medical services from private sources accelerates, we expect these tendencies to become more pronounced.

The greatest cost drivers in the health sector are medico-technical advances, which rely increasingly on the integration of ICT technologies. The further development of medical interventions, the introduction of disease management programmes, improved home care for chronically ill patients etc. will all further push the implementation of e-business applications.

**To allow European health systems and patients to reap the benefits expected from the widespread diffusion of e-business solutions, policy measures are needed to overcome a wide variety of barriers to change and to assure a fair distribution of costs and expected benefits amongst all players. This includes specific support for micro organisations, investment support for (national) ICT health infrastructure development, the development of standards or initiatives to provide solutions for security and privacy concerns acceptable to all.**

In spite of the fact that the same basic e-business models such as B2B e-commerce systems used in other sectors are applicable to many facets of the health sector, applications and implementation planning is lagging. Clearly, the fragmented structure of the sector, the dominance of micro organisations, the complexity of interaction relationships and the public/private mix are major

hindrances to the wider diffusion of such models. A shortage of investment capital in the public sector as well as with physicians in private office contributes to this.

Savings from introducing e-business solutions on a national scale do not necessarily imply a win-win solution for all. Doctors and hospitals will have to heavily invest in new equipment, training, organisational re-engineering etc., while immediate savings are, for example, expected for insurance funds. This requires a fair sharing of costs and benefits, and a vision of a citizen-centred healthcare paradigm that engages physicians and supports them in retooling medicine and its reimbursement mechanisms.

The sector is characterised by a preponderance of micro organisations often with neither the expertise, the funds nor the time to implement e-business solutions. As our data have shown, they are already lagging behind to an alarming extent, and the analysis showed that this tendency will even worsen in the foreseeable future. Specific policy measures must be developed to rectify this situation and to allow them to catch up with e-business implementations. Stimulating and supporting partnerships with and coaching by larger organisations such as hospitals which integrate them into an overall care services value chain (supported by Integrated Healthcare Communications Systems) including e-business relationships may be one way to go; another could be the support of regional networking of smaller organisations.

The lack of training, education, and experience in ICT is an important issue. Time and cost pressures, establishment size and availability of affordable third party offers all contribute to this situation. Here again measures to support partnerships and co-operation with larger regional players like a hospital or amongst a group of smaller actors are indicated.

Healthcare is a particularly sensitive field. As long as participants, including patients,<sup>41</sup> are not convinced that communications via the Internet satisfy the highest medical standards in this respect, all activities will be severely hampered. And EDI applications will not be moved to the Web. "Privacy is the sharp stick in the eye of the emerging Internet Cyclops ... E-health progress is entwined with privacy and security concerns. If healthcare organizations don't put privacy policies and safeguards into place in the exploding world of e-health, they'll end up making the system worse."<sup>42</sup>

National and international standards are needed for communication, documents, terms, patient identifier, security and privacy etc. to assure compatibility and connectivity amongst all the actors within and across national health systems. This will also be a key ingredient for the development of a European market.

**Demographic change and its impact on European economies in general and health systems in particular necessitate policy action to speed up the diffusion process of e-business solutions to support cost containment in the health sector and the necessary expansion of services.**

The most pressing issues for the next decades with which our societies are currently already faced are demographic changes. Technological progress and the "new economy" are key factors for economic growth and thereby for harnessing these challenges. As our survey results document, the majority of health sector players do not (yet) see a need to speedily expand their e-business activities, and are not planning to do so in the foreseeable future. No forecast seems currently possible on the time span within which most health sector players will communicate and share data and information in real time and interconnect their systems. To set the right stimuli and provide the right environment to promote the realisation of this vision is *the* key challenge for national and European health sector policies in the near future.

**Specific policy measures are needed to allow people with special needs to take full advantage of the benefits e-health promises for all European citizens.**

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<sup>41</sup> The EU Directive on Data Protection (1995) identifies health data as a special category and prohibits the electronic processing unless the citizen has given explicit consent to do so.

<sup>42</sup> Medical Privacy (2001), PricewaterhouseCoopers *HealthCast 2010 – E-Health Quarterly*, June, p. 1

A pressing issue, which already at this stage needs policy attention, is what can be termed the “medical divide”. Quite a considerable share of the population, particularly older, disabled and frail people, but also those with no or little education and/or on low income, as well as people who have been disappointed by what they find (or cannot find) on the Internet and who are not interested in e-services, will be left out of these developments and cannot or will not participate in the benefits and advantages customer-facing e-health applications offer for them. Creativity, innovations and support are needed to integrate them, to progress to a true Information Society for all, to assure cohesion and equality in access to medical and health services in future years also, when the pressure to improve the efficiency of services via e-business solutions will rise further.

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## Annex: Methodology of the e-Business Survey 2002

### Background

The data presented in this report are derived from the European e-Business Survey 2002, a cornerstone of the monitoring activities of the *e-Business W@tch*. In total, 9,264 telephone interviews with decision-makers in European enterprises in all EU Member States were conducted during June and July 2002. For the construction of the questionnaire and for underlying definitions, OECD recommendations were taken into account.

### Fieldwork

The fieldwork of the survey was carried out by INRA Germany in co-operation with its partner organisations on behalf of the *e-Business W@tch*:

Country	Organisation	Country	Organisation
Austria	Spectra Marktforschung: Brucknerstr. 3-5/4, 4020 Linz	Italy	INRA Demoskopea S.p.A., Via Rubicone 41, 00199 Roma
Belgium	INRA Belgium, Avenue de la Couronne 159-165, 1050 Brussels	Luxembourg	ILReS Market Research, 46, Rue di Cimentière, L-1338 Luxemburg
Denmark	Gallup TNS Denmark, Masnedogade 22-26, 2100 Copenhagen	Netherlands	Blauw Contactcenter, Conradstraat 18, 3013 AP Rotterdam
Germany	INRA Deutschland GmbH, Papenkamp 2-6, 23879 Mölln	Portugal	Metris GfK, Av. Eng. Arantes e Oliveira 3-2, 1900-221 Lisboa
Finland	Taloustutkimus Oy, Lemuntie 9, 00510 Helsinki	Spain	INRA España S.A., C. Alberto Aguilera, 7-5, 28015 Madrid
France	CSA TMO, 22 rue du 4 Septembre, 75065 Paris Cedex 02	Sweden	GfK Sverige, Box 401, 221 00 Lund
Greece	MEMRB – K.E.M.E, 24 Ippodamou St., 11635 Athens	UK	Continental Research, 132-140 Goswell Road, EC1V 7DY London
Ireland	Lansdowne Market Research, 49 St. Stephens Green, Dublin 2		

### Interview method

The fieldwork was carried out in June and July 2002 using computer-aided telephone interview (CATI) technology. The decision-maker in the enterprise targeted by the survey was normally the person responsible for ICT within the company, typically the IT manager. Alternatively, especially in small enterprises without a separate IT unit, the managing director or owner was interviewed.

### Population coverage and sampling

The highest level of the population for the e-Business Survey was the set of all enterprises which are active at the national territory of one of the EU Member States and which have their primary business activity in one of the 15 sectors specified by NACE Rev. 1 codes. The most important used viewpoints for breakdown of the population in the survey were (i) the economic activity, (ii) the national territory of the enterprise and (iii) the size in terms of employees. The survey was carried out as an enterprise survey, i.e. data collection and reporting focuses on the enterprise (rather than on the establishment), defined as a business organisation of one or more establishments comprised as one legal unit.

The sample included enterprises from 15 sectors of the economy, defined by NACE Rev. 1 business activities (see table below). The composition of sectors took into account their economic importance, homogeneity with respect to the analysis of e-business, and the relevance of e-business activities.

Population coverage of the e-Business Survey (2002)			
No.	NACE Rev. 1 Codes (Section – Division/Group)		Sector Name
01	D	15, 16	Manufacture of food products, beverages and tobacco
02	D / O	22, 92.1, 92.2	Publishing, printing, reproduction of recorded media, audiovisual services
03	D	24, 25	Manufacture of chemicals and chemical products
04	D	28	Manufacture of metal products
05	D	29 (except 29.6, 29.7)	Manufacture of machinery and equipment
06	D	30, 31 (except 31.3 - 31.6), 32	Manufacture of Electrical machinery and electronics
07	D	34, 35	Manufacture of transport equipment
08	G	52.11, 52.12, 52.4	Retail
09	H / I / O	55.1, 55.2, 62.1, 63.3, 92.33, 92.52, 92.53	Tourism
10	J	65.12, 65.2	Credit institutions, investment firms and leasing enterprises
11	J	66	Insurance and pension-funding services
12	K	70	Real estate activities
13	K	74	Business services
14	I / K	64.2, 72	Telecommunications and computer-related services
15	N	85.11, 85.12, 85.3	Health and social services

The sample drawn was a random sample of companies from the respective sector population in each Member State where the respective sector was to be surveyed with the objective of fulfilling quota with respect to company size class. Target quota were to include a share of at least 10% of large companies (250+ employees) per country-sector cell and at least 30% of medium sized enterprises (50-249 employees). Samples were drawn locally by the INRA partner organisations based on the following business directories and databases:

Country	Directory / Database	Country	Directory / Database
Austria	Herold BUSINESS MARKETING database	Italy	Dun & Bradstreet
Belgium	SPECTRON database by Vicindo	Luxembourg	Répertoire des entreprises luxembourgeoises“ by STATEC (the official list of the National Statistic Administration).
Denmark	KOB (Købmandsstandens Oplysnings Bureau)	Netherlands	MarktSelect
Germany	Heins und Partner Business Pool	Portugal	Business directory by INE (the National Statistics Institute)
Finland	Blue Book - Salesleads database by the Helsinki Media Company Oy (Sanoma Magazines Finland)	Spain	Dun & Bradstreet
France	IDATA, based on „INSEE Siren file“ (the National Institute of Statistics) and other directories	Sweden	Swedish Post Address Register (PAR)
Greece	ICAP directory (the major database for Greece and member of the European Association of Directory and database Publishers)	UK	Dun & Bradstreet
Ireland	Bill Moss / Dun & Bradstreet		

## Interviews per country and average interview length

In total, 9,264 interviews were carried out. The following table shows the breakdown by country and the average interview length:

Country	No. of interviews	Average length	Country	No. of interviews	Average length
Austria	308	17.0 min.	Italy	1517	22.5 min.
Belgium	300	18.2 min.	Luxembourg	102	17.4 min.
Denmark	304	20.2 min.	Netherlands	500	17.2 min.
Germany	1500	18.8 min.	Portugal	300	23.0 min.
Finland	308	20.6 min.	Spain	502	18.4 min.
France	1362	17.2 min.	Sweden	260	19.8 min.
Greece	308	16.5 min.	UK	1538	16.5 min.
Ireland	155	20.1 min.	<b>TOTAL</b>	<b>9264</b>	<b>~ 18 min.</b>

## Problems encountered

No major problems were reported by the fieldwork organisations with respect to interviewing (e.g. comprehensibility of the questionnaire, logical structure). A statement from the institute that carried out the survey in the UK summarises this general assessment very well: "On the whole, the fieldwork went relatively smoothly. The questionnaire was logically structured and flowed naturally. Most problems stemmed from the difficulties of conducting research projects among ICT decision-makers in general rather than from any specific flaws in design of this project itself. Dedicated ICT professionals are heavily researched and therefore securing their participation can be difficult. This is a particular problem in larger companies."

In some countries, it was not possible to accomplish the number of interviews envisaged, mainly in those cases where the total population of enterprises was relatively small (e.g. in the insurance sector in smaller countries). In some cases, the objective of including a share of 10% of large companies could not be accomplished; if possible, these were then replaced by interviews with SMEs.

An issue – which was known in advance but is unavoidable in telephone interviews – is that it is not always easy to find the right target person. Fieldwork organizations reported that sometimes a data processing manager is not very aware of the consequences of e-business on the whole of the company, on the personnel level and on the financial level. On the other hand, the general manager may not always be aware of the implementation status and technical consequences.

## Tabulations

Within the coverage specified above, and in line with the special task of the *e-Business W@tch*, results were compiled for two main sets of data:

1. An activity breakdown of the population of enterprises into 15 sectors. This breakdown is based on the aggregate of four countries (D, F, I, UK), as in these countries all 15 sectors were included in the survey and therefore comparability of the sample is given. These four countries represent more than 60% of the market volume in any of the 15 sectors and in most sectors actually more than 70%.
2. A size-class breakdown of the population of enterprises into three categories: small enterprises (including micro-enterprises, i.e. enterprises with 0-49 employees), medium sized enterprises (50-249 employees) and large enterprises (250+ employees).

A breakdown of the population by EU Member States is also available, but it is restricted to four countries (D, F, I, UK) for the same reason as explained in (1.) above. This implies that two different kinds of totals were calculated: (i) an EU-4 total consisting of the results from Germany, France, Italy and the UK and (ii) a sector total consisting of all countries included in the survey of a particular sector. For reasons of comparability and consistency, the tables in this scoreboard build on the EU-4 totals. Sector totals are composed of 6-8 countries per sector.

(cf. databases on [http://www.empirica.com/marketwatch/database/sector\\_database.htm](http://www.empirica.com/marketwatch/database/sector_database.htm))

In addition, the activity breakdown was cross-tabulated with the country as well as with the size-class breakdown. These cross-tabulations are offered in special sector databases. However, depending on the indicator and the filter questions, the number of observations can become very small in many cells of this cross-tabulation. It is therefore recommended to limit the breakdown of data to one dimension (in the case of pre-filtered questions) or two dimensions (if all enterprises were asked).

## Weighting principles

Two weighting schemes have been applied: weighting by employment and by the number of enterprises. Data are presented in either way depending on the kind of the analysis to be made.

Values that are reported as employment-weighted figures should be read as "enterprises comprising x% of employees". To give an example: The indicator "*percentage of companies selling online*" is – if employment-weighted – defined as "*companies comprising x% of employees sell online*". The reason for using employment-weighting is that there are very many more micro enterprises than non-micro enterprises. The unweighted figure would effectively represent mainly the smallest sizes of firm.

Values that are reported as enterprise-weighted figures are to be read as "x% of enterprises", reflecting the number of enterprises as legal entities but not their relative economic importance in terms of employment.

Weighting was based on the latest available universe figures by Eurostat. Missing or undisclosed universe data had to be imputed. The imputation procedures depended on auxiliary or proxy data availability, taking into account where available information about higher industry aggregations, nearest neighbour data, turnover-employment correlation and secondary sources other than Eurostat and allowing for the constraint of predetermined ranges such that imputed data had to be contingent with published sectoral, national and European universe totals as well as for final plausibility checks for every single imputed data item. The weighting cells correspond to the data reporting pattern used as regards industries and employment size-classes. Uniform expansion factors are applied to enterprises within one of the three size-classes per industry per country. As for data that refer to a base other than the universe of all enterprises (e.g. indicators appropriately reported for on-line selling enterprises only), expansion factors are adjusted to the different shares of observations per cell that build the computation base.

## Variables - indicators

The set of ICT and e-business indicators for which data were collected in this survey can be structured into five main modules:

Module A: ICT infrastructure and e-skills development in the company

Module B: E-commerce and e-business usage

Module C: Barriers to e-commerce

Module D: Impact of selling and procuring online

Module E: Impact of and satisfaction with electronic business

The choice of indicators includes a basic set of widely accepted measures for e-commerce and e-business (as used in related surveys on e-commerce and e-business e.g. by Eurostat), but also introduces a few innovative indicators which have a pilot character and are not yet widely tested. The full list of variables which was the basis for preparing the questionnaire can be downloaded (in \*.xls format) from the *e-Business Watch* website at its "database" section:

[http://www.ebusiness-watch.org/marketwatch/database/survey\\_info.htm](http://www.ebusiness-watch.org/marketwatch/database/survey_info.htm)