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m•power

Middleware Platform for eMPOWERing cognitive disabled and elderly

SIXTH FRAMEWORK PROGRAMME : PRIORITY 2.5.11 EINCLUSION SPECIFIC TARGETED RESEARCH OR INNOVATION PROJECT

MPOWER Project Deliverable:

Socio-economic, regulatory and policy studies

Deliverable id:

D8.2

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Other Documents/Items forming part of this deliverable

This document is the "master" document for this deliverable. The deliverable as a whole has been split into this master document and the "annexes" listed below. All of the annexes should be considered as formally forming part of the deliverable.

Annex Identifier	**Document name**	**Content of the Annex**
Annex I	Figures and Tables	Compiled Figures and Tables of the Report
Annex II	The Questionnaire	The questionnaire used to gather information from countries

Release History

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MPOWER Consortium

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1 Executive summary

The purpose of this deliverable is to present a socio-economic, regulatory and policy report which aims to be some basis and a preliminary tool for a future business plan.

This report aims at better understanding the market dynamics of IST-based products and services geared towards the older and disabled people in the European Union. That for, it goes through a socio-economic evaluation of some European countries, focusing on the countries from the partners of the Consortium and always comparing to the European Union on the whole. The information here presented has been extracted from a wide variety of secondary sources. In order to get some particular data and information from their countries, a questionnaire was designed and sent to the partners.

The Information Society Technologies' (IST) market environment seems to be very complex, even when only targeting to older and disabled people. The uptake of IST products and services by the focus target is influenced by many different factors: socio-economical, technological, political and psychological. Also several actors are involved and play a relevant role: organizations and institutions, policy makers, industry, care providers, social services, the end users, etc.).

In the present document an overview over these actors and factors is given, as far as it relates to IST uptake among older people or their care-givers. All this information has been drawn together to present a comprehensive picture of the situation in the European Union.

Demand for health and social services are rising as a result of an ageing population and higher income levels. But, in order to develop an integrated European e-Health system it is necessary to establish a legal framework, which will act as the basis for a further development of an e-Health services market. The reasons for a new health care structure are analysed in the report as well as the different IT services available in the market. The importance of the digital territorial divide, the slow acceptance of ICT by the elderly and its affordability are also widely described in the document. Nevertheless, a whole chapter is dedicated to technological considerations and accessibility and standardization matters. Making the products and systems easier to use, and matching them more closely to user needs and requirements will be the key to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use. Although several laws have been released on this subject, its potential has not been totally exploited.

A final conclusions chapter goes through a key synthesis and general trends and recommendations as well as the risks to be taken into account to achieve the technical, social and economic goals of the European Union in terms of better integrating older and disabled people into the emerging knowledge Society.

2 Introduction

2.1 Context

The European Union is founded on the principles of liberty, democracy, respect for human rights and fundamental freedoms and on the rule of law, principles which are common to the Member States.

The right to equality before the law and the protection of all persons against discrimination constitutes a fundamental right and is essential to the proper functioning of democratic societies. It contributes to the objectives of promoting economic and social progress and a high level of employment through the strengthening of economic and social cohesion.

The Article 13 of the EC Treaty, introduced by the Treaty of Amsterdam, expanded upon this principle by stipulating that *"Without prejudice to the other provisions of this Treaty and within the limits of the powers conferred upon it by the Community, the Council, acting unanimously on a proposal from the Commission and after consulting the European Parliament, may take appropriate action to combat discrimination based on sex, racial or ethnic origin, religion or belief, disability, age or sexual orientation."* As defined in the Treaty, Article 13 takes a subordinate role if a more specific legal basis applies. Thus in addition to this key article, a number of other anti-discrimination articles is to be found, such as:

- Articles 136 and 137, which promote measures to combat exclusion.
- Declaration No 22 to the Final Act of the Amsterdam Treaty, which refers to Article 95 of the EC Treaty and concerns equal opportunities for the disabled.

Discrimination should be seen as an obstacle to the economic and social cohesion of the European Union. There is an obvious social cost when one or more individuals suffer discrimination because they are members of a particular group. Discrimination is even more unacceptable when directed against those who might need help, like the disabled or the elderly. Moreover, it is only right that the European Community should guarantee respect for human rights in its Treaty.

Discrimination must also be seen as interfering with the four fundamental freedoms - particularly the free movement of persons - and as such constitutes an obstacle to the working of the internal market.

On the other hand, the transition to a digital knowledge-based economy is set to be a powerful factor for growth, competitiveness and job creation, technical progress, modernisation and structural changes to be made to the economy. It will also help improve people's quality of life and protect the environment. Given that ICT greatly improve competitiveness, the European Union (EU) should make use of all the possibilities offered by them.

In order to meet the new challenges of globalisation, telecommunications and new electronic services will require strengthened international cooperation. The objective is to reach wider agreement at international level on how to proceed with a view to creating a frontier-free electronic market while respecting the public interest.

Why does the EU need to develop its e-Health systems and services?

For some years European countries have been facing rising demand for health and social services as a result of an ageing population and higher income levels, although the funding available remains limited. At the same time, citizens have higher expectations and the mobility of patients and of health professionals has increased. Huge quantities of medical information are difficult for the authorities to manage.

Developing e-Health systems and services should help solve these problems. It could in particular help reduce costs and improve productivity in such areas as billing and record-keeping, reducing medical error, cutting down on unnecessary care, and also in improving the quality of healthcare.

Today at least four out of five European doctors have an Internet connection, and a quarter of Europeans use the Internet to get information about diseases and health matters. These encouraging figures indicate that e-Health systems and services will develop rapidly.

European Community research funding has supported e-Health to the tune of EUR 500 million since the early 1990s, with total investment through co-financing being around twice that amount. Many of today's success stories are the product of that research. All this has helped to create a new e-Health industry with a turnover of EUR 11 billion. Estimates suggest that by 2010 up to 5% of health budgets will be invested in e-Health systems and services.

This action is only part of the EU's response to the huge challenges that health services across the EU are facing. Two further examples include action on patient mobility and the benchmarking of national reforms of healthcare systems.

The Health Ministers of the EU and the European Commission established 2010 as the deadline to develop an integrated eHealth system characterized by its interoperability and compatibility with the various national health systems based on the new technologies at the service of the European citizens.[1]

[1] Information gathered from European Commission.

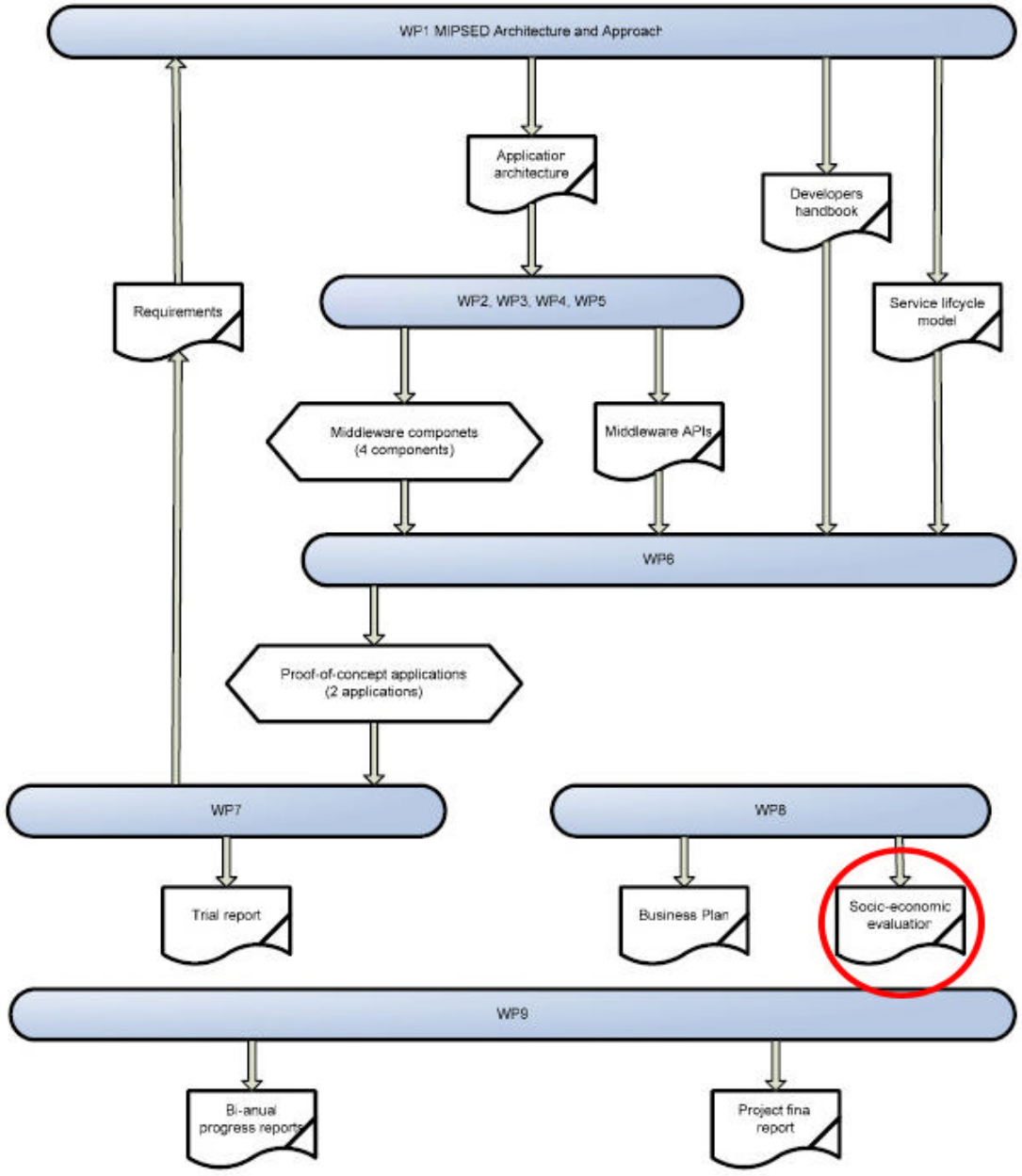
2.2 Role of this deliverable and relationship to other MPOWER deliverables

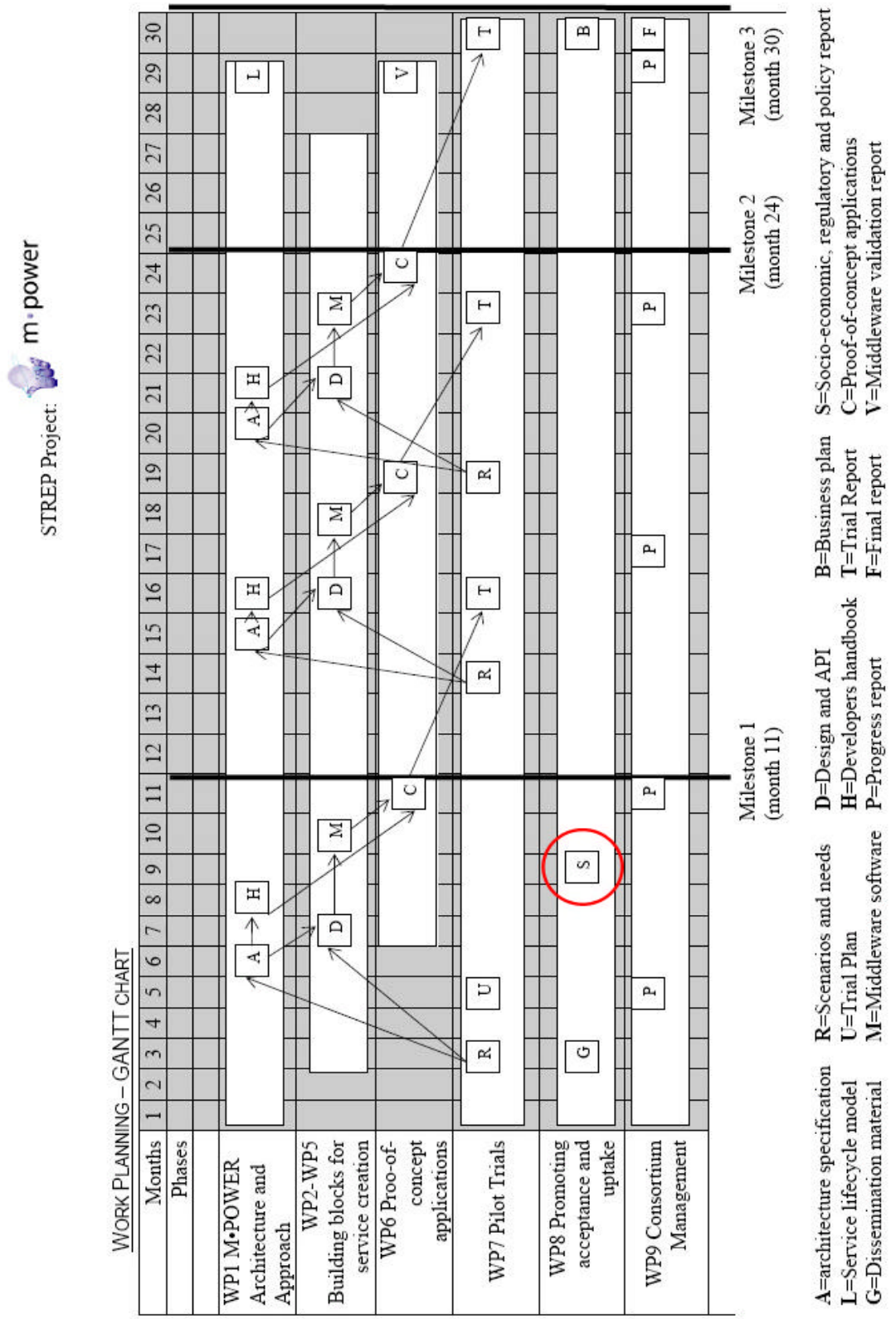
This D8.2 - Socio-economic, regulatory and policies report is part of the WP8.

WP8 together with WP9 are Support workpackages and it is expected they provide general support for the other workpackages, and for the project as a whole. WP8 Promoting Acceptance and Uptake aims to spread information about the project and to develop business plans for exploitation of project results

This deliverable presents a socio-economic evaluation of some European countries, focusing on the countries from the partners of the Consortium and always comparing to the European Union on the whole.

It aims to be some basis and a preliminary tool for a future business plan and therefore, the recommendations and conclusions are stated in order to do so.




STREP Project: m•power
WORK PLANNING – GANTT CHART
Months 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Phases
WP1 M•POWER Architecture and Approach
WP2-WP5 Building blocks for service creation
WP6 Proo-of-concept applications
WP7 Pilot Trials
WP8 Promoting acceptance and uptake
WP9 Consortium Management
Milestone 1 (month 11)
Milestone 2 (month 24)
Milestone 3 (month 30)
A=architecture specification
L=Service lifecycle model
G=Dissemination material
R=Scenarios and needs
U=Trial Plan
M=Middleware software
D=Design and API
H=Developers handbook
P=Progress report
B=Business plan
T=Trial Report
F=Final report
S=Socio-economic, regulatory and policy report
C=Proof-of-concept applications
V=Middleware validation report

2.3 Structure of this document

The present document is intended to be a comparative analysis of the needs, expectations and attitudes concerning IST services of the older and disabled people in the EU and its Member States, with an especial focus on the countries included in the M-power consortium. The information here presented has been extracted from a wide variety of secondary sources. In order to get some particular data and information from their countries, a questionnaire was designed and sent to the partners.

All this information has been drawn together to present a comprehensive picture of the situation in the European Union.

*Chapter 3*of this report focuses on the generic demography and economy data, the description of the dependency degrees and statistics about the healthcare services and facilities available in the individual Member States.

The description of the IT services that might be included in M-Power as well as its maturity degree and the access and availability of ICT infrastructures is followed in *Chapter 4*.

In *Chapter 5* ICT legislation is looked at from both European and national perspective. Usability and accessibility Standards regarding ICT is given in *Chapter 6*.

Finally, a concise conclusions chapter will go through key synthesis and will develop general trends and recommendations as well as the risks to be taken into account to achieve the technical, social and economic goals of the European Union in terms of better integrating older and disabled people into the emerging knowledge Society.

This deliverable includes an Annex, which is divided in two parts. In annex 1 several figures can be found. When through the report some text is referring to these figures, a note is indicating which figure in annex 1 could be of interest to look at. Annex 2 includes the questionnaire sent to the partners.

3 The organization of services for elderly and cognitive disabled

3.1 Demographic and social aspects

3.1.1 Characterization of the target end users

We will focus the study on elderly end users and people that because of age or other reasons have some light cognitive disabilities that would restrict or complicate the use of new technologies, like lower ability of concentration or attention or light loss of memory.

But in order to better focus the study, we won't consider potential end users with advanced and severe diseases or disabilities with incidence to cognition, like severe dementia, Alzheimer, or severe mental illnesses.

3.1.2 Generic demographic data

Europe is the world's oldest continent in demographic terms. It has the highest median age of all continents (38 years). The population of the EU Member States is ageing, on the one hand through fewer births and on the other hand through increasing longevity. As a consequence, the shape of the age pyramid becomes narrower at the bottom and broader at the top.

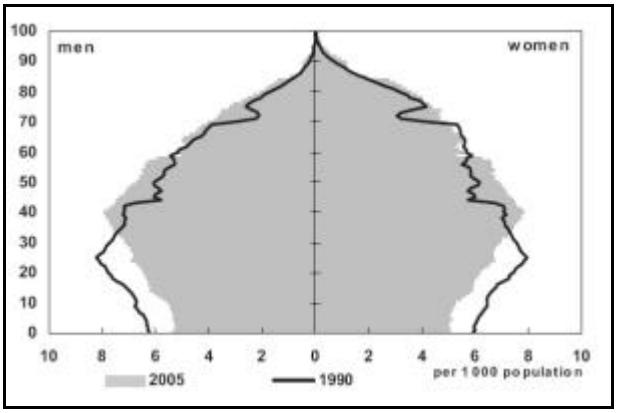


Figure 1: Age pyramid of the EU-25, 1 January 1990 and 2005

Between 1990 and 2005 the proportion of the people aged under 20 in the EU fell from 26.5 to 22.3, while the proportion of people aged 60 and over rose from 19.2 to 21.9.[2]

By 2050, one-third of Europe's population will be over 60, compared to 13% who will be under 16.[3] 58% of older people will be women. The number of older people (over 60) will increase by 44% between today and 2050. The number of 'oldest old' or very old people (aged 80+) is expected to grow by 180%.

Table 1: Total population and percentage by age groups, 2004.

Country	Total		Less than 15 years	15-24	25-49	50-64	65-79	80 and over
Austria	8.140.122	1,8	16,3	12,2	37,9	18,1	11,4	4,1
Croatia	4.441.800	1,0	16.3	13.4	35.4	18.4	13.9	2.6
Cyprus	730.367	0,2	20,0	15,7	36,2	16,2	9,3	2,6
Netherlands	16.258.032	3,5	18,5	11,9	37,3	18,4	10,4	3,4
Norway	4.577.457	1,0	19,9	12,1	35,7	17,6	10,2	4,6
Poland	38.190.608	8,3	17,2	16,7	36,1	17,0	10,6	2,4
Spain	42.345.342	9,2	14,5	12,7	39,6	16,2	12,7	4,2
EU 25	**459.119.267**	**100,0**	**16,4**	**12,7**	**36,6**	**17,9**	**12,5**	**4,0**

Source: Eurostat

Table 1 shows the total population and the percentage by age groups for each country. The group with the highest weight is 25-49 years old although the percentage of people over 65 is not negligible. Spain, Austria and Norway are the countries counting on a higher number of elderly (over 65).

Table 2: Demographic indicators

[2] EUROSTAT, Population Statistics; 2006 Edition.
[3] UN 2002

Country	Annual population growth rate(a) (%)	Life expectancy at birth		Life expectancy at age 65		Old-age-dependency ratio	At-risk-of poverty rate for persons aged 65 years and over (%)	Crude rate of net migration (annual average per 1000 population)
	2004	2005		2002		2000	2003	2004 (1)
		Male	Female	Male	Female			
Austria	0,2	76,7	82,2	16,3	19,7	22,9	14,0	7,6
Croatia	-0,3	72,3(ps)	79,2(ps)	-	-	18,2	-	2,6
Cyprus	1,2	77,0	81,7	-	-	17,0	51(b)	21,2(1)
Netherlands	0,5	77,2	81,6	15,6	19,3	20,0	5(b)	-0,6
Norway	0,5	77,7	82,5	16,2	19,7	23,5	19,0	2,9
Poland	0,0	70,8	79,4	14,0	17,9	17,6	7(b)	-0,2
Spain	0,7	77,4	83,9	16,8	20,7	24,5	29,0	14,3
EU-25	**-**	**75,8(p)**	**81,9(p)**	**-**	**-**	**23,4**	**19(s)**	**4**

(a)Data from WHO
(b)Break in series
(p)Provisional value
(s)Eurostat estimate
(1)Including corrections due to population censuses, register counts, etc. Which cannot be classified as births, deaths or migrations
(2) Starting from 1975 Government-controlled area only
Adapted from Eurostat

Second column in Table2 indicates that Spain followed by Norway and the Netherlands were the countries that experienced a higher population growth in 2004.

Life expectancy at birth (LE) ranges from 71 in Estonia to 80 in Italy. Poland and Croatia are below the EU-25 average by both genders.

Spain counts on the highest *Life expectancy at 65.* It shows the mean number of years still to be lived by a man or a woman who has reached the age 65, if subjected throughout the rest of his or her life to the current mortality conditions (age-specific probabilities of dying).

Europeans enjoy amongst the highest levels of life expectancy in the world: 75.8 years for men and 81.9 for women (EU-25). Life expectancy has been rising on average by 2.5 years per decade in Europe.

There is growing evidence that not only are we living longer, but we are also living healthier lives. Overall disability levels amongst older Europeans are decreasing, not increasing[4]. But because there is more old people overall, the absolute numbers of dependent older people may increase in future. On balance however, the impact on future increased demand for care may be mitigated to some extent by improvements in the overall health status of older persons[5]

Old-age-dependency shows the ratio between the total number of elderly persons of an age when they are generally economically inactive (aged 65 and over) and the number of persons working age (from 15 to 64). This ratio is higher in Spain, Austria and Norway due to a higher number of elder people as it could be seen in Table1.

In comparison to 1960, the old age dependency ratio went up from 28 to 39%. The old age dependency ratio is on the rise, due to the growing proportion of the elderly.[6]

The indicator *At-risk-of-poverty rate for persons aged 65 and over* is showing the share of persons with an equalised disposable income, before social transfers, below the risk-of-poverty threshold, which is set at 60% of the national median equalised disposable income (after social transfers)[7].

[4] Lutz and Scherbov, 2002
[5] European Commission, Council of the European Union, 2003
[6] See Figure 1 in Annex 1
[7] Retirement and survivor's pensions are counted as income before transfers and not as social transfers (Source: Eurostat)

Cyprus has by far among the considered countries the highest rate. Only Cyprus and Spain are above the EU-25 average. These latter countries are the ones with a higher rate of net migration. Austria is above the EU-25 as well although with a much lower rate.

3.1.3 Economic and market demography

Some economic indicators may help to get a general situation of the considered countries. This chapter will go through it and will focus on the expenditures for the target end users of the M·Power project.

Table 3: Economic indicators

Country	Uemployment rate	GDP per capita in PPS* Index EU-25=100
	2006	2005
Austria	4,8	123,0
Croatia	-	48(f)
Cyprus	4,9	89,0
Netherlands	3,9	126,0
Norway	3,5	172,0
Poland	14,0	50,0
Spain	8,6	98,0
EU-25	**7,9**	**100,0**

(p)Provisional value
(f)Forecast
*Purchasing Power Standards: common currency that eliminates the difference in price levels between countries allowing meaningful volume comparisions of GDP between countries.
Adapted from Eurostat

Unemployment rate represent unemployed persons as a percentage of the labour force. The labour force is the total number of people employed and unemployed. Table 3 shows that Poland had a high unemployment rate compared to the EU-average. Spain was situated above the EU-average as well while Austria, Cyprus, the Netherlands and Norway had low figures.

The GDP is defined as the value of all goods and services produced less the value of any goods or services used in their creation. The volume index of *GDP per capita* in Purchasing Power Standards (PPS) is expressed in relation to the EU-25 average set to equal 100. When the index of a country is higher than 100 like Austria, the Netherlands and Norway, this country's level of GDP per head is higher than the EU-25 average.

Table 4: Expenditures on elderly and pensions

Country	Expenditure on care for elderly (% of GDP)	Expenditure on pensions Current prices (% of GDP)
	2003	2003
Austria	1,0	14,6
Croatia	-	-
Cyprus	0(p)	6,8
Netherlands	0,7	12,8
Norway	1,8(p)	8,7
Poland	0,3	13,9
Spain	0,3(p)	9,2(p)
EU-25	**0,5(p)**	**12,4(p)**

(p)Provisional value
Adapted from Eurostat

Expenditure on care for elderly is defined as the percentage share of social protection expenditure devoted to old age care in GDP. These expenditures cover care allowance, accommodation, and assistance in carrying out daily tasks. Norway was the country among the ones considered with a higher expenditure on care for elderly, being above by far of the EU-25 average. It is worth to remark that the Expenditure on care for elderly in Cyprus was estimated to be 0% in 2003.

Austria, Poland and the Netherlands had an Expenditure on pensions above the EU-25 average. The "Pensions" aggregate comprises part of periodic cash benefits under the disability, old-age, survivors and unemployment functions.

Table 5: Expenditure on social protection (as % of GDP)

	1994	1996	1998	2000	2001	2002	2003
EU-25*	**-**	**-**	**-**	**26,9**	**27,1**	**27,4**	**28**
EU-15	**28,4**	**28,4**	**27,5**	**27,2**	**27,5**	**27,7**	**28,3**
Austria	28,9	28,8	28,4	28,3	28,6	29,2	29,5
Belgium	28,7	28,6	27,6	26,8	27,7	28,8	29,7
Cyprus	-	-	-	-	15,2	16,4	-
Denmark	32,5	31,2	30,0	28,9	29,2	29,9	30,9
France	30,2	30,6	30,0	29,3	29,5	30,2	30,9
Germany	27,7	29,4	28,9	29,3	29,3	29,9	30,2
Italy	26,0	24,8	25,0	25,2	25,6	26,1	26,4
Netherlands	31,7	30,1	28,4	28,3	28,6	29,2	29,5
Norway	27,6	26,0	27,1	24,6	25,6	26,2	27,7
Poland	-	-	-	20,1	21,5	21,9	21,6
Spain	22,8	21,9	20,6	19,6	19,4	19,6	19,7

*In 2000 and 2003, EU-25 does not include data of Cyprus. The ratio for EU-25 is calculated on the basis of the 24 countries for which data are available.
Source: Eurostat

Taking the EU-15 countries as a whole, after reaching a maximum of 28.7 % of GDP in 1993, social protection expenditure fell to 27.2 % by 2000. This ratio then rose continuously from 2001 and was 28.3 % in 2003. 2003 thus saw a rise in most of the EU-25 countries except Poland and others. This increase reflects faster growth in social protection expenditure than GDP, which slowed in the European Union in 2002 in comparison with 2001 and again in 2003 in comparison with 2002.

Table 6: Social protection expenditure by type (2001, EU-15)

Expenditures:	%
Social Benefits	96
Administration costs	3
Transfer to other schemes	0
Other expenditure	1

Source: Eurostat

According to Table 6, we can break down the social protection expenditure into the following types:

Social Benefits: They consist of transfers, in cash or in kind, by social protection schemes to households or individuals to relieve them of the burden of the eight risks or needs ("social protection functions") listed above.

Administrations Costs: They are the costs charged to the scheme for its management and administration.

Transfers to other schemes: They are unrequited payments made to other social protection schemes.

Other expenditure: Other expenditure consists of miscellaneous expenditure by social protection schemes such as interest payable by the scheme to banks and other creditors in respect of loans taken up and payment of taxes on income or wealth.

From now on, we will focus on Social Benefits as the main social expenditure indicator.The list of risks or needs that may give rise to social protection is fixed by convention as follows:

1. Sickness/Health care: Income maintenance and support in cash in connection with physical or mental illness, excluding disability. Health care ended to maintain, restore or improve the health of the people protected irrespective of the origin of the disorder.

2. Disability: Income maintenance and support in cash or in kind (except health care) in connection with the inability of physically or mentally disabled people to engage in economic and social activities.

3. Old age: Income maintenance and support in cash or in kind (except health care) in connection with old age.

4. Survivors: Income maintenance and support in cash or in kind in connection with the death of a family member.

5. Family/children: Support in cash or kind (except health care) in connection with the costs of pregnancy, childbirth and adoption, bringing up children and caring for other family members.

6. Unemployment: Income maintenance and support in cash or in kind in connection with unemployment.

7. Housing: Help towards the cost of housing.

8. Social exclusion not elsewhere classified: Benefits in cash or kind (except health care) specifically intended to combat social exclusion where they are not covered by one of the other functions.

Table 7: Social benefits by group of functions in 2001 (as a % of total social benefits)

	Old age and survivors	Sickness/ health care	Disability	Family/ Enfants	Unemploy-ment	Housing and social exclusion
EU-25*	**46,2**	**27,9**	**8,2**	**8,0**	**6,2**	**3,5**
EU-15	**46,1**	**28,0**	**8,0**	**8,0**	**6,3**	**3,6**
Austria	49,9	25,3	7,8	10,5	4,9	1,6
Belgium	44,1	24,7	9,3	8,7	11,6	1,6
Cyprus	-	-	-	-	-	-
Denmark	38,0	20,3	12,5	13,3	10,0	6,0
France	43,7	29,2	6,0	9,5	7,1	4,4
Germany	42,5	28,7	7,8	10,4	8,2	2,5
Italy	62,3	26,1	5,7	4,1	1,6	0,3
Netherlands	41,8	30,4	11,5	4,4	5,0	6,8
Norway	30,5	34,5	16,5	12,8	2,6	3,1
Poland	55,2	19,2	13,3	7,8	4,3	0,2
Spain	45,3	30,0	7,6	2,6	12,9	1,7

*EU-25 does not include data of Cyprus

Source: Eurostat-ESSPROS

Benefits relating to the disability function accounted for almost 17% of the total in Norway compared with an average of 8.2 % in the EU-25. The share represented by this expenditure was also high in Poland and the Netherlands. In Spain and Austria, by contrast, disability benefits accounted for less than 8 % of the total.

Regarding benefits for the old age and survivors, Poland and the Netherlands are above the EU-25 average.

Table 8: Social benefits at constant prices – Index, annual average 1998-2002

	Old age and survivors	Sickness/ health care	Disability	Family/ Enfants	Unemploy-ment	Housing and social exclusion	Total benefits
EU-25	-	-	-	-	-	-	
EU-15	**102,7**	**104,2**	**102,2**	**102,1**	**101,1**	**101,3**	**102,8**
Austria	102,7	102,0	101,2	104,1	102,0	101,3	102,5
Belgium	101,6	102,0	103,0	100,3	101,2	106,4	101,8
Cyprus	-	-	-	-	-	-	-
Denmark	101,0	103,5	104,2	102,2	95,7	100,4	101,5
France	102,3	103,9	102,4	101,2	102,6	102,1	102,7
Germany	102,2	102,2	101,3	103,8	101,3	98,4	102,1
Italy	101,5	105,0	101,8	104,4	94,6	119,0	102,3
Netherlands	102,7	105,2	101,2	102,9	94,9	100,5	102,6
Norway	103,8	106,1	106,9	102,6	101,0	103,5	104,8
Poland	-	-	-	-	-	-	-
Spain	103,1	104,6	101,8	104,4	104,2	98,6	103,5

Source: Eurostat-ESSPROS

Disability expenditure increased steadily over the period 1998-2002 in the EU-15 (2.2% per annum on average).

Disability pensions accounted for the largest share of this expenditure (55% of the total)[8], the entitlement conditions of which vary enormously from country to country. However, this expenditure increased most strikingly in Norway. In Germany, Austria and the Netherlands, conversely, this expenditure rose only by a small amount but it did not fell in real terms in any of the considered countries.

Old age and survivor's expenditure increased 2.7% per annum on average. This expenditure didn't decrease in any of the considered countries while Norway followed by Spain experienced the highest increase in this expenditure (always among considered countries).

Considering the period 1996-2004, expenditure in disability as a percentage of the total social benefits increased 2-3 points average in Austria, Belgium and Denmark and slightly in Spain. This figure did not vary in Norway that has kept and expenditure in disability around 16%. Netherlands experienced a considerable decreasing of such expenditure, falling 6 points down to 11,6%.

Regarding expenditure in old age and survivors in the same period, in Austria and Belgium this expenditure increased around 3 points and in 6% in the case of Spain. Norway's expenditure in old age and survivors didn't change while conversely it rose in the Netherlands from 31 to 36%.[9]

The general tendency of expenditures in disability and old age population out of total social benefits is increasing, which is not surprising if we see the age groups weights and its evolution. Although there are some exceptions it could be due to an increase of the total budget.

[8] Font: *Eurostat (Social Protection in the European Union:* http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-NK-05-014/EN/KS-NK-05-014-EN.PDF) and *European social statistics (Social protection Expenditure and receipts. Data 1996-2004*: http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-DC-07-001/EN/KS-DC-07-001-EN.PDF)

[9] See Figures 2 and 3 in Annex1

3.1.4 Dependency degrees and distribution of light cognitive disabilities per ages and places of residence

What do we understand by dependent person under the protection system?

A person is under the coverage of the dependency protection system when he/she is not able to carry out any of the daily life activities without the help of others. This includes self-care, mobility at home or basic mental functions.

Activities of daily living classification:

- Activities regarding personal care:
  - To get washed or to take a bath alone, and take care of one-self.
  - To control bodily functions, to be able to go to the bathroom alone.
  - To get dressed and to get ready alone.
  - To eat and drink without any help.
- Activities regarding home mobility:
  - To change and maintain body positions alone.
  - To stand up, to lie down, to remain stand or sited.
  - To move alone at home.
- Basic mental functions:
  - To recognize people, objects and to maintain spatial-temporal orientation.
  - To be able to understand and carry out orders or simple tasks.

Nevertheless, any dependency degree status estimation might be preceded by the definition of the "barriers to entry" of each system, as well as a dependency level degree formula which will be used as a reference to fix the intensity and frequency of the care service provided.

EU environment shows us several options when fixing the barriers and thresholds to entry as well as the degrees of level protection coverage.

Regarding this subject there are two widely agreed estimation systems within Europe:

THE GERMAN SYSTEM

The German System establishes the "threshold to entry" in accordance with the amount of help that dependents are requiring. It is consider that a dependency situation exists, when someone needs at least 90 minutes at day of home care assistance, and the half of this time is used to daily people' personal care assistance.

German System distinguishes three dependency degrees:

DEPENDENCY DEGREES ACCORDING TO THE GERMAN SYSTEM

Degree I. Including people who need at least 90 minutes at day of care assistance, the half of which should be expended on personal care. These persons require help at least one time per day when getting washed, eating, moving and, furthermore, they need help to do home tasks several times at week.

Degree II. People who need a considerable amount of help (at least 3 hours at day, two of them should be dedicated to personal care). People in this group require help to get washed, to take a bath, to eat and move, at least three times at day in different moments; In addition they need help to do home tasks several times at week.

Degree III. People who are extremely needed of help (at least 5 hours at day, four of them should be dedicated to personal care). People in this group require help for all daily life activities mentioned above, every day, 24 hours. They also need help to do the home tasks.

THE FRENCH SYSTEM

The French system establishes the "threshold to entry" in accordance to the ability to perform physical and psychosocial activities of daily living (ADL). It is consider that exist a dependency situation when someone needs help to get washed or dressed, to do personal activities, to eat and drink, and to get up from the bed or a chair, even being able to move at home alone.

Unlike the German System, the French autonomy benefit only covers the loss of autonomy of people over 60 years old.

To evaluate autonomy-loss degrees, the French system use a scale of four degrees which provide protection, and two other ones of a lower severity level that could cause other benefits such as home care services or departmental social aid. (Notice that the groups below are arranged from lowest severity to highest in accordance with autonomy-loss level).

DEPENDENCY DEGREES ACCORDING TO THE FRENCH SYSTEM

NOT ALLOWED TO RECEIVE AUTONOMY PERSONALIZED BENEFIT

Group 6. People who haven't lost their daily life activities autonomy.

Group 5. People who are able to move alone at home, to eat or to get dressed. They occasionally need help to get washed, cook and do the home tasks.

ALLOWED TO RECEIVE AUTONOMY PERSONALIZED BENEFIT

Group 4. People who need help to get up from the bed or a chair — even being able to move at home alone—; and people who have no problems to walk, but they need help to do their personal activities as well as to eat.

Group 3. People who maintain their cognitive abilities and, partially, motoric autonomy, but they need help to do their daily personal activities several times at day.

Group 2. People who are in bed or in a wheelchair whose cognitive functions are not totally upset, and that need help to almost all daily activities, as well as people whose mental functions are disturbed, but they maintain their motoric ability and they can move inside home, but they need partial or total assistance to get washed and dressed.

Group 1. People who are in bed or in a wheelchair, that has lost their mental, motoric, body and social autonomy, and that need someone providing care services during all the day.

By now, it seems that not all the European countries have already established a scale of degrees. Among the countries in the consortium, it just Austria and Spain that have already them.

AUSTRIA

There are seven nursing allowance degrees in Austria, according to the care needs in hours per month as it can be seen in table 9:

Table 9: Dependency degrees in Austria*.

DEGREE	Care needs in hours/month
1	More than 50
2	More than 75
3	More than 120
4	More than 160
5	More than 180 and extraordinary nursing effort
6	More than 180 hours, if a timing of the care-activities can not be coordinated and in the case that those have to be fulfilled during day and night or if a constant presence of a nursing person during day and night is necessary because an existing possibility of harming oneself or others is given.
7	More than 180 hours, in the case that a coordinated movement of the four extremities with functional reaction is not possible (or if similar conditions are given).
Total	

*31.12.2004

Table 10: Number and percentage of nursing allowance recipients, 2004 (Austria).

DEGREE	Nursing allowance recipients*			
	Female	Male	Total	Percentage
1	56.115	21.060	**77.175**	**20,80%**
2	85.369	42.443	**127.812**	**34,44%**
3	41.942	21.282	**63.224**	**17,04%**
4	36.619	18.735	**55.354**	**14,92%**
5	20.247	9.801	**30.048**	**8,10%**
6	6.395	4.162	**10.557**	**2,85%**
7	4.563	2.334	**6.897**	**1,86%**
Total	251.250	119.817	**371.067**	

*31.12.2004

Source: Die Kosten der Pflege in Österreich. Ausgabenstrukturen und Finanzierung

As table 10 shows, those people receiving nursing allowance are concentrated between degree 1 and 4. Nearly 12,8% of the recipients need more than 180 hours of care per month. In most of these cases a 24-hours-care is necessary.

Table 11 is showing the rate of people getting nursing allowance by the total population 2004.

Table 11: Percentage of people receiving nursing allowance by total population, 2004 (Austria).

Age	Total Population	Total number of nursing allowance recipients	Percentage of nursing allowance recipients
Less than 60	6.479.710	66.286	**1,02**
61 to 80	1.404.899	129.695	**9,23**
Over 80	290.124	175.086	**60,35**
Total	**8.174.733**	**371.067**	**4,54**

Source: Die Kosten der Pflege in Österreich. Ausgabenstrukturen und Finanzierung

Austria had about 770 residential homes for the elderly and nursing homes, with places for approx. 68.000 elderly persons. Service capacities are markedly different in the individual provinces. The staff of these homes totals approximately 21.200 FTEs[10]; one third is skilled health care staff or skilled nurses, and about 50% are skilled care workers for the elderly, nursing assistants or assistants for the elderly. Similar to the field of mobile services, large regional differences are found with regard to qualification of staff, which cannot exclusively be attributed to the specific structure of homes in the individual provinces (i.e. shares of residential homes for the elderly persons. nursing homes) but also points to differences in the quality of the homes. Austria's public health care service comprises district health departments, provincial health departments and the Federal Ministry of Health and Women. Its total staff consists of approx. 300 public health officers (physicians) and around 460 other specialised staff.[11]

SPAIN

DEPENDENCY DEGREES ACORDING TO THE SPANISH SYSTEM

(The Spanish Dependency Law)

Regarding the Spanish Protection Law, dependency degrees estimation is established in accordance with the amount of help required by individuals as well as the specific type of help received.

The Law describes dependency levels and degrees as follows:

Degree III. High Dependency:

Dependents need the help of others to do any daily life activities several times at day and, due to the physical and psychic total autonomy loss, she or he needs assistance during all the day, 24 hours.

Degree II. Severe Dependency:

Dependents need the help of others to do several daily life activities at least two or three times at day, but is not required to receive constantly home care assistance.

Degree I. Moderate Dependency:

Dependents need the help of others to do one or some daily life activities at least one time at day.

There are two levels for each degree. That will allow a graduation by filtering dependency situations from lowest intensity to highest, and at the same time it will facilitate benefits evaluation and management.

Table 12: Total or severe disabled people for any of the daily life activities by sex and age group. (Data refers to individuals older than six). Spain, 1999.

	From 6 to 64		From 65 to 79		80 and over		Total from 6
Male	134.641	**42%**	108.496	**33,9%**	77.155	**24,1%**	320.292
Female	129.441	**24%**	204.444	**37,9%**	205.713	**38,1%**	539.598
TOTAL	264.083	**30,7%**	312.939	**36,4%**	282.868	**32,9%**	859.890

Source: IMSERSO, Libro Blanco de la Dependencia, EDDES 99.

Table 12 shows that the total number of persons over 65 suffering from a severe or total disability for any daily basic activity raises to 595.807.

[10] FTE stands for full time equivalent, hours per year in full time work.
[11] Die Kosten der Pflege inOsterreich. Ausgaben strukturen und finanzierung.

Table 13: Severe disabled people that need help to do home tasks and/or moderate disabled people that need help on self-care, mobility, eating and basic mental functions, by sex and age groups.(Data refers to individuals older than six).Spain, 1999.

	From 6 to 64		From 65 to 79		80 and over		Total from 6
Male	247.930	**49,1%**	169.599	**33,6%**	86.962	**17,2%**	504.491
Female	309.495	**33,4%**	379.882	**41,1%**	232.565	**25,1%**	924.941
TOTAL	557.425	**39,1%**	549.480	**38,5%**	319.527	**22,4%**	1.426.432

Source: IMSERSO, Libro Blanco de la Dependencia, EDDES 99.

According to table 13, the number of total persons over 65 who need help with domestic tasks and who are suffering from a moderate disability in areas like self-care, mobility, alimentation and basic mental operations would be 869.007.

This figure is just representing those persons living in homes. Therefore we should add those persons living in residences for old and disabled people.

The following table shows the distribution between dependency degree and place of residence:

Table 14: People with disabilities for the daily life activities, arranged by necessity degrees of care assistance.
(Spain, 1999).

DEGREE	At home (EDDES 99)	In residencies (estimation)	Total	Proportion
Dependent persons*				
3 (High Dependency)	121.109	20.300	**141.409**	14,7%
2 (Severe Dependency)	262.485	41.600	**304.085**	31,7%
1 (Moderate Dependency)	476.296	38.100	**514.396**	53,6%
TOTAL	**859.890**	**100.000**	**959.890**	**100,0%**
People needing help to do domestic tasks and/or moderate disability for any ABVD ****				
A (Moderate disability for some ABVD)	679.565	45.000	**724.565**	47,5%
B (Disc. for some AIVD)	746.867	55.000	**801.867**	52,5%
TOTAL	**1.426.432**	**100.000**	**1.526.432**	**100,0%**
People with disabilities for the daily life activities				
TOTAL	**2.286.322**	**200.000**	**2.486.322**	

Source: IMSERSO, Libro Blanco de la Dependencia, EDDES 99.

(*)Includes severe or total disabled for the daily life activities; to recognize people, objects and to maintain spatial-temporal orientation; to be able to understand and carry out orders or simple tasks; to change and maintain body positions alone; to stand up, to lie down, to remain stand or sited; to move alone at home; to wash or to take a bath alone, and take care of one-self; to control bodily functions, to be able to go to the bathroom alone; to get dressed/undressed and to get ready alone; to eat and drink without any help.

(**)Includes disabled outside the I, II and III degree who have a moderate disability for some of the daily life activities related above, as well as disabled who are unable to do some of the following activities; to move independently on public transportation or drives own car; domestic utilities management and food shopping, home cleaning and ironing, meal preparation; take care of other family members.

It was estimated that dependent population accommodated in institutions for elderly and disabled reached the amount of 100,000 in 1999, and the number of people requiring help to do home tasks and/or moderately unable to do some daily basic life activities, accommodated in the same type of institutions, was also approximately 100,000.

Regarding the *White Book* of the IMSERSO (Instituto de Migraciones y Servicios Sociales del Ministerio de Trabajo y Asuntos Sociales), from 2011 onwards there will be a demographical change process of huge importance. Population will continue aging, but the age group from 65 to 75 will rise faster than the one from 75 and over. This is due to an increasing amount of people belonging to the retiring age group by this year. At the same time dependency protection expenditure will not descend

while other social demands will apply for public assets, which always are short in relation to the necessities.

Besides population aging, that will increase the number of dependents, it is expected a certain reduction of dependency situations by age groups. This is due to a healthy level improvement, and a higher conscience among the population regarding healthy habits and preventive behaviours.

The following prospective has been made on the basis of the gradual reduction on dependency prediction explained above. Nevertheless, the decrease of dependency prevalence will be more appreciable in the lowest severity levels.

Table 15: Estimated number of people with disabilities for the daily life activities arranged by necessity degrees of care assistance and age groups (Spain, 2020).

DEGREE	6 to 64 years	65 to 79 years	over 80 years	Total
Dependent persons				
3 (High Dependency)	31.473	51.256	195.156	**277.885**
2 (Severe Dependency)	88.208	120.885	311.971	**521.064**
1 (Moderate Dependency)	219.942	234.021	243.315	**697.277**
TOTAL	**339.623**	**406.162**	**750.442**	**1.496.226**
People needing help to do domestic tasks and/or moderate disability for any ABVD				
A (Moderate disability for some ABVD)	336.470	312.878	329.996	**979.344**
B (Disc. for some AIVD)	339.550	348.779	340.663	**1.028.992**
TOTAL	**676.020**	**661.657**	**670.659**	**2.008.336**
People with disabilities for the daily life activities				
TOTAL	**1.015.643**	**1.067.819**	**1.421.100**	**3.504.562**

Source: IMSERSO, Libro Blanco de la Dependencia, EDDES 99.

Table 16: Spanish and German dependency degrees distribution comparative (Regarding people protected in both countries).

DEGREE	Spain estimation		Germany (2002)	
	Persons	Percentage	Persons	Percentage
3 (High Dependency)	141.409	**14,7**	244.651	**12,9**
2 (Severe Dependency)	304.085	**31,7**	678.267	**35,8**
1 (Moderate Dependency)	514.396	**53,6**	970.263	**51,3**
TOTAL	**959.890**	**100,0**	**1.893.181**	**100,0**

Source: IMSERSO, Libro Blanco de la Dependencia, EDDES 99.

Dependent population estimated in relation to the total population is 2, 4 % in Spain. The same indicator in Germany is about 2,3%.

Figures in Table 16 show a high level of consistency between both systems the Spanish and the German. Dependency distribution by degree levels is very similar in both countries.

3.2 Social and medical care

3.2.1 Listing and description of healthcare service

- Homecare Services
    - Help at home service (nursing and social care services).
    - Telehealth service (Telemedicine, Telecare).
- Daytime Health Services:
    - Daytime centres for dependent people.
    - Senior centres and clubs for the elderly.
- Geriatric Institutions and other accommodation services such as foster care (informal care at family members home), public protected homes and residential apartments.

Home Care Services:

Home Care service is integrated by help at home service (public and private); telecare service (public and private) and others issues with different implementation degrees depending on the country (public economic benefits to adapt home infrastructures and to help family members taking care of the dependents). Nevertheless, among the public home care services, help at home and telecare service seem to be the most frequently used within E.U.

Help at home service includes home care and personal care, spending generally more time on home tasks than on personal care.

Telehealth service feeds in the earlier dependency and isolation degrees in which an important assistance is not required yet (neither formal nor informal care), but a little contact can be sporadically demanded.

Telehealth service results the cheapest option for the user and most of the times it is totally free.

When a closely care is required, remote healthcare or telecare can be possible through the use of telemedicine technology which allows constant monitoring of the patient without either having to move the patient or the caregiver to and from the care facility.

Daytime centres for dependent people:

It is composed by daytime centres and senior clubs for the elderly. It can be both of private or public nature.

Residential Services:

It includes residential centres and alternative accommodation systems; hospice accommodations, family foster care, residential apartments or any other type with the same characteristics.

Residential Centres: Private sector often keeps a greater weight in this subject. However it can be also mixed funded. Most of the people needing this service are dependent old people.

Alternative accommodation systems: The advantage of this service is that the elderly can live in a more familiar environment and, sometimes, close to her/his physic environment. This can increase the quality of life and the ageing.

3.2.2 Statistics about social healthcare assistance and private healthcare services.

The system of revenue collection may affect both access to insurance coverage and access to health care services. Countries in which private health insurance is the sole form of coverage for much of the population have the most extreme differences in access to insurance coverage.

Coverage is not necessarily universal in social health insurance systems; rather, eligibility may be limited to certain income groups or occupational groups or may depend on contributions made. However, in Western Europe, coverage through a publicly funded health care system is virtually universal in most countries except Germany and the Netherlands. Low- and middle-income countries have been attempting to achieve universal coverage by extending coverage to groups such as self-employed people and low-income workers. Another challenge is extending coverage to elderly, unemployed and disabled people. Many countries in central and Eastern Europe and the former Soviet Union enshrined a universal right to health care in the constitution. Thus, social health insurance was required to provide cover age for the whole population from the outset. This has been much more difficult to achieve in practice. In the countries that have introduced social health insurance, the state covers the contributions of the non-employed population through taxation. This population is eligible for the same benefits as employed people, thus guaranteeing equity of access. If this is not the case, in countries with limited formal employment, the usual result is an explicitly inequitable arrangement. The social health insurance system has a pool of lower risks, higher income beneficiaries and has more highly paid providers. Systems funded by general tax revenue are often a poor system for poor people. As wage-related contributions are not sufficient to provide universal benefits, the funds rely on subsidies from government revenue to cover deficits. Informal payments cover the 'deficits' at the provider level.

Most health care systems in Europe are funded from a mix of sources, including taxation, social health insurance, private health insurance and out of-pocket payments. Nevertheless, taxation and social health insurance dominate as methods of funding in nearly all European countries and private health insurance still plays a minor role. Three clusters of countries can be identified in Western Europe – those predominantly funded by taxes, those predominantly funded by social health insurance and those with mixed system. Three clusters can also be identified in countries in central and eastern Europe and the former Soviet Union – those predominantly funded by taxes, those predominantly funded by social health insurance and those predominantly funded from out-of-pocket payments (both official and informal), where the prepaid sources of revenue have declined substantially and, in some cases, largely collapsed.

Private health insurance is associated with high spending because of the extra costs of administration, marketing and profit margins, especially where there are for-profit competitive insurance providers. The motivations of the insurers or third parties greatly affect the incentives to contain costs. Private health insurers are interested in maximizing profit, which provides incentives to maximize revenue (charging high premiums) and minimize expenditure, including cream skimming, reviewing utilization to eliminate unnecessary procedures and excluding expensive treatments from benefits. The motivations of the state in tax-funded systems are very different and affected by political motivations such as getting re-elected, although cost control is usually a part of this.

Demographic changes and changes in household structure affect the supply of informal care, which may increase the demand for formal health and long-term care services. Changes in social values may also influence decision-making. However, at least in Western Europe, public support for public funding of health services still appears to be widespread.

The fact that most funding systems are mixed in practice means that evaluating a system's performance based on the sources of funding is difficult.

The key to improving policy outcome is to weigh up the advantages and disadvantages of each funding method carefully and to relate the discussion to the specific national context[12].

Table 17: Government and private expenditure on health

Country	General government expenditure on health as % of total expenditure on health(a)	Private expenditure on health as % of total expenditure on health(a)
	2003	2003
Austria	67,6	32,4
Croatia	83,6	16,4
Cyprus	49,1	50,9
Netherlands	62,4	37,6
Norway	83,7	16,3
Poland	69,9	30,1
Spain	71,3	28,7

(a) The World Health Report 2006: working together for health.
Geneva, World Health Organization, 2006.
(http://www.who.int/whr/2006/annex/en)

Government expenditure on health is higher in Norway and Croatia, around 83% of the total expenditure on health. In Cyprus, *Private expenditure on health* counts on half of the total expenditure while it rises to 30-35% approximately in Austria, the Netherlands, Poland and Spain.

Table 18: Expenditures on health

Country	General government expenditure on health as % of total government expenditure(a)	Social security expenditure on health as % of general government expenditure on health(a)	Out-of-pocket expenditure as % of private expenditure on health(a)
	2003	2003	2003
Austria	10,0	65,8	59,2
Croatia	13,8	96,1	100
Cyprus	7,0	10,7	96,0
Netherlands	12,4	93,0	20,8
Norway	17,6	17,9	95,4
Poland	9,8	86,0	87,8
Spain	13,7	7,0	82,0

(a) The World Health Report 2006: working together for health.
Geneva, World Health Organization, 2006.
(http://www.who.int/whr/2006/annex/en)

Concerning General government expenditure on health out of total government expenditure, Norway is the country with a higher percentage with 17,6%.

Out-of-pocket expenditure as percentage of private expenditure on health: Out-of-pocket Spending is the direct outlays of households including gratuities and payments in-kind made to health practitioners and suppliers of pharmaceuticals, therapeutic appliances, and other goods and services whose primary

[12] Source: Funding health care in Europe: weighing up the options (chapter 12).

intent is to contribute to the restoration or to the enhancement of the health status of individuals or population groups. Includes household payments to public services, non-profit institutions or non-governmental organisations, excludes payments made by enterprises which deliver medical and paramedical benefits, mandated by law or not, to their employees.

3.2.3 Health care system: hospital beds, doctors and nurses

For many people, the hospital has come to symbolize the modern health care system. Yet in many countries, the role of the acute hospital is changing, with an emphasis on outpatient diagnosis and treatment as well as alternatives to long-term hospital care, leading to reductions in numbers of hospital beds.

International comparisons that show large variations in hospital bed numbers, combined with the knowledge that hospitals are relatively expensive, often create political pressure to reduce hospital capacities. As a result, there is considerable interest in how countries that have reduced hospital capacity have done so, and what impact such changes have had on different stakeholders.

Such comparisons are extremely problematic because of differences in counting methods. Moreover, bed numbers are very poor measures of health system capacity, as a bed only contributes to health care if it is supported by an appropriate mix of staff and equipment.

Reductions in capacity often have adverse effects on health care staffs. Such problems can be mitigated by good communication and recognition of the increased workload that accompanies reductions.

A strategy to reduce hospital bed capacity should include policies to reduce inappropriate admissions, make the provision of inpatient care more efficient and facilitate quicker discharges. It will often require the development of alternative facilities and services, and even though bed numbers decrease, the overall cost to the health system might not.

However, figures reported to the World Health Organization show that, since 1990, hospital bed numbers in some countries have fallen dramatically.[13] In absolute terms, the greatest reductions occurred in some of the countries that had the largest concentrations of beds in 1990 (these countries include former republics of the Union of Soviet Socialist Republics (USSR), particularly those in the Caucasus and central Asia that faced the greatest economic hardships during the 1990s). However, in relative terms, large changes also occurred in Finland and Sweden (47% and 45%, respectively). Most of the other countries in Western Europe experienced reductions of between 10% and 20%. Of course, these figures only measure one aspect of hospital activity; some countries, such as the Netherlands, made only small reductions in bed numbers while making large reductions in bed occupancy.

These changes raised the question whether they were the result of health care reforms. Even if closures were a result of health care reform, was bed reduction the aim of the reform, or was it an unintended consequence? Or did it occur for other reasons?

As ever, the situation varies. In both Sweden and Finland, a substantial part of the reductions can be attributed to decisions to transfer parts of the health care system to the social sector. It led to both the re-designation of existing facilities and a programme to construct more appropriate long-term facilities outside the hospital sector. However, simple comparisons of beds in each sector can also be misleading, as the example of Denmark shows. Construction of new nursing homes there stopped in 1987, and subsequent investment has focused on sheltered housing and social and nursing support to individuals living in their own homes. As a consequence, bed reductions in the Danish hospital sector have not been accompanied by bed increases in the social sector, because care is now provided in different ways.

[13] See Figure 4 in Annex1

What impact does an ageing population have on bed requirements?

It is widely assumed that an ageing population will increase the need for acute hospital beds. This assumption may not be justified. Although ageing has led to increased utilization in many countries, the increase is largely attributable to growing numbers of people with chronic diseases, particularly cognitive decline, for which acute care is ineffective, while alternatives, especially nursing care, are more appropriate. The well-known relationship between age and the need for acute care is actually a reflection of the increase in need with proximity to death, with individuals requiring the greatest resources in the year that they die. Consequently, the effects of an ageing population are minor.

Table 19: Percentage of doctors, nurses, hospital beds

Country	Human resources for health(a)						Hospital beds (a) (per 10000)	
	Physicians			Nurses				
	Number	Density per 1000	Year	Number	Density per 1000	Year	Number	Year
Austria	27.413	3,38	2003	76.161	9,38	2003	83	2003
Croatia	10.820	2,44	2003	22.372	5,05	2003	55	2004
Cyprus	1.864	2,34	2002	2.994	3,76	2002	43	2003
Netherlands	50.854	3,15	2003	221.783	13,73	2003	46	2002
Norway	14.200	3,13	2003	67.274	14,84	2003	43	2004
Poland	95.272	2,47	2003	188.898	4,90	2003	55	2003
Spain	135.300	3,30	2003	315.200	7,68	2003	37	2004

(a) The World Health Report 2006: working together for health. Geneva, World Health Organization, 2006. (http://www.who.int/whr/2006/annex/en)

3.2.4 National and European associations, organisms and institutions

Here below, we present a listing and description of National and European Associations, organisms and institutions that provide help and assistance to cognitive disabled and the elderly and description of type of help.

AUSTRIA

- **Organisations for elderly:**

  - Österreichisches Hilfswerk

  www.hilfswerk.at

  - Volkshilfe

  www.volkshilfe.at

  - Caritas

  www.caritas.at

  - Rotes Kreuz

  www.roteskreuz.at

- **Organisations for cognitive disabled:**

  - Lebenshilfe

  www.lebenshilfe.at

  - Diakonie

  www.diakonie.at

CYRPUS

- **Social Welfare Organisations**

http://www.cyprus-information.com/listings/social.htm

NETHERLANDS

- **DCDD,** Dutch Coalition on Disability and Development**.**

DCDD was founded on April 18, 2000, by people from development co-operation, (international) disability movement and service-providing organisations.

DCDD's mission is to improve the condition of persons with disabilities by promoting equality of rights, communal responsibility for care, and social integration. DCDD takes the perspective of human rights as its point of departure, working on the basis of the UN standard rules.

DCDD's primary practical objective is to ensure that disability receives all the attention it deserves on the development-aid agenda, both at the political level and in society at large.

http://www.dcdd.nl

- **Unie KBO,** which is an Association of Catholic Organisations of Senior Citizens

(6-7% of the Dutch elderly 50 years is a member)

Unie KBO develops new activities, such as in the area of IT, and supports local KBO's in conducting these activities. A project group of the Unie KBO, in co-operation with KITTZ, is called "elderly people and technique" and this project group has three subjects: ICT, technical devices and utensils. Every year there is an over 50s market in the Netherlands with 95.000 visitors, where a lot of attention is given to the use of ICTs for older people.

http://www.uniekbo.nl

- **PCOB,** De Protestants Christelijk Ouderen Bond (2-3% of the Dutch elderly 50 years is a member)

- **ANBO,** the league for 50+ (5-6% of the Dutch elderly 50 years is a member)

- **Vitality in Age,** is the Brabant approach to an innovative policy for the elderly.

- **LOL,** Seniorweb and the National Deliberation Council Discrimination of the Elderly**.**

NORWAY

- **FFO,** Norwegian Federation of Organisation of Disabled People

The co-operative body of disabled peoples' organisations Norwegian Federation of Organisations of Disabled People (FFO) was founded on September 21st 1950, and is a central co-operative body of organisations of disabled people in Norway.

Fundamental to FFO's work is its belief in a society based on solidarity – a society that ensures to all the right to freedom, social security and societal participation. FFO envisions a society where disabled people have equal opportunity to take part in all aspects of society, where disabled people are equal in all respects.

http://www.ffo.no

- **NFU,** Norweigan Association of the disabled

The vision of NFU's work for international solidarity is a society for all. NFU believes that in order to attain this, people with developmental disabilities and the families must be heavily engaged in the fight for their rights and freedoms. Therefore, the outside work of the NFU will always be through cooperation or partnership. NFU will only form partnerships with special interest organisations of and for persons with developmental disabilities.

http://www.nfunorge.org

- **NPA,** Norwegian Pensioners Association, in the general assembly of 1998 decided to establish a committee for IT. Lobby groups for older people are the Norwegian Pensioners Association (170 000 members).

Public sector initiatives:

- Organize courses for older people
- Have meeting places for older people
- Is advanced in service provision (providing public services on internet , construction, applications)

http://www.pensjonistforbundet.no

Also:

- National Council for elderly people (also elderly councils in most municipalities).
- Seniornett Norway, an organisation of older Internet users.

www.seniornett.no.

POLAND

- **Intergracja, The Friends of Integration Association**

The Friends of Integration Association is a public benefit organisation. It was established in 1995 on the initiative of Piotr Pawlowski, a founder of the Integracja magazine for the disabled. We endorse the idea of integration as a normal element in all spheres of social life. We want to promote and facilitate social integration of people with disabilities based on coexistence, cooperation and partnership in all forms of civic life. We show how much remains to be done before the disabled citizens can fully participate in the everyday life of our country and, according to their abilities, satisfy their own aspirations. It is our goal to increase the activity and self-efficiency of handicapped people as well as to provide information and advice.

http://www.integracja.org

- Polish Alzheimer Foundation

  http://www.alzheimer.pl
- Polish Association of Aid to Persons with Alzheimer Disease (URL as above)
- Foundation “To live with Parkinson disease”

  http:// www.parkinsonfundacja.pl
- The Association of Disabled Persons

  http://www.parkinson.prv.pl
- The Association of Residential Houses and Long-term care Facilities for Senior People

http://www.stowarzyszenie.domyopieki.pl

- The Association for Support of Rehabilitation of Disabled Person

  http://www.swron.internet.pl

- Polish Red Cross

  http://www.pck.org.pl

- Polish Committee for Social Aid

  http://www.pkps.org.pl

SPAIN

- **IMSERSO, Instituto Nacional de Mayores y Servicios Sociales.**

The Disability Information Service of the IMSERSO, SID, is a documented service with a digital access system to obtain on-line information regarding disabilities. Data is up-dated periodically. It can be found information such as regulations, resources, centres and services, organizations, aids, documentation, news, statistics, etc.

http://sid.usal.es

In addition, it includes an empiric internet portal specialized on gerontology and geriatria, developed by the *Consejo Superior de Investigaciones Científicas (CSIC)* and the *Instituto de Mayores y Servicios Sociales (IMSERSO)* addressed to academic and scientific environment, social services workers, the elderly and the society in general. It was created in 2001 as the results of the collaboration between both institutions, and its activities are based on elderly network data interchange.

http://imsersomayores.csic.es

- **Fundación ONCE**

Fundación ONCE para la Cooperación e Integración Social de Personas con Discapacidad (for the cooperation and the social integration of disabled people) was born in February 1988, by agreeing of the *Consejo General de la ONCE*, and it is presented to the society in September 1988 as a cooperation and solidarity tool created by spanish vision impaired people to other impaired collectives in order to improve their life conditions.

The main purpose of *Fundación ONCE* consists on the elaboration of labour integration – employment and training for disabled - and global accessibility programmes promoting the creation of environments, products and services globally accessible.

http://www.fundacionONCE.es

http://www.once.es

- **Fundación Telefónica**

Through the collaboration agreement between IMSERSO and the Fundación Telefónica, the Adapted Equipment Demonstration Unit has been set up in the CEAPAT. It comprises presential and virtual work posts to be used in advising, investigating and informing on barrier free access to IT and to develop all the possibilities offered by new technologies for training, employing and communicating people with physical, psychic and sensorial deficiencies.

The CEAPAT also supports a large number of centres located in all the autonomous communities: the Centres for Advice and Information (CAI). The aim of this network of centres is to exchange and diffuse information concerning the technical aid and accessibility for the disabled.

http://www.ceapat.org

- **Other organisations for disabled people:**

  - **COCEMF**, Confederación Española de personas con Discapacidades Física u Orgánica.
  - **FEAPS**, Confederación Española de Organizaciones a favor de personas con Discapacidad Intelectual.
  - **CNSE**, Confederación Nacional de Sordos de España.
  - **FEAFES**, Asociación de Familiares y Amigos de Personas con Enfermedad Mental.
  - **PREDIF**, Plataforma representativa Estatal de Discapacitados Físicos.

- **Other organisations for elderly:**

  - **AGE**, Plataforma Europea de Personas Mayores.
  - **CAJUMA**, Confederación de Asociaciones de Jubilados, Pensionistas y Mayores.
  - **CEOMA**, Confederación Española de Organizaciones de Mayores.
  - **FATEC,** Federació d'Associacions de Gent Gran de Catalunya.

EU

- **EDF** is a European umbrella organisation representing more than 50 million disabled people in Europe. Its mission is to ensure disabled citizens' full access to fundamental and human rights through their active involvement in policy development and implementation in the European Union.

http://www.edf-feph.org

4 Technologies and services for elderly and cognitive disabled

4.1 The provision of services and associated facilities

4.1.1 Current popular IT services: Smart House, Tele-care, Distributed healthcare

The notion of independent living services can be identified in very general terms as (*culturally adapted*) "*enabling services*". *Independent Living Services* (ILS) are designed to help people with disabilities to gain independence and communities to eliminate barriers to independence. Any product, application or service that enables people, whose independence in daily life is challenged, to lead a more independent and participatory life fall under the ILS label. ICT based ILS refers to ICT products and applications as well as services based on a salient deployment of ICT.

It is important to note that many ILS are available (or will be available soon) to a large market audience today, and are no longer in the pilot phase. There are already a myriad of mainstream, everyday products, services and applications that could also help older people to live independently.

Specifically designed ICT-based assistive technologies can be of great benefit to older people who are increasingly at risk of having functional difficulties in areas such as mobility, vision, hearing and in some aspects of cognitive performance. Smart home and consumer electronic developments can make management of the home and everyday living a lot easier for older people. Workplace technologies and tools can help to prolong working life. Healthcare technologies can help in prevention, early detection, cure, and management of chronic conditions.

Many of the challenges of old age require support from the health and social care services as well as assistive technologies. Telemedicine opens up new opportunities for providing medical care to the home and there are many new developments in ICT-based home care, including ways of monitoring well-being and providing a secure home environment. Future developments in many of these areas are underpinned by some key emerging technologies. These include robotics, new materials and biosensors.[14]

Another concept related to ISL is the "Ambient Assisted Living" (AAL). It is the name for a new European technology and innovation funding programme which is intended to address the needs of the ageing population, to reduce innovation barriers of forthcoming promising markets, but also to lower future social security costs.

AAL aims – by the use of intelligent products and the provision of remote services including care services – at extending the time older people can live in their home environment by increasing their autonomy and assisting them in carrying out activities of daily living.

The programme AAL is prepared as a so-called Article 169 initiative – referring to the respective article of the European treaty. This article allows the EC to participate in the AAL programme which, however, remains a member state driven initiative in the first place. Before this becomes true, a co-decision process is required to get both, the approval of the Council and the European Parliament.[15]

Smart House, Tele-care and Distributed healthcare are the main issues to achieve in this chapter. Nevertheless there are some terms to manage before further explanations.

[14] User Needs in ICT Research for Independent Living, with a Focus on Health Aspects from the European Commission.
[15] http://www.aal169.org/

These terms are *Telemedicine* and *eHealth* which sometimes are confused or broadly used interchangeably. Telemedicine normally refers to the practice of medicine or provision of medical services from a distance, while eHealth, broadly speaking, refers to the administration of health data electronically.

Smart house, tele-care and distributed health could be all included in both terms Telemedicine and ehealth at the same time. However each of three IT services has a different weight in each term.

Telemedicine[16]:

• Telemedicine is the use of telecommunication technologies to provide healthcare services across geographic, temporal, social, and cultural barriers.

(J. Reid, 1996)

• The delivery of healthcare services, where distance is a critical factor, by healthcare professionals using information and communications technologies for the exchange of valid information for diagnosis, treatment and prevention of diseases and injuries, research and evaluation, and for the continuing education of healthcare providers, all in the interest of advancing health and their communities.

(WHO, 1997)

eHealth[17]:

• eHealth refers to the use of modern information and communication technologies to meet needs of citizens, patients, healthcare professionals, healthcare providers, as well as policy makers.

(Ministerial Declaration, eHealth, 22 May 2003)

• The use of information and communications techniques including health-related activities, services and systems carried out over a distance for the purposes of global health promotion, disease control and healthcare, as well as education, management and research for health.

(L. Androuchko, ITU-D, ITU Workshop on Standardisation on eHealth, 2003)

• eHealth is an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterises a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve healthcare locally, regionally, and worldwide by using information and communication technology.

(Journal of Medical Internet Research, 2001)

Regarding *The Use of Information and Communication Technology (ICT) to Support Independent Living for Older and Disabled People* report, there are some important terms to describe:

"Assistive technology" - equipment or systems that can assist people who have difficulties, due to age or disability, in carrying out everyday activities.

"Telecare" – care provided at a distance using ICT, generally to people in their own homes.

[16] *Tele Medicine Alliance team(2004 European Space Agency)*
[17] *Tele Medicine Alliance team(2004 European Space Agency)*

"Smart Homes" – homes in which ICT has been installed to help control a variety of functions and provide communication with the outside world.

Without prejudice of the terms described above, there are several definitions regarding IT services for elderly and disabled people. In order to clarify the most the concepts mentioned, we have chose those definitions which are widely accept according to associations and institutions such as WHO (World Health Organization), or the Department of Health of the U.K.

Smart House

Smart House definition 1[18]:

Smart Houses are the evolutionary technological step of home in current society. A smart home relies on real-world sensory equipment data. This data is collected from smart integrated sensors that reside in heterogeneous distributed environments. The smart integration of sensors aims in recognizing the user interaction, sensing the situation and observing the context of the interaction and giving data inputs that can be analyzed and utilized for related decision making.

A Sensor is a new class of computing devices that supports sensing phenomena from its environment, performs computations on that data and receives/transmits this data throughout a sensor network.

One may distinguish sensors, according to their usage. Some well known sensor types are sensors useful for daily life domestic activities but also others for people with specific needs such as health monitoring and care and security activity control.

Sensors must be distinguished from actuators. An actuator is the mechanism by which an agent acts upon an environment. The agent can be either an artificial intelligent agent or any other autonomous being (human, other animal, etc). Sensors are intelligent actuators that can be programmed according to the application requirements.

Sensors present many research challenges as they pose the following resource constraints:

- Power Consumption
- Sensors have limited power supply and thus conserving battery life is crucial in developing sensor applications
- Communication
- Wireless communication in sensor networks provides limited QoS, has limited bandwidth, high latencies and high packet loss ratios.
- Computation
- Sensors have limited computation capabilities and memory sizes.
- False readings

Sensor network systems have to dynamically adjust routing tables and storage points as sensors often malfunction or run out of battery.

Sensors can communicate via any communication medium available. If the sensors are wired then there is a variety of communication methods that can be used, with the RS232 and Ethernet being the most popular.

[18] Mpower consortium definition

In the case of wireless sensors, ZigBee is the most commonly used option. ZigBee is a suite of high level communication protocols that use small, low-power digital radios based on the IEEE 802.15.4 standard for wireless personal area networks (WPANs).

Sensory data often require some kind of aggregation. Data aggregation (or Query aggregation) is the process of collecting information from a sensor network. Each sensor is responsible for collecting readings from its sensing components and transmitting the data to the sensor network. This is handled by the operating system.

The operating systems used nowadays are TinyOS, MOS and SOS with TinyOS being the most popular. TinyOS is an event-oriented operating system which supports the programming of sensor nodes using the nesC language.

In the MPower project we are specifically interested in sensor and actuator technologies that support the creation of a smart house environment. This sensor area includes a subset of environmental sensors like temperature, humidity, light, etc and vital signs monitoring sensors like heart rate, pulse rate, ECG, etc.

The term "Smart House" was defined from various perspectives that spawn from the aspects of construction that includes the ambience controlling to aspects of activity controlling for people. In the MPower project framework, our main perspective is to develop an appropriate Smart House services middleware concentrating on users that need to keep or improve their quality of life, such as in cases of elderly or handicapped people, including people with dementia, where their physical and/or cognitive capabilities to perform daily tasks are reduced.

From the engineer perspective, such "Smart House" is a blending of wired and wireless computational technologies, sensors and processing units, with the aim to improve the quality of life of the user. In some cases, these technologies, like for example wireless sensor networks for daily life, are necessary to ensure that the end user will remain and live independently in his habitat, thus not forced to be transferred to a facility where he can be taken care of.

A smart house should be connected to the outside world via an interface. Recent projects in sensor networks have used an internet based interface which provided the users with status, alerts and query like capabilities.

Regarding Smart House and Telecare, it is interesting to mention the definition given by *The Use of Information and Communication Technology* report. It shows the overlap between some of the concepts and definitions achieved in the chapter, and it is useful to clarify some aspects about both Smart House and Telecare healthcare services.

The following paragraphs are intended to be a divulging definition of these terms. The whole point has been extracted from the papers[19] mentioned below.

Smart House definition 2:

Smart' homes are homes in which ICT has already been installed to help control a variety of functions and provide communication with the outside world.

Telecare services and 'smart' homes share a common technological base in information technology and telecommunications. Smart homes and telecare services are natural companions, since both product

[19] Source: The Use of Information and Communication Technology (ICT) to Support Independent Living for Older and Disabled People

(smart home) and application (telecare) entail similar technology. For example, the monitoring equipment for telecare would probably already be installed in a smart home thus avoiding the need for retrofitting.

A basic and widely accepted parameter for systems is that they should be modular, that is, with the ability to add functionality as needs arise.

Core functions of generic smart home systems are:

- Control of system
- Emergency health
- Temperature monitoring
- Water and energy use monitoring
- Automatic lighting
- Door surveillance
- Cooker safety
- Water temperature control
- Window, blind and/or curtain control
- Property security
- Online links

Additional functions of smart systems associated with provision for older people are:

- Memory joggers and diary facility
- Lifestyle monitoring
- Medical monitoring
- Dementia care

Tele-care

It is relevant to consider the use of ICT-based new technologies within sheltered accommodation, residential homes and nursing homes, involving, for example, CCTV, passive alarms and sensors, and electronic tagging. The evidence available, which is mainly anecdotal, indicates that such use is limited but developing.

Tele-care fits into a care package that is derived on the basis of an individual assessment of need and which can include domiciliary care, assistive technology and home nursing care. The care package is thus personalised but a "core" hardware package is emerging to which elements can be added to meet individual needs. The current development work is making the capabilities of telecare clearer and the principles and practicalities of implementation are emerging.

It requires a multi-agency and multi-disciplinary working.

The main function of telecare is to enable older and disabled people remain in their own homes with increased safety and reassurance. Reassurance to the user that help can be summoned quickly; to the informal carer that their relative is safe and they will be called in the event of an emergency; and to the professional that there is cover when they are not present.

The capabilities of telecare are that it is:

- Remotely Delivered Service
- Flexible and Expandable
- Location Independent
- Risk Minimising

Typical Tele-care Equipment Package:

The core telecare equipment package for safety and risk reduction at home could be "an enhanced capability telephone with a client pendant alarm as the hub of the home system. The hub receives alarm signals via wireless transmission from a fall detector, flood detector, smoke detector, carbon monoxide detector, temperature monitor, and movement detector. These are all automatically relayed to the named carer or to a call centre, in some cases also triggering a shut-down of equipment." (This core package is commercially available.)

Other sensors can be added to suit individual need, including bed or chair occupancy detector, fridge door closure detector, and front door open/shut detector.

More advanced telecare applications include:

- Passive devices to detect falls, wandering and other hazards such as fire or gas and trigger a human response or shutdown of equipment
- Lifestyle monitoring using intelligent systems
- Electronic prompts and memory aids
- Physiological monitoring systems (in conjunction with specialised telemedicine equipment)
- Specialised telephones and videoconferencing.

Telemedicine and Telecare:

There is a degree of overlap between telecare (care provided at a distance using ICT, generally to people in their own homes) and telemedicine (the practice of medicine at a distance using ICT), as telecare may include health care, social care and housing support.

The main focus of this section is the use of telecare to enable older and disabled people to remain in their own homes by providing increased safety and reassurance to them and their carers. Telecare can also be used to provide information and reminders, to reduce social isolation, and to support treatment, rehabilitation and intermediate care.

Another distinction between telecare and telemedicine services is in the technology used. Generally telecare services operate over standard telephone lines whereas telemedicine requires a more sophisticated telecommunications connection.

However, as service users gain experience and confidence with telecare systems and new products are introduced, the extension of the services to the home to provide hospital at home facilities such as physiological monitoring and rehabilitation. The likelihood is that telecare services will expand incorporating aspects of telemedicine.

Smart House and Telecare integration:

The integration of smart homes and telecare services should lead to improved housing conditions, and deliver care and support services more efficiently to the home. Effective integration could improve the quality of life of all citizens and enable safer independent living. The benefits of such integration can be measured in terms of the extent to which people are able to live more independently and, importantly, the extent to which they may be empowered and socially included through the availability and use of such technologies. It should be noted, however, that integrated systems are only feasible when the manufacturers of system components agree upon a common standard.

Potential problems in the application of telecare and smart homes:

In contrast to social alarm devices, which have become relatively commonplace, lifestyle monitoring is a relatively new concept and entails the continuous or intermittent gathering and interpretation of data relating to the movement, activity and behaviour of people in their homes.

- Lack of standardisation
- Confidentiality (remote analysis of person's activities not always desirable and transfer of personal information to third parties)
- Perceived danger of smart technologies removing choice and control from the user
- Perceived danger of substitution of more personal forms of care and support.
- Technology push as a driver for change, user needs overlooked
- Risk of underpinning the wrong model of care (i.e. oppressive) - as a result of inadequately considering the social context in which technology is placed.
- The lack of homes with installed smart technologies, the fact that they need to respond to the differing needs of residents and the lack of systematic evaluations of their impact means that there is some scepticism regarding their merits.

Distributed healthcare (Telehealth)[20] according to the WHO:

Telemedicine should always aim to support health workers providing care as close to the patients as possible. This means information resources should be provided to all levels starting at primary care and clinical telemedicine should be used where possible to prevent referrals to district or tertiary hospitals and support care at the more local level. Used in this way, telemedicine can strengthen care at the primary care and district level.

Telemedicine meet locally identified needs, and adequate technical support for users.

The technologies involved in telemedicine can be divided into two main groups, those that are involved in the transmission and receiving of the information (i.e. running the network), and the end-user devices which generate and present the information (i.e. computers, televisions, telephones).

The following health applications are not necessarily exclusive and projects may well use a mixture of technologies to achieve a variety of ends.

Tele-consultation:

Tele-consultations can be carried out either by telephone or by using video conferencing. Phone consultations between a patient and a health professional are a common informal part of health care for getting minor medical advice.

Video-conferencing adds greater rapport to the medical-history gathering process and also allows the signs and symptoms of the patient to be demonstrated and viewed at the remote end. This can be augmented by pictures of X-rays which can be sent either by using the video-conferencing equipment and a suitably placed backlit X-ray viewing box or utilizing a parallel system which uses a digital scanner to digitize the X-ray and then send the digitized image via the phone lines.

Teleconsultation in this fashion has been used successfully in specialties as diverse as psychiatry, orthopaedics, dermatology, renal medicine, medical oncology and emergency medicine. It can be used also for interpreter services.

[20] Source: Telemedicine, Communications and Health Information, WHO (World Health Organization).

The aim of tele-consultation programmes is generally to improve access to scarce health expertise for outlying patients and obviate the need for patients to travel long distances for a consultation. It can be used to support patient management at facilities lower down the referral hierarchy.

From a cost-benefit point of view, because the equipment for videoconferencing is costly there need to be substantial travel savings or better use of extremely scarce expertise to justify these programmes.

Diagnostic reporting:

Radiology images can be electronically transmitted from a remote location to a central location for reporting or review and second opinion. This is common in many places around the world and would be regarded as well proven technology .The minimum equipment for this is a digital scanner of sufficient quality, a telephone connection and computers and software to transmit and regenerate the image. This is often done in a store-and-forward mode so that the image can be viewed and reported at the convenience of the reporter.

Pathology images can also be reported in a similar fashion. A digital camera can be set up on top of a microscope and images sent for reporting and review. In pathology there is generally a very high quality colour image required and this is technically more difficult to achieve.

As a result, this does not seem to be as common an application of telemedicine as radiology.

Accessing health information:

Access to information can be extremely empowering for health workers. Using computers to access information has the advantages of being extremely cheap compared to hard copy; such information is also capable of being continuously updated. An example of this is using a computer to remotely search the Medline database of journal article abstracts available on the World Wide Web. This is available to anyone who has an Internet connection. The hard copy version is not only always out of date but the cost is such that only libraries in universities and large institutions can consider buying them. The disadvantages of electronic health information are the cost of the computer equipment and the training and time required for people to become comfortable using the computer.

Large electronic databases can also reside on a central computer of a hospital's computer network or copied for distribution on CD/DVD. CD/DVD are very cheap compared to hard copy; however, they can only be continuously updated by sending out updated replacement discs.

The variety of electronic health information which might be of relevance to district health facilities would include drug information databases, poisons databases, electronic versions of medical textbooks, online medical journals, and patient education materials. Many health information resources are available in a variety of languages with English and other European languages being most common. Most countries have a range of their own health information resources published in their own languages, tailored to their own specific needs.

These may be put in an electronic format that is relatively inexpensive. When doing this it is important to spend enough money to make it user friendly and to hold people's interest.

On-going education of staff:

The maintenance and improvement of health professionals' knowledge and skills is a key determinant of the quality of a health service. Nearly all of the technologies discussed here can be used for educational purposes. Audio conferencing and video-conferencing can be used to conduct lectures, tutorials and discussions between a number of geographic sites. The savings in staff travel costs and travel time have to offset the cost of the technology. Distance education courses can also be conducted

using e-mail or the World Wide Web to distribute educational material and supervise the students. Electronic communications such as e-mail arrive virtually instantaneously and so the course can be far more interactive than distance education methods using ordinary mail. Non-interactive technologies such as satellite TV, radio, audiotapes and videotapes can be used to deliver educational materials effectively.

A well organized educational programme would generally use a variety of interactive and non-interactive methods, some using telecommunications technology, and some not using it. The most suitable methods of teaching need to be determined on a case-by-case basis. District health facilities should be able to provide those technologies most commonly used in their country and region. Efficiency requires that the development of educational materials be spread over as broad a base of recipients as possible and for this reason educational programmes should use a consistent group of technologies throughout each country (or region).

Advice and information on self-care:

The majority of health problems are initially managed without advice from a health professional. Minor problems such as coughs, colds and cuts do not require outside advice. Information on self-care is usually gained through word of mouth from family and acquaintances. Other sources are books, newspapers, magazines, radio, TV and schools. All are important. Online advice is only useful if the target population have ready access and the skills to use computers. Telephone call centres are an option for providing either prerecorded information or telephone access to a nurse or other health professional. It is possible for the person answering the telephone to have access to computerized information which guides them through what questions to ask for a given symptom and provides a checklist of recommended advice.

Hospitals which provide telephone advice may wish to look at using computerized information to streamline and improve such services.

Health promotion and preventative health:

The mass media has a major role in health promotion and in educating the public about preventative health measures. Online health information is only likely to be significant if and when computers become a ubiquitous form of mass media.

Electronic patient records:

Efforts are under way in some countries to develop comprehensive electronic medical records which allow real-time electronic access to the individual patient's clinical records wherever that patient may be.

Health is widely regarded as many years behind other service industries in developing this type of infrastructure. In the financial services industry, for example, people can electronically access their bank accounts using credit cards on a global basis, and credit histories are accessible electronically on a national basis. There is no technical barrier to patients' medical histories being accessible electronically in the same way.

A number of benefits are expected. It will be possible to do away with paper records with consequent cost savings. There will always be a complete set of clinical information available when seeing a patient with a corresponding improvement in patient care. There will be no need to unnecessarily repeat tests, delay treatment whilst seeking information from previous providers, or provide treatment when ignorant of past episodes of care. As health care involves increasing numbers of providers and patients become more geographically mobile, sharing of clinical information becomes more important.

The database of clinical information offers a major opportunity to increase medical knowledge by searching and analysing the electronic data.

There are numerous problems to be overcome, however. The task of migrating all records from paper to computer is enormous. For some years it is necessary to run dual paper and electronic records. There is a large cost in providing computer workstations throughout the hospital.

Finally, there is often resistance from professional health staff to input clinical notes electronically as it is initially slower than writing, and many are not comfortable using computers.

District health facilities would generally have very limited use of electronic patient records. The first steps would usually be a computerized index of patients for administrative purposes and tracking the paper records. Pathology and radiology test results are areas which commonly keep results in electronic records.

There are a number of potential administrative uses of information technology and telecommunication within district health facilities. These include:

- finance and accounting systems
- human resource systems including payroll
- supply systems for stock inventory management, stock ordering
- management information systems which summarize the above information.

4.1.2 Quantity and quality of current Tele-care services

This point has been extracted from Senior Watch Survey, which is a market study about the specific needs of older and disabled people to guide industry, RTD and policy. It is a project funded by the European Community under the "*Information Society Technology*" Programme (1998-2002).

Regarding Senior Watch study there are three main Surveys to be distinguished:

- The user surveys were undertaken across all 15 European Union Member States, by computer-assisted telephone interviews -CATI. The random samples were geographically and socio-demographically stratified. The surveys were carried out in the summer of 2001.
- The Older Population Survey (OPS) is based on 9,661 respondents aged 50+ from all Member States. The data are weighted according to country size and are representative for the EU.
- The Decision Maker Survey (DMS) contacted 512 decision makers, randomly selected, from home care provider organisations in all Member States.

Regarding the current chapter *Quantity and Quality of current Tele-Care services,* the entirely point has been focused on Home-care services, which is the most widespread service within Europe. Nevertheless, Distributed Healthcare is supposed to be integrated within Europe by the next years. Actions such as the electronification of the European Health Insurance Card (EHIC) and the further development of European recommendations on e-Health standardisation, as well as the elaboration of the roadmap for further development of integrated smart house systems, are all included in the *2006 ICT Standardisation Work Programme.* Other actions proposed by *e-Europe 2005* are the future implementation of health information networks and on-line health services. Regarding the implementation of Smart House services most of the times are experimental.

The heterogeneous structure of the European care market

Due to the diversity of the field in question, comparable information at European level is not available as regards the levels of provision and the relative importance of these various services in the different countries. A considerable amount of pioneer work would be required in order to generate such an overview. The demographic changes in the European society among other things bring about institutional reforms of the legislatory framework and thus lead to a rapidly changing European market structure for care and related services. To gain structural data about this market remains a field where further research is needed.

Care services for older people in Europe

Care for older people in Europe is being provided in different contexts and by a range of organisations. This includes medical care, social care as well as care related to activities of daily living such as for instance house keeping. Services include:

- Day care
- Respite care
- Chore services
- Home health care
- Homemaker services
- Meals on wheels
- Friendly visitors/ escort services

- Caregiver support groups
- Congregate meals
- Senior centres
- Transportation Services
- Mental health services
- Housing

DMS focus: care services to or at the client's home.

Against this background, the SeniorWatch project focused its efforts in order to enable the collection of Europe-wide comparable empirical information within the given resource limitations. Therefore, the decision maker survey focused on organisations providing care services to or at the client's home. This included various service components as illustrated in the table below. The decision to focus the decision maker survey on *home care providers* was based on the following reasons:

- Home care is the most prevalent form of care service delivery to older people in Europe. It is estimated that only about 5% of the European older population live in institutional settings.
- The home care sector is growing in all European countries. Almost all European Member States pursue a policy which explicitly prefers home care instead of institutional care. Some countries have even implemented a moratorium with regard to building new institutional homes for older people.
- Although there is a lack of robust empirical data with regard to the forms of support that older people would prefer, there are indications that most people prefer home care instead of institutional care. For instance, many older people increasingly see public home care services - when they become necessary
- As a public right. In view of demographic developments, the market potential for home care-related IST applications can thus be expected to grow considerably in the near future.

In the case of home care, services need to be delivered at dispersed geographic locations (i.e. the clients' homes), and IST can be of particular importance when geographic distances need to be overcome.

Examples of common home care services:

Nursing	Support within the home environment	Support outside the home environment	Consultancy	Other
- Continuous care - Time restricted medical care / treatment	- Cleaning, Laundry / Ironing, Meals - Gardening - Cooking	- Transport - Shopping - Accompanying-Services - Meals on wheels - Animal-keeping	- Readministrational issues - re housing-adaptation - Repsychological problems for family-carers	- Emergency-call-centres - Leisure-time-offerings

Source: SeniorWatch, (funded by the E.U Technology Programme, 1998-2002)

The organisational and institutional structures of the home care sector vary considerably across Europe, and little comparable information is available. In some countries, a variety of care service provider organisations can be observed, including not-for-profit organisations as well as commercial service providers. In other countries, the home care sector is quasi monopolised by the municipalities. Moreover, there are some countries where informal home care through family members seems to dominate, and professional care appears to be provided only at health/social care facilities. Other countries aim at complementing informal care by professional care in the community.

Table 20: Maturity of the current telecare market

	Active alarm services	Passive alarm service	Remote support of mobile care staff	Remote support of family carers	Advanced services using video	Other
Austria	Available	Available	Available	Not available	Not available	
Belgium	Available	Available	Not available	Not available	Experimental	
Denmark	Widely used (100%)	Widely used (100%)	Widely used (100%)	Emerging	Experimental	
Finland	Widely used (100%)	Emerging	Emerging	No information	Emerging	
France	Medium maturity	Low maturity	Marginal maturity	Marginal maturity	Not available	
Germany	Available but only partially used	No information	Emerging	Emerging	No information	
Ireland	Available but only partially used	Emerging	Not at all in use	Not at all in use	Experimental	Experimental smart homes
Italy	Routinely used in a small number of areas	Usually offered in conjunction with active alarms	Almost not at all used	Almost not at all used	Experimental	
Luxembourg	Widely available and widely used (across the whole country)	No information	No information	No information	No information	
Netherlands	Widely used (80-95%)	Experimental (0-5%)	Partially used in experimental context (5-10%)	Partially used in experimental context (5%)	Experimental	Experimental smart homes & domotica
Portugal	Partially used	Partially used	Emerging	Emerging	Emerging	
Spain	Widely used	Early stages of market introduction	Early stages of market introduction	Experimental phase	Experimental phase	Experimental GPS systems
UK	Widely used	Partially used	Partially used	Partially used	Experimental	Experimental - smart homes & telemedicine
(Norway)	Widely used (available in 97% of municipalities)	Partially used but increasing interest	Emerging	Emerging	Emerging – mainly telemedicine	Smarthouse installations widely used Telemedicine emerging

Source: SeniorWatch

Overall the picture is one of low maturity for each of the applications, with the exception perhaps of active alarm services, which are widely available and used in Finland, Luxembourg, the Netherlands, Spain and UK. In general, passive alarm services are an emerging service and tend to be only partially used, which is notable in itself considering the technology involved is relatively simple and has been available for several years. Remote support services for both mobile staff and family carers are less available; countries report low levels of availability and use or no use at all. However, advanced services using video does appear to be a technology that is emerging across current European telecare markets. Other services reported included experimental work with smart home technology, domotica and telemedicine services.

4.1.3 Nature, degree of coverage and costs for the user of IT enabled services

Accordingly, organisations providing home care differ with regard to their legal status, their organisational profile and the scope of service delivery. Overall, the main types of service providers can be distinguished:

- Public institutions of the federal states/provinces/departments and the municipalities

- Welfare organisations, including church organisations

- Private service providers

Table 21: The main clusters of countries regarding homecare providers

Family carers	Municipalities	Private sector	Non-profit organisations
Austria, Belgium, France, Germany, Greece, Ireland, Netherlands, Portugal, Spain	Denmark, Finland, UK (Norway)	Italy	none

(No information available for Sweden)

Source: SeniorWatch

Overall, three main clusters of homecare providers have been defined at European level, i.e. family carers, municipalities, the private sector. It appears that the informal arrangement of family carers as providers of homecare is dominant in most European countries. In these countries also, family carers are supported mainly by care from local municipalities. For example, most of the elderly in Spain are cared for within the family structure (spouse, children, etc.). When there is no family support available, homecare services are covered by the public administrations and, to a much smaller extent, companies in formal and submerged economies.

AUSTRIA

Table 22: Distribution of elderly +70 years old in Austria.

Persons older than 70	Independence living at home	Need some care	Receiving homecare by (semi)professionals	Living in nursing or residential homes
910.000	500.000	310.000	40.000	60.000
100	55%	34%	4%	7%

Source: Austrian Hilfswerk - representative survey 2005

More than half of the population over 70 in Austria is independent. But still, 45% are dependent. It is worth noticing that only 7% of the dependent persons are living in nursing or residential homes.

NETHERLANDS

Relative to 2004, the number of persons aged 18 years or older who received AWBZ-financed home care[21] in 2005, decreased by over 12 thousand (2 percent) to 596 thousand. Notwithstanding the decrease, the amount of home care hours provided in 2005 grew by 1 percent.

The reduction in home care clients in 2005 mainly occurs among women under the age of 85. Among over-85s, there is an increase in male as well as female home care clients. This is partly due to the fact that older people live independently longer.

From the age of 90, the number of home care clients declines as a substantial part of over-90s live in nursing homes and homes for the elderly.

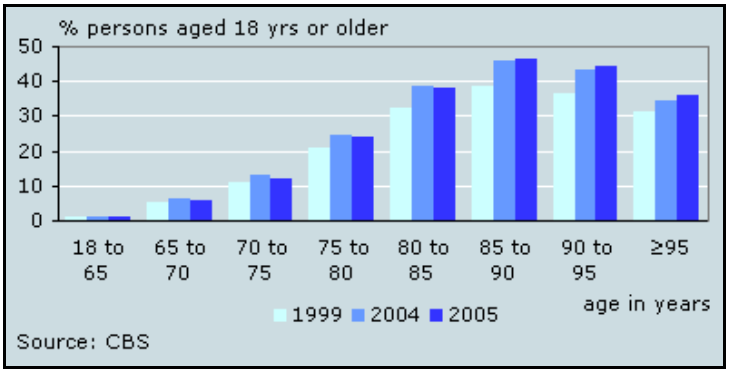


Figure 2: Proportion in the population receiving home care by age (Netherlands)

Despite the reduction in the number of home care clients, the total number of home care hours provided grew 1 percent in 2005.

The average number of home care hours per client rose by 5 hours (3.2 percent) to 152 hours in 2005. In 1999, the average home care client received 122 hours of care. The so-called extramuralisation process is partly accountable for the growing number of home care hours provided. This process has an increasing effect on the average need for home care.

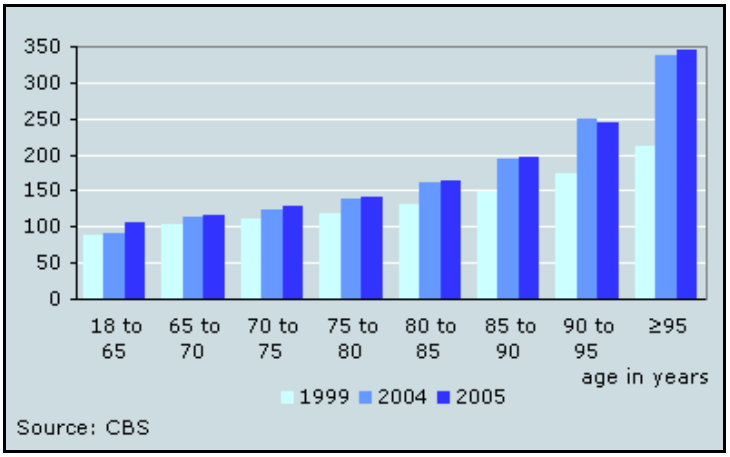


Figure 3: Average number of home care hours received per person by age (Netherlands)

The number of home care recipients fell dramatically in 2005. In the period 1999–2004, the number of persons over 18 receiving AWBZ-financed home care still increased by 22 percent.

[21] Household and personal care and attendance of people living independently, insofar as covered by the Exceptional Medical Expenses Act (AWBZ) and for which a personal contribution has to be paid. The Central Administration Office Exceptional Medical Expenses (CAK-BZ) files all personal contributions.

The decrease may only be temporary. Provisional figures published by the Central Administration Office Exceptional Medical Expenses (CAK-BZ) indicate that the number of home care recipients is slightly increasing again in 2006.[22]

In the Netherlands, 217 thousand people lived in a home or institution setting on 1 January 2003, slightly more than on 1 January 2002. The decrease in the number of residents of homes and institutions, which started in the mid-eighties, has thus apparently now come to an end.

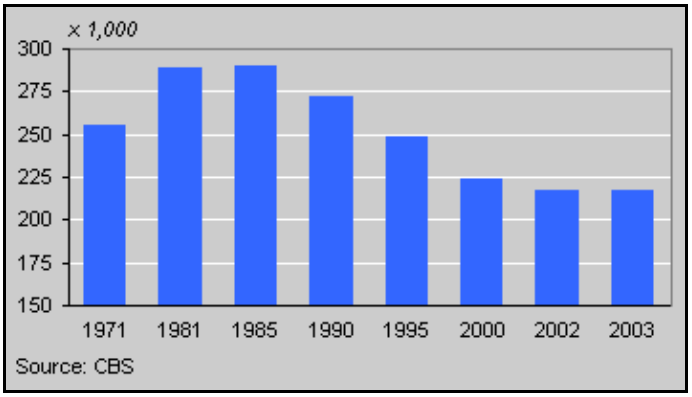


Figure 4: Residents in homes and institutions, 1971-2003 (Netherlands)

In spite of the ageing of the population, the number of residents in homes for the elderly and nursing homes has been falling since the mid-eighties. This was partly the effect of government policy measures. In 1977 the government declared that all available places in homes for the elderly and nursing homes were only intended for people who could no longer look after themselves.

Organisations were set up for people who needed assistance to live independently, providing nursing and other care for the elderly in their own homes.

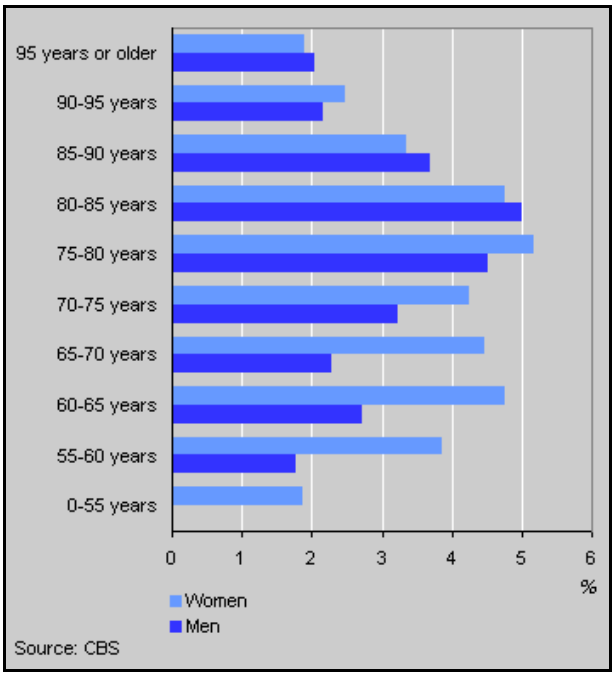


Figure 5: Percentage of people living in homes and institutions, 1971, 1981 and 2003 (Netherlands)

[22] http://www.cbs.nl/en-GB/menu/themas/gezondheid-welzijn/publicaties/artikelen/archief/2007/2007-2131-wm.htm

The effect of this government policy was small in the first years. After 1981, however, the percentage of the population living in homes and institutions fell sharply.

The share of people aged 65 and older in particular in such homes dropped. In 1981 nearly 10 percent of over-65s in the Netherlands lived in a home, by 2003 this had dropped to 6 percent. The decrease was sharpest in relative terms among the population aged between 70 and 80 years.

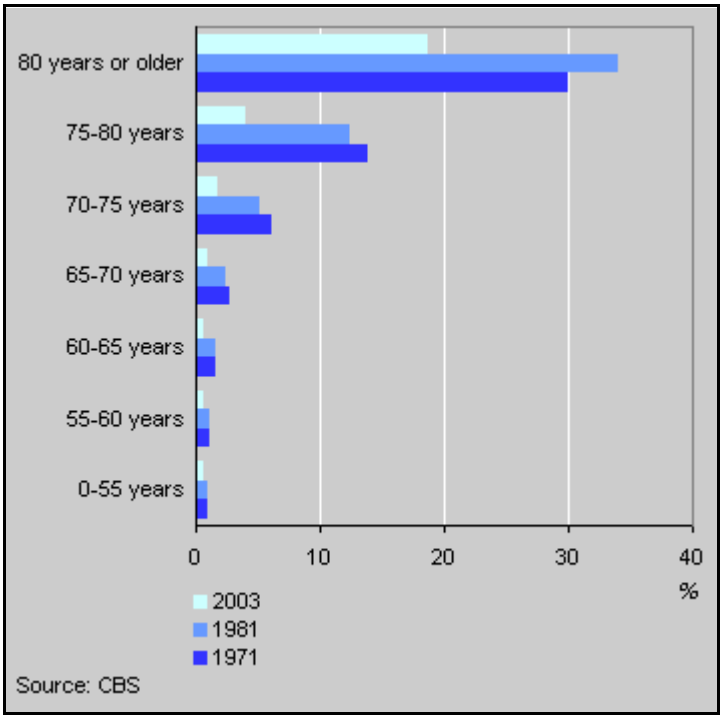


Figure 6: Average annual decrease in percentage of people living in homes and institutions, 1995-2003 (Netherlands)

The share of women in homes and institutions fell more sharply than the share of men living in these homes. Between 1995 and 2003 the share of 55-85 year-old women in these homes fell by nearly 5 percent a year. The share of men fell by less than 4 percent.

The development in life expectancy probably played a part in this respect. Male life expectancy is increasing, while for it is stable. More men are surviving their wives, thus increasing the demand for permanent nursing and other care.[23]

NORWAY

Considering the period 2000-2004, Norway experienced an increase in Man-years. Regarding recipients of home services, the number of recipients of both home help and home nursing increased due to a considerable rise of those persons receiving only nursing, as the number of those receiving only home help diminished. The number of residents in institutions decreased during this period as well, while residents in dwelling for nursing and care increased slightly.

[23]http://www.cbs.nl/en-GB/menu/themas/dossiers/vrouwen-en-mannen/publicaties/artikelen/archief/2004/2004-1442-wm.htm?languageswitch=on

Table 23: Nursing and care services. Man-years, number of recipients and per 1000 inhabitants.

		Recipients of home services*				Residents in	
	Man-years, total	Recipients, total	Both home help and home nursing	Home nursing only	Home help only	Institutions for elderly and disabled	Dwellings for nursing and care
2000	89.669	159.669	59.229	37.647	62.793	42.236	45.515
	19,9	35,5	13,2	8,4	13,9	9,4	10,1
2002	93.690	162.112	58.789	44.399	58.924	41.635	46.414
	20,6	35,6	12,9	9,8	12,9	9,1	10,2
2004	106.837	163.415	60.460	51.348	51.607	40.985	47.569
	23,2	35,5	13,1	11,1	11,2	8,9	10,3

*Recipients per 31 December.

Source: Nursing and social care services, Statistics Norway (www.ssb.no)

It can be seen in table 24 that, as it is expectable, the number of elderly and cognitive disabled living in geriatric institutions or receiving service is higher for older age groups.

Table 24: Distribution of elderly and cognitive disabled by age and place of residence.

	Geriatric Institutions (per 1000)	Private home, reciving services (per 1000)	Living at home, without services
Under 67 years	0,46	12,5	987
67-74 years	11,44	62,5	926
75-79 years	34,18	148	812
80-84 years	80,03	283	637
85-89 years	165,43	435	400
90 years and over	343,01	495	162

Source: Nursing and social care services, Statistics Norway (www.ssb.no)

Regarding the distribution of recipients of home services by age groups, it is noticeable in the table below that concerning elderly under 80 the distribution between those receiving nursing and home care and those receiving just one of them is very similar. However, when considering elderly people over 80 years it is two times the number of people receiving both service than just one.

Table 25: Distribution of recipients of home services by age.

	Nusing and home care (per 1000)	Only nursing (per 1000)	Only homecare (per 1000)
Under 67 years	3,48	5,41	3,54
67-74 years	21,24	22,11	19,27
75-79 years	52,61	49,52	46,10
80-84 years	111,80	82,31	89,34
85-89 years	202,03	107,30	125,73
90 years and over	277,12	105,90	112,24

Source: Nursing and social care services, Statistics Norway (www.ssb.no)

Table 26 shows perfectly that the number of residents in institutions is decreasing, as people prefer to stay home and the development of home care services is enabling it. This decrease of residents in institutions is a general tendency among several countries such as the Netherlands or Denmark.

Table 26: Residents in institutions for the elderly and disabled, by age. 1992-2005

	1992	1995	2000	2005
Total	**45.571**	**42.532**	**42.236**	**40.719**
Under 67 years	1.804	1.589	1.598	1.862
67-74 years	4.202	3.756	3.194	2.870
75-79 years	6.377	6.329	5.896	4.769
80-84 years	10.749	9.968	10.001	9.335
85-89 years	12.058	11.230	11.469	11.321
90 years and over	10.381	9.660	10.007	10.562
Unspecified age	0	0	71	0

Source: Nursing and social care services, Statistics Norway (www.ssb.no)

SPAIN[24]

In Spain, the number of users receiving help at home public service has sharply increased during the last 15 years, as it can be seen in figure below.

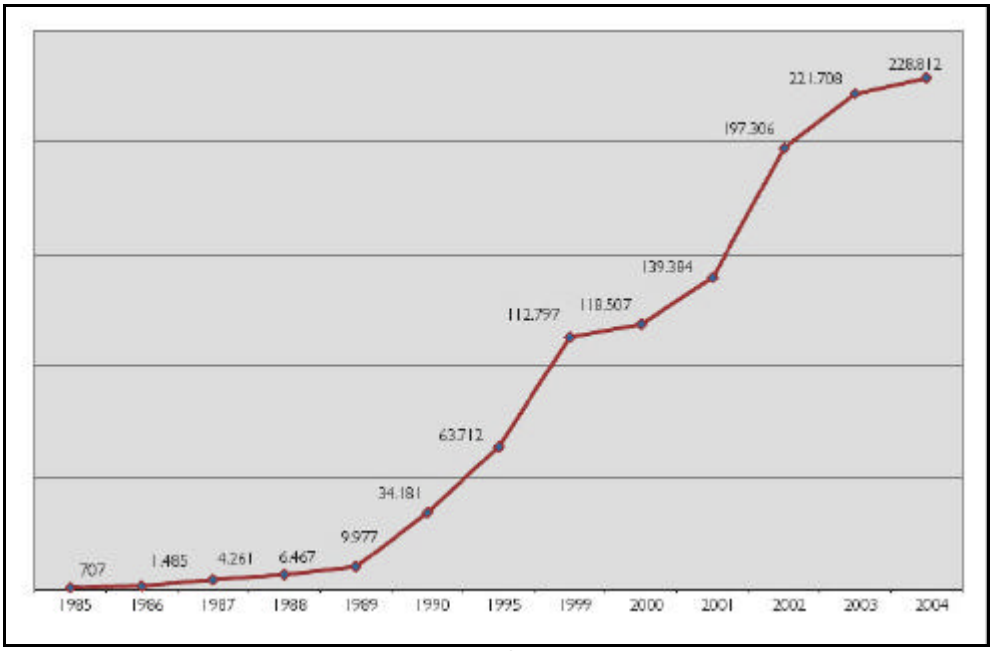


Figure 7: Help at home public service (SAD)[25](Spain). Evolution of number of users. 1985-2004

The coverage index of the help at home public service indicator shows the number of users out of the total population over 65. It went from 0,64 in 1990 to 3,14 in 2004. It means, such increase was not only due to and increment of old population but also of coverage.

[24] Source: Ministerio de Trabajo y Asuntos Sociales (2000,2002).Las Personas Mayores en España. Informe 2000 y 2002.
[25] SAD (Servicio de Atención a Domicilio)

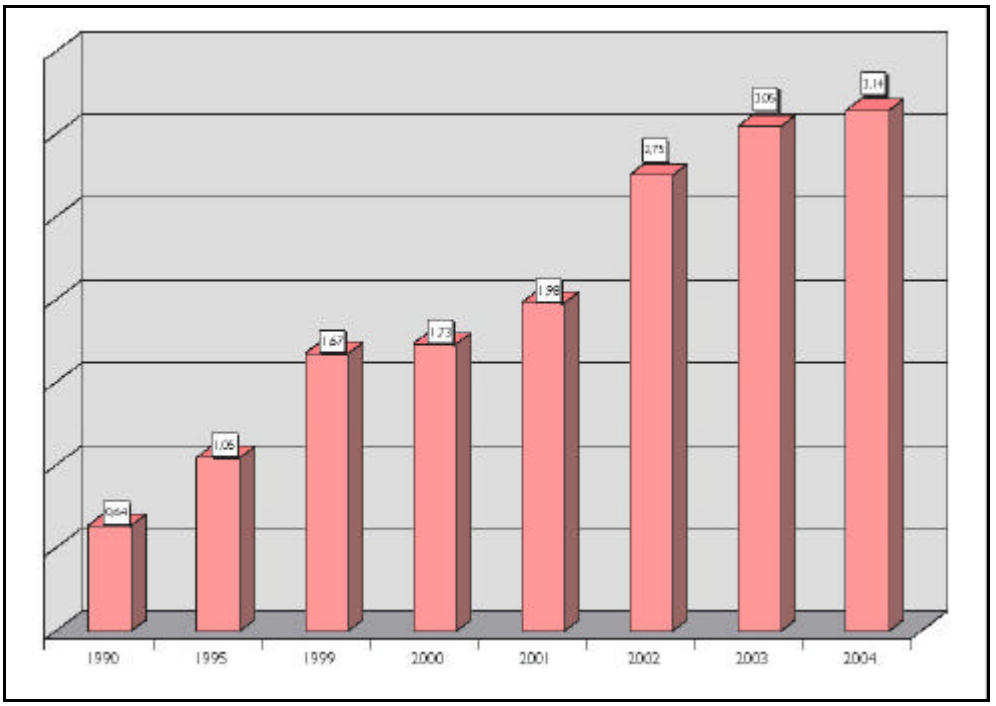


Figure 8: Help at home public service. Evolution of coverage index. 1990-2004
Coverage index: (Number of users/Population>65)*100

As regards of Telecare public service it has also experienced a high increase, gaining around 140.000 users in less than 10 years.

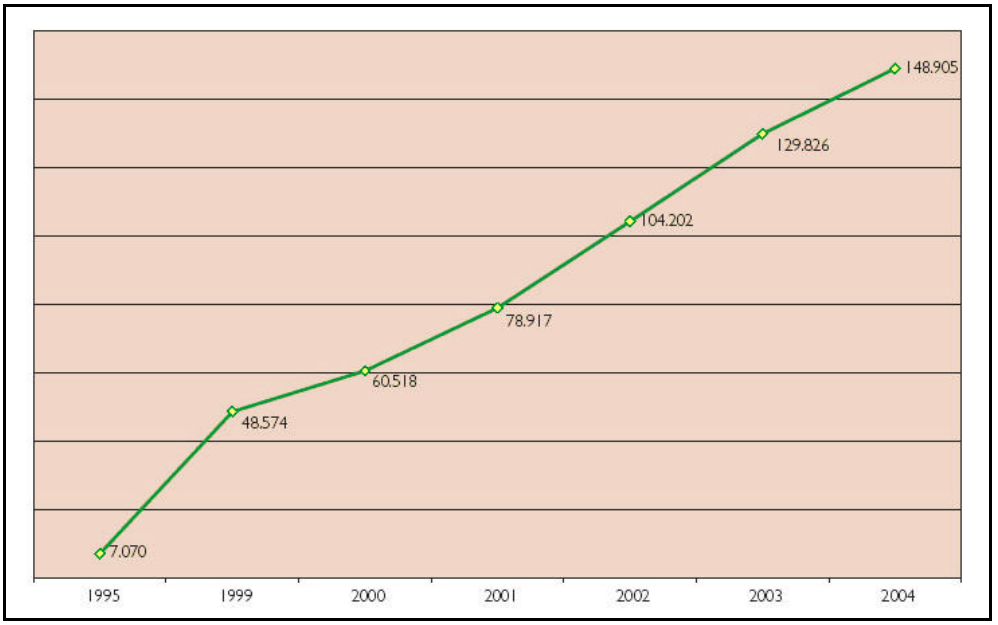


Figure 9: Telecare public service (Spain). Evolution of number of users. 1995.2004

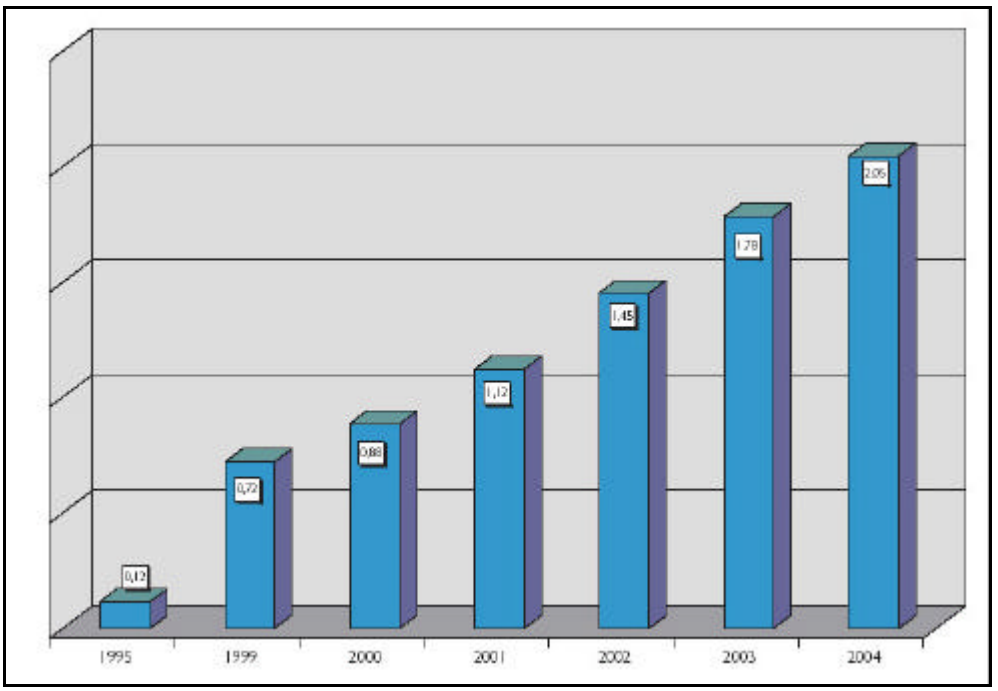


Figure 10: Telecare public service. Evolution of coverage index. 1995-2004
Coverage index: (Number of users/Population>65)*100

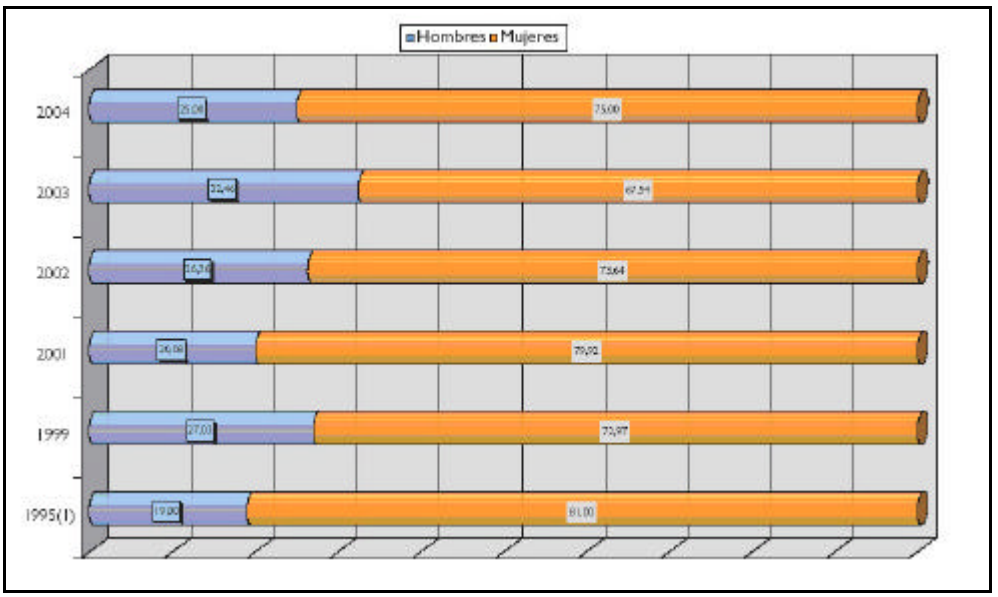


Figure 11: Telecare public service (Spain). Distribution by user's gender. 1995-2004
Percentage out of total number of users.

Main users of Telecare public service are females. Percentage varies each year but women are still representing the group receiving higher proportion of this service. It is understandable when regarding the gender distribution of the elder citizens.

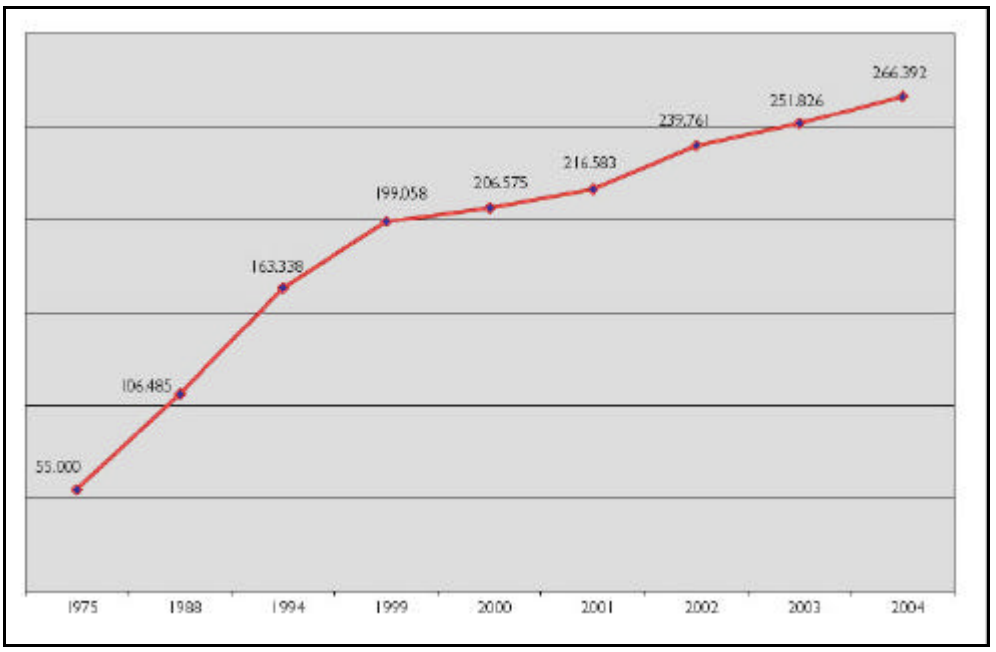


Figure 12: Residential services (Spain). Total number of residential places. 1975-2004

Residential services multiplied per 4,8 during the period 1975-2004. This could be an answer to the rapid change of the population structure.
Day-care-centres for dependent persons experienced a high increase as well. Public centers counted in 2004 on 12.494 more places than 1999, due to an increment of 485 new centres.

Table 27: Day-care-centres for dependent persons in Spain, 1999-2004

	January 1999	January 2004	Var.2004/1999
Population > 65	6.739.558	7.276.620	537.062
Public places	7.103	19.597	12.494
Public centres	227	712	485
Coverage Index	0,11	0,27	0,16
Total number of places(1)		33.709	
Total number of centres(2)		1.756	
Coverage Index		0,46	

(1)Including public, mix and private places
(2) Including centres with public and private ownership
Source: Las personas Mayores en España. Informe 2004.

Table 28 shows the distribution of the residential places increase between 1999 and 2004. Most of the new places are in private centres. New private centres in this period are two times the new public centres. It can also be seen in figure 13.

Table 28: Residential centres for the elderly in Spain. (1999-2004)

	January 1999	January 2004	Var.2004/1999
Population > 65*	6.725.412	7.276.620	551.208
Total number of places(1)	**199.058**	**266.392**	**67.334**
Public places	51.413	65.560	14.147
Mixed places(2)	26.028	48.282	22.254
Private places	120.917	152.550	31.633
Total number of centres(3)	**3.720**	**4.888**	**1.168**
Public centres	484	1.002	518
Private centres	2.703	3.886	1.183
Coverage index			
Total places	**2,96**	**3,66**	**0,70**
Public and mixed places	1,15	1,56	0,41
Private places	1,80	2,10	0,30

*Population data from INE.(01/01/1999 and 01/01/2003)
(1) Total number of places in January 1999 doesn't add up to public+mix+private places because a difference of 700 places corresponding to Castilla y León.
(2) Mix refers to those private places half financed by the government
(3) Total number of centres doesn't add up to public+privat centres because a difference of 533 centres corresponding to Andalucia.
Source: Las personas Mayores en España. Informe 2004.

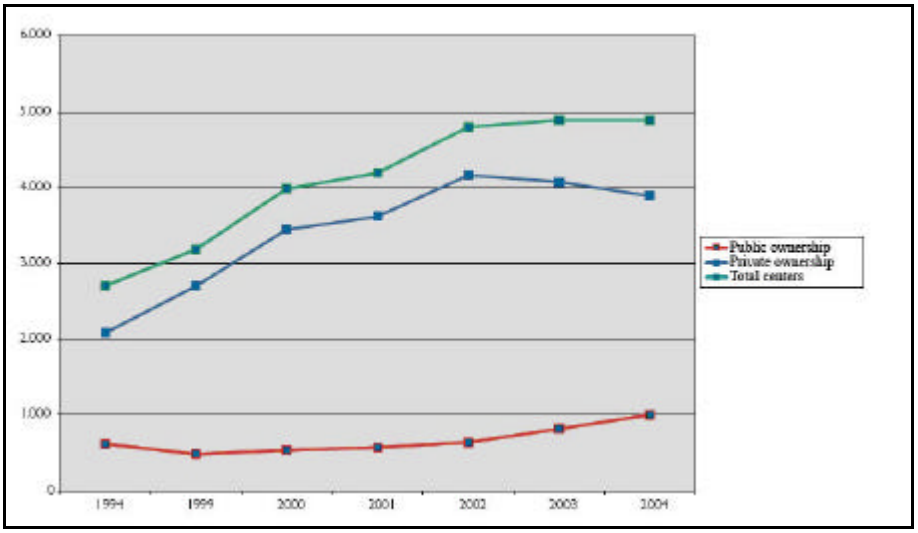


Figure 13: Residential services (Spain). Number of centers according to ownership. 1994-2004

Here below, it is shown the evolution of number of SAD and Telecare users and residential places. In table 30 it can be seen how the coverage index improved between this period 1999-2004, especially in SAD and Telecare.

Table 29: Evolution of number of users in Spain. (1988-2004)

Years	Population > 65	SAD (users)	Telecare (users)	Residences (places)	Total
1988	4.961.456	6.448	-	106.485	112.933
1995(1)	6.086.365	63.712	7.070	163.338	234.120
2000	6.842.140	118.507	60.518	206.575	385.600
2004	7.276.620	228.812	148.905	266.392	644.109

(1) 1994 for residences
Source: Las personas Mayores en España. Informe 2004.

Table 30: Evolution of coverage index (1). 1988-2004

Years	Population > 65	SAD	Telecare	Residences (2)	Total
1988	4.961.456	0,13	-	2,15	2,28
1995	6.086.365	1,05	0,12	2,68	3,85
2000	6.842.140	1,73	0,88	3,02	5,64
2004	7.276.620	3,14	2,05	3,66	8,85

(1) Coverage index (Number of users/Population>65)*100

(2) 1994 for residences

Source: Las personas Mayores en España. Informe 2004.

Table 31: Homes and clubs for the elderly, 1999-2004

	January 1999	January 2004	Var.2004/1999
Population > 65*	6.739.558	7.276.620	537.062
Number of users	1.893.886	3.528.376	1.634.490
Coverage Index	28,10	48,49	20,39
Public price/hour (euros)	3.136	3.588	452

*Population data from INE.(01/01/1999 and 01/01/2003)

Source: Las personas Mayores en España. Informe 2004.

Homes and clubs for the elderly also improved their service during the considered period. Coverage index rose 20 points. Although number of associates vary each year, there is a growing tendency.

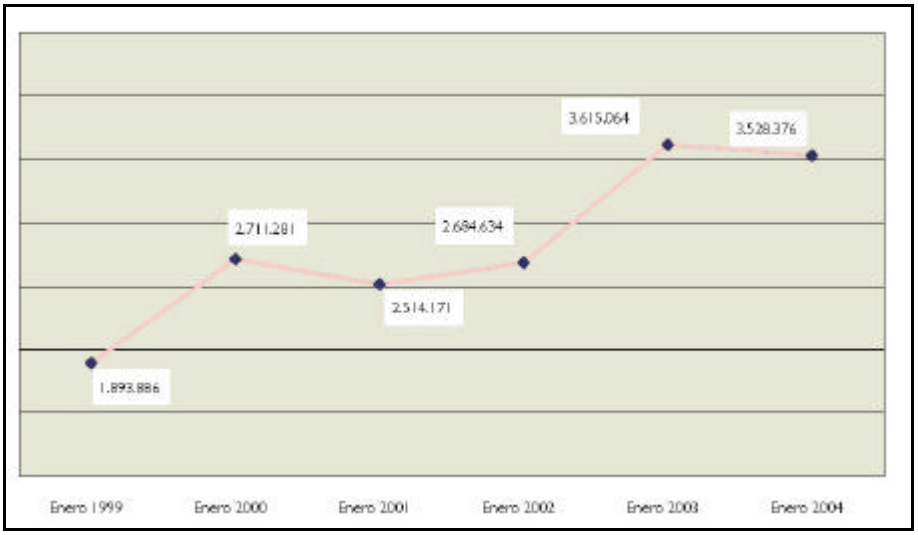
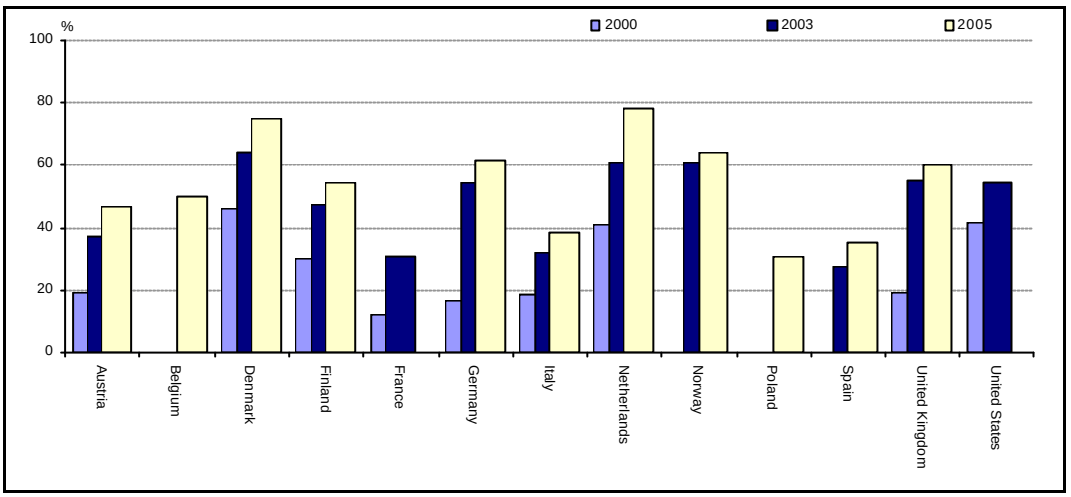


Figure 14: Homes and clubs for elderly. Number of associates. 1999-2004

4.2 Access, availability and affordability of technological resources

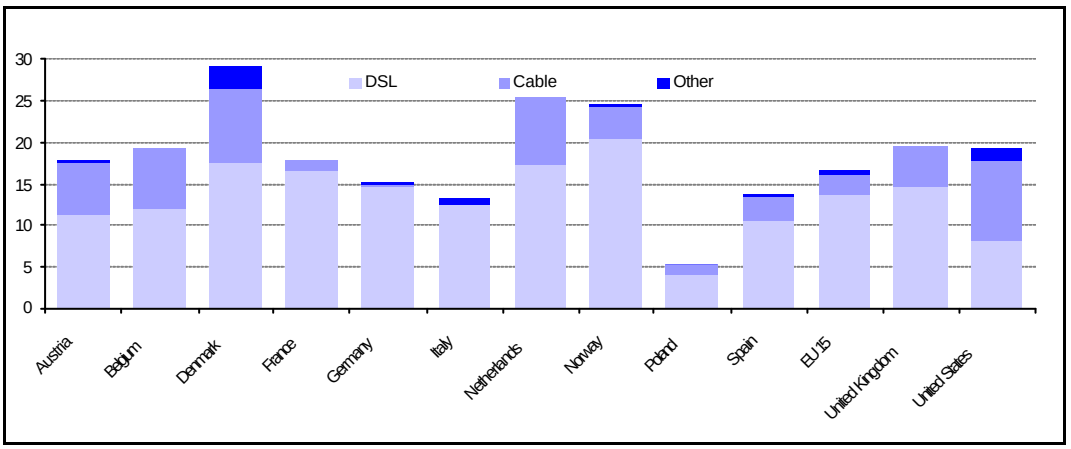
4.2.1 Access and availability of ICT infrastructures

Fast broadband Internet access is essential to stimulate information society in Europe. Lack of broadband access in the less technologically advanced areas of the European Union (EU) is an issue, generally known as territorial divide or digital gap, which should be addressed urgently. The following figures sets out the current situation as regards the territorial divide in ICT infrastructures access in Europe.



1. Generally, data from the EU Community Survey on household use of ICT, relate to the first quarter of the reference year.
2. Internet access is via any device (desktop computer, portable computer, TV, mobile phone etc.)
Source: OECD, ICT database and Eurostat, Community Survey on ICT usage in households and by individuals, September 2006.

Figure 15: Households with access to the Internet (1) 2000-2005 (2), percentage of all households.



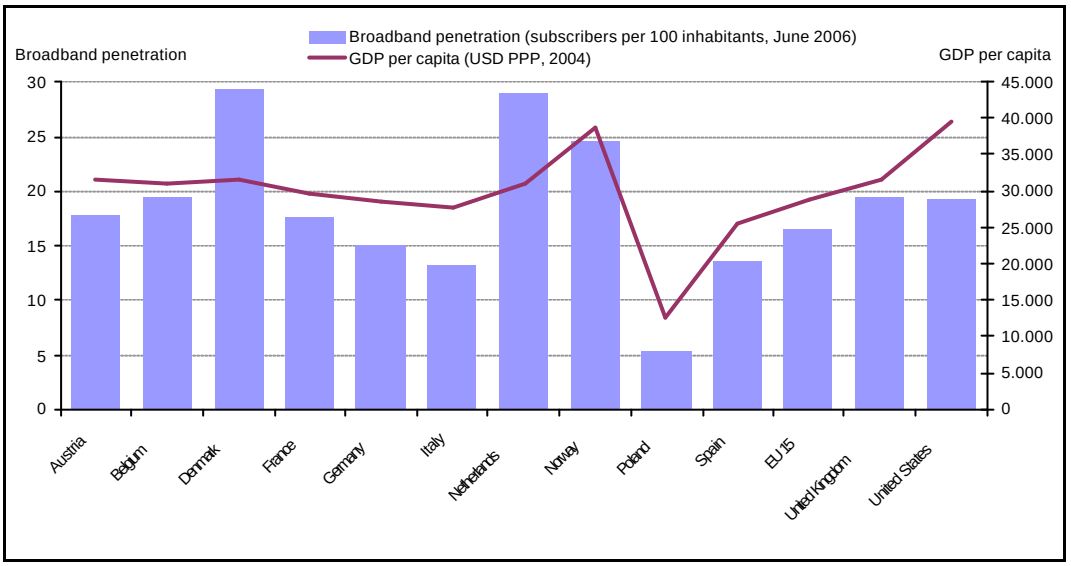
Source: OECD

Figure 16: Broadband subscribers per 100 inhabitants, by technology, June 2006

Table 32: Broadband subscribers per 100 inhabitants, 2001-2005

	2001	2002	2003	2004	2005
Austria	3.6	5.6	7.6	10.1	14.1
Belgium	4.4	8.7	11.7	15.5	18.3
Denmark	4.4	8.2	13.0	19.0	25.0
France	1.0	2.8	5.9	10.5	15.2
Germany	2.3	4.1	5.6	8.4	13.0
Italy	0.7	1.7	4.1	8.1	11.9
Netherlands	3.8	7.0	11.8	19.0	25.3
Norway	1.9	4.2	8.0	14.8	21.9
Poland	0.1	0.3	0.8	2.1	2.4
Spain	1.2	3.0	5.4	8.1	11.7
EU15	1.6	3.4	5.9	9.7	14.2
United Kingdom	0.6	2.3	5.4	10.5	15.9
United States	4.5	6.9	9.7	12.9	16.8

Source: OECD



Source: OECD

Figure 17: Broadband penetration (subscribers per 100 inhabitants, June 2006) and GDP per capita (USD PPP, 2004)

Broadband connections have increased sharply in number, almost doubling in the period 2004-05. By the end of 2005, the broadband penetration rate was estimated to be 11.5% in terms of population, i.e. roughly 20% of households, corresponding to roughly 53 million connections in the EU25. In EU-15 it was estimated to be around 17%.

Although broadband is progressing fast, there is still a large gap between urban and rural areas. Broadband access in the EU's more remote and rural regions is limited because of the high costs associated with low population density and remoteness. Commercial incentives to invest in broadband deployment in these areas often turn out to be insufficient.

Broadband may also have a considerable impact on everyday life, particular as regards telemedicine and eHealth applications. Broadband could also enable: quicker access to healthcare services through the provision of eHealth applications, and simpler hospital management and provision for skills shortages.

CYPRUS

Information about internet access in Cyprus was not found in the same source as above for other countries. Therefore, information from the CYSTAT has been used to describe the situation in Cyprus. As it can be seen in the following table, internet access (12,3%) is below the EU-15 average (16%) as shown in figure 17.
Comparing households with internet access (%) in Cyprus with other countries in figure 15, it is noticeable that Cyprus is still far from the average.[26]

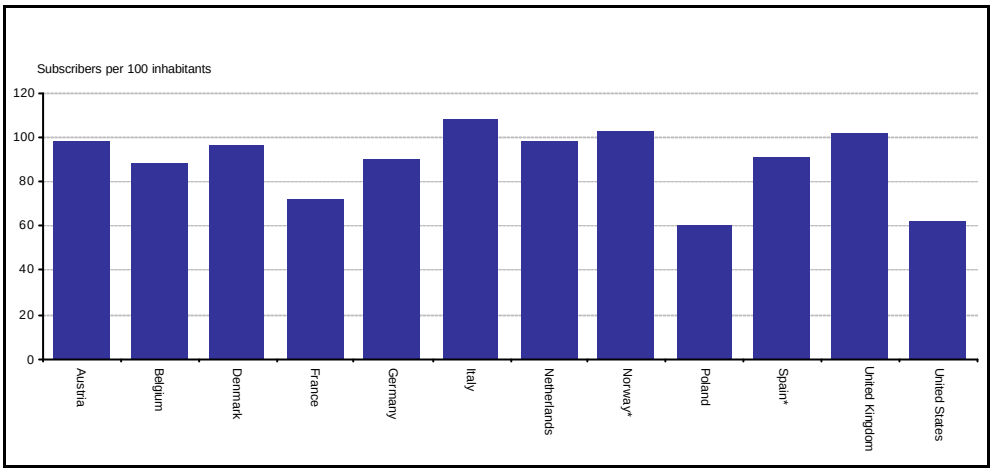
Table 33: Internet access and usage in Cyprus

	1997	1998	1999	2000	2001	2002	2003	2004	2005
Subscriptions to ISPs for Internet access (per 1000 inhabitants) (2)	24	43	53	86	90	104	120	119	123
Type of Internet connection(2) (% on total subscriptions)									
Dial-up							75,6	72,4	59,2
ISDN							12,3	7,9	4,3
DSL(2)							12,1	19,7	36,5
ISDN lines per 1000 inhabitants	0	2	4	10	20	27	33	43	37
Households with Internet access (%)				14	20	24	29	29	32
Regular Internet usage(3)									
Total(%)						23,3	24,2	25,4	26,2
Male						26,9	27,1	28,8	28,4
Female						20,1	21,6	22,2	24,2

(1) Source: AVACOM NET, CALLSAT, CYTANET, LOGOSNET, NETINFO, NETWAY, OTENET, SPIDERNET, THUNDERWORX, WAVESPEED
(2) Includes connections aDSL , DSL-Lite, DSL-Bus
(3) Source: Labour Force Survey (2002-2004) and survey on ICT Usage in Households and by Individuals (2005)
Source: CYSTAT (http://www.mof.gov.cy/mof/cystat/statistics.nsf)

[26] For more information about access and availability of ICT infrastructures in Norway and availability of DSL in some of the Member States see figures 5 to 7 in Annex 1

4.2.2 Access and availability of ICT devices

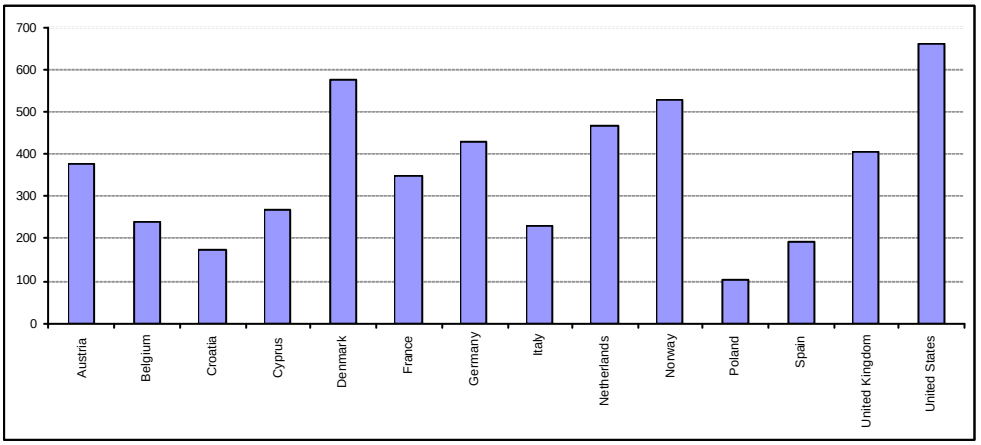


*Estimations
Source: OECD ICT key Indicators (www.oecd.org/sti/ICTindicators)
Figure 18: Mobile subscribers per 100 inhabitants, 2004.

In the EU-25, 83% of the population has a mobile phone. In Italy, Norway and United Kingdom, mobile subscriber's indicator is above 100% of inhabitants. Most of the Member States in figure 18 are above the EU-25 average, except France and Poland.

In the EU-15, the average number of households with fixed and mobile telephone is around 66%. Density of households without fixed telephony tends to increase due to a decrease of the households' size. In the EU-15, 28% of the individual households do not have contracts of fixed telephony, while in Spain it rises to 37%. In Spain, 16% of the households only have mobile telephony contracts, very similar to the EU-15 (15%) which has a growing tendency. In general terms, individual households predominate among those households with only mobile telephony. In the EU-15, 22% of the individual households just have mobile telephony contracts.

Market penetration of third generation mobile telephony (UMTS o 3G) is maximal in Sweden, where around 80% of its population has a 3G mobile phone. In Spain, this figure rises to 33%.[27]



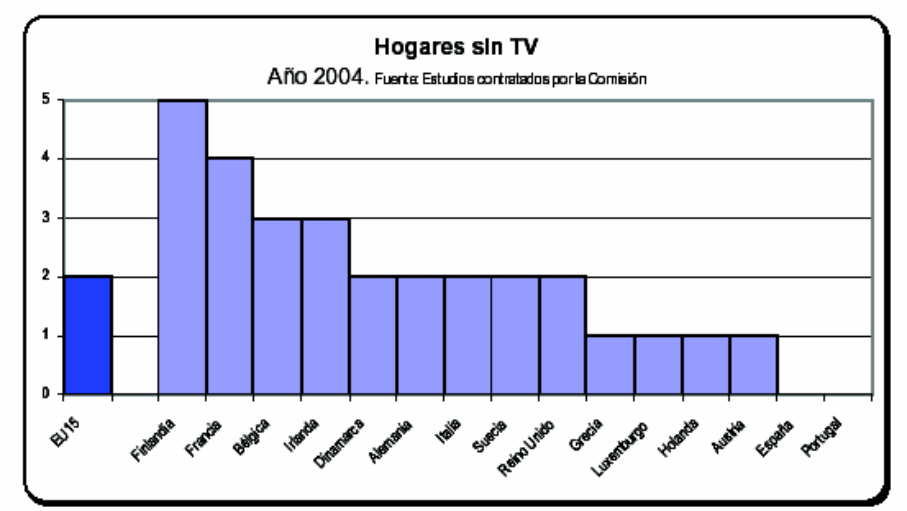
Source: WHO
Figure 19: Personal computers per 1000 inhabitants, 2002.

[27] For further information about access and availability of mobile and fixed telephony services see figures 8 to 13 in Annex 1.

In EU-15, 53% of households have a personal computer Spain, is situated slightly below the EU-15 average with 49%.

Considering the period 2003-2004, both figures experienced an increase of 5 points. It means that although the number of households with a pc is increasing, the distance between both figures keeps constant.

In figure 19, it can be seen that Denmark and Norway are above the EU-15 average while Spain, Croatia and Poland have less than 20% of households with a personal computer.[28]



Source: Indicadores comparados de servicios de telecomunicación (III Televisión) – subsecretaría SG. Estudios. Ministerio de industria, turismo y comercio 29

Figure 20: Households without TV

In Austria and Spain, among others, 99% percent of the households have television. In the EU-15, the minimum penetration is higher to 80%.

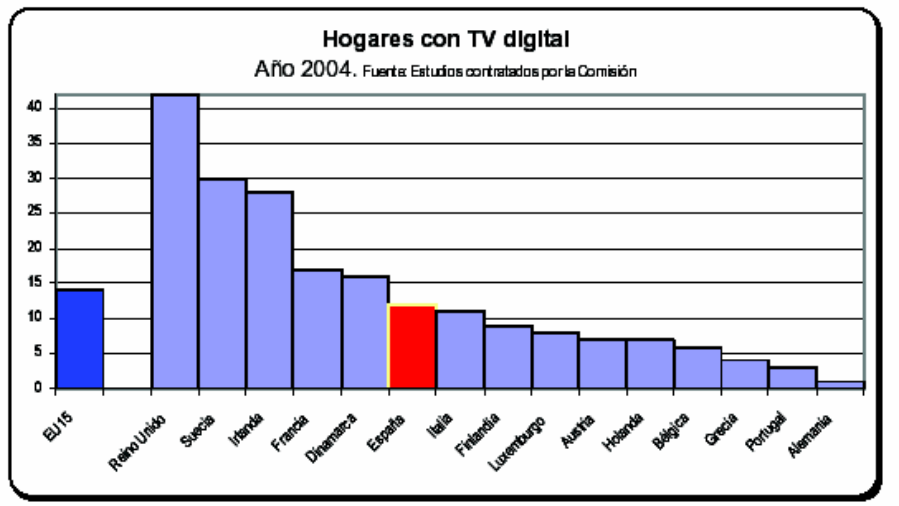
Due to spread problems, access to cable television is more developed in northern Europe, Netherlands, Belgium,etc. In Spain, only 6% of the households use cable television compared to 32% in EU-15.

The technology to access satellite television has been the last one to appear in the market. Its attraction lies in the fact that it can satisfy the demand instantaneously as one satellite can attend all of it. Its main inconvenient is the high cost. In Spain, only 2% of the households accede to the service through this technology, compared to 13% in the EU-15.

In Spain, 8% of the households have more than one type of access to television service, as in EU-15 it counts on 7%.

[28] For further information about access and availability of personal computers see figures 14 to 17 in Annex 1

[29] http://www.mityc.es/NR/rdonlyres/28A32FD2-03B2-43A8-80AD-B46377F52A7A/0/IIITelevision.pdf



Source: Indicadores comparados de servicios de telecomunicación (III Televisión) – subsecretaría SG. Estudios. Ministerio de industria, turismo y comercio

Figure 21: Household with digital TV

In the UK, 42% of the households have digital television. Only Sweden, Irland, France and Danemark are above the EU-15 average.

As regards penetration of digital TV among older Europeans, the United Kingdom leads the European-wide ranking. Here, more than a quarter of the 50+ population subscribe to digital TV. Sweden, Spain, France, Belgium, the Netherlands and Italy show penetration rates of more than 10 percent while the take up in the remainder of the Member States is even lower. Overall, some 15 million Europeans aged 50 years and over possess digital television.

DVD players as a means to access digital content via a television set are most widespread in Finland, the Netherlands, and Denmark with penetration rates of around 12 percent. Austria, Luxembourg, France and Belgium follow with penetration rates about 10 percent. Italy and the United Kingdom rank in the midfield with about 8 percent. In the other Member States penetration of DVD players among 50+ households does not trespass 6 percent. It emerges that DVD players have not really entered the seniors market yet. Overall, some 9 million Europeans aged 50 years and older currently possess a DVD player.[30]

[30] For further information about ICT devices in Austria, Cyprus, Norway and Poland see figures 18 to 21 in Annex 1.

4.2.3 Acceptance level of ICT infrastructure and devices by the elderly

Computer technology, the internet and mobile telephony can perhaps be regarded as the most prominent examples of Information Society Technologies. However, other technologies such as interactive television or video telephony may also play an increasing role within economic and social life as the Information Society further progresses. With a penetration rate of 98 %, the TV set is at present the most widespread means of receiving electronic media content in older European's households, and this applies to all age cohorts. There has been a considerable debate during the recent years as to whether the TV and the internet may converge into one type of system, and some analysts believe that increasingly consumer devices will be linked together with a TV set-top box likely to become a multimedia hub. Some authors have argued that internet access via the ordinary TV set may be of particular interest for people that cannot afford or do not want to buy a home PC.

Some 55 million older Europeans (45 % of the EU 50+ population) use teletext and can, thus, be regarded as being familiar with retrieving structured information by means of electronic media - at least in a rudimentary form. However, penetration of cable TV and digital TV which - at least in principle - are capable of carrying interactive services varies considerably across the European Union. In the Benelux countries over 80 percent of the 50+ population possess cable TV; in Germany, Ireland, Sweden and Austria about 50 percent. Denmark and Finland follow with 43 percent and 29 percent respectively. In the United Kingdom, Spain, France, Italy and Portugal cable penetration is below 20 percent, and with 2.7 percent Greece ranks at the very bottom.

Readiness, Use and Acceptance of Technology[31]

The health and social care sectors are relatively slow to use ICT tools. ICT use in the health sector lags behind the other sectors in general, making it one of the least connected sectors, with great disparities across countries.

Table 34: Wish for more domain-specific devices

Household		Health Care		ICT	
Non-Impaired	Impaired	Non-Impaired	Impaired	Non-Impaired	Impaired
Dishwasher (57); 19%	Tumble-dryer (69); 21%	Blood pressure/ Pulse meter (49); 16%	Blood pressure/ Pulse meter (66); 30%	Cordless phone (107); 32%	Cordless phone (86); 28%
Tumble-dryer (53); 15%	Dishwasher (64); 21%	Hometrainer (47); 11%	Massage device (48); 14%	Cellular phone (64); 14%	Answering machine (37); 10%
Microwave (29); 12%	Microwave (32); 14%	Massage device (38); 9%	Lifting gear (43); 11%	Answering machine (44); 11%	Cellular phone (36); 9%

Source: Presentation by Heidrun Mollenkopf, (Database Sentha Survey 1999).

The German Centre for Research on Ageing (2005)[32] is one of the very few organizations working on how technology-based options would simplify life at home for older people. In a survey on older

[31] User Needs in ICT Research for Independent Living, with a Focus on Health Aspects, from the European Commission.

[32] Presentation by H. Mollenkopf "Future Societal Trends and Older Technology Users' Needs, EC Workshop,

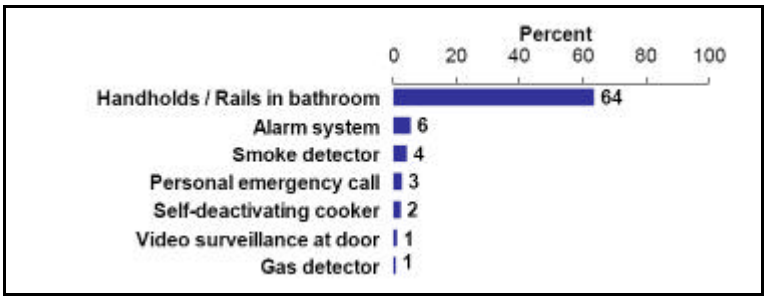
people's attitudes to technologies, the respondents expressed strong preferences for a variety of devices, as table 34 and 35 show.

Table 35: Wish for more domain-specific devices (2)

Security Devices		Comfort Devices	
Non-Impaired	Impaired	Non-Impaired	Impaired
Secure door (225); 44%	Secure door (208); 51%	Noise-adjusting doorbell (213); 39%	Noise-adjusting doorbell (189); 43%
Self-deactivating cooker (213); 40%	Self-deactivating cooker (203); 46%	Automated light in entrance area (183); 49%	Motion detector in hallway (174); 44%
Smoke detector (144); 28%	Personal emergency call (149); 34%	Motion detector in hallway (181); 39%	Automated light in entrance area (164); 53%

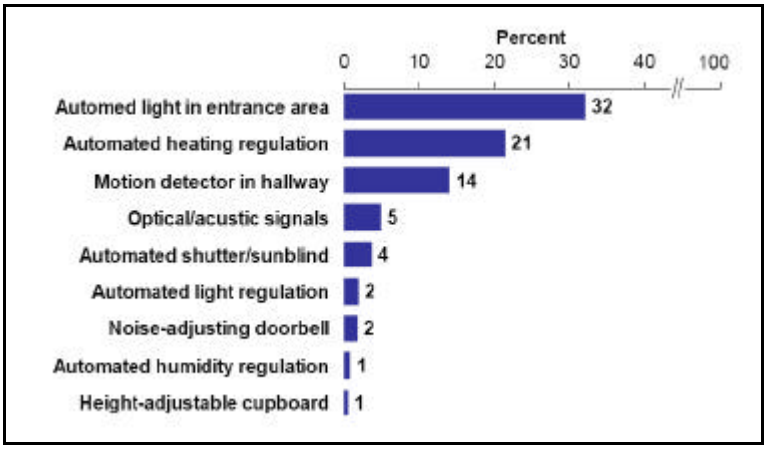
Source: Presentation by Heidrun Mollenkopf, (Database Sentha Survey 1999).

Actual equipment with many of these devices, however, was reported to be very low as the next figure shows:



Source: Presentation by Heidrun Mollenkopf, (Database Sentha Survey 1999).

Figure 22: Equipment with security devices



Source: Presentation by Heidrun Mollenkopf, (Database Sentha Survey 1999).

Figure 23: Equipment with comfort devices - Items

The same organization also studied which activities were perceived to be the most difficult. The results can be clustered under the headings “household”, “body care” and “leisure time”.

The most difficult household activities were “hanging up the curtains” (55% of the older people interviewed mentioned this), “fixing household devices” (51%), “cleaning the windows” (45%), “ironing” (34%) and “making the bed” (34%). For body care tasks, the most mentioned ones were podiatry (29%), gymnastics, including sports and fitness (28%), see table 36

According to the German SENTHA study, 67% of older people in Germany view ICT devices as a major support to their independence. Barely 15% of the respondents expressed fears of ICT. Almost half stated that they always liked to use ICT, while 45% preferred to use it as little as possible. About one third thought that it was no longer worth while buying new ICT.

Many older people use some sort of new ICTs, but their numbers are lower than in the younger age group. In 1998, mobile phones were owned by 37% in the 35-44 age group and by 10% of respondents in the 75+ age group; 74% and 5% of these groups respectively owned PCs. Age has a major impact on PC adoption. Over 50% of older people experience problems in using PCs, and mobile phones. In several studies, age was the most important predictor of usage, followed by education and gender. Older people complain about having difficulties with user interfaces. Dutch research in 2002 showed that half the older people did not use modern technology that could make life easier.

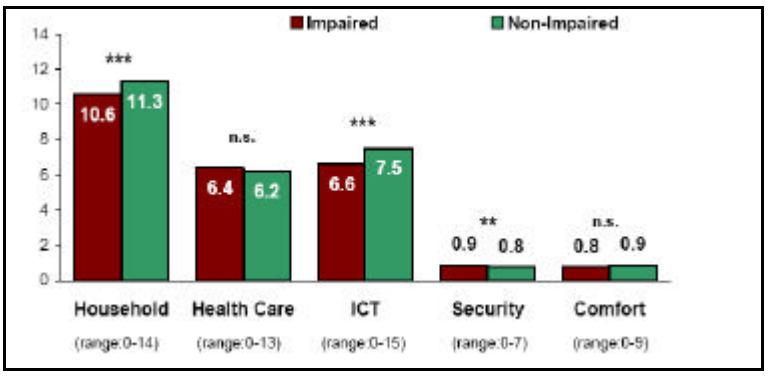
The factors affecting acceptance and rejection of technical aids (true for technological devices in general) are described as:

- fear of the new
- lack of motivation for use; often demand is lacking for this specific function or people are unwilling to try them out
- ease or complexity of use
- advice, training, and encouragement or the lack thereof

According to the European study "MOBILATE-Enhancing mobility in later life"[33], access by older people to modern technologies appears strongly dependent on income, education, experience, and attitudes

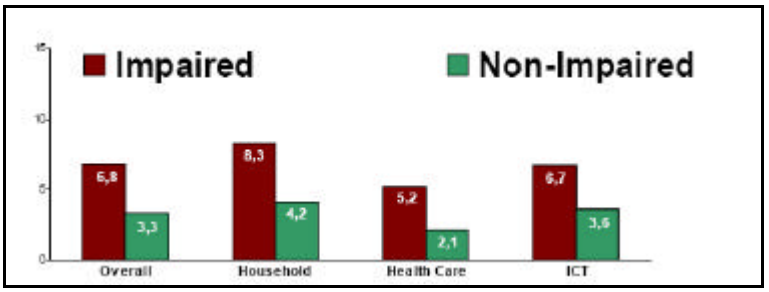
People could use ICT to compensate for physical deficiencies. It is noted that mobility restricted people are significant users of tele-shopping, mainly over the telephone. However, people in poor health use mobile phones and Internet even less than people in good health. In general, the use of technology is lower and the perceived problems with technology are higher for old people with impairments compared to old people without impairments, as next figures indicate:

[33] Tacken, Marcellini, Mollenkopf, Ruoppila, Széman (2005) "Use and acceptance of new technology by older people. Findings of the international MOBILATE survey: Enhancing mobility in later life", in Gerontechnology, March 2005.



Source: Presentation by Heidrun Mollenkopf, (Database Sentha Survey 1999).

Figure 24: Equipment with domain-specific devices



Source: Presentation by Heidrun Mollenkopf, (Database Sentha Survey 1999).

Figure 25: Bad experiences with domain-specific devices

Innovative options that go beyond increasing the human resources or technologies available need to be considered, as the composition and characteristics of the ageing population change. Today's older people are generally better educated than in the past and have a strong desire to remain independent. Keeping older people integrated within their community as far as possible, so as to preserve their personal autonomy and quality of life, while ensuring their personal security and protection, becomes the obvious main goal. Inevitably, there will be a certain gap between the pace of technological innovation and the acquisition of technology skills by the ageing population, leading to a persistent risk of their exclusion. Therefore it is important to attempt to predict future user groups' (today's net generation) needs. Related innovation processes should try to anticipate these future needs. Today's "computer generation" has a friendly attitude to technology and is likely to demand increased technology supported services in their old age. This means that those who are in their forties today will ask for these services in two decades from now. This coming generation of older people will be more acquainted to changes in their professional lives (fragile careers, life-long learning) and social relationships than former generations. What's more, the increasingly intercultural mix of older citizens is another factor that needs to be considered in the design of technologies for future older age groups. Ongoing socio-economic and socio-cultural dynamics lead us to expect that the next generation of ILS users will have somewhat different expectations and attitudes towards technology.

First, these future user groups will have more widespread experience with extended periods of living alone. This translates into increased independence and expectations of freedom of action, but at the same time leads to an increased need of social, practical and technical support in case of frailty and chronic illness. Second, the improved standards of living that these user groups enjoy generate high expectations with regard to comforts of housing and technological amenities, specifically in terms of convenience, support and security. Third, future user group will enter old age with increased experience with new technologies and can therefore be expected to be more open to technological advances. To sum up, future older user groups of ILS can be expected to be more technology savvy

but also more demanding in terms of the autonomy they seek, and the convenience they expect from technological solutions.

It is widely agreed that technical aids could offer a multitude of benefits with regards to the preservation of independence, mobility, and social participation. However the design of these technical aids leaves much to be desired. The developers and suppliers of technology need to take the interests, needs, and possibilities of older people into greater account.

Next table for instance, shows the percentage of reported problems of German older people in performing everyday activities. According to the "Sentha" project results, hanging up curtains is the biggest problem for older people at home. The majority of the applications that would help with these activities require technologies which are already available on the market and are currently being introduced into many "smart" homes.

Furthermore, it is important to keep in mind that innovation for ILS need not start from scratch. A large number of readily available off-the-shelf devices can be harnessed, as well as existing ICT infrastructures, such as TV or telephone. Designing innovative solutions that can be integrated with and built onto this installed infrastructure base and available devices is thus a key task for R&D in ILS.

Table 36: Reported problems in performing everyday activities

Household	Health Care	ICT
Hanging up the curtains 55%	Podiatry 29%	Surfing the Internet 60%
Fixing household devices 51%	Gymnastics / Sports / Fitness 28%	Using the computer 58%
Cleaning the windows 45%	Sauna / Solarium 22%	Learning languages/Special interests 39%
Ironing 34%	Physiotherapy / Massages 21%	Taking courses /Attending roadshows 38%
Making the bed 34%		

Source: Database: Sentha survey 1999; N=1, 417; weighted data

Source: Database Sentha Survey 1999

The responses collected in the Sentha survey also affirmed that simple design with regard to ICT devices is a persistent concern, especially for older people with impairments as the next figures show.

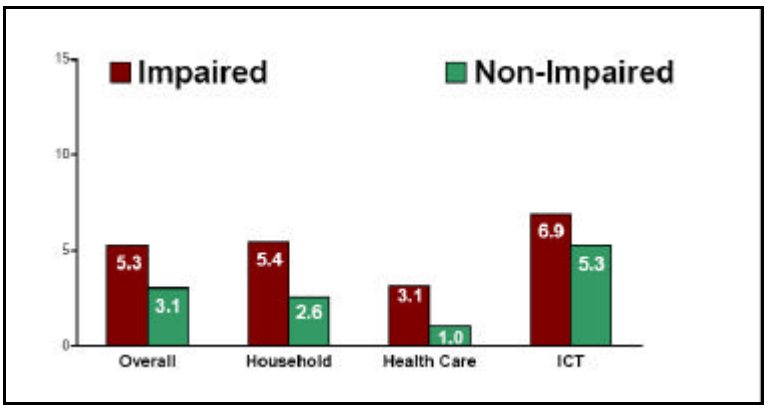


Figure 26: Wish for simplification of devices
Source: Presentation by Heidrun Mollenkopf, (Database Sentha Survey 1999).

Table 37: Problematic devices

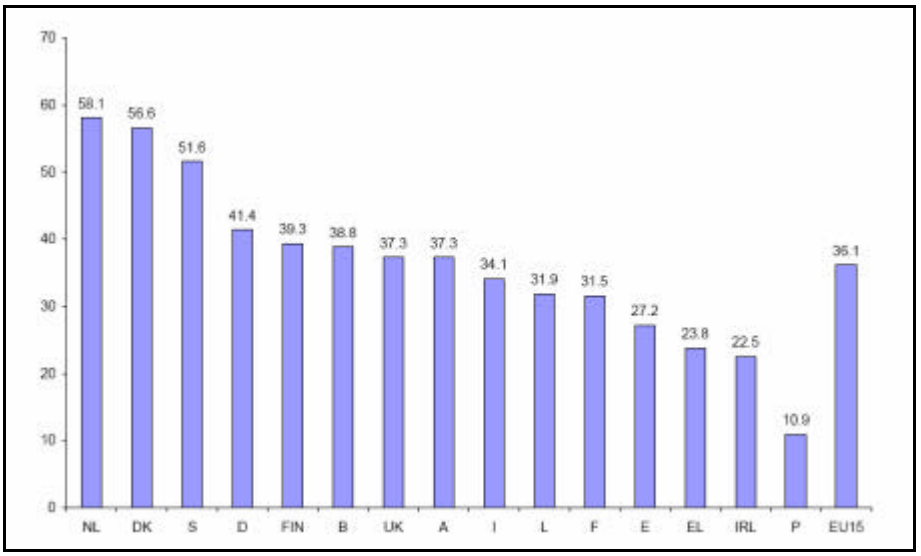
Device	Equipment	Bad experiences	Fears	Need for simplification of use
Video recorder	52	23,1	16,4	33,2
Computer	11	18,0	19,3	24,8
Modem, Internet access	5	17,5	12,7	17,5
Video camera, Camcorder	13	16,3	12,5	19,0
Mobile phone	8	13,7	7,7	18,8
Answering machine	20	11,9	5,4	8,7
Fax machine	7	11,8	7,5	11,8
TV set	99	11,2	5,7	8,9
Cordless phone	30	10,3	4,9	6,8
Teletext	63	8,1	5,5	10,3
Stereo system	60	7,8	5,6	9,5
CD player	47	6,5	3,5	5,9
Cable connection	92	6,1	3,5	4,1

The percentages refer to the respondents who are equipped with the respective devices.
All further devices asked for (telephone with cord, radio) were mentioned by less than 5% in all aspects.

Source: Database Sentha Survey 1999.

When it comes to computer usage among older Europeans, a considerable proportion of the European 50+ population have already gained hands-on experience with a PC. According to SeniorWatch data 40% of the European 50+ population, i.e. some 49 million people, have ever used a computer in their life (including 20% of those who are in their 70ies and 10% of the 80+).

Home access to a personal computer among European senior citizens is quite unevenly distributed across the European Union. In the Netherlands, Denmark and Sweden over 50 percent of the 50+ population currently have access to a computer at home. Germany, Finland, Belgium, the United Kingdom and Austria are above the EU average as well whereas access rates for Italy, Luxembourg, France, Spain, Greece and Ireland are below average. In Portugal only one out of nine senior citizens has access to a computer at home. PC penetration of 50+ households tends to be slightly lower than across the overall population in most Member States. Nevertheless, in some EU-countries PC penetration rates in 50+ households appear to be even higher than in an average household.

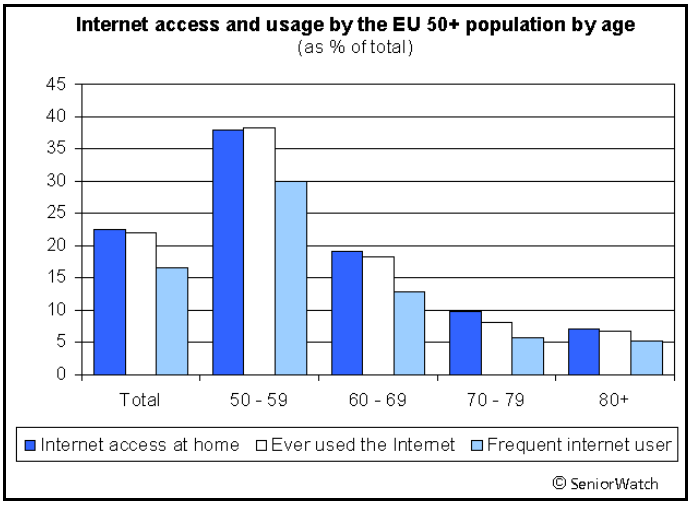


Source: SeniorWatch

Figure 27: Computer access at home among the EU 50+ population (%)

Internet usage and access by elderly[34]

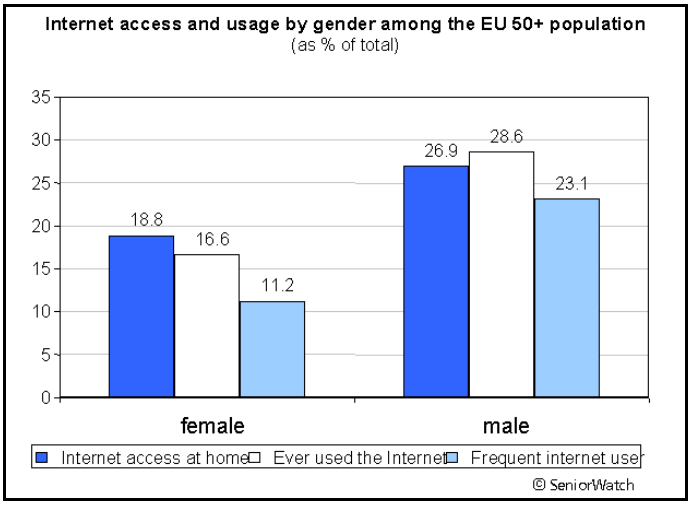
The Internet has only begun to enter the European senior market. Overall, 16.5% of the EU 50+ Population do regularly use the Internet and 22% have access at home. However, usage is strongly concentrated within the 50-59 age cohort. Here 38% have home access, and 30% are regular users. In contrast, only 95 of those who are 70 years and above have home access to the Internet, and only 5% are regular users.



Source: SeniorWatch

Figure 28: Internet access and usage by the EU 50+ population by age

As it can be seen in the figure bellow, the gender gap is still considerable: Men are about twice as likely to be internet users as women. Overall, 23% of male elderly are frequent internet users while only 11% of the male elderly are. Access (in households) is not as distinctive as actual usage. Internet experience - among other things – reflects the gender specific educational attainment and labour participation rates. The gender effect strongly decreases when controlling for age, income and educational attainment.

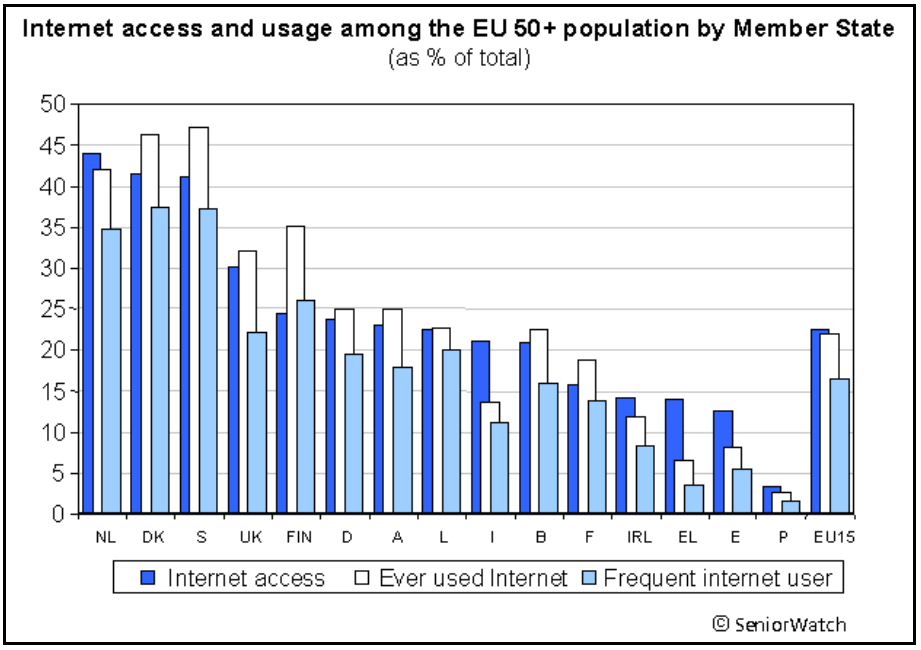


Source: SeniorWatch

Figure 29: Internet access and usage by gender among the EU 50+ population (as % of total)

[34] SeniorWatch (http://www.seniorwatch.de)

Figure 30 shows that shares of internet users in the older population vary considerably across Europe. Internet access benchmark is the Netherlands (44%), while Sweden (37%) and Denmark (37.5%) set the usage benchmark. Southern Europe and Ireland are challenged to catch up.



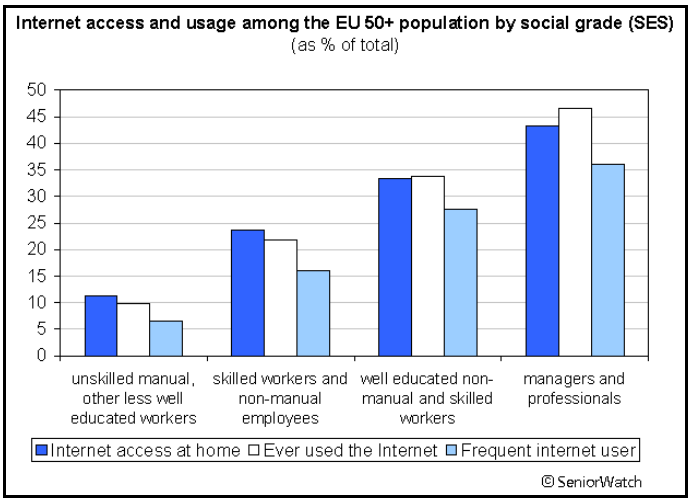
Source: SeniorWatch (http://www.seniorwatch.de)

Figure 30: Internet access and usage among the EU 50+ population by Member State (as % of total)

Some 27 million Europeans who are 50 years and older (22 percent of the EU 50+ population or 60 percent of the computer owners) have currently access to the internet from home. It becomes however evident that penetration among the younger age cohorts tends to be higher than among the older. As regards actual usage of the internet, some 26 million older Europeans have already gained hands-on experiences, and some 20 millions can be regarded as regular users, i.e. using it at least once a month. [35]

[35] SeniorWatch (http://www.seniorwatch.de)

4.2.4 Affordability of ICT infrastructures and devices

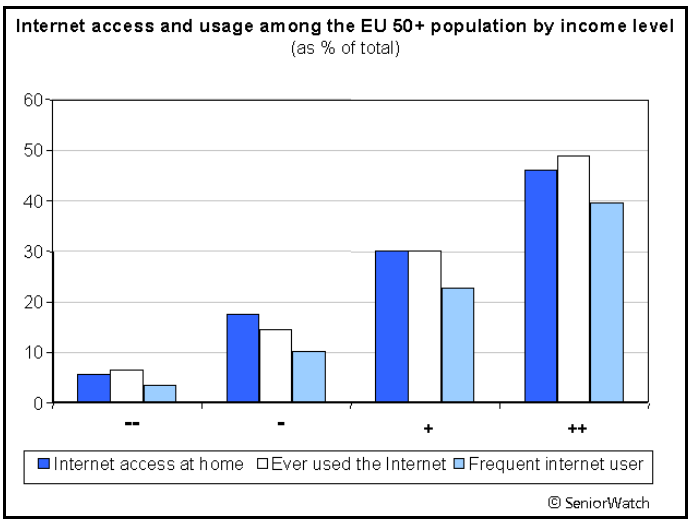


Source: SeniorWatch (http://www.seniorwatch.de)

Figure 31: Internet access and usage among the EU 50+ population by social grade (SES) (as % of total)

Figure 31 shows that access and usage follows societal stratification patterns: Upper middle class senior citizens hardly differ from the population average of all ages whereas the internet has hardly reached less well educated households. 36% of members of manager and professional's households are regular internet users but only 6.5% in less skilled worker's households. Socio-economic status (SES) is a compound indicator, ascribed to a household and derived from the main income earner's educational attainment and professional status.

Income is also a major factor determining internet usage. Uptake in the highest income class is approaching half the population (46% access, 40% regular users) whereas low income persons (6% and 4% respectively) run the risk of exclusion from the Information Society. Here, income is measured country-specific, i.e., relative to the respective national income distribution and not to a European distribution. It is closely related to SES (socio-economic status) but remains an independent predictor when controlling for age, SES and education.



Source: SeniorWatch (http://www.seniorwatch.de)

Figure 32: Internet access and usage among the EU 50+ population by income level (as % of total)

FINANCIAL SUPPORT

The availability of financial support for impaired people (older and/or disabled) who wish to obtain ICT equipment for use in their homes differs between countries. The type of equipment included in Senior Watch Survey[36] is: PC, fax, modem, internet browser, voice synthesiser, TV text decoder, TV audio decoder, text telephone, pager and videophone.

In some countries, funding may be provided by the state or it may come from user organisations, voluntary organisations or other sources. The form this funding takes can also differ; for example, there may be provision to provide equipment free or a contribution towards equipment costs may be required. The financial supports available or not available in each country will be reported based on the information contained within the document mentioned below. Three main clusters of countries were identified as follows.

Table 38: The main clusters of countries with financial support for ICT equipment

Direct and indirect financial support for ICT equipment available	Some funding available on case-by-case assessment/or individual application	No support for ICT equipment
Belgium, Denmark, Ireland, Italy, Netherlands, Portugal, UK (Norway)	Austria, Finland, France, Germany, Spain	Luxembourg

(No information available for Greece, Sweden)

Source: SeniorWatch

The first cluster includes those countries that identified established direct and indirect funding mechanisms for ICT equipment. The second cluster includes those countries that did not identify a direct funding mechanism for this type of technology, but rather that funding is based upon an individual case-by-case assessment or by application through the existing general AT (*Assistive Technologies*) funding mechanism. The third cluster includes those countries that offer no funding for ICT equipment for use at home.

Direct and indirect financial support for ICT equipment was identified as available in six countries – Belgium, Denmark, Ireland, the Netherlands, Portugal and the UK. In Denmark, no distinction is made between AT and ICTs and both types of technologies are provided free-of-charge from local municipalities. Braille printer, modems and text-phones are almost always considered necessary. In Belgium, good financial support is available for ICT equipment but only to those aged less than 65 years. People over 65 are provided only with basic AT (such as wheelchairs), which is generally financed by the municipality in which the person resides. In Ireland, funding for ICT equipment is available through the VAT Repayments Scheme, where disabled persons are able to claim a refund of VAT on the purchase or importation of aids such as ICT equipment. In addition, under the Technical Aids Adaptation Grants, financial support for the purchase for PCs, printers, scanners, synthetic speech technology for use in the home is available. Also, ad hoc expenditure on ICT equipment sometimes becomes available when extra budget provision is available at end of a year, e.g., the National Association for Deaf People have used such funding to buy fax machines, text telephones, etc.
In the Netherlands, direct financial support for ICT equipment is available from public health insurance where it can be shown that the device is essential, e.g. for communication. In Portugal, direct funding is available from the 'Aladim' programme, which provides a 50% discount on ISDN

[36] **Older People and Information Society Technology** (*A Comparative Analysis of the Current Situation in the European Union and of Future trends, Senior Watch Survey).*

equipment and communication costs to people with disabilities. Indirect funding is sometimes available to individuals from their local charities, such as Lions Club and Rotary Club.

The availability of financial support in the UK presents an extremely complicated picture. Support is often partial and an applicant may have to access several funding sources or use personal funds. Financial support may be direct (ear-marked specifically for equipment) or indirect (general financial support for the applicant). A range of state and voluntary sector agencies are involved in indirect funding, including the Department of Work and Pensions (formerly Social Security), the Department of Employment, local authorities, Local NHS agencies, local charities, e.g. Rotary Club, occupational benevolent funds, and recycling and loan schemes. Direct funding is available from several national trust and charities and some specialise in funding equipment and technology, e.g.

5 ICT Legal aspects.

5.1 ICT legislation, Privacy and data protection.

5.1.1 European secondary legislation glossary

In order to make an easier understanding of the current point, we will firstly clarify some legal aspects.

Legislative acts of the European Union are directives, decisions, recommendations, regulations and opinions (Article 249 EC Treaty).

A directive is a legislative act of the E.U which **requires member states to achieve a particular result without dictating the means of achieving that result.** It can be distinguished from European Union regulations which are self-executing and do not require any implementing measures. Directives normally leave member states with a certain amount of leeway as to the exact rules to be adopted. Directives can be adopted by means of a variety of legislative procedures depending on subject matter of the directive.

Directives are only binding on the member states to whom they are addressed, which can be just one member state or a group of them. In practice however, directives are addressed to all member states.

A decision is a law which is not of general application, but **only applies to its particular addressee of the decision** (be it Member States, companies or individuals). The legislative procedure for adoption of a decision varies depending on its subject matter.

The Codecision procedure requires agreement of and allows amendments by both the European Parliament and the Council of the European Union.

The Assent procedure requires agreement of both Parliament and Council, but the Parliament can only agree or disagree to the text as a whole - it cannot propose amendments.

The Consultation procedure requires agreement of the Council alone, the Parliament merely being consulted on the text. In some areas, such as competition policy, the Commission may itself issue decisions.

Recommendations are without legal force but are negotiated and voted on according to the appropriate procedure. Recommendations differ from regulations, directives and decisions, in that they **are not binding for Member States**. Though without legal force, they do have a political weight. The Recommendation is an instrument of indirect action aiming at preparation of legislation in Member States, differing from the Directive only by the absence of obligatory power.

Regulation has a general scope, and **is obligatory in all its elements and directly applicable in all Member States** of the European Union. Any local laws contrary to the regulation are overruled, as EU Law has supremacy over the laws of the Member States. New legislation enacted by Member states must be consistent with the requirements of EU regulations. For these reasons regulations constitute the most powerful or influential of the EU legislative acts.

Opinion is non-legislative instrument of the European Commission. It may be addressed to other Community institutions, Member States or individual legal entities. It can **express the Commission's legal or political view** of Community projects or national projects.

5.1.2 Regulatory framework for electronic communications

The opening-up of the telecommunications market to competition has acted as a catalyst on a medium previously reserved for oligopolies. To keep up with these changes, Europe's decision-making bodies have adopted legislation in tune with technological progress and the requirements of the market. These developments have given rise to the adoption of a new regulatory framework on electronic communications, mainly with a view to strengthening competition by easing the arrival of new entrants and stimulating investment in the sector.

"Framework Directive"

- Directive 2002/21/EC **of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communications networks and services.**

The objective of this Directive is to establish a harmonised framework for the regulation of electronic communications networks and services. It lays the foundation in the form of horizontal provisions serving the other measures: the scope and general principles, basic definitions, general provisions on the national regulatory authorities, the new concept of significant market power, and rules for granting certain indispensable resources.

This includes, for example, fixed and mobile telecommunications networks, cable or satellite television networks and electricity networks, where they are used for electronic communications services. On the other hand, the content of services delivered over electronic communications networks, such as broadcasting content or financial services, are excluded, as is telecommunications terminal equipment.

"Authorisation Directive"

- Directive 2002/20/EC **of the European Parliament and of the Council of 7 March 2002 on the authorisation of electronic communications networks and services.**

To harmonise and simplify the rules and conditions for authorising electronic communications networks and services in order to facilitate their provision throughout the Community.

The provisions of this Directive cover authorisations for all electronic communications networks and services, whether they are provided to the public or not. However, they only apply to the granting of rights to use radio frequencies where such use involves the provision of an electronic communications network or service, normally for remuneration.

The aim is to establish a harmonised market for electronic communications networks and services by limiting regulation to the minimum that is strictly necessary.

"Access Directive"

- Directive 2002/19/EC **of the European Parliament and of the Council of 7 March 2002 on access to, and interconnection of, electronic communications networks and associated facilities.**

To harmonise the way in which Member States regulate access to, and interconnection of, electronic communications networks and associated facilities. To establish a regulatory framework for the relationships between suppliers of networks and services that will result in sustainable competition and interoperability of electronic communications services.

The objective is to establish a framework which will encourage competition by stimulating the development of communications services and networks, and also to ensure that any bottlenecks in the market do not constrain the emergence of innovative services that could benefit the users. The approach adopted is technologically neutral, i.e. the Directive is not intended to introduce rules which could be adapted to technological progress but, instead, to establish a modus operandi to address market problems.

The Directive applies to all forms of communication networks carrying publicly available communications services. These include fixed and mobile telecommunications networks, networks used for terrestrial broadcasting, cable TV networks, and satellite and Internet networks used for voice, fax, data and image transmission.

"Universal Service Directive"

- Directive 2002/22/EC **of the European Parliament and of the Council of 7 March 2002 on universal service and users' rights relating to electronic communications networks and services.**

The European Union intends to ensure the availability of a minimum set of high-quality services that are available to all users at an affordable price, without distortion of competition. It therefore lays down obligations with regard to the provision of certain mandatory services, such as the retail provision of leased lines. It also establishes end-users' rights and the corresponding obligations of undertakings that provide publicly available electronic communications networks and services.

5.1.3 European laws about privacy and medical data protection for electronic communications.

Medical Data Protection

- European Parliament and Council Directive 2001/20/EC of 4 April 2001 on the approximation of the laws, regulations and administrative provisions of the Member States relating to the implementation of good clinical practice in the conduct of clinical trials on medicinal products for human use.

This directive establishes specific provisions regarding the conduct of clinical trials on human subjects. In particular Article 3, Protection of clinical trials subjects, and Article 5, Clinical trials on incapacitated adults not able to give informed legal consent forms specific instructions for how our trials should be planned and conducted.

Protection of Personal Data

Directives 95/46/EC and 97/66/EC, as well as the national data protection laws implementing them, apply to medical personal data.

Nevertheless, such legislation is of a general nature and does not, in principle, contain medical sector specific provisions (with the exception of art. 8.1; processing of data concerning health).

The application of the national regulations concerning processing of personal data varies in the Member States, within the general limits established by Directives mentioned above.

"Personal Data Directive"

- European Parliament and Council Directive 95/46/EC **of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data.**

Directive 95/46/EC is the reference text, at European level, on the protection of personal data. It sets up a regulatory framework which seeks to strike a balance between a high level of protection for the privacy of individuals and the free movement of personal data within the European Union (EU). To do so, the Directive sets strict limits on the collection and use of personal data and demands that each Member State set up an independent national body responsible for the protection of these data.

This Directive applies to data processed by automated means (e.g. a computer database of customers) and data contained in or intended to be part of non automated filing systems (traditional paper files)

- European Parliament and Council Directive 97/66/EC **of 15 December concerning the processing of personal data and the protection of privacy in the telecommunications sector.**

Extension of the scope of application of certain provisions of Directive 95/46/EC (article 14).

Protection of Databases

"Databases Directive"

- Directive 96/9/EC **of the European Parliament and the Council of 11 March 1996 on the legal protection of databases.**

This directive aims to provide harmonised copyright protection to databases. It introduces a new specific *sui generis* right for the creators of databases, whether or not these have an intrinsically innovative nature.

The objective of the Directive is to provide:

- Copyright protection for the intellectual creation involved in the selection and arrangement of materials;

- Sui generis protection for an investment (financial and in terms of human resources, effort and energy) in the obtaining, verification or presentation of the contents of a database.

Privacy and Electronic Communications Directive

"Directive on privacy and electronic communications"

- Directive 2002/58/EC **of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector.**

This directive was adopted in 2002 at the same time as a new legislative framework designed to regulate the electronic communications sector. It contains provisions on a number of more or less sensitive topics, such as the Member States keeping connection data for the purposes of police surveillance (the retention of data), the sending of unsolicited e-mail, the use of cookies and the inclusion of personal data in public directories. Specific requirements to ensure that users can trust the services and technologies they use for communicating electronically.

- Changes made by Directive 2006/24/EC

In March 2006 the European Parliament and the Council adopted a Directive on the retention of data generated or processed in connection with the provision of publicly available electronic communications services or of public communications networks services and amending Directive 2002/58/EC.

The Directive seeks to harmonise the provisions of the Member States concerning obligations incumbent on the providers of electronic communications services with respect to data retention. The aim is to ensure the availability of these data for the purpose of investigating, detecting and prosecuting infringements.

In particular, the Directive defines the following:

- Categories of data to be retained

- Shelf-life

- Storage requirements for retained data

- Principles to be observed in the area of data security

Standard Contractual Clauses for the Transfer of Personal Data to Third Countries

- Commission Decision 2004/915/EC **of 27 December 2004 amending Decision** 2001/497/EC **as regards the introduction of an alternative set of standard contractual clauses for the transfer of personal data to third countries.**

The European Commission has approved new standard contractual clauses which businesses can use to ensure adequate safeguards when personal data are transferred from the EU to third countries. These

new clauses will be added to those which already exist under the Commission Decision of June 2001 (see below).

-Commission Decision 2004/535/EC **of 14 May 2004 on the adequate protection of personal data contained in the Passenger Name Record of air passengers transferred to the United States Bureau of Customs and Border Protection.**

In this Decision, the European Commission considers that the data on EU air passengers transferred to the US authorities enjoys the "adequate protection" required under the Directive 95/24/EC for data sent to countries outside the EU.

A law requiring all airlines operating flights to, from or through the US to provide electronic access to their Passenger Name Records (PNR) was adopted by the US Congress in the aftermath of the events of 11 September 2001. The European Commission then entered into intensive negotiations with the US authorities with a view to ensuring that the US fully respected passengers' rights as regards the protection of data and reinforcing legal certainty.

- Commission Decision 2001/497/EC **of 15 June 2001 on standard contractual clauses for the transfer of personal data to third countries under Directive** 95/46/EC**.**

This Decision sets out standard contractual clauses to ensure an adequate level of protection of personal data transferred from the EU to third countries. The Decision requires Member States to recognise that companies or bodies which use these standard clauses in contracts relating to the transfer of personal data to third countries ensure an "adequate level of protection" of the data.

5.1.4 European wireless laws.

Radio frequencies: digital European cordless telecommunications - DECT – UMTS

These two measures aim to create the necessary conditions for the coordinated introduction of digital European cordless telecommunications into the Community. The aim is to enhance the possibilities of cordless telecommunications.

- Council Directive 91/287/EEC **of 3 June 1991 on the frequency band to be designated for the coordinated introduction of digital European cordless telecommunications (DECT) into the Community.**

Member States are obliged to designate the 1880-1900 MHz frequency band for digital cordless communications by 1 January 1992 at the latest. Digital European cordless telecommunications * have priority and are protected in the designated band.

The Commission will report to the Council on the implementation of this Directive not later than the end of 1995.

- Council Recommendation 91/288/EEC of 3 June 1991 on the coordinated introduction of digital European cordless telecommunications (DECT) into the Community.

The Council recommends that telecommunications organisations continue to cooperate within the European Conference of Postal and Telecommunications Administrations (ECPT) and/or the European Telecommunications Standards Institute (ETSI) on the completion of the specifications, as well as the introduction and operation of DECT technology.

The Commission is required to prepare a long-term strategy for the development of the pan-European digital cellular, paging and cordless telecommunications systems. In doing so, it must take account of the general development towards a universal personal communications system, recent studies and the ETSI work programme.

Mobile and wire-less Communications

- Commission Communication of 11 June 2002 'Towards the full roll-out of third generation mobile communications

This Commission document gives an overview of the situation in the third generation (3G) mobile communications sector. It also identifies the main challenges that will need to be addressed in order for 3G services to fulfil their role in the implementation of a competitive and dynamic information society.

- Decision 128/1999/EC **of the European Parliament and of the Council of 14 December 1998 on the coordinated introduction of a third-generation mobile and wireless communications system (UMTS) in the Community.**

The aim of this Decision is to facilitate the rapid and coordinated introduction of compatible UMTS networks and services into the Community, on the basis of internal market principles and in accordance with commercial demand.

- Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions on the further development of mobile and wireless communications - Challenges and choices for the European Union.

- Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions - Strategy and policy orientations with regard to the further development of mobile and wireless communications (UMTS) - Outcome of the public consultation and proposals for creating a favourable environment.

Radio Spectrum / Radio Spectrum Policy Group

- Commission Decision 2005/513/EC **of 11 July 2005 on the harmonised use of radio spectrum in the 5 GHz frequency band for the implementation of wireless access systems including radio local area networks (WAS/RLANs).**

This measure will allow quicker and wider wireless access to the Internet. This decision makes a large part of the radio spectrum in the European Union available for radio local area networks (RLANs, more commonly known as Wi-Fi). These networks are used to provide mobile access to the Internet and to private networks.

This Decision increases the possibilities for access to radio local area networks in a single, open and competitive market for wireless access systems (Wi-Fi networks).

Access to this spectrum on the basis of harmonised rules will bring down the cost of equipment and alleviate the growing overloading of the spectrum already used to this end. This will facilitate the adoption of wireless systems in both the private and public sectors, both for company networks and for hotspot access points in public places, shopping centres, hotels, etc.

Availability of frequency bands:

Member States are obliged to make two specific frequency bands (5150-5350 MHz and 5470-5725 MHz) available for wireless access systems in all EU states.

Mitigation of interference:

The decision introduces power limits and mitigation techniques to prevent harmful interference between radio local area networks and other users of the radio spectrum (particularly military radar and satellite services).

Context:

This decision forms part of the i2010 initiative promoting growth and employment in the digital economy.

There are currently some 120 million Wi-Fi network users in the world (25 million in Western Europe). According to estimates, this number could reach more than 500 million over the next three years.

- Commission Decision 2002/622/EC **of 26 July 2002 establishing a Radio Spectrum Policy Group.**

This decision establishes an advisory group, called the Radio Spectrum Policy Group, which is responsible for assisting and advising the Commission on radio spectrum policy issues.

This Decision sets up an advisory group on radio spectrum policy. The aim is to provide the European Union with a platform on which the Member States, the Commission and the other interested parties can coordinate the use of the radio spectrum.

"Radio Spectrum Decision"

- Decision No 676/2002/EC **of the European Parliament and the Council of 7 March 2002 on a regulatory framework for radio spectrum policy in the European Community.**

This decision establishes a legal framework in the Community to harmonise and rationalise the use of radio spectrum in the EU.

Harmonisation of the 169.4-169.8125 MHZ Frequency Band

- Commission Decision 2005/928/EC **of 20 December 2005 on the harmonisation of the 169.4-169.8125 MHz frequency band in the Community.**

This Decision covers the harmonisation of the conditions for the availability and effective use of the 169.4-169.8125 MHz radio spectrum band in the Community.

Radio Local area Networks

- Commission Decision 2005/513/EC **of 11 July 2005 on the harmonised use of radio spectrum in the 5 GHz frequency band for the implementation of wireless access systems including radio local area networks (WAS/RLANs).**

This Decision will make a large portion of the radio spectrum available to radio local area networks (RLANs, more commonly known as "Wi-Fi" networks) in the EU. This will increase the speed of wireless access to the Internet and lead to it being more widely used.

5.1.5 European laws about ICT installations

Radio and telecommunications terminal equipment

-Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

This Directive establishes a regulatory framework for the placing on the market, free movement and putting into service in the EU of radio equipment and telecommunications terminal equipment. The aim of this Directive is to create an open and competitive single market for radio equipment and telecommunications terminal equipment. It also aims to ensure a high level of health and safety protection.

Essential requirements and harmonised European standards:

Member States must ensure that apparatus complies with the essential requirements and is properly installed, maintained and used for its intended purpose before it is placed on the market.

The following essential requirements are applicable to the apparatus:

- Protection of the health and safety of the user and any other person, including the security provisions laid down in Directive 73/23/EEC, relating to electrical equipment designed for use within certain voltage limits (but with no lower voltage limit);

- Electromagnetic compatibility as per Directive 89/336/EEC;

- Use of the spectrum allocated to terrestrial/space radio communication and to orbital resources in such a way as to avoid harmful interference.

- When an apparatus is in conformity with harmonised European standards , in accordance with the procedures established by Directive 98/34/EC, the Member States presume that the current Directive's requirements have been met.

Information and notification:

Member States shall ensure that the manufacturers or the persons responsible for placing the apparatus on the market provide information on its use in the documentation or packaging, together with the declaration of conformity with the essential requirements.

More specifically, for radio equipment, this information must be sufficient to identify on the packaging and in the instructions for use of the apparatus the Member States or the geographical area within a Member State where the equipment is intended to be used.

For telecommunications terminal equipment, such information must identify the interfaces of the public telecommunications networks to which the equipment is intended to be connected.

CE marking:

Apparatus which complies with all the essential requirements bears the CE conformity marking . Manufacturers identify their apparatus by stating its type, batch and/or serial numbers and by the name of the manufacturer or of the person responsible for placing the apparatus on the market.

If a notified body has been consulted by the manufacturer regarding the equipment's conformity with the Directive, its number accompanies the CE marking.

In its Decision 2000/299/EC of 6 April 2000, the Commission established a class of radio equipment and telecommunications terminal equipment that cannot be used everywhere in the EU (as in the case

of non-harmonised national frequency plans). This type of equipment must bear a corresponding warning mark along side the CE marking.

Placing on the market and free movement:

Member States must not prohibit, restrict or impede the placing on the market and putting into service on their territory of any apparatus if it complies with the essential requirements and other provisions of the Directive.

If a Member State decides that apparatus does not meet the requirements of this Directive, it may prohibit, interrupt or restrict the placing on the market and also the putting into service of that apparatus.

Putting into service and the safeguard clause:

Member States may restrict the putting into service of radio equipment only for reasons relating to the efficient and appropriate use of the radio spectrum, the need to avoid harmful interference, or public health issues.

If a Member State decides that an apparatus does not satisfy the requirements of the safeguard clause, it may take measures to withdraw it from service, to prohibit its being in service or to restrict its free movement.

Conformity assessment and notified bodies:

This Directive lays down the procedures from which the manufacturer may choose for assessing conformity with the essential requirements for different types of equipment. Member States notify the Commission of the bodies they have designated to carry out the conformity assessment procedures.

If the manufacturer so chooses, the procedures for assessing conformity with essential requirements in Directive 73/23/EEC and Directive 89/336/EEC may also be used for assessing conformity with the respective requirements of those directives.

Electronic Commerce laws

- Directive 2000/31/EC **of the European Parliament and of the Council of 8 June 2000 on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market ("Directive on electronic commerce").**

The purpose of the Directive on electronic commerce is to improve the legal security of such commerce in order to increase the confidence of Internet users. It sets up a stable legal framework by making information society services subject to the principles of the internal market (free circulation and freedom of establishment) and by introducing a limited number of harmonised measures.

5.2 National current situation concerning ICT laws, health data, and other legal aspects.

AUSTRIA[37]

Health Telematics Law (GTelG):

The Federal Ministry of Health worked out the health telematics law for securing the transmission of sensitive patient data. The law elaborates security measures already stipulated in the Data Protection law 2000. The government coordinated public administrations and the involvement of regional and local authorities in the development of the strategy. The social security sector participated and the private sector ensured the strategy implementation on the business level.

CROATIA[38]

Medical data protection:

The Croatian Government has formed an Agency for data protection, which amongst other things are looking into medical data protection issues as well. In general Croatia is adopting most of the legislation coming from the Council of Europe and European Commission. Patient is the owner of his/her medical record; administrative data about the patient needs to be held separate from his genomics data, and further more separated from his/her medical record. In primary care, only the assigned physician is allowed to access patient records, for the patients that have delegated that right in the written form.

The Croatian National Institute for Health Insurance is the main body taking the initiative of configuring and specifying the ICT legislation when it comes to healthcare ICT enabled services (http://www.cezih.hr). The digital signature act has been adopted by the Croatian parliament and is available as the official form for data integrity, validation and non-repudiation check. In addition, Croatia has adopted the National standardization act and Electronic Medial Personal Data Protection Act.

CYPRUS[39]

Data Protection:

The processing of personal data in Cyprus is governed by the Processing of Personal Data (Protection of the Person) Law of 2001 ("the Law") which entered in force on November 23, 2001. The Commissioner for the Protection of Personal Data was appointed on March 1, 2002 and she took up office in May 2002.

The Law has been amended in 2003 for the purpose of harmonising Cypriot legislation with Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of

[37] Health Policy Monitor
http://www.hpm.org/en/Surveys/IHS/06/Health_Telematics_Law_(GTelG).html?search=start+search&content_id=251&p_c:182=182&a=sh&search.x=58&p_i=0&language=en&search.y=7
[38] Uncertain source: data extracted from the questionnaire for the M-Power parnerts (Croatia)
[39] Ministry of Commerce Industry and Tourism
(http://www.mcit.gov.cy/mcit/mcit.nsf/dmlindex_en/dmlindex_en?OpenDocument)
CYSTAT (http://www.mof.gov.cy/mof/cystat/statistics.nsf/other_en/other_en?OpenDocument&sub=3&e=)

individuals with regard to the processing of personal data and on the free movement of such data. Secondary legislation in the form of Regulations has been enacted, namely, the Processing of Personal Data (Permits and Fees) Regulations of 2002, which were issued on November 8, 2002.

The Law also provides for the right of confidentiality and security of processing. Furthermore, it states the rights of data subjects such as the right of information, the right of access to personal data, which concern them personally, the right to temporary judicial protection and the right to damages. Furthermore, the Law provides for the appointment and the rights and obligations of the Commissioner for the Protection of Personal Data. It establishes his Office and sets out the competence, operation and decision-making powers of the Commissioner.

Data Protection and the Electronic Communications Law:

The Law Regulating Electronic Communications and Postal services of 2004 (the Electronic Communications Law) has been enacted for the purpose of harmonisation with certain European Directives, including Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications). It particularises and complements the provisions of the Law for the Processing of Personal Data and provides for the protection of the legitimate interests of subscribers of electronic communications networks and services who are legal persons.

The Law applies to the processing of personal data in connection with the provision of publicly available electronic communications services in communications networks in Cyprus.

Electronic Commerce:

The main legislation in Cyprus in the field of e-commerce is the Law on Certain Legal Aspects of Information Society Services, in Particular Electronic Commerce and Associated Matters of 2004, Law 156(I)/2004 (The Electronic Commerce Law). The Law has been enacted on 30 April 2004 for the purpose of implementing Directive 2000/31/EC of the European Parliament and of the Council of 8 June 2000 on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market (Directive on electronic commerce).

The Electronic Commerce Law aims at ensuring the free movement of information society services between the Republic and the Member States of the European Union, relating to the establishment of service providers, commercial communications, the conclusion of electronic contracts, the liability of intermediaries, codes of conduct, out-of-court dispute settlements, means of legal protection and the cooperation between Member States.

The Law applies to all information society services normally provided for remuneration, at a distance, by electronic means and at the individual request of a recipient of services, within the meaning of section 2 of the Law for the Procedure for the Provision of Information on Certain Technical Rules of 2003 to 2004.

NETHERLANDS[40]

For medical applications and data:

Any doctor, healthcare provider, dentists, physiotherapists, nurses etc. have a privacy protection duty. These people are not allowed to give any information about a patient to others. You can break this with permission of the patient, when you need to exchange information with others who are involved in the treatment. The patient needs to give permission before the information is given.

When the patient is younger than 16 the parents are responsible. In an emergency situation you can break the duty to keep information secret. So if there is any danger.

Electronic file have all the information about the patient. The information is restricted to those who are directly involved in the treatment of the patient, and the one that is replacing the doctor, nurse etc. We call this group 'a functional unity'. A secretary can have only insight in the information of the doctor she works for.

A patient has the right to see his medical files. With electronic files privacy is restricted by allowing only certain professionals to certain data.

People who collect information about a client/patient are held to certain rules. It is not allowed to spread this information to others without permission. It is not allowed to use these data specific when it is about race, religion, political preference, membership of trade union, health. These data can only be spread to other professionals with a direct link to treatment and not without the permission of the client/patient. We make no difference in age only the under age. Older than 16. Younger than 16: the parents of those who take care of this person are responsible and could give permission.

NORWAY[41]

The Patients' Rights Act: The objective of this Act is to contribute to ensuring the population equal access to health care of good quality by granting patients rights in their relations with the health service. The provisions of this Act shall contribute to the promotion of a relationship based on trust between the patient and the health service while having respect for the individual patient's life, integrity and human worth. This law gives the patient right to make information in his or her patient record unavailable to health personnel. The patients may even demand that documents should be erased from his or her patient record.

The Health Personnel Act: The objective of this Act is to contribute to safety for patients and quality in the health services and also trust between the patient and both health personnel and health services. The different paragraphs in this Act focuses on subjects like requirements on how the health personnel works, how the organization is structured, specific rules connected to authorization, professional secrecy, information requirement, duty to inform and duty of documentation.

Personal Data Act: The purpose of this Act is to protect natural persons from violation of their right to privacy through the processing of personal data. The Act shall help to ensure that personal data are processed in accordance with fundamental respect for the right to privacy, including the need to protect personal integrity and private life and ensure that personal data are of adequate quality.

Personal Health Data Filing System Act: The purpose of this Act is to contribute towards providing public health services and the public health administration with information and knowledge without violating the right to privacy, so as to ensure that medical assistance may be provided in an adequate,

[40] Uncertain source: data extracted from the questionnaire for the M-Power partners (The Netherlands).

[41] Information found in Dow of the M-Power project.

effective manner. Through research and statistics, the Act shall contribute towards information on and knowledge of the state of public health, causes of impaired health and illness trends for administration, quality assurance, planning and management purposes. The Act shall ensure that personal health data are processed in accordance with fundamental respect for the right to privacy, including the need to protect personal integrity and respect for private life and ensure that personal health data are of adequate quality.

The Regulation of Personal Information: This regulation concerns the treatment of personal information that fully or partially takes place using electronic aids when it is necessary to ensure confidentiality, accessibility and information integrity.

The Regulation of Patient Records: This regulation states further rules on:

- The health personnel's duty of documentation, including content in patient records, writing, correcting, deleting, keeping, transferring, accessing and destroying of record according to the Health Personnel Act.

- The enterprises responsibility according to establishing and organizing the record system, matching The Specialist Health Services Act § 3-2, Dental Health Services Act § 1-3a and Municipal Health Services Act § 1-3a.

- The right to look into ones record, matching The Act of Patient Rights § 5-1.

The regulation requires that there must be someone responsible of all data. Every record must be signed and dated. If using EPRs, an electronic signature is needed. The regulation also states that not everyone is to access the entire record. Just the ones in need of the information shall get the access necessary. For instance, doctors and nurses have different access rights to the patient records.

POLAND[42]

Personal Data Protection Act of 29 August 1997, amended 2004.

Protection of consumer rights Act and on the liability for damage caused by a dangerous product, act of 2 March 2000.

Medical Devices Act of 20 April 2004, amended 2005. Requirements of medical devices including telemedicine products have to comply with EU requirements specified in Medical. Devices Directive (93/42/EEC).

Providing Services by Electronic Means Act adopted on 18 July 2002

Medical Professions Act from July 8, 2000.

The Regulation of data collection of the Minister of Health from October 11, 2001 on range of data collected by health care providers, registration of data and their presentation to National Health Fund, and other bodies.

The Regulation of documentation and storing of Minister of Health and Social Affairs from September 15, 1997 on types of medical documentation and methods of its conducting and storing.

[42] Information found in Dow of the M-Power project

6 ICT Standardization

6.1 Information, communication, security and interoperability standards

This whole point has been extracted from the Deliverable 5 of the E-SUPPORT project within the 6FP, lead by CRIC.

6.1.1 Communications, Security and Cryptography and Data Compression

6.1.1.1 Communications

1. Wireless Technologies

1.1 Methodology

An evaluation of all wireless technologies both available and near future, was done and the following factors were studied:

- Speed
- Price
- Device Compatibility
- Coverage

The following wireless technologies were studied:

- Wi-Fi
- Wi-Max
- 3G
- GPRS
- Edge
- HSDPA

All of them available in Europe apart from Wi-Max which is still under trial but will be available in the near future.

1.2 Analysis

1.2.1 Speed

Table 39 and Figure 33 show the different speeds of the available and near future technologies.

Wireless Technologies	Speed (Typ) Mbps	Speed (Max) Mbps
Wi-Fi 802.11.b	6.5	11
Wi-Fi 802.11.g	25	54
Wi-Max 802.16		75
3G	0.144	0.384
Edge		0.236
GPRS	0.033	0.056

Table 39: Wireless technologies speed

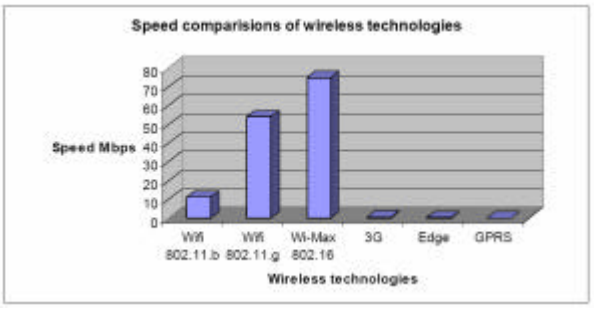


Figure 33: Speed comparisons of wireless technologies

1.2.2 Coverage

Here below table 40 shows coverage possibilities of the considered wireless technologies.

Wireless Technologies	Coverage
Wi-Fi 802.11.b	Builidings, Offices, Factories (*Production Areas*) [1]
Wi-Fi 802.11.g	Builidings, Offices, Factories (*Production Areas*) [1]
Wi-Max 802.16	Not available, will be available throughout the city
3G	Available with GSM coverage
Edge	Available with GSM coverage
GPRS	Available with GSM coverage

1 Only specific companies offer the facilities of wireless Wi-Fi network in the production area, normally this would be found in administration areas.

Table 40: Wireless technologies coverage

1.2.2.1 European 3G coverage

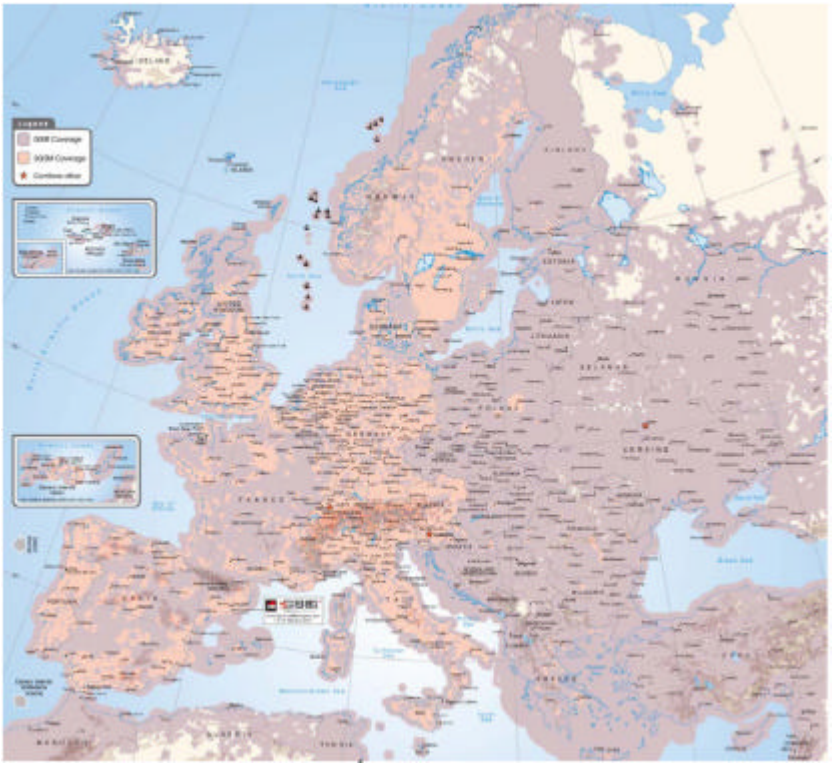


Figure 34: European 3G coverage43

[43] Image Courtesy of Comfone and Europa Technologies www.comfone.com www.coveragemaps.com

The figure above shows the coverage of the 3G and GSM networks across Europe

1.2.3 Price considerations

Table 41 goes through a brief price analysis for the different wireless technologies:

Wireless Technologies	Typical prices across Europe
Wi-Fi 802.11.b	Free supplied from office or factory [1]
Wi-Fi 802.11.g	Free supplied from office or factory [1]
Wi-Max 802.16	Not available, no prices announced yet
3G	250Mb Monthly at Euro 37.525
Edge	Normally the same as GPRS
GPRS	Euro 0.07/60kb > Euro 2 /MB

1 Connection to a hotspot, if available, can be made but this is not free. Normal rates are of Euro 5 / hour.

Table 41: Wireless Technologies Prices

1.2.4 Device compatibility

In the table below, compatibility between wireless technologies and devices is presented.

Wireless Technologies	Devices
Wi-Fi 802.11.b	Laptops, PDA's ,Smart phones 2
Wi-Fi 802.11.g	Laptops, PDA's ,Smart phones 2
Wi-Max 802.16	Not Available, possible integrated in Laptops, PDA's, Smart phones and Mobiles
3G	Primarily Mobiles and Smart phones, but future laptops will have built in
Edge	Smart phones and Mobiles 3
GPRS	Smart phones and Mobiles 3

2 Laptops, PDA’s and Smart phones without Wi-Fi connectivity can use external card to enable Wi-Fi communication.

3 Laptops can use external cards to enable Edge and GPRS.

Table 42: Wireless Technologies Device Compatibility

6.1.1.2 Security and Cryptography

1 Protocols

1.1 Methodology

A set of protocols commonly used were evaluated for versatility, speed, compatibility and usage. A software was developed upon which the protocols will be tested. Security will be given great importance as the data transferred will be company know-how and external excess will not be permitted.

1.2 Hypertext Transfer Protocol – HTTP/1.1

The Hypertext Transfer Protocol (HTTP) is an application-level protocol for distributed, collaborative, hypermedia information systems. It is a generic, stateless, protocol which can be used for many tasks beyond its use for hypertext, such as name servers and distributed object management systems, through extension of its request methods, error codes and headers. A feature of HTTP is the typing and negotiation of data representation, allowing system to be built independently of the data being transferred.

Http has been in use by the World-Wide Web global information initiative since 1990. This specification defines the protocol referred to as "HTTP/1.1, and is an update to RFC 2068.

All specification named in this Document refer to rfc2616 - HTTP.pdf. *The Internet Society (1999).*

The first version of HTTP, referred to as HTTP/0.9, was a simple protocol for raw data transfer across the Internet. HTTP/1.0, as defined by RFC1945, improved the protocol by allowing messages to be in the format of MIME-like messages, containing meta information about the data transfer and modifiers on the request/response semantics. However, HTTP/1.0 does not sufficiently take into consideration the effects of hierarchical proxies, caching, the need for persistent connections, or virtual hosts. In addition, the proliferation of incompletely-implemented applications calling themselves "HTTP/1.0" has necessitated a protocol version change in order for two communicating applications to determine each other's true capabilities.

This specification defines the protocol referred to as "HTTP/1.1". This protocol includes more stringent requirements than HTTP/1.0 in order to ensure reliable implementation of its features.

Practical information systems require more functionality than simple retrieval, including search, front-end update, and annotation. HTTP allows an open ended set of methods and headers that indicate the purpose of a request. It builds on the discipline of reference provided by the Uniform Resource Identifier, as a location or name, for indicating the resource to which a method is to be applied. Messages are passed in a format similar to that used by Internet mail as defined by the Multipurpose Internet Mail Extensions (MIME).

Http is also used as a generic protocol for communication between user agents and proxies/gateways to other Internet systems, including those supported by the SMTP, NNTP, FTP, Gopher and WAIS protocols. In this way, HTTP allows basic hypermedia access to resources available from diverse applications.

1.3 Security Issues on HTTP

Http is not a secure protocol. It operates on top of TCP/IP sockets. Information exchanged using HTTP is highly susceptible to eavesdroppers. A more secure alternative, HTTPS, runs atop Transport Layer Security (TLS), Secure Sockets Layer (SSL), or a similar protocol. TLS and SSL provide a

layer of authentication and encryption between sockets and higher-level protocols like HTTP, POP3, SMTP and NNTP.

In typical TLS interactions, the server sends a certificate to the client to authenticate itself. The client must have Certificate Authority (CA) root certificates on hand to verify the server's certificate. If the client can verify the certificate, the client will then send a secret value to the server, encrypted with the server's public key. The server and the client both derive a session key from this secret value which is used to encrypt all subsequent traffic sent between the client and server.

1.4 HTTP Protocol Network Model

Http runs atop of the TCP (Transport Layer) and this makes it insecure since the sockets are available to eavesdropping, hence a second layer between the Transport Layer and the application layer which makes a connection secure. The protocol used is the Secured Socket Layer (SSL). Using this layer between the Transport Layer and the Application Layer, HTTP evolves to HTTPS or S-HTTP (Secure Hyper Text Transfer Protocol).

1.5 S-HTTP Protocol Network Model

Figure 36 shows the difference between HTTP and S-HTTP. The introduction of the fourth layer Secure Sockets Layer makes the connection a secure connection.

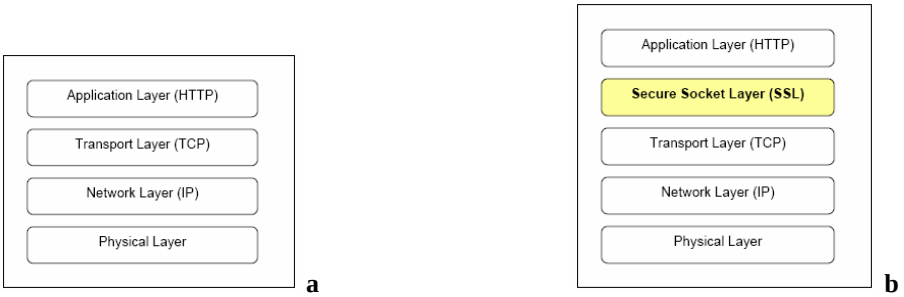


Figure 35: (a) HTTP Protocol Network Model. (b) S-HTTP Protocol Network Model

1.6 Secure Sockets Layer (SSL)

This Document makes reference to "SSLv3".

The Transport Layer Security (TLS) "RFC 2246" is an upgrade of SSL, backward compatible with SSLv3. This document makes use of SSL although all assumptions comply with the TLS "RFC2246" Protocol.

The SSL protocol was developed by Netscape in 1994.

The primary goal of the SSL Protocol is to provide privacy and reliability between two communicating applications. The protocols composed of two layers. At the lowest level, layered on top of some reliable transport protocol (e.g., TCP), is the SSL Record Protocol. The SSL Record Protocol is used for encapsulation of various higher level protocols. One such encapsulated protocol, the SSL Handshake Protocol, allows the server and client to authenticate each other and to negotiate an encryption algorithm and cryptographic keys before the application protocol transmits or receives its first byte of data. One advantage of SSL is that it is application protocol independent. A higher level protocol can layer on top of the SSL Protocol transparently. The SSL protocol provides connection security that has three basic properties:

- The connection is private. Encryption is used after an initial handshake to define a secret key. Symmetric cryptography is used for data encryption (e.g., DES, RC4, etc.)

• The peer's identity can be authenticated using asymmetric or public key, cryptography (e.g., RSA, DSS, etc.).
• The connection is reliable. Message transport includes message integrity check using a keyed MAC. Secure hash functions (e.g., SHA, MD5, etc.) are used for MAC computations.

The primary Key characteristics of the SSL are:

1. Cryptographic security
2. Interoperability
3. Extensibility
4. Relative Efficiency.

Encryption protects data from unauthorized use by converting it to an apparently meaningless form before transmission. The data is encrypted by one side (client or server), transmitted, decrypted by the other side, and then processed.

Source authentication is a method of verifying the data sender's identity. The first time a client attempts to communicate with a server over a secure connection, the server presents the client with a set of credentials in the form of a certificate.

Certificates are issued and validated by trusted authorities known as certification authorities (CAs). A certificate represents the public-key identity of a person. It is a signed document that says: I certify that the public key in this document belongs to the entity named in this document. Signed (certificate authority). Well-Known CAs include *Verisign, Entrust,* and *Thawte.*

All Certificates used in this document are SunX.509 compliant.

1.7 Negotiable Encryption

Among the features of SSL that have made it the de facto standard vehicle for secure e-commerce transactions is its support for negotiable encryption and authentication algorithms. The designers of SSL realized that not all parties will use the same client software and consequently not all clients will include any particular encryption algorithm. The same is true for servers. The client and server at the two ends of a connection negotiate the encryption and decryption algorithms (cipher suites) during their initial handshake. It may turn out they do not have sufficient algorithms in common, in which case the connection attempt will fail.

The SSL Handshake protocol is illustrated in Figure 37. It shows the sequences of messages exchanged during the SSL.

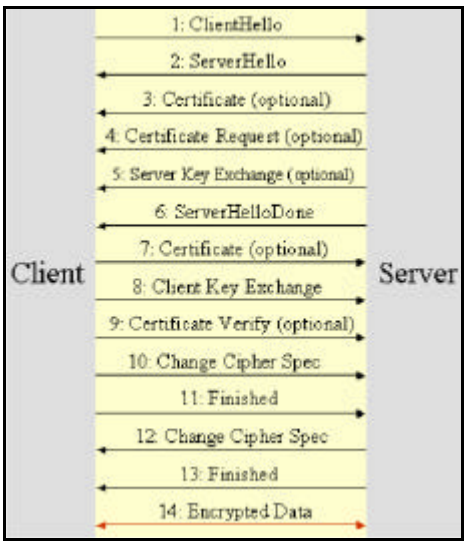


Figure 36: SSL Handshake

1.8 SSL Handshake

These messages mean:

1. *ClientHello*: The client sends the server information such as SSL protocol version, session id, and cipher suites information such cryptographic algorithms and key sizes supported.

2. *ServerHello*: The server chooses the best cipher suite that both the client and server support and sends this information to the client.

3. *Certificate*: The server sends the client its certificate which contains the server's public key. While this message is optional, it is used when server authentication is required. In other words, it is used to confirm the server's identity to the client.

4. *Certificate Request*: This message is sent only if the server requires the client to authenticate itself. Most e-commerce applications do not require the client to authenticate itself.

5. *Server Key Exchange*: This message is sent if the certificate, which contains the server's public key, is not sufficient for key exchange.

6. *ServerHelloDone*: This message informs the client that the server finished the initial negotiation process.

7. *Certificate*: This message is sent only if the server requested the client to authenticate itself.

8. *Client Key Exchange*: The client generates a secret key to be shared between the client and server. If the Rivest-Shamir-Adelman (RSA) encryption algorithm is used, the client encrypts the key using the server's public key and sends it to the server. The server uses its private or secret key to decrypt the message and retrieves the shared secret key. Now, client and server share a secret key that has been distributed securely.

9. *Certificate Verify*: If the server requested to authenticate the client, this message allows the server to complete the authentication process.

10. *Change Cipher Spec*: The client asks the server to change to encrypted mode.

11. *Finished*: The client tells the server it is ready for secure communication.

12. *Change Cipher Spec*: The server asks the client to change to encrypted mode.

13. *Finished*: The server tells the client it is ready for secure communication. This marks the end of the SSL handshake.

14. *Encrypted Data*: The client and server can now start exchanging encrypted messages over a secure communication channel

1.9 Secure Hyper Text Transfer Protocol

Secure HTTP is a secure message-oriented communications protocol designed for use in conjunction with HTTP. It is designed to coexist with HTTP's messaging model and to be easily integrated with HTTP applications.

Secure HTTP provides a variety of security mechanisms to HTTP clients and servers, providing the security service options appropriate to the wide range of potential end uses possible for the World-Wide Web. The protocol provides symmetric capabilities to both client and server (in that equal treatment is given to both requests and replies, as well as for the preference of both parties) while preserving the transaction model and implementation characteristics of HTTP.

Several cryptographic message format standards may be incorporated into S-HTTP clients and servers, particularly, but in principle not limited to, [CMS] and [MOSS]. SHTTP supports interoperation among a variety of implementations, and is compatible with HTTP. S-HTTP aware clients can

communicate with S-HTTP oblivious servers and vice-versa, although such transactions obviously would not use S-HTTP security features.

An evaluation of the protocols was done by developing both an HTTP server and HTTPS server with Java j2SE.

2 Security

2.1 Methodology

A set of encryption methods were evaluated. A software was developed upon which every encryption method was tested on. The software encrypted typical files that the system will be handling such as Documents, Images, Drawings and Portable Document Format. The encryption time was calculated with the system time, hence calculating the amount of time the software takes to encode such files.

The Java SE – JCE (Java Cryptography Extension) was used to apply such encryption methods to the files. This extension is a tool for the developer to integrate encryption methods.

The methods chosen ranged from the high level of encryption (DESede – triple DES) and low level encryption (AES).

The following methods were tested:

- AES
- Blowfish
- DES
- DESede
- RC2

The two files chosen for encryption were:

- IC.pdf (datasheet of an Integrated Circuit – (6348KB)
- Pump.pdf (Manual of a Pump – (4231KB)

2.2 Analysis

Encryption Method	File Encrypted	Time Taken Milliseconds
AES	IC.PDF	719
Blowfish	IC.PDF	766
DES	IC.PDF	1437
DESede	IC.PDF	3750
RC2	IC.PDF	969
AES	PUMP.pdf	469
Blowfish	PUMP.pdf	469
DES	PUMP.pdf	922
DESede	PUMP.pdf	2422
RC2	PUMP.pdf	625

Table 43: Encryption analysis

Table 43 shows the results for the two files submitted to the software for encryption. Please note that the time may vary according to the computer and operating system used but the results are in a ratio compared to each other.

The specifications of the computer used for the test are:

- Processor : Intel Core 2 Duo at 1.6Ghz
- Operating System: Windows XP

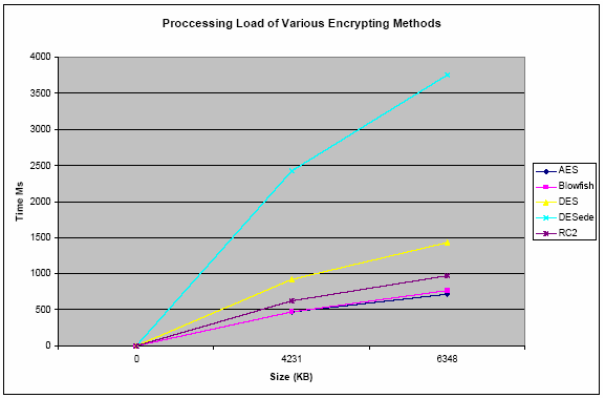
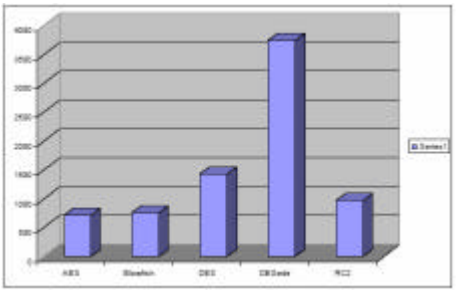
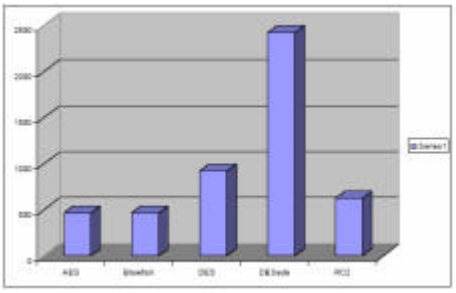


Figure 37: Processing Load of Various Encrypting Methods

Figure 37 shows all the encryption methods tested and there performance along various sizes of files. As can be seen from the graph DESede which is basically triple DES consumes the most processing power, hence giving the most security and AES is the most basic encryption. AES is used in limited resources systems, such as zigbee networks running on low power micro-controllers. DESede is used in systems where a great amount of security is needed.



a



b

Figure 38: (a)File encrypted IC.pdf. (b)File encrypted Pump.pdf

The Figure above are a comparison of all the methods relative to each other. Figure 39a shows the results when encoding IC.pdf and 39bthe result when encoding Pump.pdf.

6.1.1.3 Data Compression

1 Compression

1.1 Methodology

Several compression methods where evaluated, both free to use and proprietary. A set of typical files to be compressed, transferred and uncompressed by the system were compressed and uncompressed. Java SE ships with a free to use compression tool "ZIP". Two other formats were tested :

- RAR
- WIN ACE

Both compression techniques are proprietary and the cost of usage along their performance will be evaluated.

A program was developed with java to test the GZIP utility. The other 2 compression techniques come with their own software to compress and uncompress data.

1.2 Analysis

Table 44, 45 and 46 shows the results for the 3 compression techniques analyzed:

Zip Compression using the Java Zip utility					
File Name	Type of File	Description	Size (KB) Before	Size (KB) After	Degree of Compression
pump.pdf	Acrobat PDF format	Pump Manual	4231	3270	23%
IC.pdf	Acrobat PDF format	IC Datasheet	6348	3438	46%
Pump.jpg	Image File	Image of Pump	334	333	0%
Ram.jpg	Image File	Image of hydraulic ram	54	49	9%
PUMPDPSWITCH.DWG	Cad drawing file	Drawing of Pump Switch	29	9	69%
VFDFLOWMETER.DWG	Cad drawing file	Variable Flow Meter Drawing	27	8	70%
top.vsd	Visio Drawing	Drawing of a top flanch	107	65	39%
bottom.vsd	Visio Drawing	Drawing of a bottom flanch	108	50	54%
		Overall Performance			39%

Table 44: Compression with GZIP

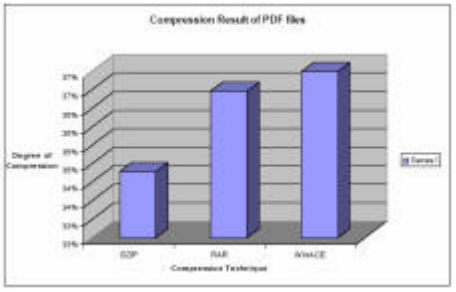
Rar Compression					
File Name	Type of File	Description	Size (KB) Before	Size (KB) After	Degree of Compression
pump.pdf	Acrobat PDF format	Pump Manual	4231	3188	25%
IC.pdf	Acrobat PDF format	IC Datasheet	6348	3284	48%
Pump.jpg	Image File	Image of Pump	334	334	0%
Ram.jpg	Image File	Image of hydraulic ram	54	49	9%
PUMPDPSWITCH.DWG	Cad drawing file	Drawing of Pump Switch	29	8	72%
VFDFLOWMETER.DWG	Cad drawing file	Variable Flow Meter Drawing	27	7	74%
top.vsd	Visio Drawing	Drawing of a top flanch	107	62	42%
bottom.vsd	Visio Drawing	Drawing of a bottom flanch	108	33	69%
		Overall Performance			43%

Table 45: Compression with RAR

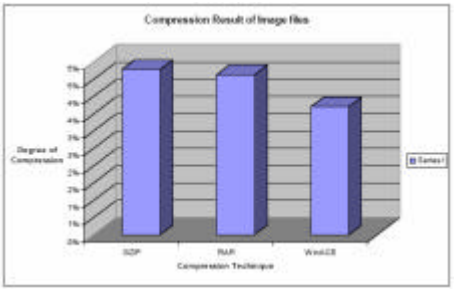
Win Ace					
File Name	Type of File	Description	Size (KB) Before	Size (KB) After	Degree of Compression
pump.pdf	Acrobat PDF format	Pump Manual	4231	3181	25%
IC.pdf	Acrobat PDF format	IC Datasheet	6348	3228	49%
Pump.jpg	Image File	Image of Pump	334	334	0%
Ram.jpg	Image File	Image of hydraulic ram	54	50	7%
PUMPDPSWITCH.DWG	Cad drawing file	Drawing of Pump Switch	29	8	72%
VFDFLOWMETER.DWG	Cad drawing file	Variable Flow Meter Drawing	27	7	74%
top.vsd	Visio Drawing	Drawing of a top flanch	107	63	41%
bottom.vsd	Visio Drawing	Drawing of a bottom flanch	108	34	69%
		Overall Performance			42%

Table 46: Compression with Win ACE

All the tables show the results of the three compression techniques. The following figures show the techniques compared together on different types of files. Please note that the image files subjected to compression where of type JPEG which is a compressed format hence the compression techniques did not do any compression at all the files where already compressed with the JPEG format.

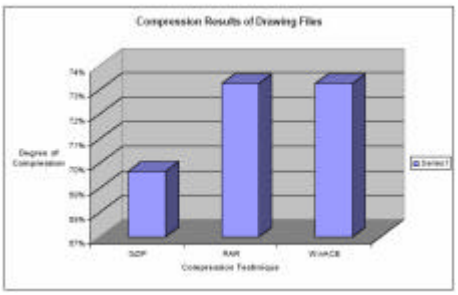


a

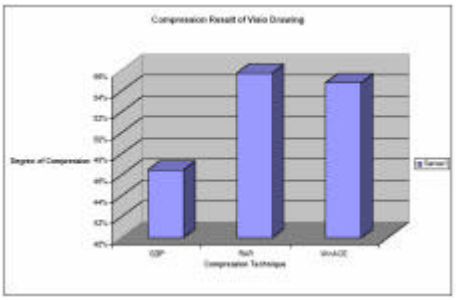


b

Figure 39: (a) Compression results of PDF files. (b) Compression results of Image file



a



b

Figure 40: (a) Compression result of Cad Drawing files. (b) Compression result of Visio Drawing files

As the results show the free utility does not offer the degree of compression the other two types offer. The tables below show the price considerations of the two compression techniques:

Users	Price in Euro
2-9	16.128
10-24	12.288
25-49	9.984
50-99	7.68
100-199	6.144
200-499	4.608
500-999	3.84

Table 47: RAR Price

Users	Price in Euro
Any amount of users	22.272

Table 48: Win Ace Price

	Compression with GZIP	Compression with RAR
	39%	43%
Mega bytes per day		
3	1.84	1.72
260	477.36	448.34
GPRS connection @ Euro 0.07/60Kb	556.91	523.06
	Difference	33.85

Table 49: Compression techniques weighted upon price

Table 49 shows an evaluation of Price versus the amount of compression a proprietary technique. If 3Mb of data are to be transferred regularly per day and it had to be compressed and passed through a wireless channel such as GPRS with a typical rate of Euro 0.07 per 60Kb in Europe this would result in Euro 33.8 spent on connection charges, while a typical RAR licence for 15 users will amount in Euro 120. Hence the GZIP utility will be used in this project since it offers the best price and compression balance.

6.1.2 Interoperability

1 Interoperability[44]

With respect to software, the term interoperability is used to describe the capability of different programs to exchange data via a common set of business procedures, and to read and write the same file formats and use the same protocols. (The ability to execute the same binary code on different processor platforms is 'not' assumed to be part of the interoperability definition). The lack of interoperability strongly implies that the described product or products were not designed with standardization in mind. Indeed, interoperability is not taken for granted in the non-standards-based portion of the computing and EDP world.

According to ISO/IEC 2382-01, *Information Technology Vocabulary, Fundamental Terms*, interoperability is defined as follows: *"The capability to communicate, execute programs, or transfer data among various functional units in a manner that requires the user to have little or no knowledge of the unique characteristics of those units".*

This definition focuses on the technical side of interoperability, while it has also been pointed out that interoperability is often more of an organizational issue. In other words, interoperability frequently has a major impact on the organization concerned, including issues of ownership (do people want to share their data?), staff (are people prepared to undergo training?) and usability. In this context, a more apt definition is captured in the term "business process interoperability".

Interoperability can have important economic consequences, such as network externalities. If competitors' products are not interoperable (due to causes such as patents, trade secrets or coordination failures), the result may well be monopoly or market failure. For this reason, it may be prudent for user communities or governments to take steps to encourage interoperability in various situations. In the United Kingdom, for example, there is an eGovernment-based interoperability initiative called e-GIF. As far as user communities, Neutral Third Party is creating standards for business process interoperability. Another example of a neutral party is the RFC documents from the Internet Engineering Task Force (IETF).

Interoperability can be achieved in four ways: through product engineering, industry/community partnership, access to technology and IP, and implementation of standards.

2 Distributed architectures which enable interoperability

- **2.1 Corba**

The **Common Object Request Broker Architecture** (**CORBA**) is a standard defined by the Object Management Group (OMG) that enables software components written in multiple computer languages and running on multiple computers to work together. CORBA “wraps” program code into a bundle containing information about the capabilities of the code and how to invoke it. The wrapped objects can then be invoked from other programs or CORBA objects across a network.

CORBA uses an interface definition language (IDL) to specify the interfaces that objects will present to the world. CORBA then specifies a “mapping” from IDL to a specific implementation language like C++ or Java. Standard mappings exist for Ada, C, C++, Lisp, Smalltalk, Java, COBOL, PL/I and Python. There are also non-standard mappings for Perl, Visual Basic, Ruby, and Tcl implemented by ORBs written for those languages.

[44] Definitions for point 1 to 4 have been extracted from http://en.wikipedia.org/

- **2.2 .NET**

.net (**net**work) is a generic top-level domain (gTLD) used on the Internet's Domain Name System. The .net gTLD is currently operated by VeriSign. Registrations are processed via accredited registrars and internationalized domain names are also accepted. .net was one of the original top-level domains (despite not being mentioned in RFC 920), created in January 1985. It was initially intended for use by network oriented entities such as Internet service providers. Currently, there are no formal restrictions on who can register a .net domain name. Therefore, while still popular with network operators, it is often treated as a second .com.

- **2.3 J2EE**

Java Platform, Enterprise Edition or **Java EE** (formerly known as Java 2 Platform, Enterprise Edition or J2EE until the name was changed to Java EE in version 1.5), is a programming platform—part of the Java Platform—for developing and running distributed multitier architecture Java applications, based largely on modular software components running on an application server. The Java EE platform is defined by a *specification*. Similar to other Java Community Process specifications, Java EE is also considered informally to be a standard because providers must agree to certain conformance requirements in order to declare their products as *Java EE compliant*; albeit with no ISO or ECMA standard.

3 Web Services

The W3C defines a **Web service** as a software system designed to support interoperable Machine to Machine interaction over a network. Web services are frequently just Web APIs that can be accessed over a network, such as the Internet, and executed on a remote system hosting the requested services.

The W3C Web service definition encompasses many different systems, but in common usage the term refers to clients and servers that communicate XML messages that follow the SOAP-standard. Common in both the field and the terminology is the assumption that there is also a machine readable description of the operations supported by the server, a description in the WSDL. The latter is not a requirement of SOAP *endpoint*, but it is a prerequisite for automated client-side code generation in the mainstream Java and .NET SOAP frameworks. Some industry organizations, such as the WS-I, mandate both SOAP and WSDL in their definition of a Web service.

4 XML

The **Extensible Markup Language** (**XML**) is a general-purpose *specification* for creating custom markup languages. Its primary purpose is to facilitate the sharing of data across different information systems, particularly via the Internet. It is a simplified subset of the Standard Generalized Markup Language (SGML), and is designed to be relatively human-legible. By adding semantic constraints, application languages can be implemented in XML. These include XHTML, RSS, MathML, GraphML, Scalable Vector Graphics, MusicXML, and thousands of others. Moreover, XML is sometimes used as the specification language for such application languages.

XML is recommended by the World Wide Web Consortium. It is a fee-free open standard. The W3C recommendation specifies both the lexical grammar, and the requirements for parsing.

5 HL7[45]

Health Level Seven is one of several American National Standards Institute (ANSI) -accredited Standards Developing Organizations (SDOs) operating in the healthcare arena. Most SDOs produce standards (sometimes called specifications or protocols) for a particular healthcare domain such as pharmacy, medical devices, imaging or insurance (claims processing) transactions. Health Level Seven's domain is clinical and administrative data.
Headquartered in Ann Arbor, MI, Health Level Seven is like most of the other SDOs in that it is a not-for-profit volunteer organization. Its members-- providers, vendors, payers, consultants, government groups and others who have an interest in the development and advancement of clinical and administrative standards for healthcare—develop the standards. Like all ANSI-accredited SDOs, Health Level Seven adheres to a strict and well-defined set of operating procedures that ensures consensus, openness and balance of interest. A frequent misconception about Health Level Seven (and presumably about the other SDOs) is that it develops software. In reality, Health Level Seven develops specifications; the most widely used being a messaging standard that enables disparate healthcare applications to exchange keys sets of clinical and administrative data.

Further information about HL7 can be found in its website: http://www.hl7.org/

[45] http://www.hl7.org/

6.2 Usability and Accessibility

6.2.1 Standards for usability and accessibility

What is Usability[46]?

Usability means making products and systems easier to use, and matching them more closely to user needs and requirements.

The International standard, ISO 9241-11, provides guidance on usability and defines it as:

The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.

Usability is about:

Effectiveness can users complete tasks, achieve goals with the product (i.e. do what they want to do?)

Efficiency how much effort do users require to do this? (Often measured in time)

Satisfaction what do users think about the products ease of use?

which are affected by:

The users - who is using the product? E.g. are they highly trained and experienced users, or novices?

Their goals - what are the users trying to do with the product - does it support what they want to do with it?

The usage situation (or 'context of use') - where and how is the product being used?

Usability should not be confused with 'functionality', however, as this is purely concerned with the functions and features of the product and has no bearing on whether users are able to use them or not.

What is accessibility[47]?

The accessibility of web sites covers much more than just disabled access. It's about giving people unhindered access to a web site from various devices, such as web-enabled televisions, mobile phones and PDAs. It's also about giving access to users who have different screen sizes, browser types and settings, or those who do not have plug-ins such as Flash.

This point is not about accessibility generally; instead, it concentrates on one aspect, namely the legal obligation to provide access to the disabled.

[46] Source: Usability of ICT-based systems State-of-the-Art Review

*Interesting website about Usability: http://www.usabilitynet.org functions and features of the product and has no bearing on whether users are able to use them or not.

[47] Source: OUT-LAW News, article published 15/09/2005 *http://www.out-law.com/page-330*

What is disabled access?

For those with disabilities such as sensory or mobility problems, the internet can be a mixed blessing. Home shopping, for example, can be invaluable to those for whom busy streets present a difficult challenge. However, in much the same way as a building may be problematic to the physically disabled, a web site may also present barriers to access.

For example, a visually impaired internet user can use a screen reader to translate the contents of web pages for speech synthesisers or Braille displays. The user will struggle to understand web pages if, for example, images are displayed on the page without a text alternative (in HTML, alt attributes should be added to all image tags).

This example is commonly cited when discussing disabled access. Bear in mind that visual impairment describes a wide range of problems including those who are registered blind, those who are colour blind or those who suffer from tunnel vision or cataracts. There are also those with motor disabilities, cognitive disabilities and other impairments. Barriers to access by individuals suffering any such disabilities can be interpreted as discrimination.

Laws on accessibility today

There are existing European policies and laws that recognize the need for accessibility, making reference to the inclusion of disabled and elderly people; these include the *Electronic Communications Directives*, the *Universal Services Directives* and the *Public Procurement Directive*. The three of them are commented in chapter 5 (Legal aspects of ICT).

Some Member States have passed their own laws. The one that goes farthest for IT is the UK's *Disability Discrimination Act,* in practice demanding that websites are accessible to the public and that intranets are accessible to staff, albeit there is no obligation for goods to be accessible.

What does the UK's law say[48]?

The UK Disability Discrimination Act of 1995 states:

"It is unlawful for a provider of services to discriminate against a disabled person [...] in refusing to provide, or deliberately not providing, to the disabled person any service which he provides, or is prepared to provide, to members of the public."

It includes *"access to and use of information services"* among its examples of services to which the rules apply. It adds:

"Where a provider of services has a practice, policy or procedure which makes it impossible or unreasonably difficult for disabled persons to make use of a service which he provides, or is prepared to provide, to other members of the public, it is his duty to take such steps as it is reasonable, in all the circumstances of the case, for him to have to take in order to change that practice, policy or procedure so that it no longer has that effect."

At first, there was some ambiguity because the wording of the Act did not specifically refer to web sites - although the consensus has long been that the reference to "information services" includes web sites.

[48] Source: OUT-LAW News, article published 15/09/2005 *http://www.out-law.com/page-330*
For further information about the Law: http://www.opsi.gov.uk/acts/acts1995/Ukpga_19950050_en_1.htm

This ambiguity was removed by the publication in February 2002 of a *Code of Practice* which is based on the Act.

In explaining the services which a business should make accessible to people with hearing or visual disabilities, the Code cites "accessible web sites" among its examples.

Further, in describing services affected by the Act, the Code gives the following example:

"An airline company provides a flight reservation and booking service to the public on its web site. This is a provision of a service and is subject to the Act."

So the duty on an organisation with a web site that is not accessible to the disabled is to take "reasonable" steps to make that site accessible. In considering what is reasonable, the Code suggests that the financial resources of an organisation will be among the factors that should be taken into consideration.

Therefore, in simple terms, a large company will struggle to justify any failure to make its site accessible, while a small business or a charity may have a better defence, if it can show that it cannot afford the necessary development work.

What standard is required by the Law?

Nobody knows for certain what level of disabled access is required of *UK* web sites. However, there is consensus that the best practice is to comply at least with a minimum accessibility level defined by the *World Wide Web Consortium*, or *W3C*.

The W3C has a Web Accessibility Initiative, or WAI, which includes the Web Content Accessibility Guidelines, or WCAG. The WCAG provide three 'conformance levels'. These are known as Levels A, AA and AAA. Each level has a series of checkpoints for accessibility - known as Priority 1, 2 and 3 checkpoints.

According to the W3C, a web site must satisfy Priority 1 (Level A), otherwise some users will find it impossible to access the site. The W3C considers that a web site should satisfy the Priority 2 (Level AA), otherwise some users will find it difficult to access the site. Finally, a site may satisfy Priority 3 (Level AAA), otherwise some users will find it somewhat difficult to access the site.

To be safe, your site should satisfy Priority 1 (or Level A). Although there is no relevant case law on the UK Act, a case was brought in Australia which did refer to the W3C conformance levels. This case was based on an Australian law which is very similar to the UK law, so a UK court might be persuaded to follow it.

The case was brought by a blind man, Bruce Maguire, against the Sydney Organising Committee for the Olympic Games, known as SOCOG. He argued that the SOCOG web site breached Australia's Disability Discrimination Act because it was inaccessible to him when using a refreshable Braille display and web browser. In ruling against SOCOG, the Commission of the Human Rights and Equal Opportunities Commission supported the W3C guidelines and, during the hearing, reference was made to the ease with which the SOCOG site could be brought up to Level A compliance.

What W3C guidelines exactly is[49]?

W3C guidelines explain how to make *Web content* accessible to people with disabilities. The guidelines are intended for all *Web content developers* (page authors and site designers) and for

[49] Source: W3C website; http://www.w3.org/TR/WAI-WEBCONTENT/

developers of *authoring tools*. The primary goal of these guidelines is to *promote accessibility*. However, following them will also make Web content more available to *all* users, whatever *user agent* they are using (e.g., desktop browser, voice browser, mobile phone, automobile-based personal computer, etc.) or constraints they may be operating under (e.g., noisy surroundings, under- or over-illuminated rooms, in a hands-free environment, etc.). Following these guidelines will also help people find information on the Web more quickly. These guidelines do not discourage content developers from using images, video, etc., but rather expla in how to make multimedia content more accessible to a wide audience.

This is a reference document for accessibility principles and design ideas. Some of the strategies discussed in this document address certain Web internationalization and mobile access concerns. However, this document focuses on accessibility and does not fully address the related concerns of other W3C Activities. In order to get some related information one might consult the *W3C Mobile Access Activity home page* and the *W3C Internationalization Activity home page.*

This document is meant to be stable and therefore does not provide specific information about browser support for different technologies as that information changes rapidly. Instead, the *Web Accessibility Initiative* (WAI) Web site provides such information.

This document includes an appendix that organizes all of the checkpoints by topic and priority. The checkpoints in the appendix link to their definitions in the current document. The topics identified in the appendix include images, multimedia, tables, frames, forms, and scripts. The appendix is available as either a tabular summary of checkpoints or as a simple list of checkpoints.

A separate document, entitled "Techniques for Web Content Accessibility Guidelines 1.0", explains how to implement the checkpoints defined in the document. The Techniques Document discusses each checkpoint in more detail and provides examples using the Hypertext Markup Language (HTML), Cascading Style Sheets (CSS), Synchronized Multimedia Integration Language (SMIL), and the Mathematical Markup Language (MathML). The Techniques Document also includes techniques for document validation and testing, and an index of HTML elements and attributes (and which techniques use them). The Techniques Document has been designed to track changes in technology and is expected to be updated more frequently than the current document.

"Web Content Accessibility Guidelines 1.0" is part of a series of accessibility guidelines published by the Web Accessibility Initiative. The series also includes User Agent Accessibility Guidelines and Authoring Tool Accessibility Guidelines.

W3C Usability Checking Applications

A simple check of your own site can be made by entering your site's internet address in the search box of a different range of applications. Nevertheless one might use automated testing service with caution: these tools can identify obvious errors in your site's accessibility, which is useful to indicate the need for accessibility improvements. However it is not recommended to interpret a clean bill of health from any automated test as meaning that your site is therefore 'DDA compliant'. There are problems with automated accessibility testing tools and some results have been found to be unreliable.

See Bobby accessibility tool; http://webxact.watchfire.com/

See TAW accessibility tool; http://www.tawdis.net/taw3/cms/en

European Initiatives

Regarding the Commission there is the need for harmonization and the risk to industry of market fragmentation caused by differing eAccessibility requirements. "The risk for consumers is even greater," it notes in its paper, "particularly for people with disabilities and older persons: a fragmented market means costlier, more unfamiliar and incompatible products, more difficulty in accessing/moving information across borders, etc."

However, new laws are not proposed in the short term; rather, the Commission says the "eAccessibility potential" of existing laws will be exploited.

eEurope 2005 Action Plan

Building on the success of eEurope 2002, the EC adopted "eEurope 2005: An Information Society for all - An Action Plan". Its objectives for ehealth subject is to establish a set of quality criteria for health websites, clarify legal aspects of e-health and promote best practice in health telematics infrastructure.

ICT Standardisation Work Programme

The 2006 ICT Standardisation Work Programme complements the Action Plan for European Standardisation of 2005 by dealing more in detail with ICT matters. The objective is to consolidate the achievements of the eEurope Standardisation Action Plan and to further promote the use of standards in support of EU policies and legislation

This document includes current E.U legislation, policies and actions for ICT standardization, and the Commission services priorities for that subject in 2006.

For further information download the mentioned documents from:

http://ec.europa.eu/enterprise/ict/policy/standards/wp2006.pdf (to download eEurope action plan)

http://ec.europa.eu/information_society/eeurope/2002/news_library/documents/eeurope2005/eeurope2005_en.pdf (to download ICT Standardization Work Program)

Nevertheless, there are specific laws regarding ICT Standardization in the E.U:

Information Technology And Telecommunications laws regarding Standardisation

- Council Decision 87/95/EEC of 22 December 1986 on standardisation in the field of information technology and telecommunications.

This decision aims to promote closer cooperation in establishing technical standards in the information technology and telecommunications sectors. It should lead to improvements in international competitiveness among European Community (EC) manufacturers.

Objectives:

Standardisation measures help to facilitate the exchange of information throughout the EC. They reduce the obstacles created by incompatibilities arising from the absence of standards.

Proposed measures:

Specific measures are proposed to:

1- Promote standardisation in Europe.

2- Draw up and apply standards in the field of ICT.

3- Draw up and apply functional specifications in the field of telecommunications.

- Directive 98/34/EC **of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations.**
The legal basis for European standardisation, including the ICT domain, is Directive 98/34/EC.
One of its main elements is constituted by the formal recognition of three European Standards Organisations (ESOs), CEN, CENELEC and ETSI, active in various degrees in the ICT domain.

This recognition entails financial support at the European level. Standards resulting from an open consensus building process and published by recognised standardisation bodies are by nature voluntary and non binding documents. The EU standardisation policy recognises the WTO principles for the development of international standards such as openness, transparency, impartiality, consensus, effectiveness, relevance and coherence.

*Interesting link:
http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/05/320&format=HTML&aged=0&language=EN&guiLanguage=en

Other E.U initiatives[50]

The Commission is looking at introducing new European Standards on eAccessibility that it hopes will meet the needs of industry, designers and providers of products and services without hampering creativity or innovation.

It hopes the standards themselves will be free or available at a reduced cost to make their uptake easier, especially by SMEs. The paper comments: "Whilst promoting interoperability, care should be taken that patented technologies without reasonable and non-discriminatory (RAND) licensing are not promoted as standard solutions."

It notes that Member States have already committed themselves to make their public websites accessible according to WCAG guidelines. It also sees a need for certification schemes of web accessibility as a result of those Member States, like the UK, that mandate accessibility and have a need to assess compliance. It mentions a European Committee for Normalization (CEN) Workshop that is already working on specifications for a European Web Accessibility Certification Scheme and a Quality Mark**. It does not elaborate on this.

* http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52005SC1095:EN:NOT

** http://www.cen.eu/cenorm/businessdomains/businessdomains/isss/activity/ws-wac.asp

[50] Extract from:
- OUT-LAW News, article published 15/09/2005 (http://www.out-law.com/page-6124)
- European Commission
- W3C Consortium & owned elaborated. Other relevant sources : http://europa.eu/scadplus/leg/en/lvb/l24226h.htm

The European Standardization Organizations[51] are:

The European Committee for Standardization (CEN) covers standardization in areas other than the electrotechnical and telecommunications fields. In the fast-moving domain of information and communications technologies.

www.cenorm.be/isss

The European Committee for Electrotechnical Standardization (CENELEC) deals with standardization in the electrotechnical field.

www.cenelec.org

The European Telecommunications Standards Institute (ETSI) is responsible for standardization in telecommunications and related fields of broadcasting and information technology. It produces a wide range of standards and other technical documentation as Europe's contribution to world-wide standardization.

www.etsi.org

INTERNATIONAL STANDARDIZATION[52]

Information Technology Safety Standards (TIC Quality Standards)

Standards are technical specifications of voluntary basis, agreed and carried out in conjunction with the interested parties (manufacturers, users / consumers, laboratories, public administration, investigation centres, etc.) and approved by a recognized organism.

These norms are documented agreements and contain technical specifications or precise criteria to be consistently used as rules, guides, or features definitions, making sure that materials, products, processes and services are adapted to achieve the purpose for what they were conceived. The normalization helps to simplify and to increase the reliability and efficiency of the goods and services that we use, as well as to improve the well-being of the society and redounds to the common benefit.

The norms are, therefore, documents of voluntary application, prepared by the interested parts by consensus and approved by a recognized organism.

In the international ambience, ISO (International Organization of Normalization), IEC (International Electrotechnical Commission) and ITU (International Telecommunication Union) have the target to favor the development of the normalization in the world, with a view to facilitating the commercial exchanges of services between the different countries. The work developed by ISO cover practically all the sectors of the skill, with exception of the electrical and electrotechnical field, whose responsibility relapses into IEC. The members of ISO or IEC are the organisms that represent the normalization of a country. Only one organism of each country can be a member of these organizations. The participation in the technical committees of ISO/IEC can be as a member "P" (participant) or as a member "Or" (observer).

[51] Source: http://www.eeurope-standards.org/Docs/E-Accessibility%20final.pdf

[52] Source: UNE/ISO

Standards can be broadly sub-divided into three categories, namely product, process and management system standards. The first refers to characteristics related to quality and safety for example. Process standards refer to the conditions under which products and services are to be produced, packaged or refined. Management system standards assist organizations to manage their operations. They are often used to help create a framework that then allows the organization to consistently achieve the requirements that are set out in product and process standards.

Where to find information on standards

ISO's entire portfolio of standards is listed in the *ISO Catalogue* which can be accessed online. The site also provides access to the *World Standards Services Network (WSSN)* which is a network of publicly accessible Web servers of standards organizations around the world. Through these Web site, WSSN provides information on international, regional and national standardization and related activities and services.

In fact, there are several hundred thousand standards and technical regulations in the world containing special requirements for a particular country or region. Finding information about these, or about related conformity assessment activities, can be a heavy task. ISONET, the ISO Information Network, can ease the problem. This is a worldwide network of national standards information centres which have cooperatively developed a system to provide rapid access to information about standards, technical regulations, and testing and conformity assessment activities in operation around the world.

Technical Barriers to Trade (WTO/TBT) calls upon its signatory countries to establish a national enquiry point to answer questions on these same areas in relation to that country. In many countries, the ISONET and WTO enquiry points are one and the same.

ACCESSIBILITY STANDARDS

Next link gets to a compilation that collects the most important standards in all technical and non-technical areas of e-health.

http://www.who.int/ehscg/resources/en/ehscg_standards_list.pdf

Also entering the following link you can find some guidelines explaining how to make web content accessible to people with disabilities. These guidelines are intended for all web content developers and for developers of authoring tools.

http://www.w3.org/TR/WAI-WEBCONTENT

ISO Standards Guides regarding elderly and disabled

Regarding elderly and disabled, one can get accessibility and usability standardization guidelines through ISO website (http://www.iso.org/iso/en/ISOOnline.frontpage). Once there you select the subject needed and then you can download the document by paying the required amount.

Aids for disabled or handicapped persons (Including aids for elderly people)

ISO/IEC Guide 71:2001

- Guidelines for standards developers to address the needs of older persons and persons with disabilities

- This Guide provides guidance to writers of relevant International Standards on how to take into account the needs of older persons and persons with disabilities. Whilst recognizing that some people with very extensive and complex disabilities may have requirements beyond the level addressed in this Guide, a very large number of people have minor impairments which can be easily addressed by relatively small changes of approach in standards, thereby increasing the market for the product or service.
- This Guide aims:
  - to inform, increase understanding and raise awareness about how human abilities impact on the usability of products, services and environments,
  - to outline the relationship between the requirements in standards and the accessibility and usability of products and services, and
  - to raise awareness about the benefits of adopting accessible design principles in terms of a wider market.
- This Guide applies to products, services and environments encountered in all aspects of daily life and intended for the consumer market and the workplace. For the purposes of this document, the term 'products and services' is used to reflect all these purposes.
- This Guide:
  - describes a process by which the needs of older persons and persons with disabilities may be considered in the development of standards,
  - provides tables to enable standards developers to relate the relevant clauses of a standard to the factors which should be considered to ensure that all abilities are addressed,
  - offers descriptions of body functions or human abilities and the practical implications of impairment,
  - offers a list of sources that standards developers can use to investigate more detailed and specific guidance materials.
- This Guide provides general guidance. Consideration should be given to the development of additional guides for specific product or service sectors.
- While it is recognized that accessibility and usability are important for both products amd services, international work on services standards is at the preliminary stage. At present, this Guide contains considerably more guidance on products than on services.
- This Guide is also available as a Braille version. Copies may be obtained through the ISO Central Secretariat.

ISO 9999:2007

- Assistive products for persons with disability -- Classification and terminology
- ISO 9999:2006 establishes a classification of assistive products, especially produced or generally available, for persons with disability.
- Assistive products used by a person with disability, but which require the assistance by another person for their operation, are included in the classification.
- The following items are specifically excluded from ISO 9999:2006:
  - items used for the installation of assistive products;
  - solutions obtained by combinations of assistive products which are individually classified in this International Standard;
  - medicines;
  - assistive products and instruments used exclusively by healthcare professionals;

- non-technical solutions, such as personal assistance, guide-dogs or lip-reading;
- implanted devices;
- financial support.

ISO 16201:2006

Technical aids for persons with disability (Environmental control systems for daily living).

ISO 16201:2006 specifies functional and technical requirements and test methods for environmental control systems intended for use to alleviate or compensate for a disability. Such systems are also known as electronic aids to daily living.

The aim of ISO 16201:2006 is to provide safety requirements and recommendations for manufacturers of such environmental control systems.

Target devices are not covered by ISO 16201:2006. Technical requirements for items of equipment connected within the system are to be covered by their own specific standards, e.g. adjustable beds.

USABILITY STANDARDS

ISO standards reflect product-and process-oriented approaches to usability discussed above. Process-oriented standards consider the whole cycle of activities and appropriate techniques associated with the development of usable systems. Product-oriented standards are concerned with a set of measures for defined usability features.

Process-oriented ISO standards

In accordance with the information provided, process-oriented standards can be ranged from very general, providing main principles to more concrete, describing certain tools, as following:

ISO 9241-11: Guidance on usability (1998).

ISO 13407: Human-centred design processes for interactive systems (1999).

ISO/TR 18529: Ergonomics-Ergonomics of human-system interaction. Human-centred lifecycle process descriptions (2000).

ISO/TR 16982: Ergonomics of human-system interaction. Usability methods supporting human-centred design (2002).

ISO 9241-11: Guidance on usability. ISO 9241-11 provides a basic usability framework and emphasizes user goals and context of use components that give direction to any usability evaluation activities. **User goals** of interaction with technology-based products are crucial to determine system boundaries and even more concrete functions matching user needs. **Context of use** implies user, task and environment components. Appropriate user characteristics such as physical attributes, knowledge, experience, education, age and others are necessary to distinguish different types of individuals interacting with the system and to predict their behaviour. Tasks show a sequence of specific actions necessary to reach user goals. Description and analysis of user tasks helps to map the ways users achieve goals and provides valuable information for defining overall system requirements. Environment encompasses external factors surrounding the user and system interaction that may affect usability. Environment factors are divided into technical (e.g. what other software and hardware products are used), physical (e.g. workplace characteristics), ambient (e.g. humidity), social and cultural (e.g. organizational work practices, attitudes) environments. User goals and context of use are

evaluated against effectiveness, efficiency and satisfaction criteria and appropriate measures (examples are listed in annex B).

Besides valuable notions of user goals and context of use, ISO 9241-11 states that activities designed to create a usable product are an integral part of any software and hardware product development process and contribute to its overall quality.

The standard does not provide any concrete information on how to develop a usable technology-based product but rather aims to inform developers about general usability concerns.

ISO 13407: a Human-centred design processes for interactive systems. Based on the ISO 9241-11 philosophy and definition of usability, ISO 13407 provides a human-centered perspective on the software and hardware design processes. Human-centered design is a multidisciplinary field designed to support the development of usable systems and employing ergonomics and human factor knowledge. ISO 13407 further develops the idea of usability-related activities as complementary to the general product manufacturing process and organizational context and reveals management aspects of human-centered design.

Human-centered design is based on the four general principles derived from the statements of ISO 9142-11:

The active involvement of users and a clear understanding of user and task requirements – user participation in all stages of the development process assists in formulating and later refining detailed scenarios of user and system dialogue, identifying and preventing emerging problems, and adjusting the system to users' environments and routine work.

An appropriate allocation of function between users and technology requires meaningful division of tasks between the system and its users, based on diverse factors such as the possibility of automating certain tasks, user features, capabilities and limitations.

Iteration of design solutions points to the essence of the usability-based approach that requires continuous system improvement by collecting and reacting to user feedback. Iteration is an effective means of revealing hidden problems that can be clarified and eliminated when users are actively involved in design processes.

Multi-disciplinary team principle highlights organizational aspects of human-centered design. The development of the technology-based product involves a range of stakeholders not limited only to users and system developers but embracing business analysts, user instructors, experts in human factors and technology etc.

The idea of usability as an integral part of organization performance expressed in ISO 9241-11 is emphasized by ISO 13407 in its description of human-centered design processes. Organizations that intend to implement principles of human-centered design should accomplish preparatory tasks and plan future activities that should include:

- Human-centered design activities.
- Procedures for integrating these activities with other system development activities.
- The range of skills necessary for human-centered design including responsible members of staff.
- Effective means and procedures for user feedback, communication and documentation of human-centered activities.
- Milestones of human-centered activities.
- Time management.

Planning activities are described as preliminary tasks and are not included in the list of human-centered design processes. However, this does not diminish their importance and shows that organizations undertaking a human-centered design project should incorporate the main usability

principles into their overall practices. Sufficient managerial support should be provided to allocate resources for usability tasks and to respond to emerging challenges such as change management, multi-disciplinary teamwork and so on.

The preliminary planning stage is followed by four human-centered design phases:

Phase I: *Understand and specify the context of use.* As prescribed in ISO 9241-11, this stage concerns with collecting detailed information on all components of the context of use. This information is crucial to support primary modelling of the system corresponding to user needs and requirements.

Phase II: *Specify user and organizational requirements*. The organization developing the system operates in a complex environment and should consider various factors such as legislation, finance etc. Therefore, user demands should be tuned to organizational objectives and the reality of operation, otherwise the organization risks experiencing financial losses or a lack of human and material resources for project implementation. This phase should be finalized by setting project objectives based on an appropriate balance of user and organizational requirements.

Phase III: *Produce design solutions.* Employing existing multidisciplinary knowledge, involving potential users, concrete models and prototypes of the future systems are generated and tested iteratively until set objectives are reached.

Phase IV: *Evaluate designs against requirements*. Evaluation activities take place at all stages of design and serve several purposes. First of all, evaluation is the way to obtain user feedback and so improve the prototype of the system. Other important functions of evaluation are to monitor compliance with organizational goals, legislation, standards etc. Evaluation is an effective means of identifying problematic areas in the interaction of users with the system. Finally, evaluation is applied for long-term observation of the product life-cycle and use when design is accomplished and the system is being sold.

In ISO 13407 extended principles of ISO 9241-11 take the shape of general guidance for organizations incorporating usability as an objective in the development processes of the technology-based products. However, details and actual methods for implementation of proposed activities are still unclear.

ISO/TR 18529: Ergonomics. Ergonomics of human-system interaction. Human-centred life-cycle process descriptions exploits ISO 13407's established framework, providing further details of human-centered design activities and offering seven processes and underlying actions corresponding to the main phases discussed above. This technical report takes a closer look to human-centered design and even determines the output documents of each phase. All design processes and related actions provide a guiding grid for the developers to manage their usability projects.

ISO/TR 16982: Ergonomics of human system interaction. Usability methods supporting human-centred design complements all documents with a selection of methods appropriate for implementation of usability projects. The technical report highlights the importance of active user involvement, but considers situations when the opportunities to cooperate with users are limited and supplies appropriate solutions. All methods are classified according to the level of user involvement. A short definition, and advantages and disadvantages of each method are given together with recommendations on which stage they should be applied to. The report bridges usability techniques with the software life cycle provided by *ISO/IEC 12207:1995 Information technology. Software life cycle processe*.

The ISO standards and technical reports briefly described above are complementary and reveal various aspects of usability implementation differing by the abstractness of provided information. These documents form a solid usability framework, but for users of the standards provide a lot of "noise" embedded in repetition and overlapping of statements explaining activities and processes dispersed throughout the standards.

Product-oriented ISO standards

Product-oriented ISO standards concentrate on concrete models for establishing rigorous usability metrics. Extensive metrics are based on the usability model provided in ISO/IEC 9126-1 (2001) that offers the following set of definitions related to the quality of the technology-based product:

- Internal quality
- External quality
- Quality in use

These are main interdependent features of software (the standard does not cover hardware usability issues) that contain a set of parameters (one of which is usability) that can be expressed as quantitative indicators.

The following standards reveal the model for usability metrics based on the inter-relation of internal quality, external quality and quality in use:

- ISO/IEC 9126-1: Software Engineering. Product Quality. Part 1: Quality model (2001).
- ISO/IEC TR 9126-2: Software Engineering. Product Quality. Part 2: External metrics (2003).
- ISO/IEC TR 9126-3: Software Engineering. Product Quality. Part 3: Internal metrics (2003).
- ISO/IEC TR 9126-4: Software Engineering. Product Quality. Part 4: Quality in use metrics (2004).
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ISO/IEC 9126-1: a model for quality of a technology-based product. The standard emphasizes that a technology-based product should meet user requirements and describes software attributes contributing to achievement of this goal as a part of overall product quality, which is understood as a set of product characteristics that enable it to satisfy implied user needs.

A software product contains internal and external attributes that are interdependent. External attributes point to the way a system interacts with a potential user; internal characteristics are a necessary prerequisite to implement this interaction. Thus, if there are deviations in the internal parameters they will pre-condition anomalies in system responses during the interaction process that is determined by a set of external attributes. The third level – quality in use – describes the diversity of contexts in which a system can be exploited and a variety of user expectations based on specific conditions and intentions. Quality in use parameters are affected by overall software internal and external quality characteristics that provide a certain level of quality in user experience while exploiting the system.

The standard proposes six parameters of software quality – functionality, usability, reliability, efficiency, maintainability, portability – that provide a framework for measuring internal and external quality characteristics. Quality in use is measured in terms of how effectively, productively, safely and satisfactorily users can achieve their goals when operating a software product with certain internal and external parameters. Six categories reflect the perspective of various users: customer-organization, end-users, persons responsible for maintenance the product etc.

Generally, the 'usability' concept is decomposed into the absolute software internal and external attributes and the case of real use in context. Therefore, two approaches to usability are identified: a

broad one, considering use in context and defined by quality in use metrics, and a narrow one, placing usability as one of the parameters of internal and external software characteristics.

ISO/IEC TR 9126-2 and ISO/IEC 9126-3: usability in internal and external quality metrics. ISO/IEC TR 9126-2 (2003) and 9126-3 (2003) provide a quantitative metrics for six categories of internal and external qualities. In this context, usability is understood in a narrow manner, defining it as a set of internal and external attributes of the software that contribute to its quality. Usability contains the following parameters:

Understandability assesses software product characteristics enabling users to understand whether a product is suitable for his/her particular tasks and how it can be used.

Learnability evaluates how easily and effectively the user learns to accomplish tasks and what is the contribution of help documentation to learning processes.

Operability considers the extent to which the user can operate and control the software, paying particular attention to frequently used functions and anticipated usability problems.

Attractiveness evaluates the appearance of the software.

Usability compliance assesses how software meets the requirements of usability standards, guidelines and other regulatory documentation.

On the basis of five main usability measures a set of quantitative indicators is developed. Standards provide recommendations on measurement procedures and methods (user testing, observation, questionnaires, usage statistics is commonly mentioned).

ISO/IEC TR 9126-4: Quality in use metrics. Quality in use addresses specified users in specified contexts and measures how they achieve their goals in terms of effectiveness, productivity, safety and satisfaction.

Effectiveness metrics provide quantitative indicators to measure the extent of accuracy and completeness of goals achieved. The indicators are:

- Task effectiveness, that indicates which goals of the task were achieved in correct manner.
- Task completion, that evaluates how many tasks were completed.
- Error frequency indicator, that counts the number of errors per task.

Productivity metrics evaluate the resources that were consumed by the user (e.g. time, financial costs, materials etc.) to achieve the goal and relates it to the level of effectiveness gained by the user. Productivity is expressed in a following set of indicators:

- Task time – time needed to complete a task.
- Task efficiency – the proportion of goals reached for a unit of time.
- Economic productivity – cost-effectiveness of tasks.
- Productive proportion – proportion of time when the user performs productive actions.
- Relative user efficiency – user efficiency compared an expert.

Safety metrics consider economic and physical risks and harm associated with software use including health issues:

- User health and safety – how often health problems occur when using the software.
- Safety of people affected by use of the system – incidence of threats to user safety when exploiting the software.
- Economic damage – incidence of economic damage caused by the software.

- Software damage – frequency of software corruption.

Satisfaction metrics are focused on user attitudes to the software, based on user perceptions about the software properties, its effectiveness, productivity and safety:

- Satisfaction scale – the extent of user satisfaction.
- Satisfaction questionnaire – user satisfaction with specific software feature.
- Discretionary satisfaction – the proportion of users choosing the software to use.

Many of quality in use measures and indicators are used in memory institutions and are incorporated in the standards on service quality assessment. The broad nature of quality in use makes it complicated to distinguish between usability and quality of services. However, the narrow usability understanding exhibited in internal and external quality metrics is insufficient to encompass a much wider scope of usability related issues.

Other Usability Standards

ISO standards are not the only guidance and reference material on usability. Examples of successful usability solutions come from corporate initiatives and international projects as well. Some of the ideas examined below had a strong influence on the ISO standards themselves.

- *UsabilityNet* is a RTD project funded under EU Fifth Framework Programme completed in 2003. The project supports the needs of usability practitioners, managers, professional organizations and those launching EU projects and provides comprehensive information on all usability aspects.

(http://www.usabilitynet.org)

- *INUSE* (Information Engineering Usability Support Centres) was a RTD project that obtained funding under the EU Fourth Framework Programme and was accomplished in 1997. This project aimed to establish a European Usability Support Center and provides usability guidance for companies and projects within the information engineering industry

(http://www.ejeisa.com/nectar/inuse/6.2/index.htm)

- *RESPECT* (Requirements Engineering and Specification in Telematics) was an RTD project funded under the EU Fourth Framework Programme (duration 1996–1998). The main goal of the project was to create a usability methodology as an advisory tool for *Telematics Applications Projects*.

This also includes:

Basic Characteristics of Users with Special Needs and their Telematics Requirements (October 1996) introduces the concept of universal design contributing to the welfare of all citizens in the information society. The document covers age (old, young) and disabilities (vision, hearing, cognition, mobility) parameters and offers appropriate solutions for technology-based products (full-text document is available at: (http://www.ejeisa.com/nectar/respect/6.1/index.htm)

Requirements Specification and Evaluation for User Groups with Special Needs (25 August 1998) extends the topics discussed in the report on the basic characteristics of users with special needs and offers practical guidelines for conducting a usability evaluation (the full-text document is available at: (http://www.ejeisa.com/nectar/respect/6.2/contents.htm).

6.2.2 Usability good practices for the target end users[53]

Web usability good practices for elderly

Design adjustments according to the limitations related to ageing are the focus of most guidelines. Numerous recommendations on website design are published because of widespread usage of web-based services. Web usability guidelines usually present more or less the same guidance, which can be summarized as following:

Website layout and style elements:

Colours – while selecting colours for design it is necessary to avoid extremely bright colours that can be annoying or tiring, to maintain a distinction between colours of the text and background (light background and dark text are more relevant for the elderly users), balancing these considerations with colour-blindness concerns.

Text – larger font size is preferable, easy to read typefaces should be applied, and more space between paragraph and sections should be provided. When choosing the typeface and letter intensity it is important to note that some fonts become less readable when made bold or italic. Left justification of the text provides better readability, while centered text should be used only in case of titles. Full justification that creates large spaces between words reduces readability. In older age peripheral vision decreases and therefore for the elderly double-spacing is preferable.

Navigation – one of the important components for navigation is the menu that should be accessible for persons with limited ability for precise movement or with impaired vision. Menu sections are convenient if they are static (avoiding drop-down menus) and large enough to read. Error messages such as "page not found" may be frustrating. Therefore it is important to avoid multiple linking, or to provide more links to the home, or top level, page.

Frames and tables are not readable by all browsers and can prevent the use of assistive technology for visually impaired persons thus making a website inaccessible. Therefore, some experts argue that an additional version without frames and tables should be provided. Others would make the case for universal design.

Multimedia – animation elements could be distracting and even decisive element for non-use of the website in case of visual impairments. However, realistic illustrations that accompany text, or directions for e.g. filling forms or other actions, are helpful to assist users to comprehend the information. Illustration should have a textual description allowing assistive technology to recognize it for visually impaired users. When inserting audio files the problem of different additional software for playing it should be considered.

[53] *Source: The whole point has been extract from Usability of ICT-based systems State-of-the-Art Review* (CALIMERA Deliverable 9)

Content organization:

Memory cues – it is important to place some cues that will help the user to get oriented during the navigation. Site maps that structure the content provided can be a helpful orientation tool.

Language – clear, non-ambiguous language facilitates using the website. Professional or technical slang should be avoided. Summaries of the content at the top of the page are preferable to make browsing more effective.

Information arrangement – long documents should be avoided or structured to shorter sections. Clear content organization and avoidance of information and graphic overload facilitates retrieval of necessary information and reduces frustration.

Help information should encompass both content and technical assistance. Providing alternatives for getting help information as, for instance, email, telephone or frequently asked questions, is important. Information about errors should provide some explanation of why the error occurred. Search engine hints that explain the system logic and suggest some recommendations on search improvement may be crucial.

Designers collaborating with older adults in the development process of ICT-based technology should be aware of certain peculiarities of such partnerships. Usually elderly people assign all failures of using the system to their own lack of skills or knowledge instead of assuming that the technology is at fault. Even if the system works badly they tend to find some positive aspects and rarely disclose negative ones. However, they won't use it again. Usability tests conducted by *AARP Foundation* (USA), which supports the elderly, reveal the common denial of being old among the elderly persons. Invited to participate in usability test they assumed that it was performed to assess usability for their parents or older friends. Members of usability teams should also consider adult children of the elderly participants of usability projects as usually they assist their parents with ICT and can provide a valuable information about problems encountered.

Usability good practices for disabled

Diverse human abilities emerging due to illnesses, aging, accidents or those that are inherited significantly impact the quality of accessing, acquiring, processing or otherwise managing incoming information provided by ICT. Unfavourable environment conditions such as, for instance, noise or several activities being performed simultaneously, can also contribute to decreased accessibility. In order to offer the best design solutions it is necessary to be familiar with the spectrum of common limitations of human abilities:

- Visual impairments.
- Hearing impairments.
- Cognitive impairments.
- Mobility impairments.

As accessibility is an important pre-requisite of usability (inaccessible ICT-based system cannot be used in a satisfactory, effective and efficient manner when the context of use and features of the user are neglected) all listed ability limitations will be discussed below.

Before starting to discuss separate cases of disability it is important to note that there are general guidelines offered by EU RTD MINERVA (*Ministerial Network for Valorising Activities in*

Digitisation aims to harmonize activities in cultural heritage digitization in member states) project for the memory institutions audience providing cultural services on the Web (see *Handbook for Quality in Cultural Websites. Improving Quality for Citizens*, available at:

http://www.minervaeurope.org/publications/qualitycriteria1_2draft/table.htm where issues of usability and accessibility are discussed.

Visual impairments cover a wide range of vision disorders such as blindness, low vision, and colour blindness that may be temporary or permanent, and occur due to various reasons. The same effect of limited visual ability can be common for persons acting in a low lighting conditions or in adverse environments (e.g. bad weather), or undertaking an excessive number of visual tasks.

ICT-based systems mostly rely on human visual channels thus making most information inaccessible for persons with visual impairments without assistive technology. There are a number of solutions helping visually disabled persons to cope with this issue: e.g. screen readers, Braille displays, screen magnifiers.

A *screen reader* is usually exploited for reading of online/offline digital documents. Visual information provided on the screen is transformed to audio with the help of speech synthesizer. Examples of such programmes are *JAWS* (Job Access with Speech for Windows), *IBM Home Page Reader 3.0* etc. Often screen synthesizers are complemented with the option of Optical Character Recognition. This kind of assistive technology is useful for blind or very low vision persons but requires additional effort by the designers. Many websites have a lot of graphic information including animation, illustration and graphs that cannot be recognized by the speech synthesizer. Therefore, alternative textual descriptions should be provided. This is crucial for websites employing extensive graphic information. W3C is working intensively in the accessibility field (WAI – Web Accessibility Initiative) provides exhaustive recommendations for making Web content accessible by enhancing mark-up languages. HTML 4.0 supports additional features allowing the enrichment of the structure of documents thus making more information readable for speech synthesizers (e.g. ABBR and ACRONYM tags help to read acronyms and Q indicates the citation). HTML 4.0 enables the creation of textual descriptions for graphic components. Currently W3C WAI is preparing guidelines for XML accessibility (see *XML Accessibility Guidelines*, working draft, 3 October 2002, available at: http://www.w3c.org/TR/xag.html). However, despite all advantages offered by screen readers they are not acceptable to some people because of limited understandability of synthesized speech.

A *braille display* is a tactile device that represents letters and numbers readable with the fingertips by raising six dots in various combinations. Braille displays are connected to the computer and during the interaction the text from the computer screen is sent to the device. This assistive technology is often called refreshable or dynamic because while reading the text dots are changing. Devices vary in size from one cell comprising six-eight dots to eighty-cell consisting of twelve to twenty cells per line. It should be noted that relatively few visually disabled people are able to read Braille.

A *screen magnifier* is a software programme intended for users with low vision which allows them to magnify part of screen view to make it more readable. In order to ensure good readability for low vision users it is necessary for designers to provide several options. Large and configurable fonts are crucial to read with a screen magnifier. The developer should make all fonts in text, messages, menu labels etc. easily configurable and enlargable to the level appropriate for the user. In order to remove strain from the visual channel and increase the speed of information processing alternative audible information options should also be provided.

A separate issue for developers is the use of colours in the design of the ICT-based products. Colour is usually used as an additional cue to enhance comprehension of information. However, for colour blind users it might become a serious accessibility barrier. There are several forms of colour-blindness: trichromacy - suffered by people who are able to see all three primary colours of light (red,

green, blue) but have an increased sensitivity to one colour; dichromacy, when a person is able to see two of the three primary colours of light; and achromatopsia which results in inability to see any colour when only monochrome or shades of grey representation is available. The main rule for the developer considering needs of persons with colour deficiency is not to rely on colour as a mean to convey information because it is not distinguishable for them. It is necessary to provide textual alternatives or to avoid using colours for the purposes of expressing meaning at all. While choosing colours parameters of lightness, hue (spectral wavelength of colours) and saturation (colour intensity in the spectrum from pure intensive colour to desaturated towards neutral grey) should be considered because the ability to differentiate colours on the basis of these characteristics is reduced.

Hearing impairments ranging from partial to complete loss of hearing and constitute a significant accessibility problem in our visual/hearing channel-based society. Since complementing moving pictures with sound in 1927 a massive amount of information has become inaccessible for people with hearing impairments.

Most solutions offered to compensate hearing impairments are based on re-directing sound to the visual channel of information perception. As textual descriptions of graphics are necessary for blind, textual or visual explanation of audible information it is vital for people suffering complete or partial hearing loss. Conversion of sound information into textual (e.g. for TV programmes, films, CD-ROMs, websites) or visual form is called captioning. For web-based services HTML enables textual transcripts of sound clips. Some media formats, such as Quick Time 3.0 and SMIL (Synchronized Multimedia Interchange language, for further information see *W3C Synchronized Multimedia Homepage*, available at: http://www.w3.org/AudioVideo/) support both textual and video captioning, when video explanation of sound information is provided.

Textual captions are of two types: 1) closed – hidden on the 21st line of the vertical blanking interval of video signal and available for viewing when the special decoder is used; 2) subtitles – always visible or those chosen as an options, varying from subtitles either for translation or especially for persons with hearing impairments (these provide additional information of speaker identification etc.). Specific requirements of placing textual captions should be met: captions should not interfere with visual information, help to get oriented in the ongoing events (e.g. who is speaking), length of captions should not exceed 2 lines etc. Detailed information on captioning is provided by the Captioned Media Program (USA), available at: http://www.cfv.org/.

Cognitive impairments encompass a wide range of disabilities related to comprehending visual/audible information, communicating, understanding, speaking and writing, focusing attention, memorizing, speed of performing operations, ability to conceptualise, solve problems, learn to do new things etc. These or similar problems occur due to various reasons, such as mental retardation; language and learning disorders; head injury and stroke; aging; dementia.

People suffering from cognitive impairments represent a very heterogeneous group often with opposite needs. For instance, learning disabilities cover a wide range of diverse information interpretation disorders and therefore those who cannot interpret written textual information would enjoy ICT-based systems with a graphic interface, but those who experience difficulties in comprehending graphical information would need a textual alternative.

It should be noted that cognitive disability is not necessary associated with intellectual decline. For instance, persons suffering from language disorder such as dyslexia, aphasia etc. have average or high IQ and there are well-known talented persons with language disorders (e.g. Albert Einstein had dyslexia).

Some solutions for hearing or vision disabilities such as descriptions and captioning, visual to audible information conversion, large fonts etc. are also useful for cognitive disabilities.

Mobility impairments include limited ability of physical interaction like limited motion, object manipulation, involuntary uncoordinated movements etc. Mobility impairment can be partial or full, when a person is confined to bed or a wheelchair. In case of mobility impairments the main challenges are associated with controlling actions. Very commonly ICT-based systems require precise movements, or complex manipulation of output devices such as, for instance, pressing a combination of buttons simultaneously.

Most solutions offered to enhance use of ICT provide easier navigation. Keyboard navigation is a challenge for persons with limited mobility or inability to make precise movements. In order to prevent multiple errors and facilitate use, special software e.g. *WINPACK* include programmes for repeatable or combination keyboard commands (*Sticky keys*, *Repeat keys*) is applied. Special hardware can be exploited to provide easier navigation such as head control devices or those regulated by breath and so on. In some cases, voice controlled browsing may be a solution but it is important to consider underpinning factors such as, for instance, language to direct navigation (if the provided language is not native to user this may become an obstacle). General requirements for developers are to simplify navigation as much as possible by providing simple 'yes/no' choices, avoiding repetitive key presses and commands requiring the holding down of several buttons simultaneously, providing larger objects which are more accessible to locate and click on, etc.

Detailed recommendations and requirements to enhance websites for mobility impaired are provided in W3C *Web Content Accessibility Guidelines 1.0* (http://www.w3.org/TR/WCAG10/).

Other factors affecting usability (Horizontal factors)

As well as age and ability there are other factors that impact the ICT-based product or service usability. These may be thought of as horizontal factors and influence any of the groups of users discussed above. Moreover, there is a strong correlation between these complementary items.

According to Shneiderman the concept of universal usability it is not limited to universal access but also addresses complex social and technological constraints that constitute a part of the user environment in which the interaction takes place.

Technological variety is a challenge for providers of quality services that are usable by various target groups due to multiple standards and platforms that often are incompatible. The issue of interoperability is a hot topic of discussion in professional communities involved into the provision of digital services/products. Essential services of memory institutions including preservation and dissemination of community memories are migrating to the digital environment thus making interoperability of technology a major concern. As the Internet becomes the main medium for communication various devices, such as personal digital assistants, mobile phones, Web TV, laptops, notebooks etc. become able to provide access to Internet services. However, all these devices are characterized by different features, used for multiple purposes and in diverse situations. Therefore, in order to ensure usability several dimensions should be considered:

User – an individual characterized by specific personal features and abilities.

Platform – the sum of resources allowing user to manipulate information (e.g. input and output devices, connection, memory size etc.).

Environment – parameters of the surroundings in which the interaction takes place (e.g. light, noise etc.).

In terms of these dimensions concepts of multi-targeting and plasticity of technology are important. The multi-targeting property refers to the ability of ICT-based systems to adapt to the multiple contexts of use including user, platform and environment. The notion of plasticity addresses the problem of maintaining usability in the diverse contexts of use. For instance, mobile phone providing access to the Internet can be described as small-sized, characterized by limited memory capacity, restricted data processing and storage, and a slow and unstable internet connection that is still quite expensive. Therefore, traditional PC-oriented web design doesn't fit the new requirements of these devices, the user and the environment (limited access features in comparison to PC, high prices and small display will affect the nature of user interaction). In this case professionals recommend adapting website design, providing smaller menus, fewer graphics, clear and concise information arrangement, avoidance of certain elements such as style sheets, tables and frames.

Developers should consider the advantages and possible challenges of technological variety. On the one hand, it expands access to information and makes it more device and environment independent, while on the other a lot of work has to be done in the development stages to turn these advantages to reality.

In the context of multiple technological solutions, memory institutions often endure the challenge of adapting services to users with slow and high speed connections. When presenting digital surrogates of cultural heritage on their websites, memory institutions should carefully select appropriate image formats, including compression methods addressing the needs of those who cannot afford more time for downloading images or whose technology does not support certain formats.

User knowledge refers to a set of miscellaneous skills enabling the user to interact with the ICT system in an effective and efficient manner. As was mentioned in the above description of the elderly, features that prevent or encourage productive use of technology include general education level and this is of crucial importance because it assists in figuring out the general logic of the system. Since the interaction process is still supported by textual information (e.g. commands, error messages, instructions etc.) general literacy is necessary to operate the system. However, a large part of world and European population is illiterate and cannot fully exploit public digital services. The main task for all stakeholders involved into the development process of the ICT-based services/products is to address the needs of this target group (including immigrants who do not know the national language) by suggesting alternative ways of interaction (e.g. by developing intuitive graphical user interface with minimized language cues). In spite of general literacy concerns computer skills and knowledge of the domain for which the product/service is created needs a thorough examination. In terms of digital literacy and domain knowledge, novice and expert users may need to be distinguished. These groups are characterized by opposite usability preferences – learnability and simplicity are the system features meeting beginner expectations and efficiency is crucial for experts. However, there are no experts without being a novice and there are no eternal beginners. The system should address evolving skills and needs in a flexible ways.

Access to ICT-based products/services, gaps in all kinds of necessary knowledge for successful use are affected by **income** that may prevent or lower the quality of the interaction. Often low-income persons cannot afford a necessary technology though the demand for ICT in education and the job market is increasing. Problems of low income and a broader context of social inclusion cross the whole spectrum of usability concerns but have an influence on the minimum features needed for the interaction.

7 General conclusions

7.1 Synthesis

- **Ageing population**

Demand for health and social services is rising as a result of an ageing population and higher income levels.

There is growing evidence that not only are we living longer, but we are also living healthier lives. Overall disability levels amongst older Europeans are decreasing, not increasing. But because there are more old people overall, the absolute numbers of dependent older people may increase in future. On balance however, the impact on near future increased demand for care may be mitigated to some extent by improvements in the over all health status of older persons.

The general tendency of expenditures in disability and old age population out of total social benefits is increasing, which is not surprising if we see the age groups weights and its evolution. Although, there are some exceptions but it could be due to an increase of the total budget.

Developing e-Health systems and services should help reduce costs and improve productivity in such areas as billing and record-keeping, reducing medical error, cutting down on unnecessary care, and also in improving the quality of healthcare.

- **Dependency law development and implementation**

In order to develop an integrated European e-Health system it has been necessary to establish a legal framework. It will act as the basis for a further development of an e-Health services market. Once the countries will be adapted to it, it will be possible to specify the necessities of the increasing demand of care services.

Some countries have already started to set some laws or regulation concerning dependency, like Sweden and Denmark among others. Therefore, they have established a dependency degrees classification which is used as a reference to fix the intensity and frequency of the care service provided (whether it is in accordance with the amount of health required or the ability to perform activities of daily living).

Still, there are some countries which haven't adapted this legal framework to its national laws yet.

- **Mixed health system funding**

The social health insurance system in Europe includes both insurance coverage and access to health care services. Although most health care systems in Europe are funded from a mix of sources, including taxation, social health insurance, private health insurance and out of-pocket payments, the first two sources are predominating as methods of funding in most European countries, as private health insurance is of little importance. The fact that most funding systems are mixed in practice means that evaluating a system's performance based on the sources of funding is difficult.

The key to improving policy outcome is to weigh up the advantages and disadvantages of each funding method carefully and to relate the discussion to the specific national context.

- **New health care structure**

Hospital has been the most representative issue of the modern health care system, but some figures in the report come to indicate that it will no longer play this role.

According to the WHO, since 1990 hospital bed numbers in some countries have fallen dramatically in both absolute and relative terms. It is known that hospitals are quite expensive due to the fixed costs associated. Hospital bed number is not the only cost factor but it is often seen as the main indicator to determine hospital capacity.

A substantial part of the reduction can be attributed to both decisions to transfer parts of the health care system to the social sector and especially, to the home care services. In this manner, the scope of reducing costs and improving the overall health status of the elderly and disabled as well as their quality of life will be achieved.

- **Home care prevalence**

Home care, which is growing in all European countries, is the most prevalent form of care service delivery to older people in Europe. Structures of the home care sector vary considerably across EU. It can be provided by family carers, municipalities, private sector or non-profit organisations. Most common home care services are: nursing, support within the home environment, support outside the home environment, consultancy and others like emergency-call-centres or leisure-time-offerings.

- **IT services**

Any product, application or service that enables people, whose independence in daily life is challenged, to lead a more independent and participatory life fall under the ILS label: "Independent Living Services". ILS is designed to help people with disabilities to gain independence and communities to eliminate barriers to independence. ICT based ILS refers to ICT products and applications as well as services based on a salient deployment of ICT.

"Ambient Assisted Living" (AAL) is another concept related to ISL. It is the name for a new European technology and innovation funding programme which is intended to address the needs of the ageing population, to reduce innovation barriers of forthcoming promising markets, but also to lower future social security costs. AAL aims at extending the time older people can live in their home environment by increasing their autonomy and assisting them in carrying out activities of daily living.

Smart House, Distributed Healthcare and Telecare are the three main IT services studied in this deliverable. Sometimes these concepts are confusing and overlapped. They are included in general categories such as Telemedicine or eHealth[54].

Focusing on telecare, it is used to enable older and disabled people to remain in their own homes by providing increased safety and reassurance to them and their carers. It can also be used to provide information and reminders, to reduce social isolation, and to support treatment, rehabilitation and intermediate care.

[54] Telemedicine normally refers to the practice of medicine or provision of medical services from a distance, while eHealth refers to the administration of health data electronically.
While telemedicine is the practice of medicine at a distance using ICT, telecare refers to the care provided at a distance using ICT, generally to people in their own homes and it may include health care, social care and housing support.

The maturity degree of the current telecare applications varies slightly within European countries and a similar trend has been observed. While active alarm services are widely available it is mostly used in Finland, Luxembourg, the Netherlands, Spain and UK; passive alarm services are an emerging service and tend to be only partially used, which is notable in itself considering the technology involved is relatively simple and has been available for several years; remote support services for both mobile staff and family carers are less available and services using video does not appear to be a technology that is emerging across current European telecare markets. Other services find itself under experimental work, like domotica and smart home technology, which are those in which ICT has been installed to help control a variety of functions and provide communications with the outside world.

The health and social care sectors are relatively slow to use ICT tools. ICT use in the health sector lags behind the other sectors in general, making it one of the least connected sectors, with great disparities across countries.

Due to the diversity of the field in question, comparable information at European level is not available as regards the levels of provision and the relative importance of these various services in the different countries.

- **Towards distributed healthcare system**

WHO defines Distributed Healthcare as the use of ICT to support health workers providing care as close to the patients as possible. The healthcare sector also requires the exchange of healthcare information between professionals from different disciplines and institutions.

To support co-operative work among health professionals and institutions it is necessary to share healthcare information about patients in a meaningful way. But, nowadays, in most hospitals health data are distributed across several information systems whose interconnection is difficult to achieve, this leads to the so-called islands of information.

The electronic Patient record is one more step in order to achieve a European integrated health system. Efforts are under way in some countries to develop comprehensive electronic medical records which allow real-time electronic access to the individual patient's clinical records wherever that patient may be.

Nevertheless, global use of smart cards will only become a reality once the benefits of the technology have been proven in a number of countries. Germany can be considered the key ‘benchmark’ in Europe and the rollout of the patient smart card. Costs of implementation of national programmes and the possible savings associated with smart card use will be the most notable factors of interest.

This offers the potential to make healthcare smart card technology a significant market opportunity for existing manufacturers and their technology partners. More importantly, from the patient’s viewpoint, information is the key. The ability to securely store the minimum amount of data on a smart card that will allow an individual to acquire the services of a physician at any location at any time should prove a fundamental move forward in patient care. As the momentum of certain governments on the smart card issue gathers, there are signs that wider use of the technology may be closer to hand.

Among the objectives within the e-inclusion 2010 on e-Health, there is the aim to develop a European eHealth service and information space that leads to improved quality and access to care while enabling cost effectiveness of eHealth systems and services, stimulating European industry, and supporting European patient mobility; to facilitate and contribute to the implementation of the European eHealth Action Plan (2010) including eHealth actions plans in each of the Member States and European Economic Area countries.

eHealth interoperability will focus on emergency data sets and ePrescription, nominated by the i2010 subgroup on eHealth members. eHealth stakeholders' group, comprising representatives from

industrial, standardisation, and user associations focusing on eHealth, and coordinators of Commission co-financed projects.

- **Digital territorial divide**

As a fast broadband internet access is essential to stimulate information society in Europe, there is still lack of it in the less technologically advanced areas of the European Union (EU). This situation is known as digital territorial divide. It can also be considered digital gap the difference in development between rural and urban areas and the different socio-economic conditions of the citizens within a country (also known by social gap). This issue should be addressed urgently.

Public intervention at all levels could help improve broadband coverage in under-served areas. That said, the risks associated with public intervention - particularly the risk of distorting competition - should be taken into account.

Local and regional authorities are best placed to plan a broadband project. They are the most familiar with local needs and are able to determine the optimum technology mix for the local topography.

Broadband may have a considerable impact on everyday life, particular as regards telemedicine and eHealth applications. Broadband could also enable: quicker access to healthcare services through the provision of eHealth applications, and simpler hospital management and provision for skills shortages.

- **Slow acceptance of ICT by the elderly**

Computer technology, the internet and mobile telephony can perhaps be regarded as the most prominent examples of IST. However, other technologies such as interactive television or video telephony may also play an increasing role within economic and social life as the Information Society further progresses.

As today's older people are generally better educated than in the past and have a strong desire to remain independent, ongoing socio-economic and socio-cultural dynamics lead us to expect that the next generation of ILS users will have somewhat different expectations and attitudes towards technology. But inevitably, there will be a certain gap between the pace of technological innovation and the acquisition of technology skills by the ageing population, leading to a persistent risk of their exclusion.

The developers and suppliers of technology should take the interests, needs, and possibilities of older people into greater account.

While the EU 50+ population average of computer access at home is around 36%, only 15,5% of them did regularly use the Internet in 2000. The gender gap is still considerable among 50+ population. Internet experience reflects the gender specific educational attainment and labour participation rates. Around 22% of Europeans over 50 have currently access to the internet from home. It becomes however evident that penetration among the younger age cohorts tends to be higher than among the older.

In general, IST uptake among 50+ is considerably lower in the southern European Member States than in the northern part of the EU.

People could use ICT to compensate for physical deficiencies. It is noted that mobility restricted people are significant users of tele-shopping, mainly over the telephone. However, people in poor health use mobile phones and internet even less than people in good health.

The factors affecting acceptance and rejection of technical aids are described as:

- Fear of the new
- Lack of motivation for use
- Ease or complexity of use
- Advice, training, and encouragement or the lack thereof

It is of great interest to take these factors into account when designing the devices for the elderly, as they often complain about having difficulties with user interfaces.

- **Affordability of ICT**

Access and usage follows societal stratification patterns. Internet has hardly reached less well educated households. Socio-economic status is a compound indicator, ascribed to a household and derived from the main income earner's educational attainment and professional status. Income is also a major factor determining internet usage. Uptake in the highest income class is approaching half the population whereas low income persons run the risk of exclusion from the Information Society.

- **Technological considerations**

The present report went through several wireless technologies. Wi-Max is not yet available and hence a further evaluation for this technology has to be made when the technology is available.

Among the considered protocols, the best one is the S-HTTP which is HTTP with SSL. This protocol offers the security for the system while keeping the versatility of the widely used and tested HTTP protocol. T

Several encryption methods have been mentioned in the report. The most versatile cryptographic algorithm is DES as it offers the best processing power to security balance. Concerning data compression, although proprietary compression techniques offer better performance, the price to performance ratio favours the use of the free GZIP utility offered with java.

Regarding interoperability it is recommended to follow HL7 standards to satisfy a minimum level of standardization. Health Level Seven, Inc. (HL7) is an all-volunteer, not-for-profit organization involved in development of international healthcare standards. HL7's primary mission is to create flexible, low-cost standards, guidelines, and methodologies to enable the exchange and interoperability of electronic health records.

- **Need for accessibility standardization**

Making the products and systems easier to use, and matching them more closely to user needs and requirements will be the key to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.

There are European policies and laws that recognize the need for accessibility, making reference to the inclusion of disabled and elderly people. Some members States have passed their own laws. The UK Disability Discrimination Act is a great reference to follow as regards of standardization. There is a lack of harmonization and the risk to industry of market fragmentation caused by differing eAccessibility requirements.

Although several laws have been released on this subject, its potential has not been totally exploited.

The W3C (World Wide Web Consortium) as well as The ISO (International Standardization Organizations) seem to be the main reference when looking for standards of usability and accessibility.

It notes that member States have already committed themselves to make their public websites accessible according to WCAG (W3C) guidelines. There is also consensus within the UK's law that the best practice is to comply at least with a minimum accessibility level defined by the same organization.

The eEurope Action Plan and the ICT Standardization Work Programme are the main documents that include legislation, policies and actions for e-Health and ICT standardization as well as the Commission services for that subject.

7.2 Trends

- Demand for health and social services is rising as a result of an ageing population and higher income levels.

- Demographic changes and changes in household structure affect the supply of informal care. Therefore the demand for formal health and long-term care services may increase. Changes in social values may also influence decision-making.

- Expenditure in disability and old age population out of total social benefits is increasing.

- Only some countries have already started to set their own laws or regulations concerning dependency. Once most countries will be adapted to it, it will be possible to specify the necessities of the increasing demand of care services.

- In Western Europe public support for funding of health services still appears to be widespread.

- Decentralization process of the health care system to the social sector and especially, to the home care services (by reducing hospital beds and other facilities).

- Home care is the fastest growing care service delivery to older people in all European countries (Almost all Member States pursue a policy which explicitly prefers home care instead of Institutional care).

- The dominant trend for older and disabled people is to remain in their own homes.

- Remote patient monitoring via the Internet and remote patient monitoring via mobile technology seem to be the most valuable telecare features for the future.

- eHealth systems will significantly enhance the move towards citizen-centred healthcare in order to let the patient become the focus of the healthcare system and be in a position to control his/her own care plan.

- eHealth is recognized as an integrated intelligent person-centered health care delivery network that contributes to the improvement of quality, access, and efficiency of healthcare.

- The scope of health services is expanding from treatment of diseases to addressing the needs of informed and health-conscious citizens.

- Consumers' demands for personally relevant medical information and services will continue to drive an increase in the quantity and quality of Internet-enabled healthcare applications.

- Physicians will struggle to balance consumers' demands for online information and services with more practical issues of cost and feasibility.

- The electronic patient record offers the potential to make healthcare smart card technology a significant market opportunity for existing manufacturers and their technology partners.

- European Commission will continue on its aim to promote and simplify an easier and less costly uptake of accessibility and usability standards (especially for SMEs).

Risks

- General risks regarding the target audience in the IST context:

  These are the main risk factors associated to the elderly and disabled that must be taken into account when designing ehealth services and devices:

  - Fear of the new
  - Lack of motivation for use
  - Complexity of use
  - Lack of advice, training, and encouragement

- As a fast broadband internet access is essential to stimulate information society in Europe, there is still lack of it in the less technologically advanced areas of the European Union.

- In the case of home care, services need to be delivered at dispersed geographic locations, and IST can be of particular importance when geographic distances need to be overcome. Although broadband is progressing fast, there is still a large gap between urban and rural areas. Broadband access in the EU's more remote and rural regions is limited because of the high costs associated with low population density and remoteness. Commercial incentives to invest in broadband deployment in these areas often turn out to be insufficient.

- Public interventions at all levels could help improve broadband coverage in under-served areas. That said, the risk associated with public intervention – particularly the risk of distorting competition – should be taken account.

- There will be a certain gap between the pace of technological innovation and the acquisition of technology skills by the ageing population, leading to a persistent risk of their exclusion ("Fear of the new" factor).

- There is a lack of harmonization and the risk to industry of market fragmentation caused by differing eAccessibility requirements.

- The classic problem with standards and interoperability is that they are not very flexible and that can mean that an organization's needs change faster than the standards that serve them.

- Heterogeneous structure of the European care market; comparable information at European level is not available as regards the levels of provision and the relative importance of ICT services in the different countries.

- Due to the lack of consumer participation, there is a risk that once implemented by legislators, the e-health system will be strongly influenced by lobbying groups serving the interests of private providers and corporations, and consequently not respond to consumer needs, in particular, those of the disabled and elderly as well as the caregivers.

- The best understood risks in the eHealth domain are those associated with information privacy. Over the past years legislators in many countries within Europe have enacted legislation mandating data protection to ensure the privacy rights of individuals. Nevertheless, neither privacy nor security risks can be totally avoided but minimized.

7.3 Recommendations

Older Europeans currently do not utilise IST services and devices to the same extent as younger age groups do. However, several data gathered in this deliverable show that this population group represents a market segment that offers tremendous market opportunities for the telecommunications industry, equipment manufacturers and service providers.

About two thirds of the European current 50+ population (over 80 million people) is generally open-minded towards IST.

However many older Europeans have functional restrictions, which are most commonly associated with vision, hearing, and/or use of their fingers. Overall, 21% of 50+ are severely restricted in this regard while another 43% suffer from slight restrictions, and this is not restricted only to the older age cohorts. The prevalence of functional restrictions among older Europeans in all age groups requires ubiquitous design-for-all solutions if this market segment is to be adequately addressed. However, more than half of the current 50+ population in the EU do not see their interests adequately reflected in the designs considered by IST manufacturers and more than 70% say that the media only target younger people when it comes to such technology.

Many older Europeans lack the necessary skills to utilise IST products and services, which they may principally be interested in. For instance, only 40% of those 50+ who have hands-on experience with a computer state they possess advanced computing skills, 50% possess very basic skills, and 10% say that they 'virtually do not have a clue'.

For all these reasons, among others, several recommendations should be addressed to the industry and care providers:

- **Because market potentials are not yet adequately addressed, they should consider:**
  - Gain competitive advantages from developing products and services for the widest possible range of users
  - Target older customers through dedicated marketing strategies

- **Because the design-for-all philosophy[55] has not yet received enough recognition among IST manufacturers and service providers, they could:**
  - Take advantage of guidelines, product development methodologies and tools available for supporting the design process of accessible mainstream IST
  - Apply a comprehensive approach when assessing cost-effectiveness of the design-for-all approach with regard to a particular product line

[55] **The Design for All philosophy** has come out of a growing demand for the recognition of human rights and equality of opportunity as expressed by the Disability Rights Commission in their key goal: "A society where all disabled people can participate fully as equal citizens".

- **Because a lack of skills impedes older people to fully exploit ISTs for their purpose, industry could:**
  - Consider IST training for older people as a business activity which can add millions of seniors to the pool of ebusiness customers and not only as a social contribution

- **Despite considerable potential demand, the actual market for care-related applications is still in its infancy, therefore industry and care providers may:**
  - Explore market opportunities for demand-driven e-health and telecare applications of practical relevance
  - Beware the danger of a "medical divide"

- **Structural problems internal to the home care sector which obstruct a broader uptake of IST-based care solutions should be considered:**
  - Pursue an integrative approach when developing ISTbased solutions for the care sector
  - Encourage experimentation with IST applications within day-to-day care practice
  - Recognise IST as a strategic issue for your business

- **Mainstream services – even if designed in accordance with the design for-all philosophy - are not capable of catering for all functionally restricted. Therefore, it could be of importance to:**
  - Accept and encourage technical standards facilitating access to ISTs for people with functional restrictions
  - Explore opportunities for providing more services for functionally restricted and/or vulnerable people

- **Further research is required to understand how emerging IST-based environments can be made accessible for all citizens including those who have particular user requirements**
  - Reactive RTD strategies aiming at ensuring access ability of ISTs should be replaced by proactive strategies
  - Direct RTD effort towards the investigation of nonpathological age-related user requirements

- **Adapting models of good practice**
  - Raise awareness across Europe and encourage all the actors to follow the good example of some northern countries which already provide models of good practice in the provision/utilisation of ISTs for care and accessibility purposes.

- **Business strategies depending on the national contexts**
  - The key to define a proper business strategy is to weigh up the advantages and disadvantages of each health funding method carefully and to relate the discussion to the specific national context.

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Annex 1. Figures and Tables

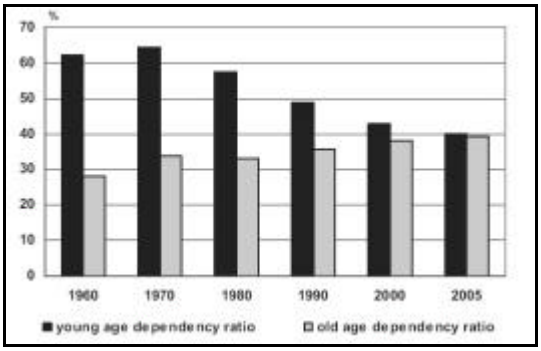


Figure 1: Young and old age dependency ratio in the EU-25, 1960-2005
Source: Lutz and Scherbov, 2002

	1992	1994	1996	1998	2000	2001
EU-15	**-**	**8,0**	**8,1**	**8,2**	**8,1**	**8,0**
Austria	6,8	7,1	7,6	8,2	8,4	8,1
Belgium	6,8	8,1	8,7	8,8	9,3	9,0
Cyprus	-	-	-	-	-	-
Denmark	9,9	10,1	10,7	11,6	12,0	12,5
France	6,0	5,9	5,9	5,9	5,9	6,0
Germany	6,3	6,7	7,2	7,9	7,8	7,7
Italy	6,8	7,3	7,1	6,3	6,0	5,7
Netherlands	16,2	13,8	12,2	11,8	11,8	11,6
Norway	16,4	16,2	16,2	16,3	16,4	16,5
Poland	-	-	-	-	-	-
Spain	7,3	7,4	7,6	8,0	7,8	7,6

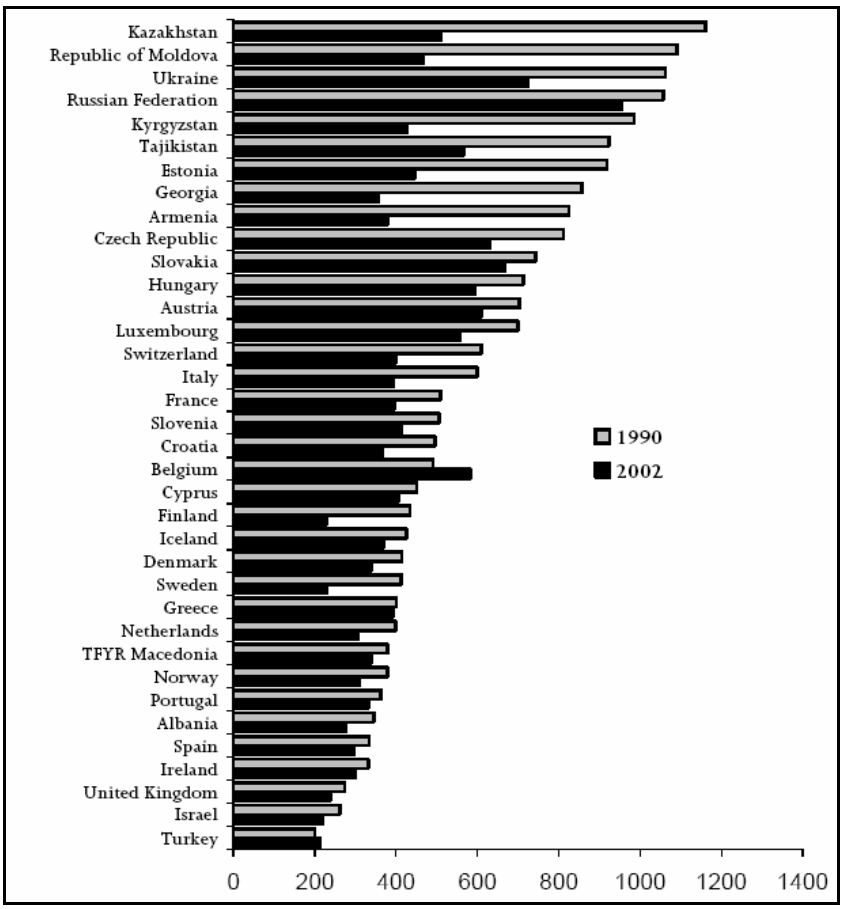
Source: Eurostat

Figure 2: Social benefits for the function: Disability (as a % of total benefits)
Source: Eurostat (European social statistics (Social protection Expenditure and receipts. Data 1996-2004)

	1992	1994	1996	1998	2000	2001
EU-15	**-**	**39,3**	**40**	**41**	**41,7**	**41,3**
Austria	36,8	36,4	37,0	38,7	39,1	39,6
Belgium	30,6	31,7	31,8	33,4	33,6	33,5
Cyprus	**-**	**-**	**-**	**-**	**-**	**-**
Denmark	39,5	40,3	39,8	40,6	40,6	40,9
France	36,6	37,0	37,4	37,8	38,0	37,9
Germany	39,5	40,3	40,8	40,2	40,6	40,9
Italy	49,9	50,9	51,9	53,2	52,5	51,7
Netherlands	31,9	31,6	33,7	35,7	37,0	36,2
Norway	29,2	29,4	29,3	30,2	29,5	29,3
Poland	-	-	-	-	-	-
Spain	36,5	37,8	40,4	42,1	42,9	42,4

Source: Eurostat

Figure 3: Social benefits for the function: Old age (as a % of total benefits)
Source: Eurostat (European social statistics (Social protection Expenditure and receipts. Data 1996-2004)



Source: European health for all databases, WHO Regional Office for Europe, 2004
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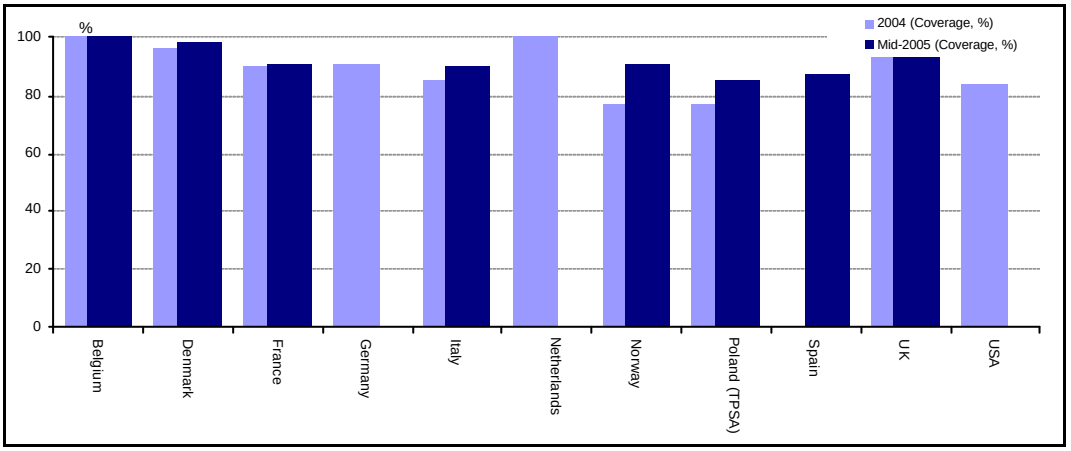

Source: OECD Key ICT Indicators (www.oecd.org/sti/ICTindicators)
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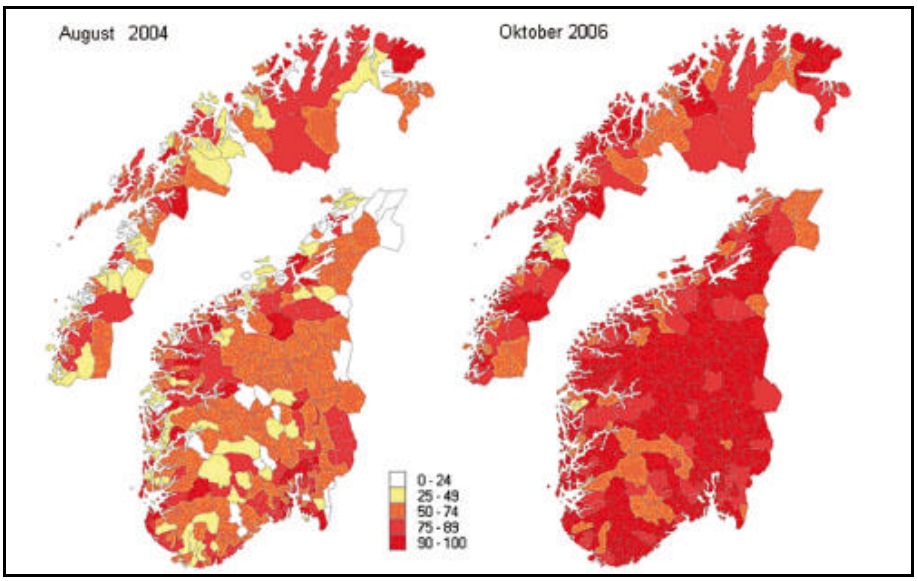

Source: Teleplan/Nexia, oktober 2006
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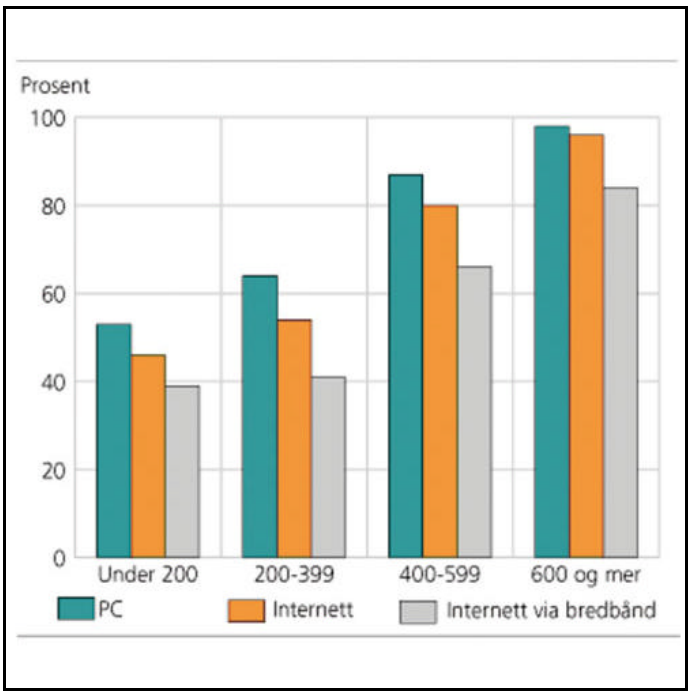

Source: SSB IKT i husholdningene 2006 (http://www.regjeringen.no/nb/dep/fad/dok/regpubl/stmeld/20062007/Stmeld-nr-17-2006-2007-/4.html?id=441525)
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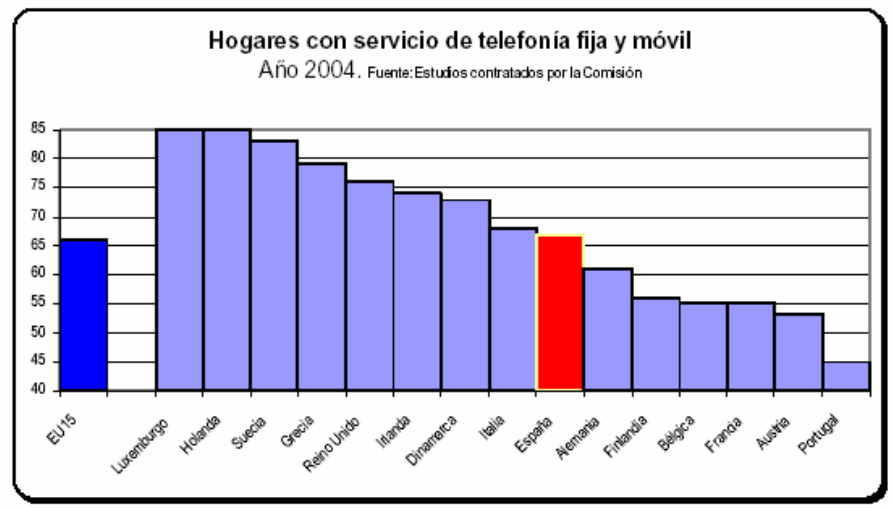

Source: Indicadores comparados de servicios de telecomunicación (I Telefonía) – subsecretaría SG. Estudios. Ministerio de industria, turismo y comercio de España
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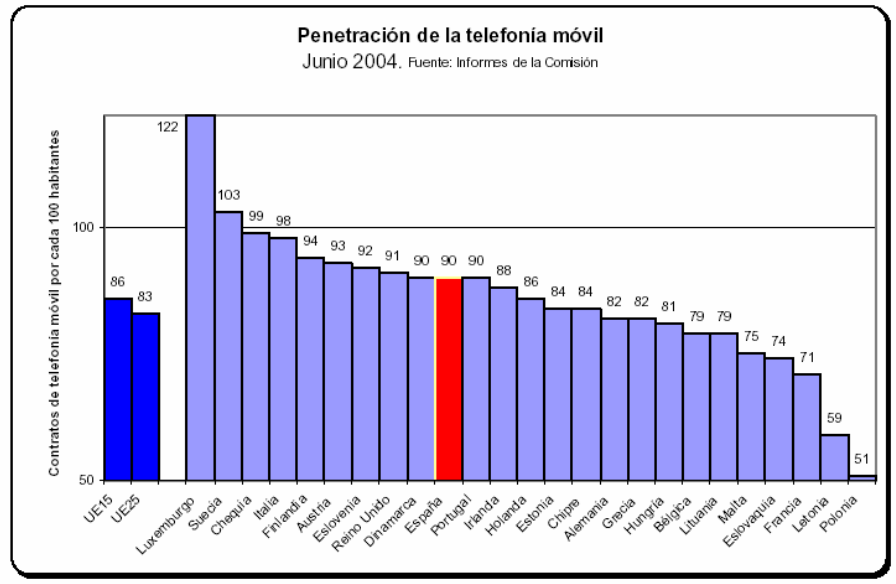

Source: Indicadores comparados de servicios de telecomunicación (I Telefonía) – subsecretaría SG. Estudios. Ministerio de industria, turismo y comercio de España
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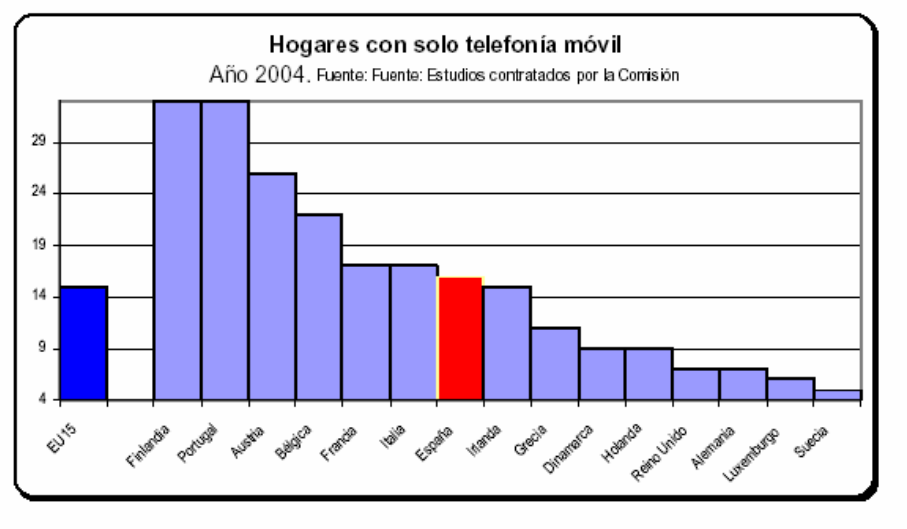
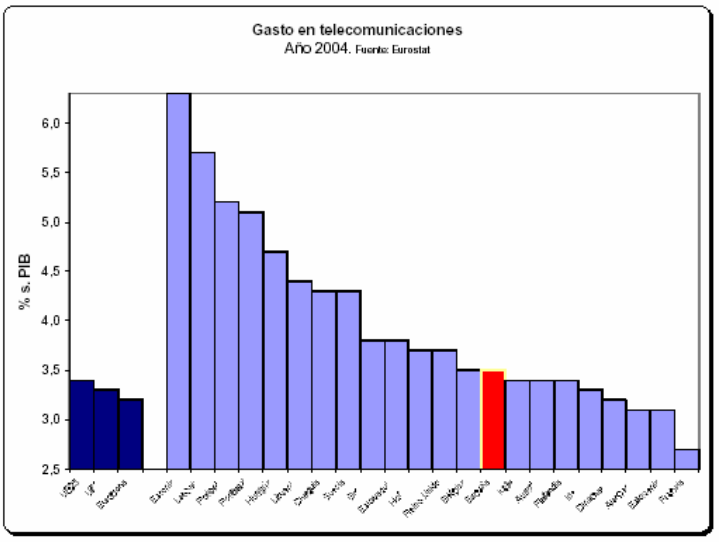


Source: Indicadores comparados de servicios de telecomunicación (I Telefonía) – subsecretaría SG. Estudios. Ministerio de industria, turismo y comercio de España
Figure 10: Households with mobile phone but no fixed phone.

Gasto en telecomunicaciones % s. PIB			
	2002	2003	2004
UE25	:	:	3,4
UE15	3,4	3,3	3,3
Eurozona	3,2	3,2	3,2
Estonia	:	:	6,3
Letonia	:	:	5,7
Polonia	:	:	5,2
Portugal	5,0	5,0	5,1
Hungría	:	:	4,7
Lituania	:	:	4,4
Chequia	:	:	4,3
Suecia	4,3	4,3	4,3
Grecia	4,2	4,0	3,8
Eslovaquia	:	:	3,8
Holanda	3,7	3,6	3,7
Reino Unido	3,9	3,8	3,7
Bélgica	3,6	3,5	3,5
España	3,8	3,6	3,5
Italia	3,3	3,3	3,4
Austria	3,4	3,4	3,4
Finlandia	3,4	3,4	3,4
Irlanda	3,6	3,3	3,3
Dinamarca	3,2	3,2	3,2
Alemania	3,0	3,0	3,1
Eslovenia	:	:	3,1
Francia	2,7	2,6	2,7



Source: Indicadores comparados de servicios de telecomunicación (I Telefonía) – subsecretaría SG. Estudios. Ministerio de industria, turismo y comercio de España
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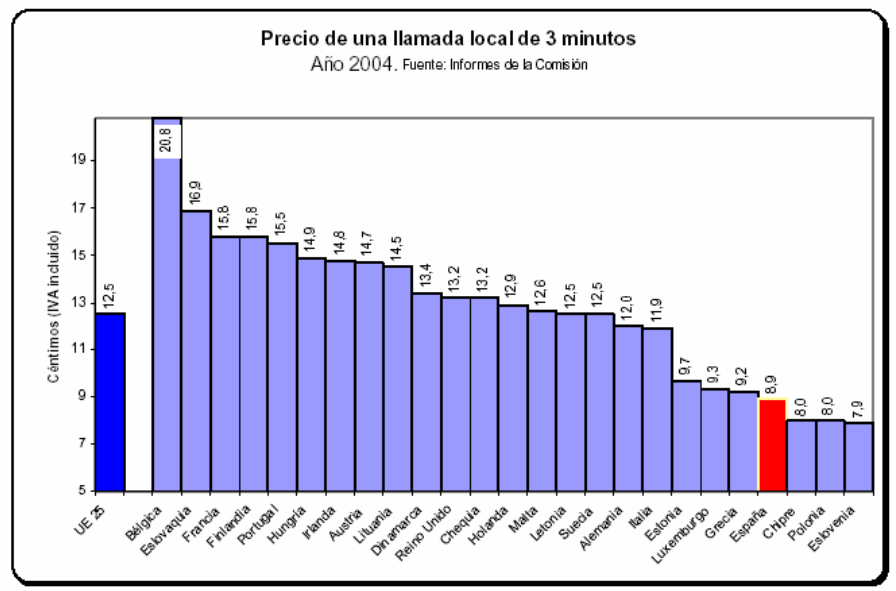

Source: Indicadores comparados de servicios de telecomunicación (I Telefonía) – subsecretaría SG. Estudios. Ministerio de industria, turismo y comercio de España
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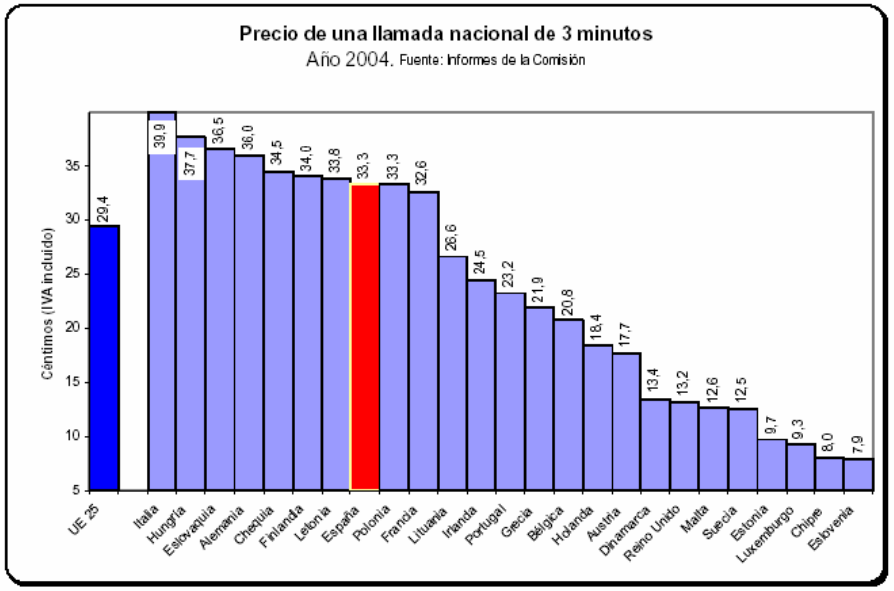
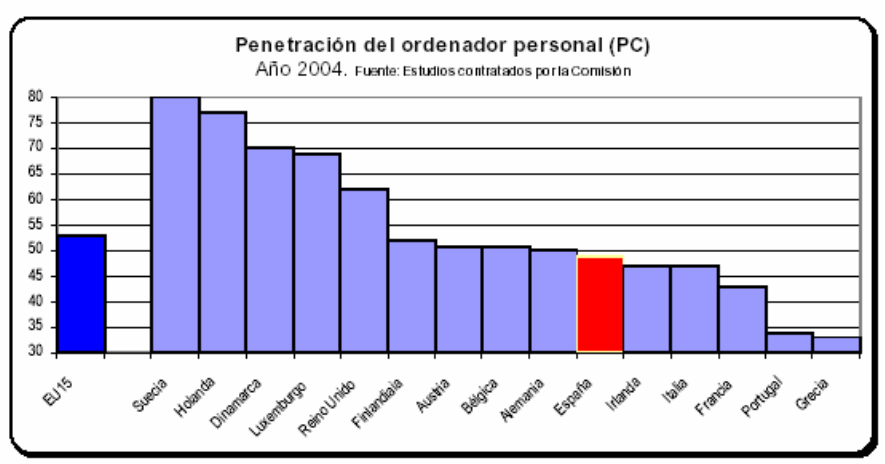


Source: Indicadores comparados de servicios de telecomunicación (I Telefonía) – subsecretaría SG. Estudios. Ministerio de industria, turismo y comercio de España
Figure 13: Price of a 3-minute-national call



Source: Indicadores comparados de servicios de telecomunicación (II Internet) – subsecretaría SG. Estudios. Ministerio de industria, turismo y comercio de España
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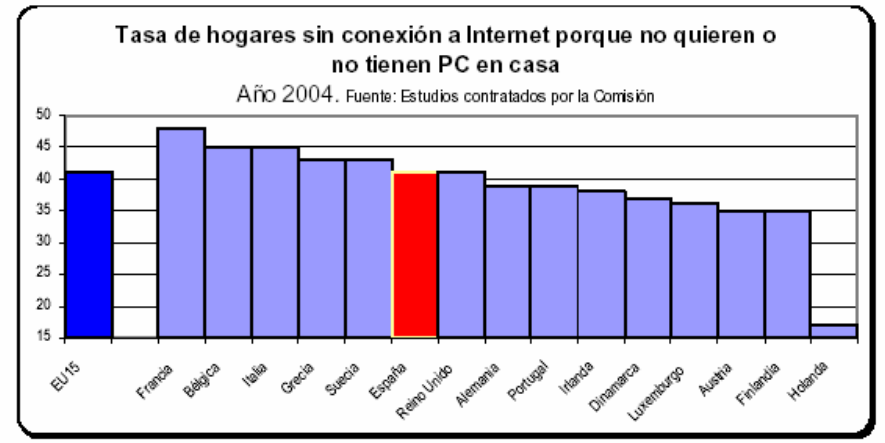

Source: Indicadores comparados de servicios de telecomunicación (II Internet) – subsecretaría SG. Estudios. Ministerio de industria, turismo y comercio de España
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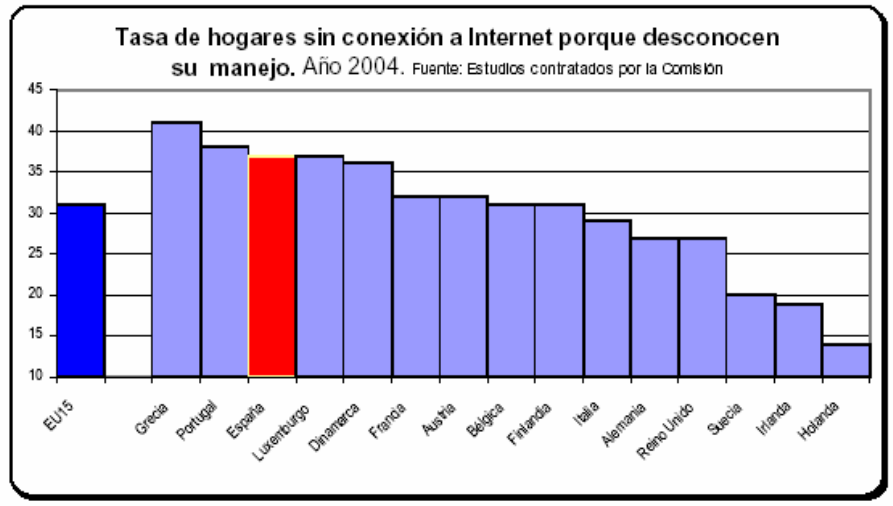
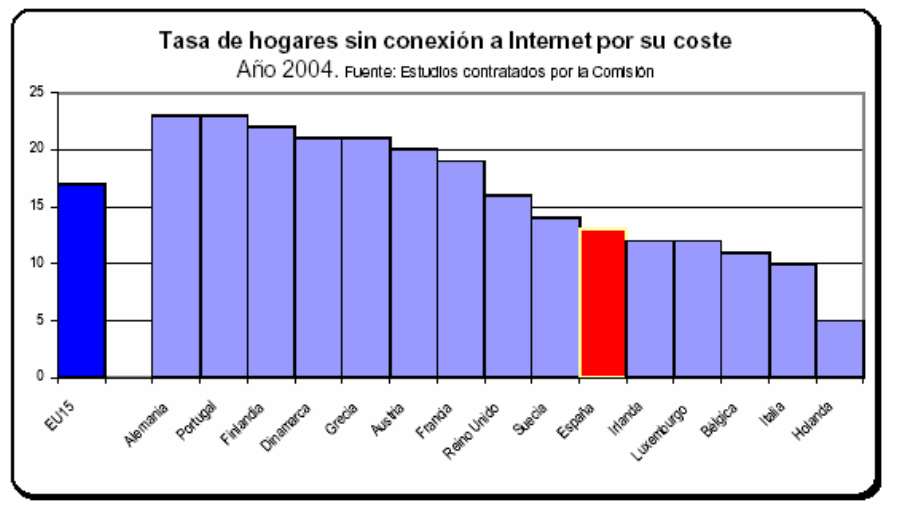
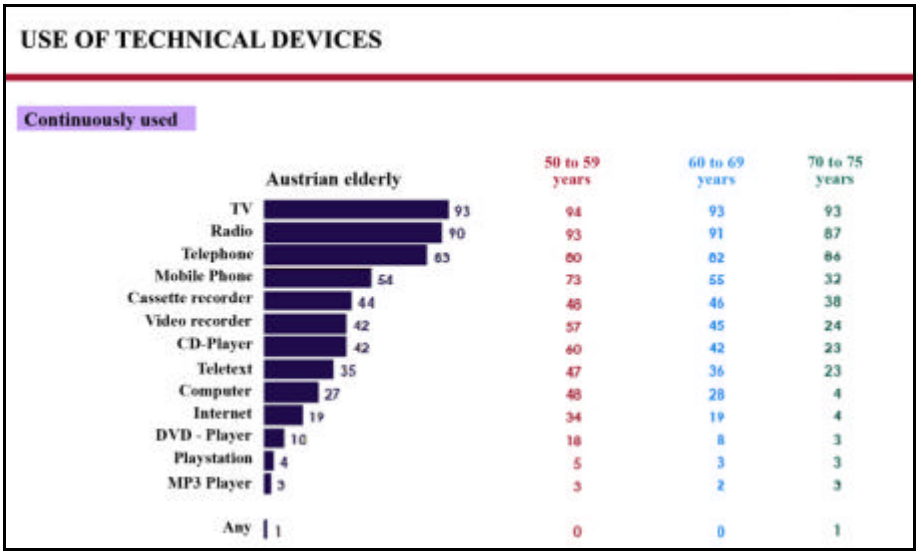


Source: Indicadores comparados de servicios de telecomunicación (II Internet) – subsecretaría SG. Estudios. Ministerio de industria, turismo y comercio de España
Figure 16: Households (in %) without connection to the Internet because they do not know how to use it.



Source: Indicadores comparados de servicios de telecomunicación (II Internet) – subsecretaría SG. Estudios. Ministerio de industria, turismo y comercio de España
Figure 17: Households (in %) without connection to the Internet because of its cost.

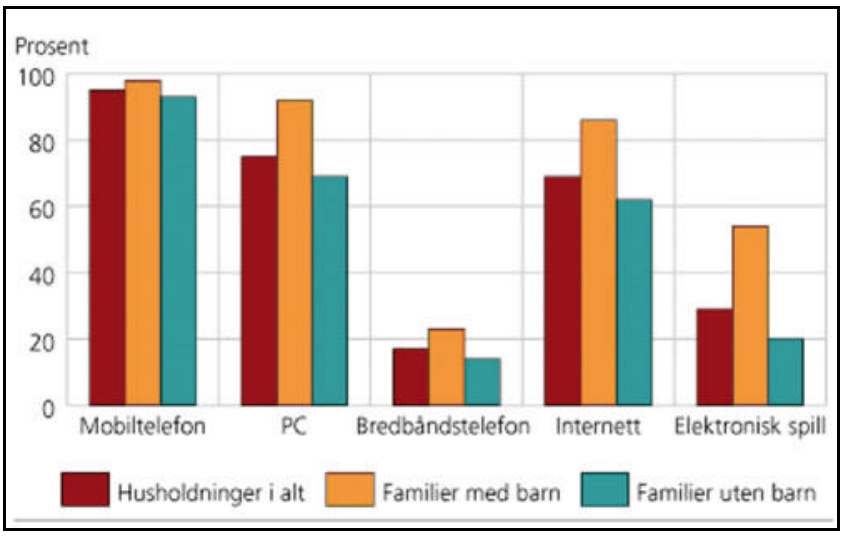


Source: Informations- und Kommunikationstechnologien für Menschen im Alter (http://www.lifetool.at/rte/upload/6_Fachforum/IKT_studie_2004_Endbericht.pdf)
Figure 18: Use of technical devices by elderly in Austria (2003)

	2004* %	2005* %	2006* %
Households with access to selected ICT (multiple answers possible)			
Mobile phone	84,6	84,9	91,2
Internet enabled mobile phone / "Communicator" type device	29,4	42,3	56,1
Fixed telephone line	-	-	92,2
TV	99,7	99,3	99,8
Satellite dish	11,9	11,6	18,4
Cable TV	0,0	1,5	8,3
Games Console	20,5	19,5	24,0
Personal Computer	47,2	46,4	51,9
Desktop computer	-	43,2	47,0
Laptop computer	-	12,1	17,9
Handheld computer (Palmtop)	2,2	2,3	2,5
Households with technical capacity to access Internet from home, regardless of whether it is used	52,8	-	60,3
Households with Internet access (Internet was accessed from home at least once)	-	31,7	36,7
Devices used in households to access the Internet at home (multiple answers possible)			
Internet enabled mobile phone (WAP, GPRS)	3,4	4,0	4,7
Personal Computer	34,4	31,5	35,7
Handheld computer (Palmtop)	0,7	0,8	1,1
Devices that are used by households as a unique way of accessing the Internet			
Only Internet enabled mobile phone (WAP, GPRS)	0,2	0,2	0,8
Only personal computer	30,7	27,5	30,5
Types of Internet connection used by households to access Internet (multiple answers possible)			
Modem (dial-up access over normal telephone line) or ISDN	34,1	27,5	24,0
Broadband connection			
DSL (e.g. xDSL)	2,4	4,5	12,1
Wireless connection	3,6	3,8	4,6

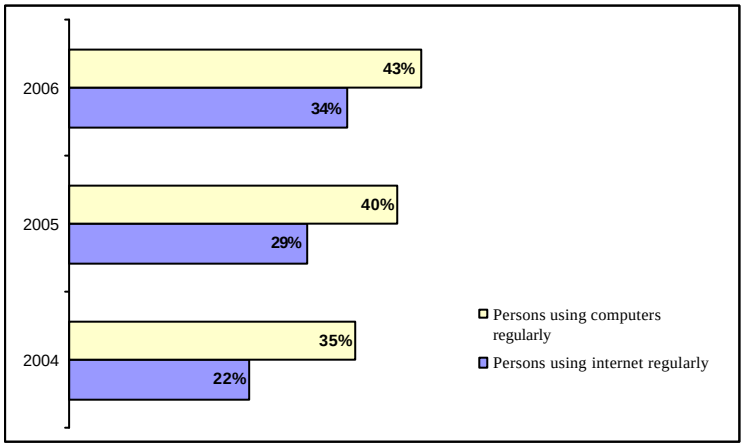
* Data refers to the first quarter of year, unless otherwise is stated
Source: CYSTAT (http://www.mof.gov.cy/mof/cystat/statistics.nsf)

Figure 19: ICT usage in households (Cyprus)



Source: SSB IKT i husholdningene 2006 (http://www.regjeringen.no/nb/dep/fad/dok/regpubl/stmeld/20062007/Stmeld-nr-17-2006-2007-/4.html?id=441525

Figure 20: Percentage of households with access to ICT by family type, 2nd term 2006 (Norway)



Source: Glówny Urzad Statystyczny (http://www.stat.gov.pl/dane_spol-gosp/spoleczenstwo_informacyjne/2006/index.htm)

Figure 21: Percentage of persons using computers and internet regularly in Poland

Annex 2. The questionnaire

Questionnaire for the M·Power partners to collect information for each country:

As you know, we are carrying out a study which will result in the Deliverable document "Socio-economic, regulatory and policy studies" for the M·POWER project.

We would be grateful if you could provide information regarding YOUR COUNTRY through this next questionnaire. When available, we would like you to provide us with the sources (documents, websites, papers, reports, etc.) which contain the data we are seeking.

Q.1.Demographical and social aspects:

Which sources could provide demographical, economical and social data in your country concerning "elderly and cognitive disabled"?

Which is the distribution of cognitive disabled by age?

What is the distribution of the different dependence degrees? Which percentage of the elderly and cognitive disabled live in private houses, in geriatric institutions, in hospitals, in residencies?

Q.2.Social and medical care:

Can you provide data sources for the distribution of medical assistance and social work data regarding elderly and cognitive disabled?

Which is the general distribution in your country of public and private healthcare coverage? How many of them (elderly and cognitive disabled) are covered by Social Security?

Q.3.Provision of services and associated facilities:

Which are the current most popular IT services in your country? (Mainly in Smart House , tele-care systems, distributed healthcare, but more general as well)

Which are the most relevant and well-known associations that support and help elderly and cognitive disabled in your country?

How do your public institutions promote the ICT use among the elderly? (Do they offer courses, financial help, etc.?)

Q.4.Access, availability and affordability of technological resources:

Could you please provide some source with statistical information regarding the number of ICT infrastructure implementations and availability of ICT technologies in your country? (ADSL, WiFi, cable, etc.)

Could you please provide some information regarding distribution of ICT devices? (Telephone, mobile, PC, TV, PDA, etc.)

Q.5.Privacy and data protection:

Could you please provide some information about legislation concerning privacy and personal data protection in your country? And specifically for medical applications?

Q.6.ICT legislation:

Could you please provide some information regarding ICT general legislation and ICT legislation affecting old people in your country?

Q.7. ICT Standardization – Information and security standards:

Could you please provide some information on ICT standardisation in your country, relevant to services for the elderly and cognitive disabled?