Deliverable

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Author	Michael Huch, VDI/VDE Innovation + Technik GmbH with contributions from Queen's University, Global Security Intelligence and Trilateral Research & Consulting LLP

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Project co-ordinator name:	Dr. R. Ben Knapp
Organisation:	Queen's University Belfast
	E-mail: b.knapp@qub.ac.uk

Project website: http://www.braidproject.eu/

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1. Introduction – Scope of this analysis

This report is a deliverable of the European funded support action BRAID – Bridging Research in Ageing and ICT Development (duration 01.03.2010 – to 29.02.2012). Its intention is to identify needs and interests of different stakeholders in the area of "ICT for Ageing". Its results shall be fed into two work packages of the BRAID project; firstly a work package that analyses the appropriate coordination mechanisms for different stakeholders identified and distinguished in this report, and secondly, a work package in which a series of workshops is conducted with stakeholders.

This analysis takes into account a series of recent publications. While many studies mention a lack of evidence based research in the context of usability and economic efficiency of "ICT for Ageing" solutions, there is – although starting from a very low level – an increasing number of published studies that try to fill this gap. Much of this work has been funded by the European Commission, DG Information Society and Media.

One of these studies is the European study on ICT and ageing[1]. It acknowledges the area of ICT and ageing to be a very important research arena and – yet only – an emerging market segment. The study is primarily a stand alone piece of work and the sketched picture of the market is still not sharp: For a reliable estimation and deployment of the "silver market", trustworthy and representative data are missing – in relation to the user needs and uncovered societal demand.[2] In consequence, every new study seems to introduce a new scheme to segment "ICT and Ageing" market categories. This "problem" is to a large extent contingent upon the variety of definitions and the lack of clear cut lines between the products and services offered, touching parts of regulated and unregulated markets at the same time.

The statement that ICT for ageing is not yet a market is also supported by the authors of this analysis, based on their extensive work in the ICT and Ageing area (e.g. in following initiatives and projects: Ambient Assisted Living Joint Programme, AALIANCE, CAPSIL, ePAL, SENIOR, and the Joint Programming Initiative "More Years, Better Lives"). There is thus far an absence of evidence derived from large-scale empirical investigations concerning the uptake and spread of ICT for ageing solutions. Mindful of these difficulties, the present analysis sometimes offers educated guesses on market aspects and the scope of usage of ICT devices. The authors of the study "Analysing and federating the European assistive technology ICT industry"[3] expressed it this way: "The lack of homogeneity and comprehensive information gathering makes it virtually impossible to analyse data, especially quantifiable market and economic data, in a reliable, credible fashion."

[1] empirica, wrc, 2010
[2] Cf. Naegele, 2010, p. 257
[3] Robotiker-Tecnalia, AAATE, IBV and NG4ALL, 2009: This study grouped five product categories for the analysis: Hearing aids, Environmental control systems, communication devices, software and Braille readers.

2. Definitions

In the following, the term "ICT for ageing solutions" includes the widest spectrum for marketable products, services or combinations of both. ICT for ageing stands for any information and communication technologies or devices and/or services based thereon that increase

- the potential for a self-determined independent living of senior citizens, and
- the productivity of professional users that work with senior citizens.

In this broad meaning, ICT for ageing solutions span a wide market segment, starting with single ICT devices, e.g. fitness watches that measure the heart rate while the user performs sports activities, and including comprehensive packages of ICT devices, products and ICT based services, such as telemedicine, which involves a bigger number of "value creation actors".

A similar definition was provided by the EC in 2006: "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."[4]

In its 2007 adopted Action Plan "Ageing well in the Information Society" the European Commission introduced a tripartition of the filed of action: [5]

- Ageing well at work or 'active ageing at work'
- Ageing well in the community
- Ageing well at home.

This concept found its way into the statutes of the AAL Association, the implementation body for the AAL Joint Programme. However, at least in the first two years of operation, the first bullet point active ageing at work played no role – the topic was not considered mature enough to be addressed by a call for proposals.

Malanowski introduced a new research framework for "ICT-based applications for active ageing (ICT4AA)"[6] in which active ageing represents a concept in which elderly people actively participate to the society, even after their working life and despite any limited physical abilities.

The "ICT and Ageing" market

A few studies have tried to analyse the ICT for ageing market and, in the absence of generally accepted and used terminology, several proposals for a categorisation of this market have been brought forward.

[4] European Commission, 2006, p.21
[5] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0332:FIN:EN:HTML
[6] Cf. Malanowski, 2009, p. 122 et seq.

The aforementioned ICT & Ageing study developed its ICT and ageing market analysis in the core technology areas telecare, telehealth and smart homes as presented in the following figure. The basic distinction between telecare and telehealth is the varying level of complexity and actor involvement, with telehealth being much more comprehensive and by far less mainstreamed at this moment. Smart homes include domotics technologies. The MPower project consortium defined a smart home as one which "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 to recognise the user interaction, sense the situation and observe the context of the interaction and give data inputs that can be analyzed and utilized for related decision making."[7]

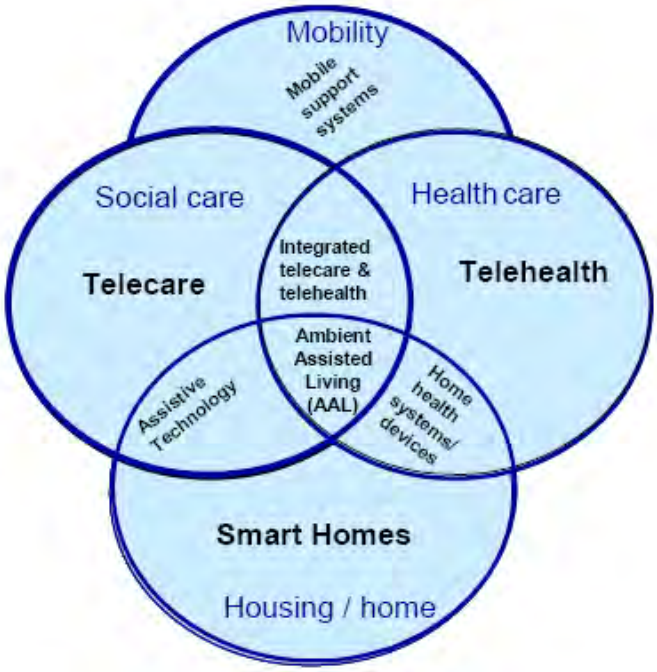

Figure 1: Three core technology domains (Source: ICT & Ageing Final Report, p. 18) with mobility associated as a fourth dimension

In comparison to this, the Ambient Assisted Living Joint Programme developed a demand-perspective for assistive technologies. Of course, the original intention of the exercise was to define the scope of AAL topics and activities, but the concept, as presented in the following figure, was further developed into market segments. The figure distinguishes broadly demand and needs of persons – not necessarily older persons only. The figure depicts a distinction between the needs inside and those outside of the preferred living environment (which could be private home or a professional care home).

[7] M Power, 2007, p. 43

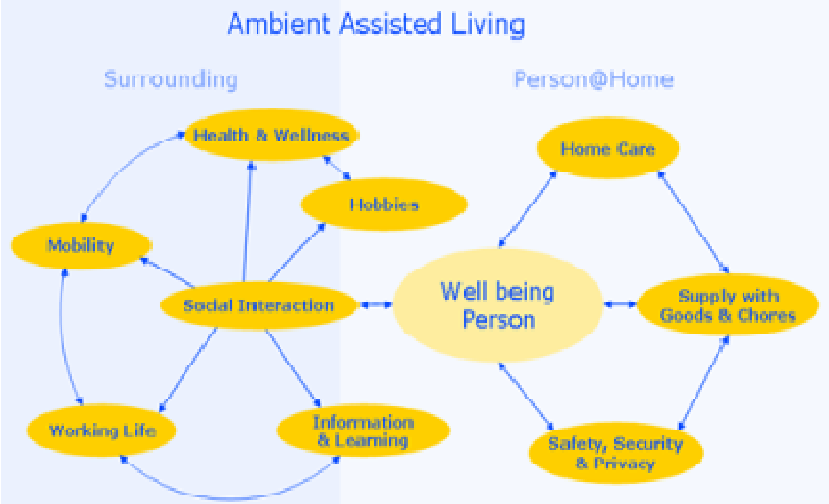

Figure 2: Demands of older persons (Source: AAL Specific Support Action project[8])

The authors of the study "ICT enabled independent living for the Elderly"[9] proposed a segmentation for AAL products and services that is based on the approach of the AAL Joint Programme indicated above, but reduced to four categories referenced as "research topics":

- Health and home care
- Social interaction
- Safety and
- Supply with daily goods and chores.

The study analysed the ratio of AAL products addressed in research projects funded in the member states of the European Union.

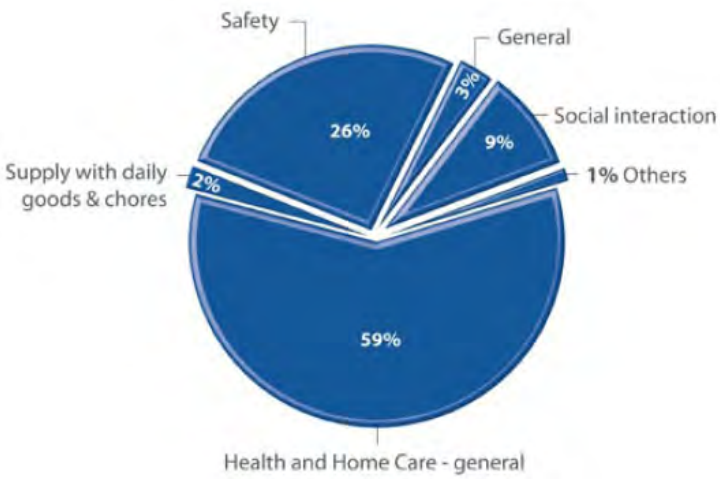

Figure 3: Ratio of AAL products in EU-27 (Source: VDI/VDE-IT (2010)[10])

Figure 3 presents evidence that AAL-related research is predominantly focussing on the health and care area, followed by safety products. The research topic "Social interaction", which comprised products and services in information provision, learning, hobbies, working life and mobility, was considerably less covered. A last category included home supply and service provision – and in this category, publicly funded research was almost not detectable.

[8] AAL SSA, 2006, p. 15
[9] VDI/VDE-IT, 2010, chapter 7.3
[10] Ibid. page 31

For the purpose of this analysis, and acknowledging the above findings, the authors propose yet another categorisation of the ICT for ageing market into only two market categories:

Healthy ageing
and
Active and inclusive ageing.

Notwithstanding that single solutions can serve both categories, the proposal for the two categories is made for mainly three reasons:

- Firstly, the proposed segmentation emphasises the main historical drivers of "ICT and Ageing" solutions: One major driver for ICT and Ageing technologies and services relates to electronic health and care solutions – and this is reflected in the "Healthy Ageing" market segment. The second important driver relates to smart home (or domotics) technologies. Solutions compromised in this segment are predominantly requested and taking place or are installed in the own place of living. This category also contains solutions that are by negative exclusion not related to health or care issues.

- Secondly, any market segmentation must contain a critical mass of products and services. E.g. a market segmentation for "AAL at work" products or solutions would reveal almost no products. The ratio of AAL products as indicated on the previous page suggests that approx. 60% of solutions appear in the "healthy ageing", and 40% in the "active ageing" market segment. This figure – also subject of validation in further market studies – justifies the taken approach of two segments.

- Thirdly, the type of business model is distinct for the two chosen segments.

Market segment: Healthy ageing[11]
Continuous health surveillance with ensured medical intervention
- Telemonitoring, telehealth, telemedicine, social alarms
  - Telemedicine is the provision of healthcare services, through the use of ICT, in situations where the health professional and the patient are not in the same location. It involves secure transmission of medical data and information, through text, sound, images, or other forms needed for the prevention, diagnosis, treatment and follow-up of patients
  - Telemonitoring is a telemedicine service aimed at monitoring the health status of patients at a distance. Data can be collected either automatically through personal health monitoring devices or through active patient collaboration (e.g., by entering weight or daily blood sugar level measurements into a web-based tool). Data, once processed and shared with relevant health professionals, may be used to optimise the patient's monitoring and treatment protocols. Telemonitoring is particularly useful in the case of individuals with chronic illnesses
  - Social alarm means a reliable communications system and network including portable equipment which allows a person in distress to initiate a call for assistance and to send an alarm by a simple manipulation;

[11] Indented definitions are taken from European Commission, 2010a

Provision of Care

- Telecare
  - Telecare is the provision of social care from a distance supported by means of telecommunications and computerised systems. Telecare usually refers to equipment and detectors that provide continuous, automatic and remote monitoring of care needs emergencies and lifestyle changes;

Carrying out Prevention and Rehabilitation

- Maintenance or re-establishment of the personal constitution e.g. by means of
  - Teletraining and educational support with the provision of training and education through the use of ICT, in situations where the health professional and the patient or their caregivers are not in the same location. In this context, professionals train patients or carers on healthy habits and provide relevant information about their illness and how it should be managed. The objective of this intervention is to allow the patient to be well informed and able to self-manage their conditions and to help the care giver provide a better care service. Usually, this empowerment process is supported by professionals.

Required IT-Infrastructure

- Accessibility to and comprehensiveness of personal health data
- Data security, data protection
- Operating reliability

The predominant *business model* in this market segment is that the products and services will be marketed and exchanged on the regulated health and care market. Users are in many cases paying indirectly, via their payments to health insurers. Private out-of-pocket expenditures take place, but to a limited extent, though expectations forecast growth of turnover.

Market segment: Active and inclusive ageing

Independent living

- Smart white goods and household appliances for carrying out daily chores as cleaning, cooking, washing, etc.
- Intelligent services (e.g. home delivery services)

Practicing social exchange

- Real and virtual social networks, i.e., Web 2.0 senior communities, TV set-top boxes for video calls, etc.

Satisfying intellectual needs: Infotainment, work and hobbies

- Stimulation, access to culture
- Life-long learning
- Work and/or Voluntary work

Moving around

- In and,
- Around the flat and
- On travel

Living in a safe environment

- Protections from threats, e.g., by enhanced door opening systems, intelligent kitchens and lighting systems etc.

Business models in this segment predominantly directly address the users (or their relatives), i.e. target at direct (out of the pocket) or indirect (subscription models) purchases.

It is considered irrelevant here to distinguish the methods of provision or instalment of the ICT for ageing solutions. Some are provided as fixed solutions, others as mobile or portable ones; some are installed in the private home, others in care homes or even touristic settings; some will appear in public buildings and infrastructure. But common is the fact that data are exchanged via the information and communication infrastructure – and it is a major challenge to build up the required capacities for a mass roll-out of the solutions.[12]

[12] Hence, the EC proposed key action 8 in its Digital Agenda, 2010b, setting ambitious broadband targets, p. 21

3. Stakeholder identification

3.1 Categories of stakeholders

Based on the work package description for this deliverable, the identification of stakeholders is proposed to be made in four main categories, as explained in the following table.

Categories	Type of stakeholders
Primary Stakeholders	Private users of ICT for ageing solutions ▪ Senior and impaired citizens, ▪ Private caregivers; usually family members or relatives
Secondary Stakeholders	Professional users of ICT for ageing solutions: ▪ Medical professionals, e.g. operating a tele-medicine centre o Professional care providers; care homes ▪ Other service providers o Housing associations ▪ "Mobility" providers o Tourism industry o Public Transport Members of this group have a B2C-relation to the primary stakeholders, i.e. they "sell" ICT for ageing solutions to clients, and a B2B-relation to tertiary stakeholder, i.e. they "buy" ICT for ageing solutions from suppliers.
Tertiary Stakeholders	Suppliers of ICT for ageing solutions ▪ Research organisations: Public and private ▪ Enterprises o (Large) Enterprises with a business in tele-medicine or tele-care (e.g. Bosch, Philips, Tunstall) o Providers of the IT infrastructure: Networks and databases (Telecoms, data warehouse providers) (side example: Personal Health Records o Small and medium sized enterprises: hard- and software and/or service provision
Quaternary Stakeholders	Supporters of ICT for ageing solutions ▪ Policy-makers ▪ Social (and private) insurance companies ▪ Employers ▪ Public administrations ▪ Standardisation organisations ▪ Civil society organisations ▪ Media

Table 1: Stakeholder categories of this stakeholder analysis

3.2 Assessment criteria for stakeholders

Each of the following chapters firstly introduces the respective stakeholder category. After this introduction, the needs and interests of the identified stakeholders are described on the basis of following criteria:

Categories	Explanation
Strategies of stakeholders	Do the stakeholders follow a coherent or a diverging strategy? A coherent strategy helps to enforce the deployment of ICT for ageing solutions and if the stakeholders do not commonly agree to a strategy, the market introduction is delayed.
Power position of stakeholders – economically or politically	The power relates to the potential to enforce the deployment of ICT for ageing solutions. In economic terms, it spans from: ▪ The ability of the private and the professional users to afford the costs of the use of ICT for ageing solutions ▪ To the amount of investment and marketing budgets of suppliers ▪ To the amount of budgets of authorities to acquire any solutions ▪ Or the ability for health and care insurances in the regulated market to take ICT for ageing solutions into the items eligible for a refunding from the insurance. In political terms, power stands for the ability to lobby the topic on the political agenda and to create a positive environment for further investments.
Knowledge	Knowledge spans from technical knowledge (functionality, interoperability, safety and reliability) to economic knowledge (price-value reflections, return on investment, competitive situation) and legal knowledge (data access and protection).
Visibility	Visibility refers to the stakeholder's position (see strategy) towards ICT for ageing solutions, i.e., whether the stakeholder actively promotes their introduction or not.
Independence/ dependencies	Does the stakeholder hold his position independently or is he dependent upon other stakeholders? As ICT for ageing solutions are predominantly exchanged on the regulated healthcare market, suppliers depend on the uptake of their products and services into the catalogue of products and services that are accepted for refund by the healthcare insurance.
Potential gains and losses	In this category, it is investigated whether the respective stakeholder will win or lose with the introduction and deployment of ICT for ageing. The position is interpreted only in economic terms, but also in terms of influence.
Existing networks	Is the stakeholder networked or rather acting on his own behalf? Networks are likely to increase the power of stakeholders. Networks are a mechanism for stakeholder coordination and this issue is taken up in WP3 of the BRAID project, which deals with the identification and the analysis of mechanisms for stakeholder coordination.

Table 2: Criteria for assessment of stakeholders

3.3 Primary stakeholders – Private users

The primary stakeholder category comprises private users of ICT for ageing products and services. Among the private users, we include senior citizens who use the solutions and people who need assistive technologies. Also persons working with people in need for assistive technologies are included in this category; these are private caregivers and very often members of the family of the person who needs care.

Senior citizens do not constitute a homogenous group. Senior persons differ in many ways, e.g., in their physical and psychological fitness, in their attitude towards use of technologies and/or services, in their cultural background, in their economic potential and their ICT skills. National, ethnic and gender differences also come into play. Moreover, people's needs and expectations evolve with time. Following an operation or period of illness, for example, elderly persons may require increased levels of care whilst they recuperate. They may then be able to resume their former lifestyle with less support from carers. A survey revealed the following majority opinion: "In almost all Member States, a majority of respondents said it was very important to use public budgets to support services allowing older people to stay longer in their homes."[13]

Various authors have developed approaches to characterise the group of older users of ICT for ageing products and some distinct approaches – relating to life-course, health status, Internet usage, social and economic criteria – are introduced hereafter.

Recommendations from Gassmann and Reepmeyer in reflection to the WHO concept of active ageing[14] distinguish needs with regard to quality of life in five – quite broad – areas health, safety, independence, mobility and participation[15]. In this context, it was proposed to differentiate the group of older persons according to a *life-course perspective* which would differentiate in "the age close to formal retirement, the autonomous age as a pensioner (period of independent living), the age with increasing handicaps (the start of the dependent living phase) and the dependent pensioner phase".[16]

Yet, scarce work is available on the potential contribution to improve or extend the work life of aging persons, either during the professional life or after having entered the retirement age. With a view on the vast differences in individual aging, Neena Gill, Member of the European Parliament, states that "… we can no longer say that because someone is sixty they are ready for retirement."[17] The ePal project published a roadmap towards the extension of professional life and specifically encompassed societal, organisational and technological perspectives. Among the technological perspective, the roadmap specifies, among others, adaptable user interfaces, advanced collaboration support services incl. virtual teams, new networking models for elderly communities, while acknowledging that many of the existing ICT solutions are not aimed at senior staff.[18]

More specific to *health and well-being*, distinctions of the users depend on the nature of the disease concerned. People with diseases like dementia, Alzheimer's, diabetes, glaucoma, high blood pressure, heart disease, stroke, CHF, COPD, etc. have different user needs according to

[13] European Commission, 2008a, p. 13
[14] Cf. Malanowski et al., 2008, p.13 et seq.
[15] Cited by Malanowski, 2009, p. 110 et seq.
[16] Malanowski et al., 2008, p. 11
[17] Cf. Mordini/Mannari, 2008, p. 37
[18] Cf. ePal, 2010, 7/8

their health problem compared to the older person in a wheelchair, or those close to being blind or deaf.

Differences within the primary stakeholder category are also expressed by the existing "digital divide" which stands for non *usage of the Internet* by older persons: "In 2007, 57% of people aged 55-64 had never used the internet; in the age group 45-54, the proportion was 39% and for people aged 35-44 it was 28%"[19]. Digital exclusion is a fact that impacts a strategy. Some persons simply oppose the use of modern IT devices[20] – and those will be almost impossible to be addressed by ICT for ageing solution providers.

It is also evident that *educational background and the income situation* do have a high impact on the use of the internet. The higher the educational degree obtained and the wealthier a person is, the more it will use the internet. And males between 70 and 79 years use the internet three times more than women.[21] Introduced by the Grey-Gruppe Deutschland, *consumer behaviour* of older persons distinguishes the older consumer into three categories:

- the "Master Consumer" is an active consumer, oriented in experience and adventures with a high educational level and high income
- the "Maintainer" enjoy their leisure and free time thanks to a good conditional constitution but continue their lifestyle as in the past, whereas
- the "Simplifier" lead a retreated life of a more traditional pensioner's role model, also usually with less consumption due to lower income.[22]

All of these distinctions in the user group reveal not only different needs for ICT for ageing solutions on the side of the users, but also the demand for differentiated business models of the suppliers.

After this introduction, more arguments are provided for the above introduced categories with the objective to further contribute to the understanding of the users of ICT and ageing solutions.

Primary stakeholder	
Strategies of stakeholders	Due to the very different needs, users do not follow a common or coherent strategy. However, they are widely unified in their wish to: ▪ extend the time that they can live in a decent way in their preferred environment avoiding institutional care wherever possible by increasing their autonomy, self-confidence and mobility, ▪ be supported in maintaining health and functional capability, especially when affected by chronic illnesses or disabilities, ▪ enhance their security, to keep social inclusion and to maintain their surrounding multifunctional network, ▪ be supported by carers, families and care organisations. [23]

[19] Commission Staff Working Document, Demography Report 2008: Meeting Social Needs in an Ageing Society, Executive Summary, SEC (2008) 2911, p. 9 et seq.
[20] See more figures and explanations in Empirica, wrc, 2008, chapter 2
[21] Cf. (in German) Abschlussbericht zur Interdisziplinären Längsschnittstudie des Erwachsenenalters (ILSE), Heidelberg, 2008, p. 106 et seq.
[22] Cf. Naegele, 2010, p. 257

	Informal carers constitute a group of their own. They are predominantly female relatives who provide the care of the person who is in need of this. This group certainly follows a strategy that is close to the professional caregivers as described further below.
Power position of stakeholders – economically or politically	The absence of a coherent strategy weakens the political power of this category of users. Although the cohort of elderly persons is sharply increasing in most European populations, it is not yet clear whether the degree of its organisation as a "power group" (e.g. a political party or strong wing within political parties) is keeping pace. Economically, the user group is heterogeneous and there is a North-South divide in Europe: as in the Northern hemisphere more elderly are economically independent than in the South. Elderly representations as the Age-Platform have taken an overall positive position concerning the use of "ICT for Ageing" solutions. They see the positive contributions that ICT can provide to extend the period of a self-determined life of older persons. However, they demand to tackle ethical issues and they believe that these are best respected through the comprehensive involvement of elderly users in development and testing phases of "ICT for Ageing" solutions.
Knowledge	The topic "ICT for Ageing" has been covered in widely accessible printed and online media as well as on TV, although the "ICT" element is by far less an issue as ageing per se. The German health magazine with the biggest circulation is the monthly *Apotheken Umschau*, distributed free by German pharmacies. Its print run is close to 10 million copies and every issue is read by two persons, i.e., every copy has almost 20 million readers. The magazine is accompanied by an online portal[24] that also has featured articles on assistive technologies. The same publisher (Wort & Bild Verlag) issues the *Senioren-Ratgeber* with close to 2 million printed copies that are read by close to 5 million readers. The online version of this senior magazine also provides information and stories about assistive technologies.[25] The example of this German publisher demonstrates that, at least for a period of transition, the older persons are best addressed with TV (see example in chapter 3.6), print and online media. As there is still a high level of Internet ignorance among senior citizens, print media, such as magazines and newspapers, appear to be still one of the best ways to raise awareness about ICT in the ageing area. A factor in raising awareness is conferences, events and fairs – and more

[23] Cf. (in German) Bundesministerium für Familie, Senioren, Frauen und Jugend, 2005, p. 236 and p. 246 et seq.
[24] www.apotheken-umschau.de/
[25] Online article on technology enhanced living on the German website: www.senioren-ratgeber.de/altersgerecht-wohnen-A090904GOK0Q122235.html

	of them are open to direct participation of older persons themselves, i.e., they not targeted at an expert clientele only.[26] See the BRAID WP 3 report for more information on these and other stakeholder coordination mechanisms. Despite the growing amount of information on "ICT and Ageing", "barriers to ICT uptake among older people include a low readiness to inform themselves before they need care."[27] Knowledge creation can be viewed as a marketing issue that lies in the hands of product and service providers. These actors are introduced within the tertiary stakeholder category. Their efforts in knowledge creation with reference to "ICT and Ageing" are somewhat limited as the "ICT for Ageing" solutions market is still in its infancy. Generally, product categories are not adequately defined nor easily understandable, and distribution channels are weak. With this short analysis, we view the primary stakeholder group still on a low but ever-increasing level of knowledge concerning the potential of "ICT for Ageing" solutions for various use cases.
Visibility	Primary stakeholders are not visible as individual persons. They are represented by senior citizen associations such as the Age-Platform or national associations. Such associations formulate a position on the usage perspectives for ICT (potential for uptake, further demands from the users) on their behalf. Other stakeholders, including the public, view these associations as politically visible in drawing attention to these issues, although ICT research is not really their top priority. Some segments of the senior population, e.g., elderly migrants of non-European origins, are almost invisible in this context. They may have specific needs which can differ substantially from those of Europeans.
Independence/ dependencies	Primary stakeholders are presumably independent in making their own choice to use or not to use "ICT for Ageing" solutions. This is especially true for the well-informed with a sufficiently high income. In turn, some segments of the senior population do depend on grants or subsidies for use of such ICT for Ageing products and services, or for other means of motivating and stimulating the usage of "ICT for Ageing" solutions.
Potential gains and losses	Primary stakeholders are most likely to derive significant benefits from wide diffusion and availability of "ICT for Ageing" solutions – as long as such solutions actually to provide senior citizens with increased self-determination, as the marketers and others have promised.

[26] See, e.g., Forum on the Future: Longevity: www.zukunftsforum-langes-leben.de/index.php?id=387&L=2
[27] Redecker and Centeno, 2010, p. 21.

	A certain risk is present in cases where the introduction of technologies leads to a replacement of human contacts and relations. Age-Platform has mentioned other concerns in a statement on ethics and ICT usage by older persons.[28]
Existing networks	It is more likely to be associations, rather than networks, that reach senior citizens and lobby for their requirements. End-user groups and their associations usually encourage senior citizens to take advantage of the possibilities that information technology brings to society and at the same time to promote to the industry the concept of a technology adapted to the needs of senior users. Most notable among these organisations is the AGE-Platform that counts about 150 organisations from European Member States and beyond among its members[29]. The AGE-Platform acts as an umbrella organisation of numerous European and national end-user associations. Additional example organisations in this respect are SeniorNet Sweden[30], seniorennet.be in Belgium[31] which is a similar site for the Belgian Dutch-speaking elderly; HI (Hjälpmedel Institutet)[32] and ASPHI in Sweden and Italy respectively, organisations devoted to promote the support to disabled people and people with special needs, etc. Suppliers of ICT for Ageing solutions are advised to cooperate with these representations.

[28] www.age-platform.eu/images/stories/EN/pdf_AGE-ethic_A4-final-2.pdf
[29] www.age-platform.eu/en/about-age/age-members
[30] www.seniornet.se/
[31] www.seniorennet.be
[32] www.hi.se/

3.4 Secondary stakeholders – Professional users

Among the secondary group of stakeholders, we analyse persons who use ICT for ageing solutions from a professional viewpoint. These persons or organisations do closely work with private users – or in other words: the private user is the subject of their work. Professional users are employing "ICT for Ageing" solutions in the course of the provision of services for primary stakeholders, i.e., the usage of the "ICT for Ageing" solution is an integral element of their value creation.

The spectrum of professional users covers representatives of the health sector, e.g. medical services that run a telemedicine service, the care sector, e.g., providers of telecare services and care homes who offer resident monitoring services, social organisations that provide extended emergency call services. These types of professional users are predominantly active in the healthy ageing market side. Housing corporations that offer ICT based living services or the (public) transport and tourism sectors with yet less clearly visible and defined services are instead addressing the active and inclusive ageing side of the market.

Secondary stakeholders aim at profits or productivity gains. Typically, the business model from the professional users is B2C (business to consumer), i.e., a technical device is used in medical services and the combination is marketed as an ICT for ageing solution.

Without exception, ICT for ageing solutions will only be introduced if they function accurately in terms of the measurement, transfer and processing of patient's data.

A recent ICT in long term care workshop publication concluded, "that it is necessary to have more evidence on the real needs for care; on what type of care is needed; and on understanding under what circumstances, with what effect and to what extent, telecare solutions can effectively be employed in long-term care."[33]

Secondary stakeholder	
Strategies of stakeholders	*Medical professionals* are increasingly confronted with ICT devices and processes in their work contexts, but few of them are related to the needs of the ageing. A typical "ICT for Ageing" solution is a telemonitoring service for patients at risk. This service is typically provided by a hospital operating a central telemedicine centre. Vital data from patients are continuously transferred to the centre and monitored and analysed by trained doctors. In emergencies, ambulances are called to provide urgent care to the patient. Local physicians can co-operate in this setting as an integral part of the dissemination chain, i.e., by providing access to the patients. Such a service changes the traditional "value creation chain". If successful, a telemedicine centre decreases the number of hospital admissions, as the patient is stabilised before the admission becomes mandatory. Admissions are costly and any avoidance of this should lead to cost savings for the social health insurance – or decreasing turnover if viewed from the perspective of the hospital. Innovators among the medical professions in favour of introducing ICT are confronted with such arguments, i.e., that the introduction of ICT for Ageing services would negatively influence the turnover.

[33] Redecker/Centeno, 2010, p. 20

If a hospital introduces a telemonitoring service this would constitute a differentiation of sources for turnover. If the service is successfully implemented and advertised, the number of patients or "clients" may even increase, as the service can be promoted as an added value. Yet, the medical sector has not adopted a common positive position regarding such services: the return on investment on the high costs of introducing the system is still not assured to be reached within predictable time horizons. Many physicians oppose the remote treatment of patients. A recently published OECD study sees three aspects as crucial for the take-up of "ICT for Ageing" solutions in the medical sector:

the alignment of appropriate incentives for medical staff including a balanced and fair allocation of benefits and costs

commonly implemented standards for medical terminology and the communication between systems

privacy and confidentiality, as an issue of sensitivity, but – more important – a legal matter.[34]

Care professionals likely follow a supporting strategy for "ICT for Ageing" solutions as they seem to ultimately benefit from them. Such solutions may release staff from time-consuming administrative tasks, which will increase the productivity of staff, which is a benefit for the care provider organisation. Such solutions allow care staff to devote more of their time for the care itself. Some of the devices may release the care staff from exhausting and strenuous tasks with patients.

The use of technology among caregivers seems to be already high – at least in the USA. A study[35] revealed the following findings:

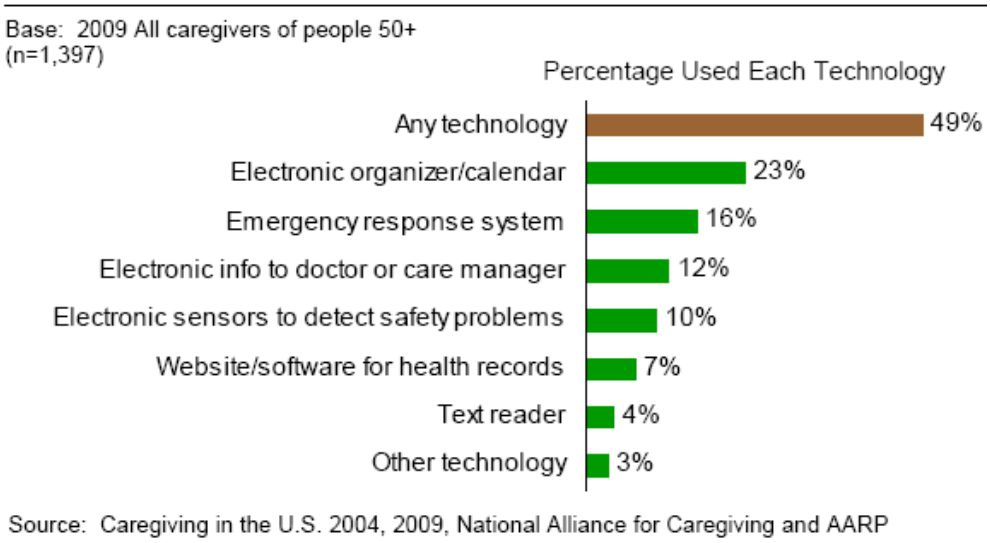

Figure 4: Use of Technology in Caregiving (Source indicated)

From the diagram above, emergency response systems and electronic

[34] Cf. OECD, 2010, p. 52
[35] Cf. National Alliance for Caregiving, 2009, p. 67 et seq.
[36] Cf. Kubitzki and Janitzek, 2009, p. 142 et seq.
[37] www.vswg-alterleben.de/ (German)

	sensors to detect safety problems seem to relate closest to what is considered as an "ICT for Ageing" solution in the sense of this study. The category "electronic info to doctor or care manager" clearly addresses a change in the work process that aims to achieve productivity gains. We assume other professional users, e.g., housing organisations or the tourism sector, are presumably supporters of early adoption of "ICT for Ageing". Their motives are either commercial benefit, e.g., a positive cost-benefit ratio of the "ICT for Ageing" solution or customer loyalty and retention: "ICT for Ageing" solutions offers the promise to extend the duration and volume of business with their customers. Also, policy decisions oblige public transport and other infrastructure investments to provide for inclusiveness of usage by all societal groups. A further motive for the private and public transport sector to invest in "ICT for Ageing" solutions is to increase the safety of older persons. A German study on safety and mobility of elderly traffic participants and road users revealed two insights: Firstly, although profiting from increased overall safety, elderly traffic participants are overrepresented among victims of accidents, and this is true for all European Member States. Secondly, senior drivers still cause fewer accidents than young drivers. In short, seniors are clearly more often at risk, but not necessarily "risky" persons themselves. The study recommends a comprehensive set of actions to improve the safety of elderly traffic participants, e.g., driver assistance systems, the ergonomic design-for-all for traffic infrastructure, e.g., roundabouts and car safety systems.[36] Professionals operating in private, non-regulated markets tend to operate under continuous economic pressure and are thus challenged to increase their productivity. Investing in "ICT for Ageing" solutions is thus a simple decision considering a positive return on investment. The German research project "AlterLeben"[37] is coordinated by a large housing organisation and specifically investigates business opportunities associated with ICT-enabled independent living services in the housing sector.
Power position of stakeholders – economically or politically	Economic pressure on all stakeholders will lead to an ever increasing interest in the adoption of ICT for ageing solutions in view of the potential gain in productivity. More studies may produce more impetus as they reveal cost-savings with the application of these solutions. This is obviously more important for the regulated market. If the studies reveal evidence of societal cost savings, health politicians will start to actively support the take-up of the solutions.

Knowledge	More events, conferences[38] and media coverage of the ICT for ageing topic will contribute to the rising number of professional users with knowledge of the purpose of the technologies and services. However, an ICT for ageing market is still in its infancy: Few products and services are available. Most products and services are still in the demonstration phase and many barriers impede a fast uptake. Mollenkopf – on the basis of analysis done in Germany – assessed that "Among caregivers the barriers are lack of information, time, and money for selecting and installing technical devices; limited opportunities for information, counselling, training; a lack of adequate training materials (e.g., in mother tongue); a high fluctuation of employees in the domiciliary care sector; and their lack of interest in and acceptance of ICT".[39]
Visibility	It is still a low number of early adopters among medical and care organisations that participate in pilot and demonstration activities, typically funded by public sources. The majority does not yet stand for a strong positive use of "ICT for Ageing" solutions. This is different with imaging techniques and methods that are widely acknowledged in the medical sector. Also in the housing sector, the introduction of "ICT for Ageing" is only at the level of few – but increasing – demonstration sites. For the tourism sector has not yet taken up ICT solutions into their catalogues.
Independence/ dependencies	The majority of health and care organisations in Europe operate in a highly regulated market and thus depend on health and care policies, health and care insurances and their own professional representatives. "As regards telehealth, there are issues of professional acceptability / encouragement to be considered. Already there are considerable differences across Member States as regards regulation and practice in relation to telephone consultation and electronic consultations, and some of these may also come to arise in relation to home telehealth. The professional users that operate in private markets depend on convincing and competitive solutions from the tertiary sector." [40]
Potential gains and losses	"The most frequently cited effect of ICTs on efficiency is related to reduced utilisation of health care services."[41] The deployment of ICT for ageing solutions constitutes a change in the relations with clients or patients. More often, i.e., for any "tele" solution, the contact will be on a remote basis. Telehealth may reduce the number of personal visits and emergency admissions to hospitals.

[38] See the European (2nd edition forthcoming) and German AAL conferences (4th edition forthcoming) that invite specifically secondary users on www.aalforum.eu and www.aal-kongress.de/
[39] Redecker/Centeno, 2010, p. 21
[40] Cf. emprica, wrc, October 2008, p. 7.
[41] OECD, 2010, p. 35.

	Within the health system as a whole, cost savings through use of ICT are not clearly proven.[42] Having analysed business models in five case studies on implemented e-health systems – including two telemedicine services – the authors concluded that "the available literature provides unclear tested guidance in actually quantifying or qualifying the benefits achieved with the introduction of an eHealth system."[43] The missing evidence for societal and individual benefits is a major obstacle for wider deployment of ICT for ageing solutions.
Existing networks	Health and care professional networks have not yet taken a unified positive position towards assistive technologies. Housing associations[44] have already identified the need of barrier-free homes for the elderly and stressed in this context the potential of ICT- enhanced homes for independent living.

[42] Ibid., p. 38 et seq.
[43] Rand and Capgemini, 2010, p. 45.
[44] www.gdw.de/index.php?mod=article_details&id_art=2589&id_mnu=23 (in German)

3.5 Tertiary stakeholders - Suppliers

The tertiary category includes suppliers of ICT and ageing solutions – again in a very broad sense. Following the value creation chain from the bottom to the top, the following suppliers are distinguished:

- Research labs that cooperate intensively with commercial actors (e.g. contract research), offer access to pilot sites for testing ICT for ageing solutions or run demonstration sites in order to support future collaboration projects
- Enterprises that produce and/or commercialise ICT for ageing devices
- Service providers that integrate solutions into their services (boundaries to stakeholders summarised within the secondary stakeholders are not strictly rigid in this case)
- Enablers, i.e. ICT infrastructure suppliers: Telecom and database providers
- Solution packagers and system integrators
- Distribution and vendor channels

Suppliers are driven by commercial interests and there are B2B (business to business) as well as B2C (business to consumer) business models represented in this category. Tertiary stakeholders aim at market shares of a new market for them in which the representatives of the secondary stakeholders are already present and active. They will invest if they are convinced they will eventually make a profit. For the time being, the market for ICT for ageing solutions does not send clear signals.

Tertiary stakeholder	
Strategies of stakeholders	All stakeholders unify the positive attitude towards the uptake of the ICT for ageing solutions – however, by following distinct and partially competing routes. It can even be cited that the fragmentation of the market – and the example is again Germany where 5,000 to 6,000 small- and medium-sized enterprises have been counted offering a huge variety of products or isolated solutions on the telemedicine market. [45] *Research actors* adapted their focus of research quite flexible to the new research programmes in the area. The ever increasing public research funds, e.g. within the eInclusion calls of FP7 (research), the ICT Policy Support Programme (large-scale pilots) or the new Ambient Assisted Living Joint Programme (time-to-market perspective of two to three years after the end of a project) are continuously oversubscribed. Parallel to this development, research organisations did expand their activities towards a more pro-active integration of the user perspective by involving user representatives in certain project development phases. This is repeatedly said to be a major factor for successful outcome of R&D activities and more programmes demand the user involvement as an obligatory funding condition. Research labs responded to this trend and new demands with either new foundations, e.g. the Institute of Innovation for Human Wellbeing[46] (I2BC) in Malaga or re-focussing to more applied research, e.g. Fatronik-Technalia[47] in the Basque country or the establishment of new networks, e.g. the Fraunhofer - Alliance Ambient Assisted Living, a cooperation of nine Fraunhofer institutes.

[45] Cf. Deutsche Bank Research, 2010, p. 7
[46] www.i2bc.es/
[47] www.fatronik.com/en/sector-prioritario.php?id=51

	Since the 1990 years, the Association for the Advancement of Assistive Technology[48] in Europe does promote the advancement of assistive technology through the conduction of workshops and conferences every each taking place every two years in turn. Already since 2001, the US based Consortium for Assistive Technology Outcomes Research focuses on the measurement of outcomes of assistive technologies[49], an approach that is proposed to be taken up more broadly by European actors too. Investments by *commercial actors* in telemedical and telecare applications have not hit the markets yet but remain research or market preparation investments. The smart home market remains scattered. Larger system integrators are not active. Leading telecom companies are involved in a number of research projects on the European level (FP7), the Spanish Telefónica being one of the most active companies in the eHealth area[50]. Yet their market investments are rather focussing on enter- and infotainment purposes ("Internet-TV"), targeting at commercial markets only. Investments in the regulated health market are still lacking. Mobile phones for seniors, however, have found their way into the telco street and online shops. The formerly stated embarrassment by specifically advertising the older person as an older person has been overcome in this specific market segment. The distribution channel, e.g. consumer electronics or do-it-yourself stores, has not yet become active in "ICT for Ageing" – due to a lack of products that can be sold "off the shelves". Certainly, the impasse for directly approaching seniors seems to be over: Mobile phones for seniors are marketed[51] as well as technical aids for daily living, even special offers by discounters. However, a commercial offer for an "ICT for independent living kit" to easily equip the apartment of seniors is not available. Additionally, the strong service component that comes along with many "ICT for Ageing" solutions still prevents the development of a simple marketing concept. Failed products and services show that there is "still an enormous lack of differentiated knowledge on the current needs of older people. Solid research on their needs is therefore an indispensable task for scientific communities working on ageing" [52]. One route of success is that suppliers devote more attention to successfully meet the needs of older

[48] www.aaate.net
[49] www.atoutcomes.com/
[50] VDI/VDE-IT, 2010, p. 50
[51] The Austrian mobile phone producer emporia has shown a commercial on German TV just before the 20.00 hrs news, see www2.emporia.at/tvspot/film/ (German)
[52] Malanowski et al., 2008, p. 21
[53] Cf. ibid, p. 25
[54] www.readwriteweb.com/archives/personal_health_records_lots_of_interest_no_users.php
[55] www.healthvault.com/personal/index.aspx
[56] www.google.com/health
[57] www.webmd.com/phr
[58] www.phrreviews.com/healthvault-phr-to-be-available-in-germany
[59] www.lifesensor.com

	people by applying the "Design for All" concept that suggests that ICT for ageing solutions ▪ can be used by as many persons as possible, including young and healthy persons, ▪ are adaptable to different user needs and ▪ should have standardised interfaces. [53] Telecare and telehealth solutions are predominantly in use in the USA and – still in trials rather than commercialised quantities – in the UK. Hence, most evidence studies on the benefits of these systems are in the majority stemming from these two countries. The three largest telecare providers are most active on these two markets (see the Box further below). Personal Health Records, as stated in the beginning, do also play an important role in the area. Several global suppliers are active on the market and it is said, that at the beginning of 2009, about 7 million adults in the US use PHR[54]. The same article considers this to be a low number and consequently estimates a slow upturn of PHR usage. Repeatedly mentioned solutions are Microsoft's Health Vault[55], Google Health[56] and Web MD, an online portal for health information[57]. At this moment, all offered solutions are free for usage by private users. In January 2010, news spread that Microsoft licensed its PHR solution exclusively to Siemens for market introduction in Germany[58]. The PHR packages of the large three US suppliers are open for add-on services from other suppliers. With this, the service range can be substantially extended, e.g. for emergency intervention. Google's solution is yet not available in other languages than US-English. The concept is rather open to include features from external providers to add and enhance the information in the own PHR or to share this information with other services. With the integration of lifestyle management features, e.g. data from sportive activities can be fed into the system, PHR solutions target at a private market segment as well. Commercial solutions are also available, e.g. by ICW[59] in Germany, but there is no information yet available on the number of clients.

Box 1: Global leaders in supply of ICT devices for telemedicine and telecare

Three European companies have positioned themselves with major investments in the area: Tunstall, Philips and Bosch.

Tunstall acknowledges itself as the provider of "market leading telehealthcare solutions (that) play a pivotal role in supporting older people and those with long-term needs to live independently, by effectively managing their health and well-being". According to information from the company's website, about 2.5 Million clients are served in more than 30 countries worldwide. The company's website also states that "The UK is leading the world in the transformation of health and social care systems and as a result, telecare and telehealth have been accepted by the Government as playing a key role in enabling new methods and patterns of care delivery, leading not only to increased efficiency but to

increased choice and independence for the service user." The evidence of this self-appraisal is supported by reported savings and other benefits under the Telecare Framework Agreement (to be replaced in June 2010 by the Telecare, Telehealth and Telecoaching Framework Agreement): Since June 2006, estimated savings to UK public sector organisations are over £36 million[60]. The savings stem from the centralised procurement performed by Buying Solutions but also from innovation gains on the side of suppliers and providers and within the wide range of more than 2,800 products and services that are available under the framework agreement. A most recent study contracted by Ofcom and published in March 2010 by Plum Consulting estimates that today over 1 Mio telecare solutions of varying complexity are in use in the UK, whereas telehealth, i.e. solutions with more or less permanent health status monitoring, is "relatively limited" with only a few of the 152 Primary Care Trusts experimenting with more sophisticated solutions at this moment.[61]

An economic analysis performed by the centre-right Think Tank "The BOW group" states that in the UK, through the Preventative Technology Grant (PTG), £80 million was invested to help English local authorities develop telecare programmes. The overall aim of the PTG was to provide telecare support to an additional 160,000 older people nationwide. £30 million was made available in 2006/7, and £50 million in 2007/8" [62]. The PTG is not longer available, Outcomes are substantial and reported in detail by the DH Care Networks[63]. At the moment, however, investments are reduced, awaiting results (expected for 2012) from the large scale pilot demonstrator "Whole System Demonstrator"[64] at which some 6,000 people participate in order to demonstrate the effectiveness of telecare and associated services.

Tunstall, with this fortunate situation in its home market operates several telehealth solutions under the brand "icp – integrated care platform". The telehealth solutions are funded by the UK National Health Service (NHS), and the recent announcement of purchase of a further 2,000 telehealth systems in North Yorkshire follows an eight month trial that is said to have revealed huge benefits for both, patients (continuous risk monitoring and thus, peace of mind)and clinicians[65]. Tunstall´s product and service range is complemented by telecare solutions that are offered to individual homes as well as to grouped housing. Additional offers comprise monitoring services, nurse call systems and door entry access controls. Tunstall is a leading global market actor in the area. In some countries, products such as emergency call systems and services are also marketed under the name "Vitaris".

Mid November 2010, Tunstall announced the landmark decision to making available its specifications for radio receiver and transmitter devices. This decision is said to be a direct response to customer feedback "that care professionals need to have the ability to offer the technology that is best suited to service users' needs in order to facilitate the wider deployment of telehealthcare solutions."[66]

[60] www.buyingsolutions.gov.uk/healthcms/healthliterature/
[61] Plum Consultants et al., 2010, page 19
[62] Yeandle, 2009, page 36
[63] www.dhcarenetworks.org.uk/IndependentLivingChoices/Telecare/TelecareOutcomes/
[64] http://webarchive.nationalarchives.gov.uk/+/www.dh.gov.uk/en/Healthcare/Longtermconditions/-wholesystemdemonstrators/index.htm
[65] www.tunstall.co.uk/News-and-Events/Latest-news/Telehealth-revolution-set-to-benefit-more-North-Yorkshire-patients-
[66] http://www.ehealthnews.eu/tunstall/2355-tunstall-launches-latest-technology-solutions-at-the-tsa-national-telecare-and-telehealth-conference (visited 18 Nov 2010)

Philips offers several modules of the telehealth[67] and remote patient monitoring market, e.g. devices as "Telestations", measurement devices for several vital data and web-based clinical review software. Today, their market is the USA where no competitor offers similar comprehensive services and coverage at the moment. There is no evidence of a greater market success of telehealth solutions in Europe, eventually except the UK where Philips is registered for the Telecare Framework Agreement (NHS procurement setting).
Philips´ "Motiva" solution "is an interactive healthcare platform that connects patients with chronic conditions, e.g. (Chronic) Heart Failure, Diabetes Mellitus, and Chronic Obstructive Pulmonary Disease (COPD), to their healthcare providers – via the home television and a broadband internet connection"[68]. No information can be found on the number of sold Motiva solutions and the website does only provide information in English; other languages are not available. Philips seems best positioned to enter the telehealth and telecare markets on the whole globe as the range of solutions are comprehensive and state-of-the-art. It is yet the market environment that prevents a successful introduction.

In a similar situation – presumably not that advanced – is Robert Bosch GmbH. The company founded the Robert Bosch Healthcare GmbH in April 2009 to promote and market a telemedicine solution under the Bosch brand. Core of the solution is the Health Buddy System[69], a remote monitoring platform that serves as a daily interface between patients with chronic illnesses, care coordinators and physicians. The system is not a self-developed solution of Bosch but an acquisition made by Bosch in the USA some when in mid 2000. The Health Buddy System was intensively tested by the Veterans Health Administration (VHA) in the USA and today, the system is used by about 30,000 patients in the US. In November 2009, a cooperation with Montefiore Medical Centre was announce to start that aimed to connect 7,000 patients in New York to the tele-medical solution.[70] In November 2010, Bosch and VRI, one of the largest providers of in-home health monitoring solutions with 50.000 active clients in the USA, announced a cooperation in jointly offering VRI´s monitoring and Bosch telehealth systems.[71] Along with other recent announcements by Bosch, (e.g. contracting a top-level healthcare OR agency; joining Continua Health Alliance) further substantial moves can be expected for 2011.
In Bosch's home country Germany, however, the operation telemedicine centres and the Health Buddy system is still in trials only and not commercially started. The "Partnership for the Heart" project[72] funded by the Federal Ministry of Economics and Technology is a large-scale demonstration and impact assessment project in which Bosch signs responsible for technological aspects in close cooperation with the project coordinator, the Charité Clinics in Berlin.

All three large companies unifies that they have systems installed in the USA and ongoing deployment efforts in Europe, two of them in the UK. But yet the activities are predominantly consisting of testbeds and trials. From the information found on the number of systems installed, it seems that Tunstall is leading in Europe.

[67] http://www.healthcare.philips.com/de_de/products/telehealth/index.wpd
[68] http://www.healthcare.philips.com/de_de/products/telehealth/Products/motiva.wpd
[69] http://www.healthbuddy.com/content/language1/html/55_ENU_XHTML.aspx
[70] http://www.bosch-telemedizin.de/content/language1/html/5926_DEU_XHTML.aspx
[71] http://www.prweb.com/releases/Bosch/VRI/prweb4772304.htm (visited 18 Nov 2010)
[72] http://www.partnership-for-the-heart.de/en/no_cache/

Smaller companies also play a role on the market of telemedicine, telehealth or telecare. The 1999 founded German Vitaphone GmbH[73], today active in 20 countries from the USA to China self-announced itself to be a global leader in telemedical functional diagnosis. Aerotel Medical Systems from Israel[74], similarly a self-proclaimed leader in telehealth and telecare solutions, cooperates with other SMEs in Europe. Their cooperation with EcoTec from Finland is on introducing a novel, wrist worn and GPS-based personal telecare safety device.

Tertiary stakeholder - continuation	
Power position of stakeholders – economically or politically	As descried in more detail above, suppliers and even the biggest industry companies among them have not yet entered the regulated European healthcare markets on a large scale and this differs from the USA. As long as the business models rely on public funding, the industry must yet deliver arguments for cost savings – and this is still lacking for large scale pilots.
Knowledge	Suppliers do best know about the potential of their products and services and all their websites are full of information available for download. Some suppliers produced professional video clips that demonstrate the solutions and the "easiness" of their use. Commercial campaigns for ICT for ageing solutions – as the emporia mobile phone clip mentioned above – remain solitaire as long as business models are not established that envisage profitable future business.
Visibility	As repeatedly confessed, an ICT for older persons market does not exist. Those, having observed the ICT enabled independent living arena for some time wonder that no store presents a range of products (sensors, under bed lights, alarm systems, remote and safe door opening) to equip an apartment with most easily installable solutions. No single supplier has tried to market a package of a comprehensive but modular range of solutions (e.g. as compared to the automotive sector, where all car manufacturers are also system package integrators). It is also remarkable that for product/services marketed on the regulated market packaging (i.e. combinations of products/services) and pricing information is often completely missing. Senior shops with an elaborated offer for also ICT solutions are rare and do not leave the impression of outstanding success.[75] However, those who want to find information will be at least successful to identify state-of-the-art products/services by simply using the leading search platforms. It is rather the "want" that is not yet developed among large fractions of the primary and secondary stakeholder categories: there is certainly a lack of interest as the benefits of the ICT solutions can not be answered positively for any person.

[73] http://www.vitaphone.de/
[74] http://www.aerotel.com/en/index.php
[75] See e.g. the German "Senio" shop: on www.senio-frankfurt.de/present.html

Independence/ dependencies	Suppliers depend on accepted business models – either by social insurers for the regulated market, or by private users. A massive uptake of ICT for ageing solutions, which involves 24/7 monitoring and data capture of millions of European seniors, would require an ICT infrastructure (broadband, database storage) that is not available today. Hence, policy does both: it provides opportunities to expand the infrastructure and sets targets to be achieved in the future.[76] Only on 28 June 2010, US President Barack Obama released a memorandum "Unleashing the Wireless Broadband Revolution". The memorandum states that "Expanded wireless broadband access will trigger the creation of innovative new businesses, provide cost-effective connections in rural areas, increase productivity, improve public safety, and allow for the development of mobile telemedicine, telework, distance learning, and other new applications that will transform Americans' lives."[77]. Timely ahead of the US administration, the German Federal Network Agency just closed its auction of spectrums for deployment of wireless services in May 2010. This auction allowed all four bidding telecom companies (Vodafone, Telefónica, Telekom Deutschland and E-Plus), to double their existing spectrum portfolio.[78] Besides the ICT infrastructure requirements, manufacturers of "ICT for Ageing" devices call for standardisation[79] and interoperability – the latter explains the success of the CONTINUA health alliance that comprises all leading IT companies among its members[80]. Even the large players avoid the risky way of proprietary solo attempts in favour of commonly developed product certification programme. At the same time, industry representatives confess the problem of objective measures for standards, e.g. for accessibility and request some level of flexibility.[81]
Potential gains and losses	The ICT for ageing market promises new business opportunities. Yet, the heavy financial investments and the regulation of the healthy ageing market side with today unclear outcomes and highly fragmented reimbursement schemes are a threat to suppliers. It is an important success factor for the leading position of the UK in telecare that the National Health Service holds a monopoly situation and expressed a favourite opinion on the wide-spread deployment of ICT solutions in the health area.
Existing networks	The IT industry is organised in several associations and organisations that discuss and decide upon standards and interoperability. For these associations, the "ICT for Ageing" sector is still not a major issue.

[76] Cf. A digital Agenda for Europe, EC, 2010, chapter 2.4
[77] http://www.whitehouse.gov/the-press-office/presidential-memorandum-unleashing-wireless-broadband-revolution
[78] Cf. Bundesnetzagentur, 2010
[79] For an overview of standardisation issues, cf. Broek, 2009
[80] http://www.continua-alliance.com/about-the-alliance/member-companies.html
[81] Cf. Mordini/Mannari, p.155

	Joint committees that bring together health and care organisations as well as the ICT industry are still not institutionalised.

3.6 Quaternary stakeholders - Supporters

This last category is made up of representatives of organisations and authorities who may have an impact on the dissemination and uptake of ICT for ageing solutions. This similarly wide definition incorporates persons who define the socio-economic and legal context for exploiting ICT and ageing: policy-makers, insurance companies, employers, public administrations, standardisation organisations, civil society organisations, the media, etc.

It is evident that a positive attitude towards the expected contribution of ICT for ageing solutions is vital for a positive market development. This attitude may be expressed

- in favourable regulatory decisions (policy-makers), acceptance of reimbursement schemes for ICT based solutions in the regulated health sector (health insurances),
- a supportive uptake in the work context (employers, administrations) or
- incentives for procurement (administrations) or
- positive stories in the news (media).

Quaternary stakeholder	
Strategies of stakeholders	The demographic ageing of European societies – the ever increasing life span and the simultaneously shrinking working population – does indeed constitute a major issue for policy actions, as the logical result of this development is an every increasing outbalanced income-expenditure situation for public budgets: "In the face of increasing needs and tight budgets improving effectiveness and efficiency take on a new urgency. Public budgets in most Member States are likely to be pressed for years, calling for prioritisation, effectiveness and efficiency. Health expenditure is significant, averaging some 9% of GDP and ranging from 5% to 11%."[82] Every contribution that promises financial relief should be highly welcomed. Without providing further details, though, the Council of the European Union regards "new technologies" in the health area as a key structural driver[83]. It is required that the contribution of new technologies become more visible. In this respect, *Governments* themselves play a pivotal role for the market uptake and several policy recommendations have been formulated, e.g. by the FP7 AALIANCE project[84]. The OECD recommends governments to become active in three ways to stimulate the uptake of ICT for health solutions: ▪ Regulation – a prescription of specific outcomes, targets or processes/procedures which compliance is monitored ▪ Financial incentives that allow a reaction to the individually acknowledged best cost-efficiency situation ▪ Accompanying measures that bypass information asymmetries as education and training, social and peer pressure.

[82] Council of the European Union, 2010, p. 10
[83] Ibid. p. 10
[84] Cf. AALIANCE, 2008

	For the time being, "no comprehensive study of the outcomes of any of these measures on the adoption of ICTs by physicians"[85] is available. Earlier, the OECD confesses that "there have also been very few studies that have attempted to forecast the economic impact of ICT on the health system as a whole – which is unsurprising given the difficulties in measuring output in this sector" [86]. If more studies would be available, the OECD recommendations to the government could profit from the expected evidence of such studies. *Representatives of social health and care insurances* also see potential benefits, no doubt. The OECD report clearly states that "payers" (i.e. social health insurance) should financially support health care providers towards an uptake of ICTs "because of the benefits that would accrue both to themselves and to the people on whose behalf they purchase health care." [87] But this plain recommendation has not found its way into the social health system. Any positive decision to integrate "ICT for Ageing" solutions in the catalogue for refundable products and services draws directly from the own budget in the first place. The promised relief from other budget items e.g., for hospitals who can expect less admissions for those who use a telemonitoring system, is not sufficiently proven yet. ICT have substantially entered the working place throughout most economic sectors. But yet, *employers* – being private or public – do not explore the potential of ICT to keep their staff healthy, skilled and motivated. An interesting, but yet solitaire example is the Workability and Innovation Living Lab (WILL) that provides personal training for an aging work force in the automotive industry and shipbuilding in North-west Germany.[88] However, Michael Takemura, Director of the Accessibility Programme Office at Hewlett-Packard, sees an exponentially demand by employers for assistive technologies since 2006 or so and considers the screen magnification and speech to text tools in Microsoft Windows Vista as good examples in this area.[89] At this moment, the ageing workforce is increasingly becoming visible[90] - very much in the light of a shortage of skilled workforce -, but there are very rare cases for ICT based solutions at the workplace. *Public authorities* do play a very important role for a faster uptake of ICT. E.g. innovative public procurement did support the deployment of ICT in

[85] OECD, 2010, p. 76
[86] Ibid. p. 39
[87] Ibid, p. 59
[88] Boronowski et al.
[89] Cf. Mordini/Mannari, p. 155f
[90] A one day conference in December 2010 will specifically discuss instruments and measures regarding demographic change in enterprises: http://www.inqa.de/Inqa/Navigation/themen,did=254626.html
[91] National Innovation Procurement Plan, 2009, page 6
[92] http://www.telemedicine-europe.net/index.php?id=12
[93] Tele Medicine project - evaluation report, page 36
[94] http://themenwoche2008.ard.de/ (German)
[95] http://www.lifepr.de/pressemeldungen/meyer-hentschel-institut/boxid-128975.html

	the health area in the United Kingdom and surely, lessons can be learned from their strategy for the rest of Europe. The National Health Service follows a three pillar approach for their procurement, among them procurement of innovation "where a beneficial innovative product or service already exists, but is not being widely adopted, driving a need to overcome the barriers and delays to adoption and diffusion, through system management"[91]. Such a strategy supports a procurement process in favour of new innovative, but also more risky products. Local and regional authorities could play a significant role in the implementation of the "ICT for Ageing" solutions. A good example could be the Non Piu' Soli solution that is a combined social alarm and telehealth service that has been mainstreamed in the Municipality of Rome since 2002. It is an example of ICT-supported services being integrated with existing public social services. The service is operated in partnership by FARMACAP, the public agency that manages the municipal pharmacies of Rome, and the Municipality of Rome. In this project the strategic key points were: ▪ Integration of the social alarm/Telehealth service with the existing municipal social care system ▪ Strong uptake of the service ▪ The recognised potential of the service to allow older people to continue living in their own homes ▪ The use of user-friendly ICT devices facilitated acceptance and uptake Public authorities of several urban authorities from The Netherlands, UK, Italy and Spain explored the potential of telemedicine within the Tele Medicine project[92] having ended in 2007 and funded under the INTERREG III C scheme. The project focused on the self management of chronically ill patients in urban areas. Project partners explored the effects on the local planning of health and medical services and housing facilities in urban areas via the stimulation of ICT (wireless) based solutions for domestic health and medical care in seven pilot projects. The evaluation of 2007 revealed following key findings[93]: ▪ Stakeholders wish to cooperate in the telemedicine area. Technical solutions like telemedicine solutions can help solve the problems. ▪ Solutions lacked the possibility of connectivity with other health care systems such as hospital information or GP information systems. Systems should be able to collaborate to achieve a maximum of benefits. ▪ Communication standards like HL7 shall be supported by terminology systems. ▪ Support of important stakeholders as leaders in specific medical areas was the most powerful source during the implementation phase. For the *media* demographic ageing is just a topic among all others and often presented in a rather exaggerated way, i.e. news on the ageing of the populations or the ever decline of the fertility rate are a "thrilling" message with which fears and anxieties are triggered in the public. Obviously, more serious media try to neutrally discuss the implications of demographic

	change. In Germany, the public broadcaster ARD run a "theme week" on TV on chances for an ageing society in April 2008[94], with numerous documentations shown and even specifically produced films on the subject. An attentive attitude is shared to some extent by some demographists and statistical offices. However, in Germany, a price[95] worth 3,000 €, for journalists has been awarded in 2010 for the fifth time. Worthy for the award is any published media clipping that sketches a picture of senior people in 2010.
Power position of stakeholders – economically or politically	*Policy-makers* and representatives of *insurances* are politically and economically the most important stakeholders as the future development of the regulated ICT for ageing market depend on their decisions. As for the healthy ageing market side, the OECD summarises that "for many ICT projects, once the initial funding runs out, the most significant challenge is developing a sustainable business model. Long-term sustainability and financing appear to be the most challenging and, in most cases, unknown aspects of the ICT initiatives reviewed in this report." and continues – after having stated that technical implementation issues dominate recent ICT projects – that "Ultimately, however it is the economics and the value to society which will determine whether a system can survive or not" [96].
Knowledge	Demographic ageing is high on the agenda for European governments, but the specific contribution of ICT to this mega-trend is much less visible. Also repeatedly mentioned, the evidence of the benefits of this technology is not proven without doubts. It is foreseeable that with more evidence, more interest will be triggered to acquire knowledge in the area. It is a factual observation that the number of ageing related events and conferences, accessible demonstration centres, funding opportunities increased considerably. It is also true that these events have left the technological corner and moved considerably into market applications and also cover relevant neighbouring areas as user involvement, business models, ethical issues, finance, etc. Events as the 1st and 2nd AAL Fora in Vienna (Sep 2009) and Odense (Sep 2010) with each about 500 attendees or the AALIANCE closing conference in Malaga (March 2010) with 180 attendees are crucial for knowledge building in the area.
Visibility	For the last decade the European Union has increased the initiation and funding of activities dealing with an incentive and coherent approach of ICT and ageing solutions not only through financial support for R&D projects but also by offering networking opportunities and a legal framework in order to match social expectations with opportunities for economic development in the elderly and disabled autonomy field. Hence the European Network of Living Labs (ENoLL) was launched on 20th November 2006, as a step towards a new European Innovation

[96] OECD, 2010, p. 87

	System (EIS). The initiative aims to set up a new European Innovation Infrastructure where users (end-users, SME´s, corporations, public sector and academia) play an active role in the innovation and can influence this to better serve their needs. A European Network of Living Labs (ENoLL) is a business-citizens-government partnership[97]. This concept is particularly interesting for ambient assisted living technologies where user needs are an essential part of the development and innovation process. At that time more than 10 "Living Labs" are running throughout Europe.
Independence/ dependencies	Politicians depend on voters. If voters support a positive attitude for ICT solutions, the politicians will incorporate this decision into their activity portfolio. The number of politicians with this topic in their portfolio is – at this moment – very small and limited to a few research-affine politicians.
Potential gains and losses	It seems from the few evidence based studies that the introduction of ICT for ageing solutions is indeed supporting the impression of a key driver for increasing cost efficiency in the health sector. This impression needs to be consolidated by further evidence based studies. The studies should be holistic in a sense as to cover the multiple user-payer-additional stakeholder relations. The complexity of the "healthy person" market segment with the predominant regulated schemes applied has been often identified as a barrier for the uptake.
Existing networks	There are no specific networks existing for any of the quaternary stakeholders that specifically address the "ICT and ageing" area. A model for such network organisations could be the US based International Council on Active Aging[98] (ICAA) that self-declared to work on a different picture of ageing. The privately owned organisation acquires funds from member organisations and the provision of consultancy services. The organisation is involved in networking professionals in the areas of retirement, assisted living, fitness, rehabilitation and wellness fields.

[97] http://www.openlivinglabs.eu/
[98] http://www.icaa.cc/index.asp

3.7 Consolidated stakeholder analytical matrix

Primary stakeholder - Private Users								
	General interest in ICT for ageing	**Stakeholder strategy for ICT for ageing**	**Power (economic/ political)**	**Knowledge of ICT for ageing**	**Visibility**	**Dependencies**	**Potential gains and losses**	**Existing networks**
Older and old Persons	Independency of living; low cost solutions: easy to use solutions; reliable solutions	Request to involve users throughout development processes of ICT for Ageing solutions; regard ethical issues; follow design-for-all principles; introduce tested and reliable, easy to use solutions which do not replace existing human contacts; (low) price-value-relation	Low as not well organised, becomes politically (in terms of no. of voters) more important	Information is randomly and rather not targeted	Older persons are the key target group; a few representations e.g. the AGE-Platform, is an acknowledged actor	The use of ICT depends on various socio-economic factors (sex, education, income, cultural background) etc.	Old persons shall benefit from ICT for Ageing solutions, e.g. by achieving additional degrees of freedom If this can not be proven, the deployment will stuck.	A number of senior organisations and internet portals exist. The AGE-Platform on EU level has considerable knowledge in the ICT for Ageing area.
Family and Informal Carers	Support and release of strenuous work	None	Low	Low	Low	Time - income: informal carers depend on framework conditions, e.g. compatibility of work with care	Positive through increased degrees of freedom	None

Secondary stakeholder - Professional Users								
	General interest in ICT for ageing	**Stakeholder strategy for ICT for ageing**	**Power (economic/ political)**	**Knowledge of ICT for ageing**	**Visibility**	**Dependencies**	**Potential gains and losses**	**Existing networks**
Health Professionals	If interested at all: additional source of income (diversity); new "modern" work context	No common strategy; but there are some early adopters engaged in trials	If unified, a potentially strong group; but the position on ICT is not a common one yet	Varying to a large extent; from well informed to not interested	Those few engaged in trials are visible for the community	Need economic incentives for uptake; partially legal boundaries (imperative personal medical treatment by doctors)	Depending on their share from the new business model	Strongly networked, but not specifically regards ICT for Ageing
Care Professionals	Increasing productivity; release from administrative tasks; support with strenuous tasks	If stereotypes of staff replacements by ICT for Ageing solutions will be finally out of the world, care professionals should unify in favour of ICT for Ageing solutions	Shortage of care staff and the potential of ICT to release this situation shifts care professional organisations into a strong power situation. This is not well formulated or unified yet.	A couple of care service representatives are among lead adopters with extensive knowledge on existing systems; the majority is still not informed	Potentially visible; a couple of bigger care organisations are quite active in deployment schemes (e.g. in the Netherlands)	Economic incentives from the regulated reimbursement schemes	Most probably positive, i.e. productivity gains: more care time per customer and relief from strenuous tasks	Strongly networked, but not specifically regards ICT for Ageing
Public Transportation Sector	Contribution to social inclusion of customers	Not known yet	Transportation is predominantly a public sector, power is in the hands of politicians	Low	Low	Public budgets; good will of politicians	Probably positive for extended customer retention	No networks that would specifically address the ICT for Ageing aspect

Housing Sector	Positive as customer retention instrument	Start with funded test beds; interested in modular and reliable solutions	Potentially strong economic power; enhancement of living conditions promise huge customer retention potential; with shrinking populations, this is of a strategic competitive position	Low (with exceptions)	Potentially visible; a couple of housing organisations are active in deployment schemes (e.g. in the Germany, UK)	Return on investment periods	Probably positive for extended customer retention	Some associations , e.g. in Germany: GDW, are in favour of ICT for Ageing solutions
Tourism	Not specified yet	Diversity; continuum of care (customer retention)	Strong private sector	Low; also due to a clear lack of cross-border solutions	Low	None	A distinct set of ICT for Ageing solutions for the tourism sector does not exist	No networks that would specifically address the ICT for Ageing aspect

Tertiary stakeholders - Suppliers								
	General interest in ICT for ageing	**Stakeholder strategy for ICT for ageing**	**Power (economic/ political)**	**Knowledge of ICT for ageing**	**Visibility**	**Dependencies**	**Potential gains and losses**	**Existing networks**
Research Organisations	Strong	Secure reliable and long term funding; move stronger to applied research	Neutral	Ever increasing, rising numbers of attendees at specific ICT and Ageing events and participants in research projects		R&D budgets; co-operations with industry; introduction of business models; adoption of standards	Still a dynamically developing research area that promises stable access to R&D funds	Few, e.g. AAATE, or within larger research organisations as the Fraunhofer AAL Alliance
System providers for health solutions (e.g. Bosch, Tunstall, Philips and smaller companies)	Health market penetration (and domination?)	Seek mass roll-out, survival of the fittest?	Return on market preparation/introduction investments is critical	High	High	Introduction of business models for the regulated market (i.e. acceptance of reimbursement schemes by health insurance); standards Interoperable solutions	Varying from skimming the return on investments from the market	Continua Health Alliance
Other producers of hardware in the health market	Strong competition	None	Not developed	High in their segments	Low	Economies of scale vs. local business	Depends on their share of the market	None
System providers for the "living" market solutions	A market segment is not clearly shaped; potentially large companies include Bosch	None	Probably strong, i.e. if the market chances are considered positive, economic investments will follow	High	Low	Market opportunities	Depends on the potential for market take up	None

Telecoms	Telecoms are investigating the potential in research projects, but do not offer services at this moment	IT infrastructure needs heavy investments (broadband) which is anyhow coming; new successful business models, i.e. the share of thee market, depend on other stakeholders	Potentially strong economic and political power, but not articulated in the ICT for Ageing area	Medium - some telecoms are more active in research projects than others		Heavy investments / profit margins standards, interoperability	Uncertain outcome	None
shop owners / vendors / distribution channels	Easy to be marketed; high turnover potential;	None	Neutral	Low	Low	None	Neutral, if not specifically addressing elderly as new customers	None

Quaternary stakeholders - Supporters								
	General interest in ICT for ageing	**Stakeholder strategy for ICT for ageing**	**Power (economic/ political)**	**Knowledge of ICT for ageing**	**Visibility**	**Dependencies**	**Potential gains and losses**	**Existing networks**
Governmental policy-makers	Cost saving potential for health and care related costs	Maintenance of public services	Strong	Vague, but increasing	Low in the ICT for ageing area	The voter: if the topic promises a positive perception with voters, policy-makers will enforce the deployment	Depends on the success of the introduction: Any failures may fall back on the policy makers, if earlier pushed by them	Political parties
Social insurance companies	Costs saving potential - specifically for the own insurance	Hesitating to include the ICT for Ageing solutions in reimbursement schemes	Depending on the size of the insurance; the NHS in UK, a monopolist, is considered to be strong but depend on politicians	Few insurances explore the potential in deployment projects	Low	Budgets; no clear evidence on cost savings potential	Social insurances pay the bill – their benefits are unclear. Beneficiaries are all the upper three stakeholder groups.	No specific
Employers	No specific interest; the area of ICT for ageing staff is in its earliest infancy	No known strategy; ageing of workforce gains attention, but not the potential contribution of ICT	Neutral	Vague	Low	None	Positive in case that ICT for Ageing solutions maintains or increases staff productivity (not proven yet)	No specific
Public administrations	No specific interest		Neutral	Vague	Low	None		No specific

Standardisation bodies	Pure professional interest	Stimulated by researchers, industries and governments to work on standards in the AAL area	Neutral	Standards in ICT for Ageing is a very complex setting and few, if any, have a holistic view	Low	US-Europe competition	Neutral	CEN / CENELEC; IEEE
Media	No specific interest	None	Neutral	Vague	Medium to high for demographic ageing aspects, low for the ICT dimension	None	Neutral	No specific

4. Recommendations

Within the BRAID project, five workshops are to be organised in year 2 of the project's duration (2011). The project description states that substantial input and orientation for the workshop agendas are expected from two work packages: The stakeholder analysis drafted in work package 2, i.e. this document, and the reflections on stakeholder coordination mechanisms in work package 3.

From a viewpoint of work package 2, one element of the workshops should be the validation of the findings of the stakeholder analysis. For this, it is proposed to organise four workshops with representatives of the distinct stakeholder categories only – and the final and last workshop would gather representatives of all groups.

The agenda item that would be contributed by work package 2 would be the presentation of the matrix and detailed findings for each of the category. The workshop character should allow an intensive debate and discussion of the results, and, where found necessary, corrections shall be assessed within the workshop.

In this way, most interesting assumptions from one representatives of one stakeholder category will come up with a perspective on the other stakeholder categories.

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