Health & Wellbeing

eit Knowledge & Innovation Community

EIT ICT Labs

Innovation Radar

Active Healthy Ageing

Health and Wellbeing White Paper

Executive Summary

The overall goal of the Health & Well-Being innovation area (the HWB Action Line of EIT ICT Labs) is to improve the quality of everyday life via ICT-enabled services in ambient assisted living for active healthy ageing. The *status quo* is here analysed in detail, using three perspectives:

1. Mental well-being for active healthy ageing
2. Physical well-being for active healthy ageing
3. Social well-being for active healthy ageing

The following is a unified list of the most important trends, challenges, and opportunities that lie beyond state-of-the-art but should manifest over the coming three-year period.

TRENDS

- Personalised medicine and individual data management is complementing population studies and macro-level statistics
- Genotyping is getting decidedly less expensive
- Changing demographics are leading to diversified care
- Computer literacy among the elderly is on the rise
- An increasing number of ICT products support cognitive endurance
- Virtual and physical robots for social well-being are developed and employed at an increasing rate
- The number of Smart Home sensors and (smaller and more portable) personal monitoring devices is increasing
- Assistive technologies form a driver for technological innovation
- Coaching technologies and digital fitness are booming
- Trustworthy data collection is crucial, and is becoming marketable
- Data from online communication is paired with data from devices

CHALLENGES

- Enabling independent living while avoiding social exclusion
- Supporting people to live uncompromised, comfortable, safe, and active lives, also at an advanced age
- Capturing the cognitive state of people, requiring an understanding of (ab)normal behaviour and intentions (for proactive support)
- Providing ICT-based support for cognitive functions, requiring assistance, exercise, and therapy
- Dealing with co-morbidities
- Handling privacy and security of (massive) data

- Standardising on a still unstructured and immature market
- Addressing independent training in assistive technologies
- Securing sensor quality and battery life
- Improving genotyping by studying genes specific or sensitive enough to be strong determinators for, e.g., dementia and cardiovascular problems, and getting the expectations right.

OPPORTUNITIES

- Supporting care givers can be made easier with ICT
- Exploiting the strong demand for self-care, self-monitoring, and preventive health measures
- Investigating the employment of ICT for identifying intention- and emotion-aware solutions for companionship and support
- Linking people and services to the network of medical professionals
- Employing ICT-based metabolic measurements to data collection
- Improving assistive technologies by employing new ICT for medication control, simplified professional technologies, and self-tracking for medical purposes
- Making coaching efficient by using ICT to promote and sustain an active lifestyle
- Analysing genotyping as a means to guiding diet and activity, taking the risk factors at the population level into account

There are also important interactions between the three perspectives. In particular, social decline, manifested in disconnectedness and loneliness may lead to mental and physical problems that in turn result in an increase of demands on the (mental and physical) systems of care and prevention. Analogously, mental and/or physical decline may lead to disconnectedness and loneliness with an increase of demands on social services.

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This White Paper was written by **Magnus Boman** (SICS), but credit is due to other researchers, developers, and innovators. In particular, the author teams of the recently completed three Foresight Technical Reports must be given credit. Many results and formulations from the three reports have been incorporated, and the reports all offer more details than the White Paper format permits. **Kåre Synnes** lead the bottom-up Innovation Radar activity in Health & Well-Being (HWB) in 2013, and also supported the writing of this report.

Jean Gelissen, Action Line Leader for HWB, is the first stakeholder (Action Line) of the results herein, and he also provided important comments and assistance. The HWB End Of Year event that he organised, staged in December 2013 in Eindhoven, provided lots of input to this White Paper. **Eric Thelen** and **Achim Luhn** at the Innovation Intelligence Business Unit represent the second stakeholder (KIC as a whole), and they too provided important advice. In addition, **Keith Baker** provided detailed and thoughtful comments on a draft, as did the health experts at T Labs, via **Elmar Arunov** and **Michal Dunaj**.

While the reference list contains pointers to the three reports mentioned, this White Paper builds on the entire activity, which produced a wealth of material. This material includes a highly relevant Philips Tech Brief shared by **Koen Huizer**.

The following experts have contributed, in various ways.

At Philips, **Keith Baker**, **Hans van Zonneveld**, and **Koen Huizer**.

At VTT, **Johan Plomp**, **Minna Isomursu**, **Toni Ahlqvist**, and **Mika Naumanen**.

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Table of Contents

1 Introduction

This White Paper is part of the EIT ICT Labs Innovation Intelligence activities, synchronised by the Innovation Radar. It seeks to expose future themes with high innovation- and business potential within the innovation area Health and Well-Being (HWB). The time frame is six months to three years into the future.

1.1 Three Perspectives

The *status quo* of health and well-being in the area of ICT is analysed in detail, using three perspectives (Fig-1):

- Mental well-being for active healthy ageing
- Physical well-being for active healthy ageing
- Social well-being for active healthy ageing

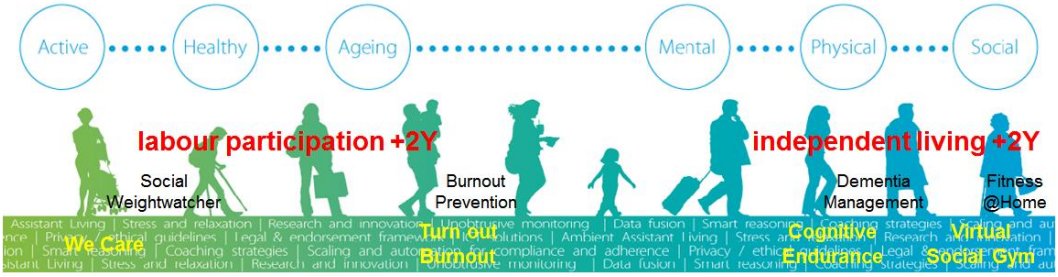

Fig-1: The three perspectives of active healthy ageing (top), some of the 2013 activities (middle) and the four 2013 priorities within the innovation area (bottom).

Naturally, the three perspectives interrelate. Someone suffering from physical chronic pain will have limited social contacts which in turn leads to a higher risk of depression, for instance. The three reports ([10], [13], [19]) and the related Philips tech brief [12] contain lots more details than are presented here. In 2014, HWB research and development is for the above perspectives in turn focused on:

1. Early detection of mental decline
2. Early screening of physical anomalies
3. Personalised fitness

1.2 Five Actors

Societal trends like an ageing population and consumer empowerment require an innovative and entrepreneurial ICT-enabled approach (cf. [7]), which is what EIT ICT Labs supports through HWB. Partners include industry, research institutes, and academia. HWB focuses on primary prevention areas where regulation barriers are relatively speaking not severe, where there is more room for entrepreneurship, and where a more diverse set of ICT-enabled solutions is possible.

Within health and well-being in general, *industry* is one actor. Research institutes are part of another, *non-profit*, actor together with NGOs. Academic institutions are in most European countries part of *nation states*, a third actor. In addition, another actor (not represented in EIT ICT Labs) must be considered, namely the *insurers*. Finally, *individuals* (including the elderly, their relatives, the care givers, and many more categories) are the fifth actor. In any stakeholder or market analysis, these five actors should be taken into account.

1.3 Methodology and Disposition

Documentation from HWB meetings and workshops held in 2013 was used as a backdrop, and some of it has been included here. In addition, a deductive literature study and desktop research was conducted. Results from international trend scouting efforts [5] have also been incorporated into work meetings and into this report.

While this White Paper itself is a static snapshot of innovation intelligence towards the beginning of the year 2014, the discussion and work is on-going. An important complement to this static report is therefore the dynamic reporting continuously made available to and from the experts of EIT ICT Labs. A digital platform for sharing results and information directly relevant to active healthy ageing is used by the HWB Action Line for this purpose.

The following three chapters are divided into trends, challenges, and opportunities. The strategic picture painted by the respective perspectives needs to be appreciated in order to move beyond the *status quo*, and this picture is painted from a user-centric perspective: putting people first. This is in keeping with the general trend of personalisation: putting the past, present, and future of the patient in focus.

2 Trends

In the sections below, trends corresponding to the three perspectives are described in turn, following on a section on relevant general trends. Demographics (*large, ageing populations*) and health (*shifting burdens of disease*) are also two out of the seven megatrends identified in the oft-cited Oxford Martin Commission for Future Generations (Fig-2).

2.1 General Trends

Relevant general trends include:

- Ageing population
- Dramatic increase in average life expectancy (co-morbidities)
- Severe shortage of (informal) care givers
- Rising healthcare costs for frailty
- Lifestyle changes
- More single households
- More intense communication
- Increased consumer/patient awareness
- Digitisation
- Massive data employment
- Increased expectations on genotyping results

Arguably the strongest technological trend is the merging of gerontology and technology into *gerontechnology*, the "study of technology and aging for the improvement of the daily functioning of the elderly" ([1], p.1). Gerontechnology has a stronger focus on technology than does health informatics or health economics, and consists of four goals: prevention, compensation, care, and enhancement.

Successful *prevention* can make the other three shift their relevance to a later point in time, especially if employed from an early age. It helps avoiding injuries and slowing down physical, mental, and social decline. Using a machine to stay fit, following a physical training plan using videos, and improving diet with an app that helps log and monitor intake are all examples of ICT for enabling active healthy ageing through prevention. When impairment or disability can no longer be prevented, *compensation* comes into place to either reduce the impact of frailty, or to partially and artificially replace a lacking capability. Here, ICT is particularly useful to support cognitive deficiencies, with sensors and actuators becoming increasingly viable as alternatives to performing physical actions. For assistance with rehabilitation after injury, or for reducing the impact of a chronic condition, *care* is needed. Here, ICT can support directly (e.g., through sensors and actuators for rehab) or indirectly (e.g., by facilitating the work of care givers). Through *enhancement*, ICT can also create new opportunities and improve upon existing capabilities for rehab. Learning new things, finding interesting activities, augmenting experiences, and finding new work opportunities are all examples of ICT for enhancement.

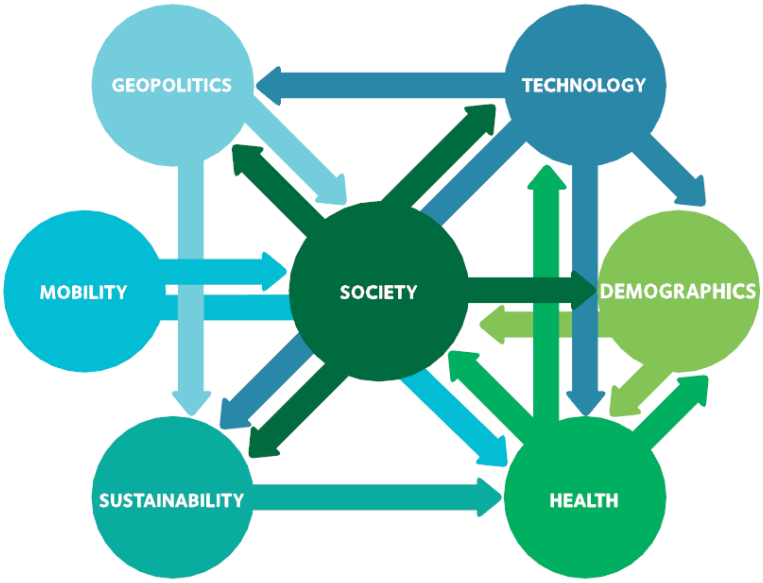

Fig-2: Megatrend headings in the recent "Now for the long term" report [14], downloaded more than a million times.

2.2 Trends from the Mental Perspective

There are at least three categories of products that prevent stress, all modern realisations of Juvenal's ancient *mens sana in corpore sano*:

- training equipment
- monitoring devices
- coaching devices

Training equipment is for directly exercising abilities thought to be important for cognitive endurance. *Monitoring* devices record physiological and behavioural characteristics. They can also help keep track of social activities and stress levels. *Coaching* devices go beyond monitoring, either by providing advice or by allowing the user to set goals and become his or her own coach. They may also provide advice for how to reduce stress or engage in social activities via social devices and services, or employ calm technology (used, e.g., for autistic groups).

There are products that directly support the intellect and the cognitive reserve, countering prolonged stress and sleep deprivation. Here, proactive environment control factors could play a role, such as intention awareness. Emotion-oriented care is a promising way of diversifying care for people with mild to modest dementia [6]. In parallel, there is a trend of quantitative measurement that aims not so much at asking if a person is happy but at providing the person with frequent measures to enable correlation with their life habits and attitudes. The *trackyourhappiness* smartphone app explicitly aims at measuring activity and well-being, and at finding correlations. *Mappiness* follows a similar route, though the focus here is on identifying with whom a person is more likely to be happy. *The Mobile Territorial Lab* aims at correlating happiness with spending

patterns. *Spire* is a sensor that measures stress that feeds data to a smartphone or a computer. This trend is likely to continue, especially in view of the increasing popularity of life logging, as realised via the *Narrative* clip camera, for instance, and numerous other developments within the Quantified Self community. However, so far it has been helpful to shed light on correlates of happiness rather than indicating that it can change people's behaviour to achieve greater happiness (cf., e.g., [20]).

2.3 Trends from the Physical Perspective

The incidence of many chronic illnesses and disabilities (like diabetes, osteoarthritis, congestive heart failure, and dementia) increases with age. Relations exist, as in diabetes being an identified risk factor for congestive heart failure, and genotyping has produced determinators albeit not yet specific or sensitive enough for providing accurate health advice. The increase in chronic conditions reflects changes in lifestyle and diet, and not only to do with ageing. Because many health problems causing symptoms in later life were rooted in early life experiences and living conditions, ensuring a healthy lifestyle early is important.

Sensor data can be recorded and shared with care givers. In the last few years, it has become increasingly common to use personal monitoring devices, the market of which can be divided into four segments:

1. Sports enthusiasts with a focus on performance monitors (most fit)
2. Healthy adults with a focus on activity monitors (fit)
3. Adults at risk, with a focus on health monitors (need to be fitter)
4. Frail people with a focus on alerting systems (not fit)

Monitoring devices suitable for use by end-users include:

- Blood pressure meters
- Blood glucose meters
- Weight measuring devices
- Heart rate meters
- POC (Point of Care) terminals for blood sampling
- CPAP breathing monitoring and aids for apnoea
- Movement sensors
- SPO2 and ECG for cardiology measurements

Even if the different personal devices have different functionalities, there is a trend related to form factors:

- From fixed (weight scale) to portable (mobile phone) to wearable (movement sensors)
- From discrete (point) to continuous (graph) measurement
- From download to instantaneous access of (processed) data
- From single function to multi-function
- From not connected to connected

The digital fitness market is differentiating into segments, with products varying in design and functionality. The growth of wearable devices that can be coupled to a smartphone will have an influence on products in all segments. The killer app is heart rate-based performance measurement for fitness and cardio training. The business model is B2C via sales of a device, with the apps and web service for free. The latest trend is to remove the chest strap, using heart rate sensors in earphones, a headband, or a second arm-band. Still more advanced is a simple wrist worn monitor and iso heart rate measuring via video (as in, e.g., the *Philips VitalSigns* app). Other applications include activity management, weight-diet management, with extensions to sleep. Commercially, the wearing position is a differentiator, which has consequences for the accuracy, i.e., energy used during activities, which can be compensated for by design innovation in sensors, and sampling methods. Strong players include *Fitbit, Jawbone UP, Fitbug, Fitlynx, IBitz GetMoving*, *LG*, *Misfit Shine*, and *Withings Pulse*. Often, a smartphone app is provided that allows the user to view (and sometimes annotate or add) data. Examples of these systems include the *Nike+ Fuelband*, the *Jawbone UP*, and *Philips DirectLife*, and smartphone apps like *Runkeeper, Endomondo*, and *Nike+ Running* (see [13] for more details and examples).

The following trends illustrate the importance of making use of the above developments, with a special eye on data collection.

- Increased accuracy of sensors and measurement methods
- Networked devices and sensors
- Integration of multiple devices
- Monitoring and mobile health
- Self-tracking, life logging, and Quantified Self
- Smart textiles
- Wearing comfort and invisibility (i.e., avoiding stigmatisation)

Alerting systems send signals to a service that cares for elderly people. The sensing is not focused on vital signs, but on trauma, such as falls and position, or location warnings. Emergency technology relies heavily on monitoring technology, but puts additional demands of latency, robustness, and quality of service. The market would profit from innovations in wearable technologies, but is likely to remain strong enough to support a separate product development process. The ethics of video surveillance also need to be addressed by practical protocols that allow design groups to review the social barriers attached to invasive monitoring of the home.

2.4 Trends from the Social Perspective

Social trends are naturally overlapping to a large extent with the previous two perspectives, and the following trends, several of which have already been mentioned, all have a social dimension.

- Promoting safety and support for independent living
- Preventing hospitalisation
- Overcoming distance and isolation
- Increased use of online services
- Improvements on self-care
- Telemedicine
- Quantified Self and life logging

Data from online communication can be paired with data from devices. The data extracted from online communication can be complemented by data from physical artefacts, such as:

- *Vicon Revue*, which collects images at a certain interval and when triggered by sensors, such as when meeting other people.
- *Q-Sensor*, a wristband that senses skin resonance to measure arousal, including sensing for when meeting other people.
- Shimmer sensors, which can also be used to sense meetings.

Social activity can now be measured not only to rank, prioritise, filter, and recommend contacts and information, but also to detect a person's social activity at a detailed level. This presents a major opportunity for social well-being. It may also be used to detect mental and physical decline, since it can be used for interventions that can capture empirical evidence of the development of frailty and subsequent degradation in bodily functions, such as resistance to infections. Use of online retail and entertainment offers the chance to monitor mental state: such technologies are studied and developed within the Smart Spaces innovation area of EIT ICT Labs, in the Smart Retail track.

Online communication will continue to evolve very rapidly, pushed by new technologies like *HTML5* and *WebRTC*, and pulled by new needs to overcome social isolation. The ability to easily integrate widgets to visualise sensor data is important, because such communication services need to be very simple (as well as privacy-respecting).

3 Challenges

3.1 International and Political Healthcare Challenges

Policy for handling resources for care currently has two desiderata (cf. [18]): firstly, a focus on the ones in most need, and second, a focus on reducing the overall system costs. In reality, care is in many countries (cf. [6]) today driven by ability to pay. Healthcare and pharma spending has in recent years grown more slowly in Western Europe than in any other region (cf. [3], p.15). Measured in percentage of GDP, however, costs are still considerable (Fig-3) and has increased in the last decade for which data is available in all the countries represented in EIT ICT Labs (Fig-4).

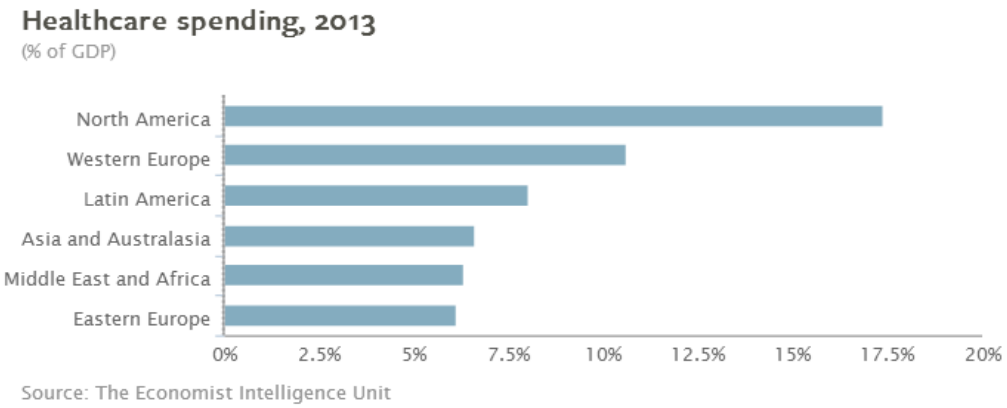

Fig-3: International healthcare spending as percentage of GDP [4].

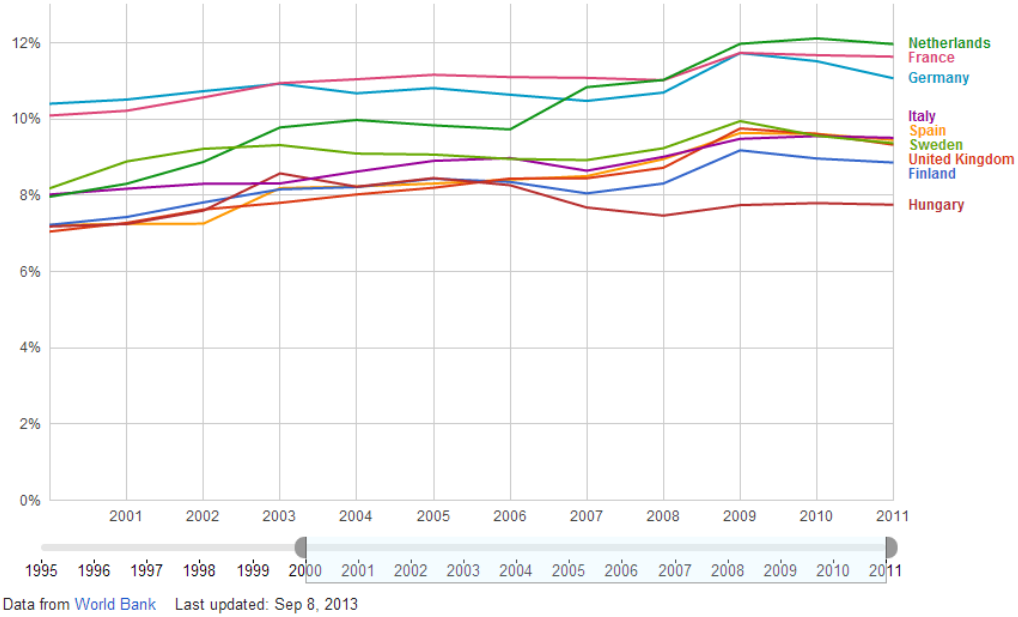

Fig-4: Health expenditure as percentage of GDP in nine European countries. World Development Indicators data from the World Bank via Google Public Data (`http://goo.gl/qML5Ss`).

Successful employment of new ICT in healthcare shows promise, but such employment also has political challenges. Privacy (sensitive mining and careful data handling) and staffing (finding qualified data scientists and analysts) are among these, and a Philips analysis of the European perspective details this (Fig-5).

Required competence	European status
Business model, process innovation	Lagging
System design	Varies by industry
Modelling, analytics, and knowledge representation	On-par
Recognition, learning, reasoning, NLP	On-par
Security and privacy	Traditionally strong position
ICT systems for Big Data	Risk of lagging

Fig-5: European status on the required competence of big data [12].

The World Economic Forum (WEF) identifies five general risks to human health and clusters them under the heading *The Dangers of Hubris on Human Health* [21]:

- Rising rates of chronic disease
- Antibiotic resistant bacteria
- Vulnerability to pandemics
- Unforeseen consequences of new life science technologies
- Failure of intellectual property regime

An ageing population is considered by the WEF to be considered an *X Factor*: an emerging concern of possible future importance and with unknown consequences (*ibid*.).

The number of demented people in the world is projected to double every 20 years and will exceed 115 million in the year 2050 [22]. As the genetics of dementia are by now well understood, this projection is likely to be accurate. This increase is pushing up costs of caring for an ageing population and already today the UK is spending £23 billion each year, almost as much as it does on combatting stroke, heart disease, and cancer together [15].

3.2 Challenges in the Mental Perspective

Capturing the mental state of people requires understanding (ab)normal behaviour, cognitive functions, and intentions (for proactive support). Providing support for mental functions (memory) requires assisting, exercising, and therapy. Dealing with co-morbidities, i.e. the fact that people suffer from more than one disease at a time, is a tremendous challenge in a healthcare system largely built on reductionist methods. In

particular, there is an urgent need for communications between primary and specialist care. In order for unobtrusive and natural interaction to become a reality, research and development is required on dialogue systems, multi-linguality, facial expressions, and privacy-sensitive emotion detection.

3.3 Challenges in the Physical Perspective

There are general challenges relevant to the physical perspective, including how to engage (elderly) people early in preventive use of ICT. This would include support to stop smoking, and advice on diet, physical activity, and alcohol use. Certification and standardisation in connection therewith is another relevant general trend. Moreover, there are specific challenges related to the sub-areas detailed in section 2.3 above:

- Providing meaningful information from sensor data
- Accuracy and reproducibility in measurements
- Intelligent analysis of sensor data, including conflicting events or missing data
- Maintenance and persistence of the underlying ICT

Emergency technologies and response must deal with the following challenges.

- Reducing false positives
- Privacy
- Lack of robust and secured home gateway (911 problem)
- Service and support staffing

In tandem, assistive technologies need to address:

- Independent Training (preparing for independent use)
- Adaptive training applications

Finally, coaching requires meeting challenges on:

- Capturing the social dimension
- Facilitating contributions to society (life-long learning)

3.4 Challenges in the Social Perspective

Even though loneliness is a phenomenon perceived almost equally by younger and older age groups, the number of people feeling lonely is higher in very old age, because of the mortality rates of spouses and friends, and of reduced mobility and chronic illnesses. Being single or widowed are among the most prominent risk factors for both social isolation and loneliness in old age. Social relationships differ in their emotional valence (significance) and meaningfulness. When developing methods for reducing social isolation, the emotional significance of relationships should be emphasised.

Another issue is the business model: Who is going to provide the services and which monetization scheme can be used? A literature study on efforts in Germany and the U.S., as well as in Europe in general, produced a challenge tree (Fig-6). The tree is consistent with the challenges identified in this White Paper, but a few points deserve special mention. The use of robots (physical or virtual) for encouraging social interaction is heavily studied and employed in some countries, notably Japan, and contexts (e.g., for patients with severe dementia), but remains debated in other countries and contexts. The barriers of personalisation could be removed, largely thanks to big data analytics and the new procedures for inference that come with it, although legislation and issues of personal integrity is creating (arguably healthy and necessary) inertia in many countries. Smooth personalisation also requires the integration of care providers, mentioned in the tree on the branch for assistive functions, but actually a more general challenge than that.

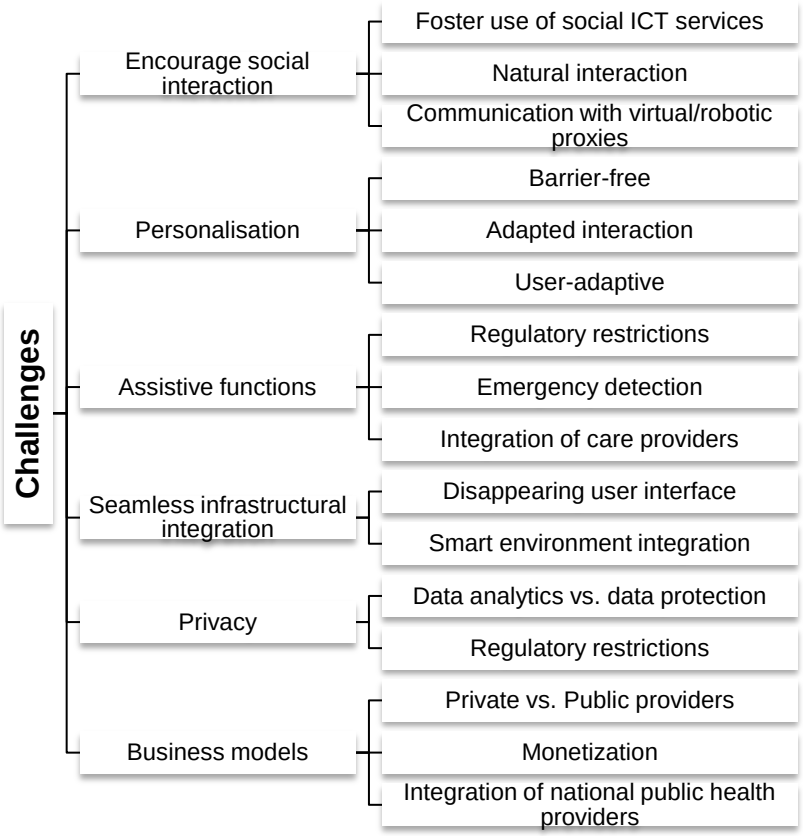

Fig-6: Challenges in social well-being within active healthy ageing [19].

4 Opportunities and Recommendations

The following actions are proposed to ensure early adoption and make possible first-mover advantages for partner companies and organisations in EIT ICT Labs.

4.1 General Recommendations

The Innovation Radar has identified the most important trends of 2013 and indicated their respective relevance for all the innovation areas of EIT ICT Labs [5], including HWB, with a special eye on new products and companies in the area (Fig-7).

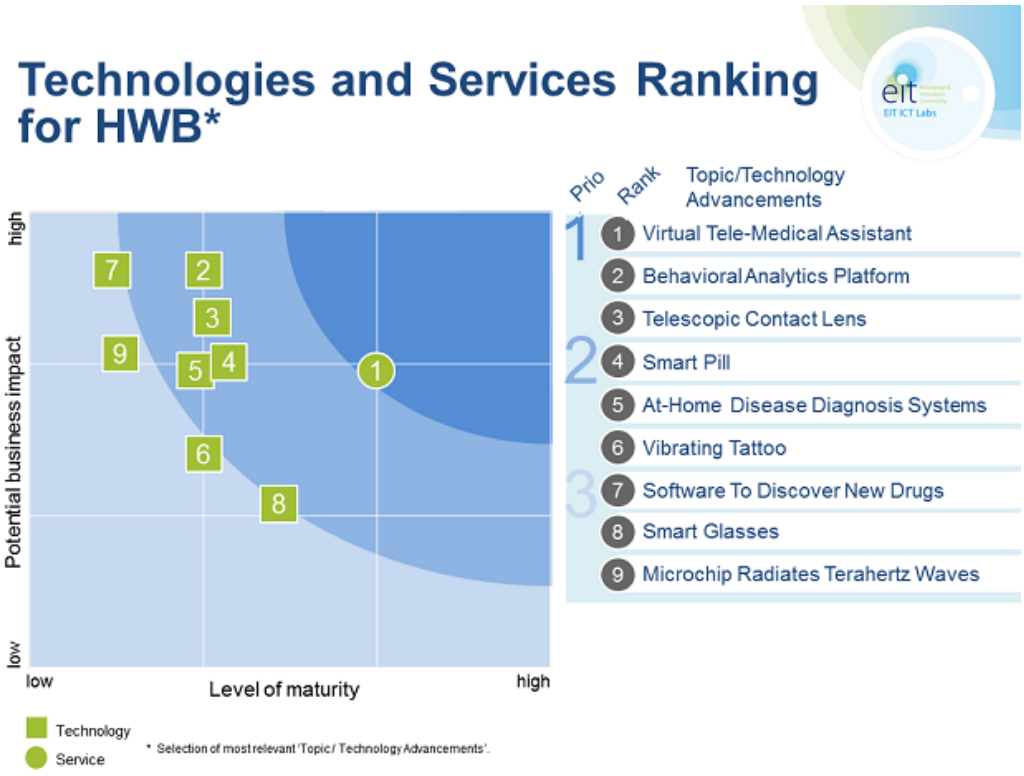

Fig-7: HWB technologies' maturity and impact, as presented in the Innovation Radar annual trend report [5].

In addition, experts from the HWB Action Line have through digital cooperation and a foresighting workshop (held in Berlin in September 2013) generated their views of the future (Fig-8). From a research and innovation point of view, an overview of what the European Commission has supported in the area in recent years is shown in Fig-9. Finally, even if investments in ICT for active healthy ageing are addressing a market that has not developed according to initial expectations in Europe, something that could be dubbed a generic business model can still be presented (Fig-10).

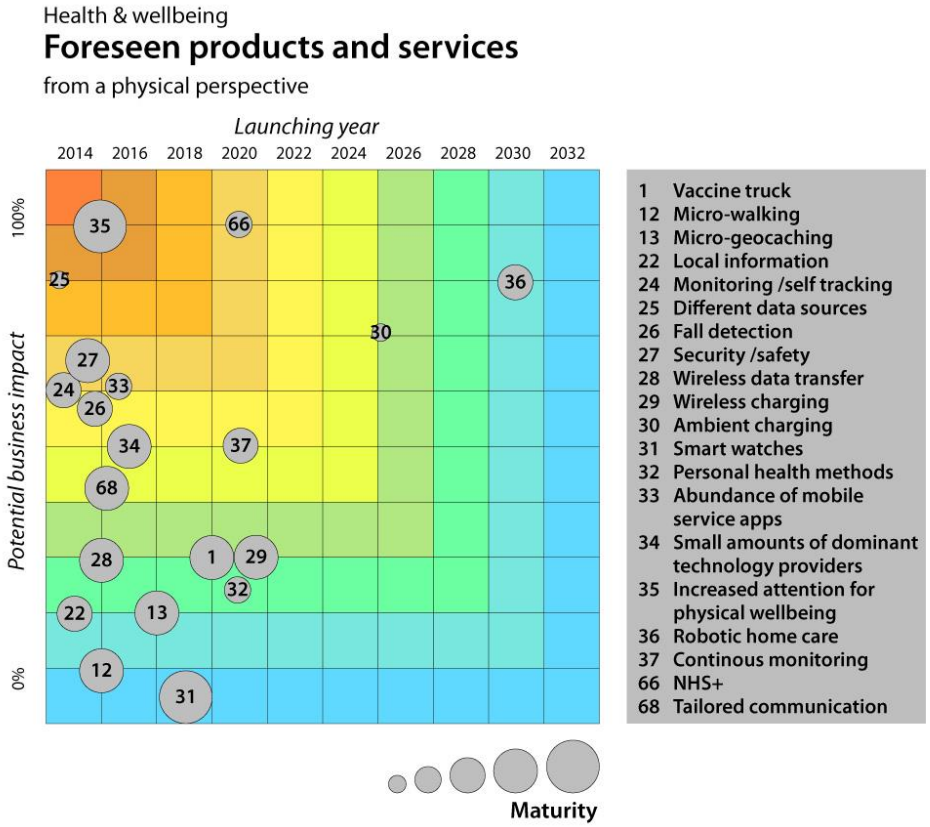

Fig-8: Visualisation of foreseen products and services in the long-term perspective, and presented in the three perspectives (only physical shown here). Each item is detailed in a tool for social digital cooperation, as part of a wiki-like structure, which allows for dynamic foresighting.

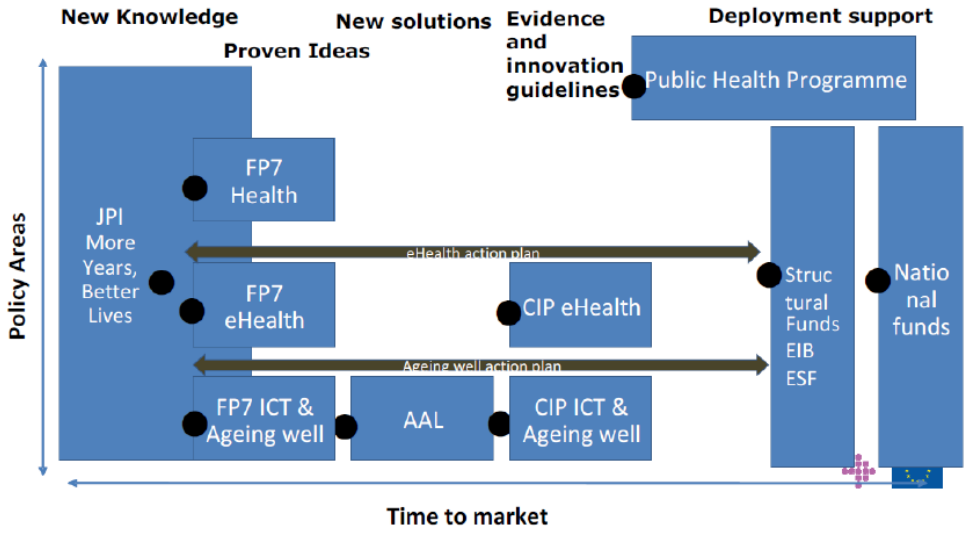

Fig-9: ICT and ageing, EU-funded schemes. Source: [2], Figure 12, p.67. (New European Developments in ICT for Ageing Well, Res. PO Bart Neerscholte).

According to this model [2] and in unison with this White Paper, there are both commercial opportunities to realise, and unrealised financial saving in the public sector of health and well-being. The general goal, synchronised among all five actors mentioned in Chapter 1, could be dubbed *health literacy*: efficient access to health, integrated with Corporate Social Responsibility, and promoting well-being for everyone.

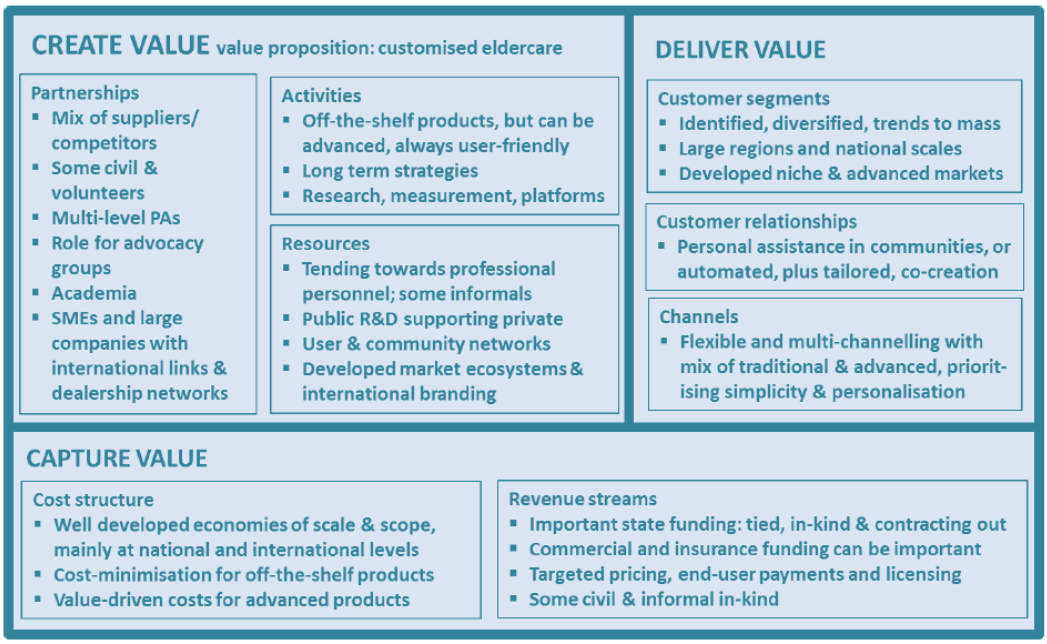

Fig-10: A generic European business model for ICT and ageing well. Source: [2], Figure 1, p.5.

4.2 Recommendations and Opportunities – Mental

The following recommendations are linked to opportunities listed below.

1. Identify the real needs of elderly people. Find knowledge sources from studies devoted to understanding what seniors need in order to stay emotionally and mentally fit.
2. Support all care givers.
3. Address the reluctance among the elderly to maintain and develop their mental faculties by means of ICT, including new media, virtual companions and robotic proxies, and emotion-aware solutions for companionship and support.
4. Focus on self-care and preventive health.

Informing the person in risk of developing, or already suffering from, cognitive decline about health-promoting behaviours is important. ICT for providing feedback and for visualising behaviour are therefore crucial. Pursuing supporting goals, such as coaching services, recommender systems, and intelligent monitoring and warning systems, create huge opportunities for developing high-quality ICT systems to address the challenges detailed in the previous chapter.

4.3 Recommendations and Opportunities – Physical

As technologies continue to improve, the ICT industry and the eHealth research community will have a great impact on the healthcare system. However, policies and procedures are needed to guarantee privacy and security, while enabling sharing of information with authorised parties. For the elderly, it is particularly important to ensure that the adopters of the technology are clearly made aware of which information is exposed, to whom, and for what purpose, in an understandable manner.

To increase the chance for success of any supporting (preventive) technology, it is important to have a strong link with specialised medical professionals and interaction designers, as they know what the challenges among the ageing population are. Seeking opinion leaders at an early development stage and getting their endorsement will facilitate the trust among future users. Developments in microelectronics can enable GPs to contemplate monitoring and treatment via medical implants, and other forms of novel telemedicine.

Self-diagnosis (e.g., for rehabilitation after injury) is another aspect that could make the healthcare system more efficient. However, professional diagnosis tools and instruments are often expensive and complex. Health professionals are taking notice of the boom in apps and other technologies to help collecting bio-data, but there is some controversy about the quality of the data and how it could be used. Monitoring devices have the potential for reducing the pressure on the healthcare system, but only after integration and acceptance.

The combination of technologies used in smart home applications and environments with additional sensors and actors to provide services supporting the elderly's well-being at home, even making the home a "third site of care and health" is a promising approach from service, usability, and cost perspectives.

4.4 Recommendations and Opportunities – Social

- Technical interventions that can illustrate best practices should be highlighted for the area of social well-being that has a weak foothold on the EU research arena and in the European national health systems.
- Frailty among elderly is a common diagnosis that eventually leads to death by the body's incapability to handle infections, etc. A major reason for frailty is inactivity and social disconnectedness. Interventions that measure and increase social activity is therefore important to study.
- Tools for increasing social well-being should be part of larger ecosystem, designed for increasing the overall well-being of an individual.
- Products in this area may be subject to national regulations for medical devices. Innovators should be aware of regulatory limits in the different countries of the EU.

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