Active Ageing:
Smart Solutions, New Markets

Proceedings of the AAL FORUM 2010 Odense

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ACKNOWLEDGEMENTS

We hope you will appreciate the variety of information and insight offered by the proceedings of the second AAL Forum event of the Ambient Assisted Living Joint Programme. The event was entitled Ambient Assisted Living Forum 2010 in Odense, Denmark, September 15-17, 2010.

We would like to take the opportunity to express our deep gratitude to everybody who contributed to the proceedings. First of all, we thank the AAL Forum Committee Members and the chair of the AAL Forum Committee, Claus F. Nielsen, and his co-chair, Reinhard Goebl.

Thank you also to all the chairs of the sessions and to the speakers who depicted a manifold picture of the Ambient Assisted Living topical field. Finally, thank you to all the authors of the texts in this proceedings, be it from sessions, articles or annex compilations.

In particular, we like to thank Gerda Geyer very much for her excellent work and editing of this volume.

Finally, we also like to thank the representatives of the Odense Municipality, Henning Seiding and his team, Region of South Denmark, and the Ministry of Science, Denmark, for their commitment to the success of the AAL Forum 2010.

We wish you joyful and interesting reading!

Lena Gustafsson

President
AAL Association, Organiser of the AAL Forum

FOREWORD

In autumn 2010, the "*AAL Forum Odense 2010*" took place in the city of Odense. This was the second of a series of events of this type organised in cooperation with the Ambient Assisted Living Joint Programme (AAL JP) and a European Member State of the programme, in this case Denmark. The event was entitled "*Active Ageing: Smart Solutions, New Markets*".

The Forum 2010 was a huge event which attracted more than 760 participants. In total it presented more than 150 speakers and chairpersons, ready to give different views, ideas, considerations, technologies or smart solutions. Altogether, the Forum was composed of five plenary sessions, including world-class keynotes, and eight different tracks offering 41 sessions.

Several side events such as a Young Researchers' Workshop, an Investment Forum and project meetings completed the picture. Next to the Forum, more than 60 exhibitors showcased exciting AAL technologies in the Innovation World and AAL Project Village. This was the right place to experience and try out a wide range of different AAL technologies in real life. The expo area was open to the public. It attracted more than 1.700 visitors.

The Ambient Assisted Living topical area was stretched to the full and proved to be vivid and vibrant.

Besides all the knowledge and contents which were shared, the Forum also tried to show the heterogeneity of old age: DJ Ruth Flowers, the 69-year old celebrity, made the Forum dance at the Mansion of Bramstrup, accompanied by tremendous, floor thumping music. But even more than that, she was a living example of powerful, vivid, self-determined, active ageing (http://www.aalforum.eu/video/dj-ruth-rocks-the-aal-forum).

In a touching slide show, Patricia Moore showed pictures of life courses, generations, and older adults. She highlighted how bad or good design can have direct influence on people's quality of life. The inventor and futurist Ray Kurzweil showed how technology might contribute to overcome future challenges.

The contents of the proceedings

Of course, the proceedings will not reflect the whole of the AAL Forum. Our aim is to give a broad insight into the variety of the event and to investigate some of the discussed topics further.

Welcome notes

The welcome notes reflect the political relevance of the AAL thematic field. They also reflect the potential that AAL solutions bear in helping societies to tackle the challenges that are linked

to demographic changes in Europe. Welcome notes were given by *Lena Gustafsson* (President of the AAL Association), *Charlotte Sahl Madsen* (Danish Minister for Science, Technology and Innovation), *Anker Boye* (Mayor of the City of Odense), and *Carl Holst* (Chairman of the Region of Southern Denmark).

Sessions[1]

Track A of the AAL Forum 2010 focused on *Market, Economy, Innovation*.

Demographic change not only leads to new challenges for society but also opens up new market opportunities. Despite the huge market potential, many solutions addressing the so-called "silver market" have had difficulties attaining the anticipated market success so far. Consequently, it may also prove difficult to translate the ICT R&D projects, funded by the AAL Joint Programme, into commercial successes.

The opening session in Track A aimed at formulating the problems that hamper access to silver markets and at addressing these challenges using practical examples as well as theoretical considerations. *Philip Osl* from the University of St. Gallen summarises the outcomes of the session entitled *Silver Markets*.

Chris Flim gave an overview of various aspects of developing business models for AAL projects and solutions. The session also discussed the importance of sustainable business models which is seen as one of the key success factors for AAL to reach its goals, and effectively bridge the gap between successful pilots, and successful products and services in the market. Read more about it in the session summary on *Development of Business Model – Conceptual Approach*.

The AAL market needs yet to be established. *Urs Guggenbühl* and speakers looked in the session *Quality aspects of AAL Interventions* at activities to develop standards for the AAL market, especially for the quality aspects of AAL interventions.

Sofia Moreno gave an insight into the outcomes of the discussion on *Innovation in Small and Medium-sized Enterprises in the Silver Markets*. The discussion showed that the silver market is not one single market. Also, age is not a useful segmentation criterion. Large companies that act globally seem to be better able to satisfy some silver customer needs. To foster innovation in SMEs it is not necessarily more funding that is needed. Read more about its necessities in the session summary.

Finally, the session chaired by *Christian Wehrmann* focused on *Meeting the Challenge of Demographic Change – an Economic Perspective*. Aspects such as buying power, economic strategies, and pension funds were discussed.

Track B of the AAL Forum 2010 focused on *Changing the Model of Innovation through User Engagement*.

Lucia Lukanova acted as chair of the session *Supporting and Sustaining End-user Engagement*. Its three speakers, each presenting remarkable achievements in their very diverse fields, brought

[1] For presentation slides see: http://www.aalforum.eu/pages/forum-2010.

a rounded perspective on what it takes to sustain user engagement in developing new and innovating, lasting solutions. The diversity of the speakers coupled with their deep practical and hands-on experience made the session highly relevant and all but theory, simply a fun session to attend.

Track C of the Forum 2010 Programme focused on *AAL Joint Programme: Topics and Basics*.

The idea of the so-called *Open Session* was to organise an event similar to speed dating:

Four possible future call themes were "dated" by the participants. A moderator and a note taker were responsible for each theme. They briefly presented the theme and subsequently the participants could ask questions as well as discuss the topic. After 15 minutes the participants moved to the next theme. Find more information about the outcomes of the speed-dating discussions in the summary provided by the session chair *Hartmut Strese*.

Two sessions in Track C were dedicated to obtaining very practical information with the aim of enhancing the quality of proposals in the future. The session on "*How to improve AAL proposals: Business Plans, End-user Involvement and Ethical Issues*" was chaired and summarised by *Maja Arnestad*. The second session was organised as a round table discussion and was chaired by *Uli Waibel*. Its title was *How to Improve AAL Proposals: SME Participation in the AAL JP*. Speakers gave some very interesting recommendations, i.e. to radically shorten the project proposals to five pages, to offer support for SME coordinators, or to build a brand label for AAL to increase market opportunities.

Five out of eight sessions in Track C were dedicated to exploring specific topics and to discussing them as potential candidate topics for future calls in the AAL JP.

The session on *Information, Learning, User Interfaces* highlighted the different aspects of learning: it can mean learning in general and/or life-long learning as is also addressed in Third Age Universities. When learning addresses ICT, it is more about training or getting familiar with ICT. Experience shows that people are not interested in computers or ICT per se. User interfaces play a crucial role when it is about information and learning, as *Gerda Geyer* points out in the session summary.

Hartmut Strese chaired the session on *Mobility*. The outcomes of the session show that mobility is a key issue when talking about autonomy and the quality of life of older adults. Mobility means freedom to move around, to cope with events, as well as to exercise the body, in short: mobility removes barriers to the world.

Hartmut Strese also chaired the session on *Home Care* (informal and professional care). The topic is perceived as highly relevant because today, family care is the predominant model of support for older persons. However, professional care services are in many cases indispensible. In future, demographic changes and individualized family structures will require new concepts of care. Read more about this topic in the session summary.

Another highly relevant topic when talking about the autonomy of older adults is the *Supply with Goods and Chores*. For an older person's independence, it is important to maintain Instrumental Activities of Daily Living (IADL). Such activities include everyday issues like meal preparation,

shopping, cleaning and maintaining the home as well as managing personal economics and medication. The session, which was chaired by *Pekka Kahri*, presented examples and discussed how AAL solutions can support older persons in their everyday activities thus helping them to stay independent.

Peter Hanak chaired the session on *Safety, Security, Privacy & Trust* (SSPT). The topic proved to be of special importance in ambient environments. SSPT seems to be an especially important area in ambient assisted living settings because of the higher level of vulnerability of elderly persons. SSPT was shown to have strong ties to ethical, ergonomic, psychological, and legal (EEPL) issues. All these areas, i.e. SSPT and EEPL should be considered simultaneously. Read more in Peter Hanak's session summary.

Track D focused on *AAL in National and Regional Politics*.

Gerhard Finking summarised the outcomes of *three sessions*:

The session on *Regional AAL Politics* comprised comprehensive policy approaches and innovative policies on the regional level. Examples comprised the implementation of a multichannel Service Centre in the Basque Country as part of the solution for chronic patients; the paradigm shift in care in the Noord Brabant region in the Netherlands, the Hungarian Initiatives Promoting AAL Innovation; and the Portuguese programme AAL4ALL. Read more about those innovative approaches in the respective session summary.

The session on *Community of Regions for Assisted Living* introduced network activities in the AAL field, as an exchange of policy views and experiences, international benchmarking, creating synergies, AAL EU policy definition and regional collaboration.

Regions were again in the focus of the session *AAL for Regions Workshop*. The session addressed specific problems of regions with a focus on rural areas. The discussed issues ranged from the deployment of AAL solutions in rural regions, to an integrated approach for ageing at home, deploying AAL services in rural areas and finally to the SENIORLAB project - Ageing Research and Development in Rural Areas.

Track E was dedicated to the host region: *AAL – The Viking Way*.

Søren Jensen chaired the session on *National Innovation Models & Clusters*. The session focused on some key public programmes in the Danish and Nordic innovation contexts. Insights into the activities of the Danish Public Welfare Technology Foundation were given as well as into the national innovation networks which promote R&D interaction between companies, knowledge institutions and users, for instance in the field of AAL focusing on the needs of older people and people with chronic diseases. Also the Welfare Tech Region of South Denmark, which fosters public-private innovation within Ambient Assisted Living and related fields, was presented. The picture was completed by Finnish, Baltic, and Nordic networking initiatives which support the internationalisation of innovation programmes.

Scandinavian AAL Projects and Business Cases was the focus of further session within Track E. The session, which was chaired by *David Grønbæk*, comprised three projects concerned with creating integrated AAL platforms which would enable older people to live longer in their

homes. A fourth presentation focused on a web-based application aimed at increasing the social connectedness of older people. Read more about these most interesting platforms in the session summary.

Analyses and Side Events

Naturally, conference attendance is of interest to organizers in order to evaluate an event. Seamlessly collecting information about the participants not only discloses such detailed information, but also allows us to build live location-based service for the benefit and comfort of participants. Targeting both of these goals *Kasper Hallenborg, Bjørn Grønbæk & Pedro Valente* set up an RTLS in the Forum conference venue and tracked participants for the whole duration of the Forum. Read more about the collected data that provided alternative statistics and results of the Forum attendance in the paper *AAL Butler: Participant Statistics of the AAL Forum 2010 Using RTLS Technology*.

Track C of the Forum 2010 Programme focused on "AAL Joint Programme: Topics and Basics". Several sessions were dedicated to exploring specific topics and to discussing them as potential candidates for future calls in the AAL JP. Four out of five topical sessions were supported by a MobiTed polling system. The aim was twofold: on the one hand, to stimulate discussion, on the other hand, the programme sought to gather information from and about the participants. The results are presented in the article *MobiTed Polling System in Track C: AAL JP Topics and Basics* written by *Gerda Geyer*.

The 1st AAL Investment Forum was held on September 15th and 16th, 2010. The rationale behind the AAL Investment Forum was to explicitly link to new and innovative interfaces between public and private investment. The structure of the sessions mirrored these important elements for market impact and success in AAL. The rapporteur *Walter Aigner* presents the sessions with some of the contributions from the audience. Read more about the event in the paper entitled *The 1st AAL Investment Forum*.

As a side event, the Forum 2010 in Odense again offered a *YR-RISE Workshop for Young Researchers and PhDs*. It constituted a follow-up to the Young Researchers and PhD Workshop held at the AAL Forum 2009 in Vienna. As such, it was meant to draw on the experiences made in Vienna and benefit from them. The goal set for the Odense YR-RISE workshop mirrored the objective of the Viennese workshop. Thus, the main focus was to press for interdisciplinary dialogues between young scientists in order to enhance mutual support, enable theoretical exchange, and create networks for possible collaborations. *Ilse Kryspin-Exner, Birgit U. Stetina, Doris Weber, Anna Felnhofer, Oswald D. Kothgassner & Helmut Hlavacs* gave an insight into this very important event which was organised with great enthusiasm and which again proved to be a successful concept.

Articles

We are very pleased that the AAL Forum 2010 Proceedings also contain papers by the three winners of the YR Workshop, who were selected by a jury.

The first prize was awarded to *Ronan McDonnell* from Trinity College Dublin. Together with *Jane Grimson*, he gives an overview of the current research in designing communications

technology for older people in care, potentially increasing their levels of social engagement. More specifically, an overview of the approach taken in this research was presented focusing on those in care settings in Ireland. Read more in the paper called *Keeping Connected in Care: Development of technology to stimulate social interaction among older people in care facilities*.

The second YR Workshop prize was awarded to *Mario Buchmayr*. In the past years, various Ambient Intelligence Systems have been proposed to decrease costs for health care and geriatric nursing with the objective to diminish the problems caused by the ageing of the population. Although numerous ambient intelligence projects have been founded, there is still: (i) potential for improvement in detecting critical situations harmful for residents, (ii) unavailable mechanisms for handling situations, (iii) a lack in analyzing future situation evolution and (iv) serious integration problems regarding related domain knowledge. Different available approaches are more or less feasible, depending on the views and knowledge of the system. *Mario Buchmayr* and *Werner Kurschl* focus on methodologies from the domains of Knowledge Engineering and Ontology Engineering as well as Situation Awareness, and Information Fusion concepts are also applied to solve these problems in their paper entitled *SENIOR: Situation-aware Ambient Intelligence Framework – a Research Proposal*.

The third prize of the YR Workshop went to an Asian project called *Confucius Chat: Mediating Cultural Communication between the Elderly and Children using New Media*.

Xuan Wang, Adrian David Cheok, Eng Tat Khoo, Xiaoming Hu and Jun Wei try in the Confucius Chat project to foster a new form of cultural computing that bridges intergenerational communication by enabling the elderly and the young to interact and explore Asian cultural heritage. The system uses new media to revive the Confucius philosophy, presenting it in a social chat context. By modelling Confucian knowledge extracted from classical texts, the system allows users to have meaningful chats with a virtual Confucius. Combining the 'old' and the 'new', Confucius Chat appeals to both older and younger generations, and serves as a perfect medium for them to communicate. In their paper, you will read more about the architecture of the system, and the user study results to show its positive effects on intergenerational communication.

Methods of end-use involvement and user-interfaces are key issues in AAL projects. *Chiara Leonardi, Fabio Pianesi, Massimo Zancanaro* present in their paper on familiarity-based design (FBD), an approach that aims to facilitate the design of artefacts, which naturally fit into the users' world and daily practices by means of an intensive process of mediation between users and technologists. They present the FBD framework and how it inspired the design of the MobiTable prototype, a communication device that aims at supporting an elderly people social network. In conclusion, they provide results from a 4-month longitudinal study where elderly people could use the MobiTable to communicate with friends and family members. The paper is entitled *MOBITABLE: Design and Evaluation of a Familiar Interface for E-Inclusion*.

The next contribution brings us back to the venue of the Forum, to the Region of Southern Denmark. *Peter Brøndum Jensen*, Product Manager of the LINAK Group and Board Member of the Welfare Tech Region gave an insight into the hospital and health care equipment market. The market is extremely competitive and product development is essential to maintain and increase the share of the market. The market for health and care services and for products improving efficiency is expected to expand rapidly in the coming years, and LINAK is using the regional

"infrastructure" by engaging in a triple helix co-operation. The cluster Welfare Tech Region provides the framework for such a co-operation with its action-oriented network aimed at making "technologies meet users" in order to bring new, so-called welfare technologies to the market. Read more in his paper entitled *Synergetic Support of Health Care and Economic Growth*.

It is a matter of fact that, over the last decades, interaction and communication have been revolutionized by technology. Although new media and all information and communication technologies (ICT) enhance our daily lives, we crave direct social and especially emotional contact. Current research deals with interesting new approaches in emotion research and virtual simulations for the elderly using psychophysiological parameters. *Birgit U. Stetina, Oswald D. Kothgassner, Elisabeth Kastenhofer & Ilse Kryspin-Exner* give us more insight into this most interesting and relevant topic in the AAL field in their article entitled *Real Life and Virtual Interactions: Exploring New Ways in Emotion Research and Interventions*.

The evaluation of Ambient Assisted Living (AAL) systems is particularly challenging due to the complexity of such systems and to the variety of solutions adopted and services offered. *Stefano Chessa, Francesco Furfari, Francesco Potortì, Casper Dahl Marcussen, Sergio Guillen, Juan Pablo Lázaro Ramos, Marius Mikalsen, Dario Salvi, Mohammad-Reza Tazari, and Reiner Wichert* describe in their paper entitled *The EvAAL Project: Evaluating AAL Systems through Competitive Benchmarking* an approach which could help to face the challenge. Their work describes the framework under which EvAAL operates (more specifically the AAL open association AALOA, www.aaloa.org), and it presents the EvAAL objectives, strategy and organization.

Last but not least, the paper presented by *Claus F. Nielsen, Cecilia Vera, Artur Serrano, Pilar Sala and Elena Martinelli* leads us back to the motto of the AAL Forum 2010 Odense, i.e. to active ageing. The paper describes the holistic user assessment approach which the PERSONA project has selected. This is seen as vital for a number of reasons; firstly because the general (non-expert) view of the elderly person is often seen as a weak person, without resources (i.e. the elderly are portrayed in some road signs, which apparently warn drivers to be aware of wild elderly people with walking sticks running all over the roads). The same view is also common in many of the technological research and development projects, where the user often is referred to as a patient instead of a citizen. The "elderly as fragile and weak" approach could often lead to technological AAL solutions or services that easily counter-react to the goals of elderly care. A holistic approach to describe the user profile is a way of shifting from the disability focus to the resources focus. Read more about this in the paper entitled *Persona project – ICF User Assessment Evaluation Methodologies*.

Gerda Geyer
Claus F. Nielsen
Kerstin Zimmermann

Vienna, July 2011

WELCOME NOTES

WELCOME FROM THE AALA PRESIDENT

Lena Gustafsson[1]

Dear Participants, welcome to the AAL Forum 2010 in Odense, Denmark.

Europe is ageing – smart technology can be a key solution.

To cope with this the AAL Joint Programme introduced two main new and important elements: the new European cooperation scheme of 23 states and the still new but vibrant topic of Ambient Assisted Living, i.e. Information and Communication Technologies (ICT) utilised for an autonomous and better life of elderly people. Both elements have strong European facets. As a result, the European AAL Joint Programme is an adequate basis for a European event to expose actual aspects of this topic.

There is the basic strategy of a "triple win" for the AAL Joint Programme: creating concrete ICT products and services to be used by elderly people for a better life at home, in society and at work; taking ageing not as a threat but as a huge opportunity of economic values, creating a strong market; and contributing to the big societal and economic challenges of ageing in Europe – "Active Ageing: Smart Solutions, New Markets".

A cooperative programme such as the AAL Joint Programme holds significant European political value by its own because of the inherent closeness of internal cooperation being necessary. As a result, a yearly programme platform is of high relevance for improving communication between the stakeholders, members and their representatives and actors. To this purpose the AAL Forum 2010 has launched a new powerful digital web 2.0 platform with the aim of strengthening ideas and knowledge sharing between stakeholders. I invite all to contribute and share their ideas and results with this social media 2.0 tool.

Compared to the event in Vienna the AAL Forum has substantially grown and further developed. To cope with this framework there are some new elements in the AAL Forum's programme.

For the first time regional aspects are being developed because many important AAL responsibilities are with regions, municipalities and not only on a national level. Alongside this we are also introducing the new regional Scandinavian Viking track. There is a new focus on Robotics, achieving user acceptance and AAL in Research, including the success of Vienna last year with the Young researchers workshop. Furthermore, a whole track invites the presentation of new ideas for relevant categories of AAL topics, which could be considered in the future for

[1] Rector of Umeå University.

calls or other activities. Additionally, many topical themes are presented and will be also discussed in the coming years.

In the long run we have to be prepared for a second phase of the AAL Joint Programme, maybe in the context of Framework Programme 8. This means we have to evolve and discuss several dimensions of AAL at a time.

To use technology to solve some problems in the context of ageing is not an exclusive dimension of coping with ageing. In the long term vision, technology and usability are complemented explicitly by a third dimension: the market entrance and investments in AAL, i.e. emphasizing the AAL innovation. Social innovation should also be considered as an investment issue.

To discuss this on as concrete a basis as possible, the first AAL Investment FORUM is preceding the AAL Forum. Included are closed private and public matchmakings. In addition, a strong track on Market, Innovation, Economy completes these economic views.

The Danish host has prepared a rich set of activities, including an exhibition, an AAL project village, an Innovation World and the social events. Please use these excellent opportunities to network with stakeholders and colleagues!

I draw your attention to the Danish Welfare Tech Region, an "AAL Valley" of Europe. The Region of Southern Denmark has based their future growth strategy in the development and uptake of AAL Technology – or Welfare Technology as it is called here locally. Furthermore, the Danish Ministry of Finance has supported the area with a funding programme for market ready solutions. All in all, this is best practice for all of us in Europe.

I welcome the entire group of distinguished guests that we are pleased to host at this event, including more than 200 brilliant speakers addressing the important topics contained in the programme of the AAL Forum. We are delighted and thankful to welcome sponsors & business and our supporting partners to our exhibition. Your support and collaboration help us to create an even greater AAL Forum. We are also grateful for the opportunity to work together so closely and actively with the end users organisation Age Platform Europe.

I have especially to give my warmest thanks and congratulations to all who have worked so hard to prepare for this event, in particular the transnational active AAL Forum Committee, chaired by Claus F. Nielsen and co-chaired by Reinhard Goebl, and the national Steering Committee in Denmark, chaired by Henning Thorkild Seiding.

I deeply appreciate the commitment by Nelly Kroes, Vice President of the European Commission and Commissioner for the Digital Agenda, for her personal presence and the support towards the AAL Joint Programme. I am also very honoured to see the commitment on the national level in Denmark, as personalized by the participation of Claus Hjort Frederiksen, Danish Minister of Finance. This demonstrates that powerful forces in the government of Denmark are now lined up to meet the challenges of the demographic change for our future society.

Last – but most important – I am deeply grateful for the collaboration from Anker Boye, Mayor of the City of Odense and Carl Holst, Chairman of the Region of Southern Denmark. Not just to

host us, but also to have yourself and your staff to actively contribute with their resources to realize this second AAL Forum 2010.

Welcome to AAL Forum 2010.

I invite you to actively participate in this attractive event.

AAL FORUM 2010 – WELCOME FROM THE MINISTER OF SCIENCE, TECHNOLOGY AND INNOVATION

Charlotte Sahl Madsen[1]

Denmark, like so many other countries in Europe, faces a demographic challenge. Simply put, in the coming decades fewer people will have to provide for, and take care of, more people.

In meeting this challenge, the Danish government is promoting the development and use of ambient assistive technologies. Our funding initiatives span the entire innovation chain, from strategic research and development to commercialisation and implementation. Generally, we emphasise public-private partnership and user-driven approaches.

The Danish government is well aware that the ageing society calls for effective and coherent policy responses at both local, regional, national and European levels. We therefore take great pleasure in welcoming the AAL Forum to Denmark.

The primary objective of AAL solutions is the wellbeing of the elderly or other people with disabilities. However, it is perfectly legitimate to consider the opportunities for labour cost reduction and commercial exploitation as well. We have to focus on the potential of new products and processes, rather than complaining about the "burden" of an ageing population.

In this spirit – which is no doubt shared by the AAL Joint Programme, its 23 member countries and the European Commission – I am pleased to welcome the participants of the AAL FORUM 2010. I hope you will have some useful, inspiring and enjoyable days in Denmark!

[1] Minister for Science, Technology and Innovation.

WELCOME TO ODENSE

Anker Boye[1]

Dear guests and participants of the AAL Forum 2010!

It is with the greatest of pleasure that I, as Mayor of the city of Odense, welcome you to AAL Forum 2010 in Odense. We are greatly honoured to have been chosen to host this year's conference. We consider the conference to be pivotal to the short and long term development of new business areas and new cross-sectoral cooperation to support public and private initiatives aimed at meeting the challenges facing the care-sectors in the coming years. To have been chosen as hosts proves to me that the unrelenting efforts, with which we pursue the ambitious objectives to which we have committed ourselves in relation to welfare technologies, are coming to fruition - and I have high expectations for the future developments in this field.

The city council in Odense has allocated DKK 20 millions to initial testing and implementation of welfare technologies. We have already initiated several projects e.g. in the Department for Elderly and Disabled Citizens. The use of GPS in relation to citizens suffering from dementia has already been implemented and tests with vacuuming robots have proven so successful that we are now in the process of implementing these in our elder care sector.

Welfare technologies are a major part of the development strategies for Odense as well as for the whole of the Region of Southern Denmark. Our scope covers the entire Triple Helix of private enterprises, the public sector and research and development. We look very much forward to presenting our visions and results as regards strategies and development of welfare technologies, and to learning more from your experiences and expertise, in your capacity as pioneers, end-users, politicians, product developers and established experts in the field of welfare technologies.

While in Odense, I hope that you will take the opportunity to see more of our city. Odense is known as the city for cyclists with a total of 510 km of bicycle paths and state-of-the-art facilities for cyclists. Our efforts in this field have won international acclaim and we are proud to have been chosen to present our results and visions at the World Expo 2010 in Shanghai. While you are here, why not make time for a bicycle trip to see the full scope of what a city for cyclists can offer first hand?

Odense is a dynamic city that combines the metropolitan pulse with village charm - there is something here for every palate and all temperaments. We are the proud home town of Hans Christian Andersen. Do not forget to visit his birthplace and the adjacent museum and information centre that have been established there in his honour, as well as the quaint historical museum in his childhood home. Take a stroll through the charming centre of the city and enjoy

[1] Mayor of the City of Odense.

the many parks and squares where you will find varied activities and also room for peaceful contemplation in beautiful surroundings.

The city of Odense and I extend a cordial welcome to AAL Forum 2010.

WELCOME TO AAL FORUM 2010 IN THE REGION OF SOUTHERN DENMARK

Carl Holst[1]

The coming decade will see the number of elderly citizens increase significantly while the number of employees in elder care and in the health care sectors will decrease equally significantly due to a dwindling workforce. Europe already faces the challenge that this situation poses – and one of the measures that can serve to counter the rapid changes that we see, is the development of new technologies that can assist elderly in their daily lives.

In the Region of Southern Denmark we seek to foster commercial opportunities for companies with the capacity to supply these technologies in the form of products and solutions to assist or automate tasks in the health and welfare sector. The region is especially known for its strong positions in the areas of robot technology, telemedicine and ICT.

The implementation of ICT will continue to expand into new fields and this creates new demands on citizens to commit to lifelong learning and continuous development of their skills – and the most dramatic development often occurs in areas that can be unfamiliar to many elderly citizens. However, technology that is developed to address the specific needs of the elderly citizens can assist them in access to free communication and access to information – and thereby help to secure the social inclusion of all citizens in the modern society.

One of the projects we are currently involved in, "UNIK", is a national project with over 80 participants in a public-private partnership and a total funding of 6 million Euros. The main objective of the UNIK-project is to enable elderly people and patients with chronic diseases to live more independently with the aid of the right technology.

We think the future commercial potential in this field is very promising and we are working in close collaboration with private enterprises and research institutions in the region on various projects. Within the public sector we strive to improve and rethink the services that we offer our citizens. A partnership with a public body offers a clear commercial potential for growth for private enterprises, especially in the development of solutions and products in the field of welfare technologies. One of the major challenges relating to welfare technology is to ensure that the technological solutions are designed so that it is the end-user and not the technology itself that is in primary focus. This is the point of departure for the Region's focused involvement in welfare technology.

Welcome to AAL Forum 2010.

[1] Chairman of the Region of Southern Denmark.

SESSIONS

SILVER MARKETS

Philipp Osl[1]

Demographic change not only leads to new challenges for society but also opens up new market opportunities. Despite the huge market potential, many solutions addressing the so- called "silver market" have had difficulties attaining the anticipated market success so far. Consequently, it may also prove difficult to translate the ICT R&D projects, funded by the AAL Joint Programme, into commercial success.

The opening session in Track A aimed at formulating the problems that hamper access to silver markets and at addressing these challenges using practical examples as well as theoretical considerations.

In his introductory remarks, Philipp Osl from the University of St. Gallen argued that the term "silver market" is much too broad to discuss and develop new business models addressing the related market potentials. Given the heterogeneity of the consumers addressed, the range of products and services they are interested in and the amount of money older people spend, it is crucial to be specific about which market segment(s) within the overall silver markets that business models aim to address.

Anne-Sophie Parent, director of AGE – the European Older People's Platform, continued with a discussion on the numerous dimensions that need to be considered in order to bring ICT-based solutions for older adults to market successfully. She emphasized that a technology push approach alone would hardly be successful. Innovations should rather be driven by customer needs, including those of informal care givers. Special attention has to be given to accessibility, user-friendly design and affordability. As Ms. Parent pointed out, user involvement in the development process is essential to ensure that ICT-based products and services respond to the evolving needs and expectations of the target group, and hence, to increase market penetration.

Then, Dr. Ignacio del Arco Herrera from the Institute of Innovation for Human Wellbeing (i2BC) presented findings from an impact study that analyzed the competitive positioning of Andalucía, Spain, in the AAL market, the general needs of the ageing population in the region and also attempted to identify the industry sectors affected by the demographic change and AAL opportunities. He came to the conclusion that AAL solutions for older people may also function as a driving force for other industry sectors beyond social and health care, e.g. tourism, biotechnology or education and training, and hence significantly push the regional economy in Andalucía.

[1] University of St. Gallen.

Florian Kicherer, researcher at the Fraunhofer Institute for Industrial Engineering IAO, talked about how new, service-centered business models could be invented, based on already existing technology. For this purpose, he presented a real-world case, which is currently in its testing phase, where a provider of telemedical consulting services and a public health insurance company combined their competencies to develop an innovative service. This service aims at promoting behavioral change towards more activity in daily life and better eating habits. Whereas the telemedical service provider offers consulting and training materials as well as a technical monitoring device, the insurance company provides access to customers and funding.

Finally, Lutz Kubitschke from empirica Gesellschaft für Kommunikations- und Technologieforschung mbH presented findings from an EU-funded study on the deployment situation of different ICT-enabled AAL solutions across 16 countries. He concluded that a wider mainstreaming of these solutions within real-world service settings has, to a large extent, yet to occur. He identified the main barriers to further market penetration as being general uncertainties about the role of business cases for ICT-based solutions, unattractive reimbursement systems (e.g. lack of incentives for established service providers to introduce new ICT-based solutions), the currently highly fragmented service market, insufficient regulatory regimes, particularly in the fields of liability and privacy, professional resistance to change, lack of organizational capacity for innovation and the underdeveloped "self purchasing culture" which results in a limited willingness-to-pay.

DEVELOPMENT OF BUSINESS MODEL – CONCEPTUAL APPROACH

Chris Flim[1]

This session gave an overview of aspects of developing business models for AAL projects and solutions.

As chair of the session, Mr. Chris Flim started with a presentation on *The Need for Sustainable Business Models*. This presentation was a short version of the presentation given in 2009 to the AAL National Contact Persons, and at the AAL Forum 2009 Vienna. In the presentation, an overview was given of relevant aspects of business models. Furthermore, the importance of sustainable business models was stressed as one of the key success factors for AAL to reach its goals, and really bridge the gap between successful pilots, and successful products and services in the market.

Mrs. Marielle Swinkels, in her presentation *Business Models Smart Care Program*, provided a short overview of the use of business models and (social) business cases in the projects of the Noord Brabant province in the Netherlands. This province has an extensive program called 'Smart Care' aiming to support elderly inhabitants of the province in their daily life. She also pointed out the distinction between civil society, business to consumer, and business to business models.

Mr. Kevin Johnson, the Founder and European head of Cisco's 'Ageing Well' program, addressed in his presentation *the big picture and some pitfalls from the Ageing Well program*, experiences and viewpoints from numerous initiatives for elderly people. He shared experiences from the Ageing Well Value Model, where initiatives are mapped on criteria: Elderly Quality of Life, Carer Quality of Life, Carer time, Provider Benefits, Policy on Employment, and Growth and Goals.

Mr. Patrik Eklund, professor in Computer Science at Umea University in Sweden, introduced the *Observe – Assess – Decide* model for *Information-Oriented Elderly Care*. The objective of OBSERVE-ASSESS-DECIDE is to establish municipal and regional best practices for strategic planning and management of ageing. This is achieved by developing accurate socio-economic modelling tools based on rigorous design of information and processes. The OBSERVE-ASSESS-DECIDE approach to socio-economic modelling-based strategic planning is both customer-centric with respect to information and process design as well as care-centric with respect to care management.

[1] Flim projectmanagement, The Netherlands.

Mr. Ad van Berlo, director of Smarthomes, the Dutch expert centre on smart housing and smart living in the Netherlands, gave a presentation on *Successful approach in supporting SME's in developing AAL products in The Netherlands*. In this presentation, the so-called IPC approach was introduced as an example of supporting innovation. The IPC instrument of the Dutch Ministry of Economic Affairs aims to stimulate innovation at SMEs via a subsidy, but with two main conditions: subcontract for 60 % at specialized companies, expert centers or universities is mandatory and cooperation with at least one other partner is also mandatory. The experiences with this model show that several barriers still need to be overcome, and business models may come from sectors other than medical or social care (alone).

Mr. Antonio Kung and Mr. Gunnar Fagerberg gave the final presentation *Business Models as Prerequisites to Standards*, based on experiences from the MONAMI project (Mainstreaming on Ambient Intelligence). In this presentation, based on experiences in this project, it was indicated that the ecosystem for AAL solutions requires three inter-related aspects: standards, business models, and cost-effective technology. The MONAMI project suggests the use of mainstream technology and focuses on one single service-platform interface. This requires an industry alliance for an open service platform and long-term consensus building by policy makers.

QUALITY ASPECTS OF AAL INTERVENTIONS

Urs Guggenbühl[1]

Rationale

The AAL market needs yet to be established. A typical indicator of a mature market is its interoperability based on established standards. In this session, we looked at activities to develop standards for the AAL market, especially for the quality aspects of AAL interventions. There have been numerous experiments and smaller scale pilot projects developing and testing independent living, telecare and telehealth solutions. It remains a challenge, however, to strengthen a scientifically acceptable measurement of the anticipated improved quality of life for the user and socio-economic benefits for the care systems. Solid evidence on common indicators and statistically significant impact measurement methodologies are essential to convince policy makers and industry to invest further in the wide deployment and uptake of solutions. This session was a follow-up to the European Commission's initiative to bring together the approaches of individual projects, and to set up mechanisms for a best practice exchange of indicators and methodologies employed in order to advance comprehensiveness, and ensure comparability of evidence to be used for meaningful policy and investment decisions.

Claus Nielson from Delta presented the Project PERSONA (http://www.aal-persona.org/) which aims at advancing the paradigm of Ambient Intelligence through the harmonisation of Ambient Assisted Living (AAL) technologies and concepts for the development of sustainable and affordable solutions for the social inclusion and independent living of senior citizens, integrated in a common semantic framework. To achieve this, a scalable open standard technological platform was being developed to build a broad range of AAL services, and to demonstrate and test the concept in real life implementations, while assessing their social impact and establishing the initial business strategy for future deployment of the proposed technologies and services. In his presentation, he looked especially at ways to measure the user impact on ICT for ageing well with the objectives to develop and suggest a universal methodology to describe and measure end-user improvements or decline in health functions & well-being based on international standards (ICF & SF-36), to review and test the methodology and the assessment tools during the trial and to evaluate whether the methodology could establish a generic approach to measure the benefits of technological interventions in health & social care. Claus described in some detail how the Health Survey SF-36 and the ICF (WHO's International Classification of Functioning, Disability, and Health) were employed and adapted in the project Persona. The results still needed to be established.

1 Urs Guggenbuehl, Dr. sc. nat., University of Applied Sciences St.Gallen

Petra Wilson from Cisco presented the **T**elemedicine **R**eadiness **E**valuation and **A**ssessment **T**ool (TREAT) which was, at that time, being developed jointly by Odense University Hospital and Cisco. This was based on a core assumption that obtaining full value from telemedicine solutions was founded on adopting innovative health and care service models which increased the *personal control* and engagement of patients and provided greater *location independence* so that health and care services might be delivered where patients wanted to consume them (at home, at work, at leisure) in a cost-efficient and care-effective manner. The driving philosophy was that telemedicine solutions provided value for citizens, providers and payers by *improving access* to services (locally or in the home), *containing costs* (reduced home visits, better control of inappropriate primary or secondary care facility attendance by patients; fewer emergency admissions to hospital), and *increasing quality* (more personalised and tailored care, easier involvement of family and informal carers). The objective was to develop a standardised assessment tool to help leaders in health and care organisations and their funding partners (local and national authorities, insurers etc) to assess their readiness to implement telemedicine solutions. The tool focussed on the policies, infrastructures, processes, systems and solutions, in place or proposed, to provide telemedicine services. TREAT is not a health technology assessment tool and does not evaluate the telemedicine solution as such, but rather looks at the organisational context in which telemedicine is to be delivered and help organisations assess, if they have the necessary framework in place to facilitate the cross-sector collaboration which telemedicine demands. In summary TREAT supports leaders to develop insights and understanding of the organisational framework of telemedicine implementation, to identify challenges and opportunities for optimizing telemedicine implementation in their area and to prioritise.

Marco d'Angelantonio presented the quest for an affordable AAL solution, from concept to reality. At the beginning of 2000, HIM SA started an evaluation for the right market niche to invest in for securing the development and growth of the Company. ICT-based elderly care or AAL looked very promising for a number of reasons (ageing of the European population, the rapid deterioration of the dependency ratio, a shortage of elderly care personnel, the declining cost of more and more user-friendly and reliable technology). Moreover, the market was not dominated by any company, and large companies could find themselves at a disadvantage compared to SMEs because of the need for the integration of components, usually managed by separate entities within the former. Thus, HIM SA took the decision to invest in building an AAL platform which would be among the very first to hit the market place. The path to success has not been easy and several EU proposals had been rejected by the Commission until the wind changed with the projects "Dreaming" and "Home Sweet Home". During 2010, the user base would reach 500 people using the platform on a regular basis and 10 trial sites (controlled and randomized) in 8 EU countries were underway to demonstrate beyond any reasonable doubt the benefits of AAL in terms of: Quality of Life and the satisfaction of elderly people, their caregivers and their relatives, health status and the social integration of elderly people, and the economics of elderly care.

In his presentation, Peter Wintlev, Head of Sector ICT & Ageing, introduced the activities in the EC under the Competitiveness and Innovation Programme. At that time, there were more than 40 regions and 10,000 users involved in pilot projects deploying existing ICT solutions for Aageing Well. The aim of these projects was to obtain real world evidence about impacts in terms of quality of life and efficiency gains as well as documenting necessary organisational and financial models for new care processes. Peter emphasised the need for a common framework

which clearly defined what was being evaluated and included equally all the stakeholders involved. He concluded that these ongoing pilot projects would deliver a lot of evidence on the type of impact the deployment of ICT solutions for ageing well would have in Europe. Further regional pilots, more work on useful indicators and better methodologies, better cooperation between various initiatives at EU, national and regional level, and a clear commitment by the European Commission to support this process were also important measures to support this ongoing process. For further information visit http://ec.europa.eu/einclusion, http://ec.europa.eu/information_society/activities/ict_psp/index_en.htm, http://www.aal-europe.eu/.

Philipp Osl from the University of St. Gallen talked about the AAL-Market and appropriate Business Models. The market potential of AAL solutions in Europe, e.g. telecare, was enormous. He underlined this with a few statements: "One of the biggest growth drivers for the asset management industry is provision for old age which is gaining in importance in the light of the ongoing demographic change"; "The over-50s own three-quarters of all financial assets and account for half of all discretionary spending power in developed countries."; "Over the past two decades, consumption by the over-50s in Europe has increased three times as fast as that by the rest of the population"; "~50% of the 50 to 79 year-olds agreed with the following statement: "I'd rather have a nice life instead of saving money all the time". Even though success stories were still rare, the number of start-up companies with new products and services as well as AAL pilot projects in Europe was impressive. Although 50+ consumers, for example, clearly benefited by living services in the eHome, why was it that a convincing business success was not yet visible? There was only a limited willingness by the target group to pay for accessing these services. The providers had difficulties in understanding the target group and were not quite in line with the consumers' demands. There was also still a lack of quality assurance by the service integrators. Philipp identified a few success factors such as the critical mass of consumers, no access fees for consumers, no fixed fees for service providers, trust (user ratings and reviews), focus on consumers pain points, no stigmatization, customer access (use online-ads for online business) and benefits for all members of the value chain. To further explore relevant business models for independent living, the University of St. Gallen created the IL network. For further information see http://il.iwi.unisg.ch/.

INNOVATION IN SMALL AND MEDIUM-SIZED ENTERPRISES IN THE SILVER MARKETS

Sofia Moreno[1]

This session was chaired by Sofia Moreno. There were two main parts: the first introduced two keynote speakers and the second consisted of an interactive round table discussion with four active SMEs with different profiles, subsectors, and maturity states.

Keynote speakers:

Urs Guggenbühl[2]
Carmen Pastor[3]

SME Round Table:

Christian Schoen[4]
Ander Altuna[5]
Andri Färber[6]
Antonio Remartínez[7]

Dr. Urs Guggenbühl presented a "Framework for innovation". Innovation is not just another idea, it is an idea that can be successfully exploited in the market. Innovation is a very positive way of increasing profit margins and competitiveness in companies, nevertheless most SME are out of touch with this approach.

Some of the reasons that are *hindering innovation in SMEs* are: the *duration of the innovation* i.e. the *estimated ROI of AAL innovation is 8 to 12 years* where financial support is very relevant in this aspect; the lack of strategic planning; the lack of resources, including financial, human and also time; finally, the lack of knowledge about the scope of innovation that is rarely an isolated effort.

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[1] Sofia Moreno, Secretaría eVIA, AETIC.
[2] Urs Guggenbühl, Dr. sc. nat., University of Applied Sciences St.Gallen.
[3] Carmen Pastor, TECNALIA (Health & Quality of Life Unit).
[4] Christian Schoen, Dr, GTN: European support for successful European SMEs.
[5] Ander Altuna, Andago.
[6] Andri Färber, Curena AG.
[7] Antonio Remartínez, Dr., Ibernex Ingenieria S.L.

In order to increase innovation in SMEs, *enablers* should be developed, and, beside financial schemes, *leadership*, a *corporate innovation culture*, an *interdisciplinary approach*, the *inclusion* of all relevant *stakeholders*, the definition, and implementation of an *innovation process* should all be emphasized**.**

Carmen Pastor's speech, "Analysing the Assistive Technologies", emphasized some relevant aspects of the SMEs' role in the assistive technology markets that are very suited to the Silver markets. Some of the market barriers that are especially relevant for SMEs, are: the lack of interoperability and standardization, and the lack of homogeneous legislation (which also has an influence on "who pays").

It would be appropriate to develop SME industry associations at European level so as to push against these market barriers and represent their interests.

Some of the ideas expounded by the keynote speakers were affirmed by the SMEs.

In the SMEs round table discussion, some of the most relevant ideas expounded were:

- The *silver market is not one single market***.** Age is not a useful segmentation criterion.

- Large companies that act globally are better able to satisfy some silver customer needs. Other silver customer needs could be fulfilled by the SME. This applies to niche market products and location-bound services. The challenge for *SMEs is finding the appropriate niche markets* with strong enough demands and being able to show *more flexibility than large companies in adapting their products/services to user needs*.

- The silver market is developing gradually. To reach its break-even point will probably take between eight to twelve years. If SMEs are thinking about utilizing new developments, they will need to make a substantial *investment effort over a long-term period to reach the break-even point*. They must *look for an investor* in order to guarantee a successful project.

- *Public services* must cover the high social needs to support the elderly population. They must *increase investment in social care*.

- To improve the capacity of SMEs to access the silver market, they must seek *synergies with other companies* (including the large ones) to be sure they can cover all user needs and to gain access to the market in time.

- A successful scenario of *innovation* for a SME could be based on the creation of an *ecosystem* with partners that are part of the value chain, sharing the vision, knowledge, and risks. The idea of involving partners that cover the whole value chain, from the hardware producer to the end user, is an Open Innovation approach that produces *win-win strategies*.

- *European policies and research programs are not conducive to supporting SMEs*. Many more activities, not necessarily involving more funding, but with a broader, strategic and closed vision of SMEs' needs are mandatory to strengthen innovative SMEs in Europe.

MEETING THE CHALLENGE OF DEMOGRAPHIC CHANGE – AN ECONOMIC PERSPECTIVE

Christian Wehrmann[1]

Speakers:

- Christian Wehrmann[2]: The Joint Programming Initiative on Demographic Change in Europe
- Ignacio Perez[3]: SENIORLAB. An Example of Employment Innovation
- Margaret Ellis[4]: The Information Economy in the EU - are we ready and trained for it?
- Francisco Pérez-Trejo[5]: Methodological Framework for Social Spaces for Research and Innovation
- Rodd Bond[6]: Embedding AAL into the WHO's Global Age-Friendly Cities Network

Christian Wehrmann presented the Joint Programming Initiative (JPI) on Demographic Change in Europe that has recently been started by several member and associated states of the European Union under the title: "More Years, Better Lives - the Potential and Challenges of Demographic Change". The aim of joint programming is to make better use of Europe's limited R&D funds through enhanced coordination and cooperation of research programmes in strategic areas. First and foremost, joint programming targets national public research and European programmes, and is a member-states driven activity. Areas affected by demographic change cover a vast range of research fields and policy topics ranging from health to social welfare, education and learning, productivity, and housing and mobility in the future. Therefore, the JPI is not limited to research in the field of assistive technologies and AAL, but follows a transnational, multi-disciplinary approach bringing together different research programmes and researchers from different disciplines in order to provide solutions for upcoming challenges and to make the most of the potential of this societal change. In his talk, *Ignacio Perez* tackled the issue of ageing at work and presented „Seniorlab" – an example of employment innovation for older people. A study showed that according to companies and national and regional employment experts, innovation is the natural labour market for older workers, the pre-retired and those who want to expand their working life after retirement. SeniorLab, as a living lab, has created three new professional profiles around ITC and the senior world (experts in ageing for ITC companies, experts in ITC for senior support and SeniorLab managers). Bringing together both approaches, seniors realize

[1] VDI/VDE-IT.
[2] VDI/VDE-IT.
[3] Value Creation.
[4] London School of Economics.
[5] Food and Agriculture Organization of the United Nations.
[6] Netwell Centre.

that it is useless applying for jobs that will never come back or recycling to professions that are dying out, but that it is more interesting to "invent" work according to demand. In this sense they are creating a 2.0 social network that includes labour supply and demand in order to train seniors for the new digital needs of companies. Finally, working in groups breaks isolation, and it means new friends and new social relations. All in all, 71% of SeniorLabers experience a significant increase in their self-esteem, 50% feel an improvement in their familiar and social relationships, and 42% feel socially valuated. And, very importantly, 53% feel qualified for complex innovation projects.

Maggie Ellis asked how the implementation and use of assistive technology could be encouraged in an effective way. Many European projects have shown that technological augmentation of living space can support daily-living tasks and increase the quality of life, thereby reducing the need for institutional and/or supported care. Tools exist which demonstrate that such interventions can be cost effective. Many projects have been laboratory based or are limited small-scale trials in users' homes. However, too little evidence has been presented to demonstrate potential market options or real potential exploitation of technology. Due to recent financial constraints, policy makers hesitate to implement new concepts. Recent work at the London School of Economics includes: some identified issues from users, stakeholders, and policy makers about barriers to change; potential exploitation of technology and methodologies; suggestions for important training for technology developers, industry, finance houses, budget holders, EU research assessors, reviewers, and project officers working alongside the disabled and older users. This would benefit all parties involved, from individual users living in the community to the European Community as a whole. *Francisco Pérez-Trejo* presented an open innovation-based approach addressing the socio-economic challenges of demographic change and migration. In his presentation, Mr. Pérez-Trejo proposed the „Social Spaces for Innovation" (SSfI) as a methodological framework for turning migration into an opportunity for sustainable livelihoods. He also introduced a decision support tool for assessing the impact of policies and programmes for scaling-up their results, based on possible future scenarios that could estimate the magnitude of migration that is likely to occur in the Mediterranean basin countries in the next 10 to 20 years. Finally, *Rodd Bond* talked about lessons learned from County Louth, Ireland's first age-friendly county and the embedding of AAL into the WHO's Global Age-Friendly Cities Framework. In 2008, County Louth, Ireland, committed to a new and ambitious strategy to improve the lives of all older people in the county, centred on creating an 'age-friendly county'. The strategy is based on the WHO's Age-Friendly Cities Programme, offering a powerful framework for understanding how people connect with their environment and providing a rich reference model to guide smooth cultural change and physical transformation. The 'Nestling Project' is a flagship AAL initiative within the age-friendly county strategy. It is a collaborative initiative between a wide range of public, private, voluntary, community, and educational stakeholders in the Dundalk area. Centred on a new housing scheme and care model for elders in Barrack Street, the project is establishing a place-based evaluation framework to develop our understanding of how a combination of community cooperation, more integrated care service delivery, sustainable environmental change, and technology for increased awareness, can improve individual and community outcomes.

SUPPORTING AND SUSTAINING END-USER ENGAGEMENT

Lucia Lukanova

With an early start after the farewell dinner and party with DJ Ruth, the closing session of Track B still saw a full auditorium. Its three speakers, each presenting remarkable achievements in their very diverse fields, blended extraordinary well to bring about a rounded perspective on what it takes to sustain user engagement in developing new and innovating lasting solutions. Being accomplished presenters, all speakers brought a good number of practical examples, making the session a true learning experience for the session participants, and preparing them well for a discussion moderated by an AGE representative.

The session was kicked off by Jose Vargas Casas from the region of Andalusia, who presented a Telecenter care solution which currently brings social services close to 150.000 family members, and Andalusians aged 65+. The end users' feedback, built into the solution as it progressed over time from pilot to higher releases, was a substantial part of its huge success. Surprisingly, the social aspect of the Telecenter turned out to be the major factor why people sought the service. Among specifics of the solution, which was developed in a multidisciplinary collaboration with think-tanks and prestigious universities, Jose also presented the methodology using different techniques of involving end users, the current project portfolio, well-proven do's and don'ts of involving users as well as the next step of developing an overall project and solution development methodology.

Marjo Rauhala from the Technical University in Vienna brought in the perspective of a researcher who can look back on 20 years of assistive technology R&D of the fortec research group - a team of highly dedicated experts. User feedback as early as in the concept stage is important. Marjo highlighted practical challenges involving users, such as making the early prototype safe and friendly enough to test and simulate the product idea to the user, while being aware of the fact that, while recruiting the "average" person for the experiment, one still ends up with highly open-minded people, or that, throughout the experiment, the end user evolves his/her own requirements with the product, ceasing to be the "average" user who was originally involved.

Liz Mesteneos, representing the Age Platform EU, closed the speakers' presentations sharing insights on policy work and focusing on the project Futurage whose aim it is to establish a roadmap for user involvement mechanisms in the EU research agenda. Liz's lively exchange with the audience drew on experiences in consultations with experts of previous projects spanning 13 different European countries. An understanding of real user requirements is key.

The discussion at the end of the session, moderated by an AGE representative, revolved around the questions and issues of recruitment of end users, suitable incentives for end users and facilitation of participation of primary end users.

Overall, the diversity of the speakers coupled with their deep practical and hands-on experience made the session highly relevant and all but theory, simply a fun session to attend.

OPEN SESSION

Hartmut Strese[1]

The idea was to organise an event similar to speed dating:

Four possible future call themes were "dated" by the participants. A moderator and a note taker were responsible for each theme. They briefly presented the theme and subsequently the participants could ask questions as well as discuss the topic. After 15 minutes the participants moved to the next theme.

- Theme 1: Information/Learning/User Interfaces (moderator: Gerda Geyer, note taker: Maud Pasquier)
- Theme 2: Supply with goods and chores – home-centred, everyday services & home care - informal and professional care (moderator: Christian Wehrmann, note taker: Pekka Kahri)
- Theme 3: Safety and security/privacy (moderator: Peter Hanak, note taker: Pal Breuer)
- Theme 4: Mobility (moderator: Axel Sigmund, note taker: Daniel Egloff)

The structure of this session was well acknowledged by the participants. At each table they introduced themselves and discussed the themes. Here are the most interesting results:

Information/Learning/User Interfaces

- Enabling older adults to access ICT learning and skills;
- Mobilizing, maintaining and sharing resources that older people possess in terms of competences, experiences, knowledge;
- Contribution of older persons to society (across generations) and to other older persons (teach, inform, help, support others);
- Keeping connected to friends and relatives (social interaction, communication);
- Easy access to daily news, weather forecast, TV programmes, etc.;

[1] VDI/VDE Innovation + Technik GmbH, DE.

- Information about available assistive-living products.

Supply with goods and chores – home-centred, everyday services & home care - informal and professional care

- Health promotion/promotion of a healthy lifestyle could be a potential topic (in contrast to health care and health prevention).

- Home care as a topic could involve other services like housekeeping, repairs, etc. This raises questions of generic/overall vs. specific services. Should care and other services (supply of goods and chores) be combined?

- Bigger pilot projects are needed in order to involve SMEs in the development of business models.

- Certification and eligibility criteria for technology and services to be covered by insurances should be simplified.

- Interoperability across Europe remains an important topic (i.e. seniors moving to Spain from other parts of Europe). How can transnational health and care records be organised? Is Cloud Computing an answer to this?

- The necessary technical education of care personal is an important issue.

- Should specific business models and buyer target groups be part of the AAL JP Calls definitions? (i.e. insurances, private consumers)

- Care personnel and physicians are an important intermediary to make technology and services known to end-users and seniors.

- Large private care organisations are in danger of losing touch with the needs of seniors. How can seniors articulate and organise their needs and interests? How can seniors and relatives be enabled to buy and share care services and care personnel independently? Can social networking/social media play a part in forming a platform where the demand for care (seniors, relatives) and supply (care services) can come together and interact? How can the quality of a service be rated and evaluated by seniors and how can they complain about a service or change the service?

- Home care needs to be designed as "evolving" over time with older persons, and with the changing diseases and illnesses. How can the available electronic health records and care services be linked?

- A variety of care models is needed, where different pathways (of organisation of care) are possible, depending on the individual condition of the older person.

Safety and security/privacy

The participants noted the following:

- Privacy is mainly a regulatory issue, and a general one; there are no special privacy issues for AAL projects.
- Privacy is a topic to be investigated by expert groups, and needs no special AAL research.
- Nonetheless, privacy should be inherent in every AAL project from the beginning.
- Privacy tools as enablers are available.
- We need to know where the gaps are in S&S/P:
    - What are the differences between the different European cultures regarding AAL (e.g. differences between North and South.)?
    - What are the best motivations for the elderly to use AAL solutions?
    - Sensors and devices are available but the number of cases of evident use is insufficient.
    - We agree that privacy should be considered in all AAL projects. The question is: how can they be applied in every single project? Are there risk lists available?

Mobility

The results showed that multi-disciplinary approaches are needed to address the topic of mobility in demography:

- Foster the mobility needs of disadvantaged people; protect them from social exclusion.
- Improve mobility and safety for older drivers by training their skills and overcoming impairments by assistance systems.
- Create framework conditions and incentives for all citizens to walk, cycle and use public transport as an alternative to the car.
- Find ways of improving walking conditions and traffic safety for older citizens.
- Introduce new navigation systems for the elderly and disabled as well as for pedestrians.
- Improve access to a self-service society.
- Assess practices, issues, and tools that help to avoid skills deficiencies in physical mobility.

- Consider the effects of mobility (walking, cycling, etc.) as a decreased risk of lifestyle diseases, a decreased risk of functional limitations, and a decreased risk of immobility.

HOW TO IMPROVE AAL PROPOSALS: FOCUS ON BUSINESS PLANS, END-USER INVOLVEMENT AND ETHICAL ISSUES

Maja Arnestad[1]

Experience from the first two calls launched in the Ambient Assisted Living Joint Programme showed that several aspects in the proposals needed improvements, such as business plans, end-user involvement, and ethical issues. The session aimed at enhancing awareness and knowledge about these critical issues.

The session started with an overview presentation on business plans, end-user involvement, and ethical issues, and the respective results of the evaluation process in Call 1-2 as well as the outcomes of relevant sessions at the Forum in Vienna. Then there were three presentations of two good practice examples of funded projects. The remaining time was dedicated to discussions with the audience.

Pekka Kahri introduced relevant topics from the perspective of the AAL JP:

The AAL Joint Programme aims at projects that can bring new solutions (products, systems and service concepts) to the market within about 2 to 3 years after the end of the project. The close-to-market nature of the programme means that developing suitable business models for the developed solutions must be an essential part of the projects. The presentation defines and discusses business model development, their characteristics and components. Understanding end-user needs serves as a foundation for new solutions that bring value to the customers. When older people are the primary end-users of the developed products, services and solutions, specific questions and challenges related to user involvement must be addressed. The presentation outlines the framework of end-user involvement in the AAL Joint Programme, and also discusses some ethical aspects related to the development. The presentation serves as an introduction to the other presentations and discussions in the session.

Flemming H: The business case AAL A2E2

It is important to analyze and understand the market opportunities for health care products for the elderly. This market is rapidly changing and is a key factor in forming new business strategies. The key questions are:

- how will this be influenced in the long and short term,

[1] Programme coordinator for the Norwegian programme IT Funk, AAL NCP for Norway.

- who are the customers,

- who is willing to pay for the products,

- what are the effective distribution channels.

All these aspects are major components in an enterprise business model. The presentation tries to cover a business case for a diabetes product with penetration in the Nordic market. The main purpose is to pinpoint possible market size, estimated penetration rate and payment models. There are many ways to reach and satisfy the market. The presentation is meant to be a small contribution to the in-depth discussion on how to form and create the future healthcare market.

Øystein Johnsen, Abilia: The business case "Memo Planner"

Abilia develops products in three main areas: communication (AAC), environment control, and cognitive aids. Abilia has 93 employees and 8 offices in Scandinavia.

Approximately 30% of the population will suffer from some kind of brain dysfunction during their lifetime. This number will increase as the average age of the population increases. The collective cost of stroke, dementia and psychiatric conditions in Norway is estimated to be NOK 55 billion (EUR 7-8 billion).

Memo Planner is an aid for people with cognitive disabilities who need help organizing their daily life, or need an overview of their planned activities in order to feel secure. Users can be found within the following groups: people with dementia, stroke patients, people with psychiatric diagnoses, and people with neuropsychiatric diagnoses (e.g. autism, AD/HD).

Finally, Verena Moser-Siegmeth from the Research Institute of the Austrian Red Cross reported on end-user involvement in the Hera project.

HOW TO IMPROVE AAL PROPOSALS: SME PARTICIPATION IN THE AAL JP

Uli Waibel[1]

1. Introduction

The European economy is, to a large extent, based on small and medium-sized enterprises (SMEs). In order to foster European innovation performance, it is, therefore, of paramount importance to stimulate research and development in SMEs. European research promotion programmes reflect this – hence the AAL JP constantly seeks to further raise the participation of SMEs.

Session C3 aimed at understanding the specific needs of SMEs when participating in the AAL Joint Programme. Four SMEs were selected from different countries to present their views based on their experience with the AAL JP. The round table was complemented with a representative of the AAL JP's Central Management Unit (CMU). The panel comprised:

- Michael Brandstötter, CogVis GmbH, Austria
- Harald Korb, Vitaphone GmbH, Germany
- Silas Olson, AAL JP (CMU)
- Christian Schön, Hope, France
- Robbert Smit, Presence Display, Switzerland

Three companies employ between 6 and 25 employees, and one company is medium sized with around 200 staff members.

2. Round table discussion

Silas Olsen presented some statistics from the first two AAL JP calls as background information for the discussion: 23 projects have been funded in Call 1, 30 in Call 2 with a quite significant involvement of SMEs, i.e. close to 50% of the participating organizations. However, no figures

[1] Uli Waibel is managing director of Innovendo, an Austrian consulting firm specialized in marketing support for technology-based innovations. For several years, Innovendo has been carrying out investigations and studies in the field of Ambient Assisted Living and has supported the development of the Austrian AAL programme *benefit*.

were available with respect to budget or the work package allocation of SMEs.

For the smaller (and younger) companies, the financial support to realize their ideas was a main *driving force for taking part* in the AAL JP, whereas the medium-sized (more mature) company primarily looked for opportunities to expand its market presence in other (consortium members') countries.

Secondary motivations were the ability to learn from others experts in the consortium and to expand their capabilities especially in the research domain.

The SMEs presented here expressed a common view concerning *project coordination*: they perceive the coordination of AAL JP projects as a huge administrative task – often too big for scarce human resources, especially in small companies. To pursue their own project vision, they rather emphasize "intellectual leadership" within a consortium to unite the members behind a common mission, a single business plan, etc. However, in the overall statistics, a remarkable 22% of all Call 1 projects are being coordinated by SMEs.

Concerning the *topic range* (i.e. broad vs. narrow topics) in the AAL JP, no consistent viewpoints emerged. There was a tendency towards narrowing the topics – but on further investigation, the main emerging issue was *focusing the proposals on a clear business perspective*, such as identifying viable target groups, and detailed business models (who will pay how much for which products/services…), etc.

Dr. Aigner in the audience even went a step further in his comment, raising the point that it is not only about getting SMEs to participate in the AAL JP but rather attracting the "right SMEs", i.e. SMEs that already have a stake in the market and are well connected to key players in the market etc.

In the final round, the panellists highlighted their *concluding recommendations* to further raise SME participation:

- Radically shorten the project proposals to five pages
- Reduce the administrative burden
- Start reviewing running projects in face-to-face meetings in order to assure project quality
- Offer support for (novice) SME coordinators (showcases, learning from other coordinators etc.)
- Speed up the process of time-to-contract as it is extremely difficult for small companies keeping resources for several months in expectation of an undefined project start (e.g. harmonize funding rules)
- Build a brand label for AAL to increase market opportunities.

INFORMATION, LEARNING, USER INTERFACES[1]

Gerda Geyer[2]

The topic "Information, Learning, User Interfaces" was discussed in two sessions at the AAL JP Forum Odense. Firstly, it was discussed with some 20 people in the so-called speed dating session, in which groups of people moved through the room discussing five different topics with the moderators of these topics. Secondly, it was discussed in the session on "Information, Learning, User Interfaces". The session started with three brief invited presentations[3] (15 min. each), covering expertise from end users, businesses, and research.

All speakers were challenged to consider the issue from

- an end user,
- a business and
- a technology/research perspective.

For more detailed information and access to the ppp please see http://www.aalforum.eu/page/track-c-aal-joint-programme.

Rationale

Life-long learning is a requirement in a rapidly changing environment, not only to keep up with technological developments. Therefore, older adults should be supported in keeping up to date with developments in order to remain included in society. It is necessary to ensure that people are allowed and capable of accessing and benefitting from information in various forms in order to learn new things and skills throughout their life course. Older adults have wishes and needs for intellectual engagement, information-related self management of health and independence, and inclusion in the information society.

[1] Access to information and learning is very closely connected to their accessibility via user interfaces. Therefore, the original topic of information and learning has been integrated with the item of user interfaces.

[2] Dr. Gerda Geyer, Austrian Research Promotion Agency, Programme Manager of the national R&D funding programme *benefit*; National Contact Point for the Austrian participation in the Ambient Assisted Living Joint Programme.

[3] Massimo Zancanaro: Design and evaluation of a familiar interface for e-inclusion; Stieger Franz: Simon – natural interface between end-users and ICT applications; Johan E. Bengsston: People with Dementia as Lead Users for Easy Interaction.

Important aspects are:

- enabling older adults to access ICT learning and skills;
- mobilizing, maintaining and sharing resources that older people possess in terms of competences, experiences, knowledge;
- contribution of older persons to society (across generations) and to other older persons (teach, inform, help, support others);
- keeping connected to friends and relatives (social interaction, communication);
- easy access to daily news, weather forecast, TV programmes, etc.;
- information about available assistive-living products.

Learning versus training?

Learning can mean different things: it can mean learning in general and/or life-long learning, as is also addressed in Third Age Universities. When learning addresses ICT, it is more about training or getting familiar with ICT. Experience shows that people are not interested in computers or ICT per se (in the sense of computer training), but rather in the added value that can be produced by using the device. Therefore, the intrinsic motivations (social connectedness, learning, playing an active role within society) are crucial as a means of overcoming the initial reluctance.

The Role of User Interfaces

User interfaces play a major role in accessing new solutions. Supporting life-long learning will require mainstream ICT support that should be extremely easy to use. Important aspects regarding user interfaces are:

- adjustability to the person's needs
- reducing complexity
- intuitive use

Speech-based interfaces have the advantage that speech ability remains the longest when compared to other dysfunctions (movement, hearing, seeing). Gestural interaction (based on familiarity-based design) may be perceived as intuitive thus lowering initial anxiety or reluctance. When the target group is people with dementia, interfaces should have a minimal cognitive load and offer few interaction options on the screen.

It was suggested that the issue of user interfaces could also be addressed across different topical areas.

Standardized interfaces for better user friendliness for the elderly were also discussed at the open consultation in Brussels 2010.

MOBILITY

Hartmut Strese[1]

Mobility is a basic right for all, as well as being a challenge for a significant part of the population. Mobility means freedom to move around, to cope with events, as well as to exercise the body, in short: mobility removes the barriers to the world. Maintaining personal mobility and orientation involves many different aspects, including opportunities for social contact, exercise, fitness, hobbies, outdoor activities or travelling. It is important to help people to visit recreational facilities, to use means of transport or to stay at a hotel. Typical problems are that especially disadvantaged people are often forced to use non-standardised devices such as ticket machines. Problems regarding physical mobility include, for example, getting in or out of bed, getting up from chairs or climbing stairs. Therefore, the following aspects of mobility are to be considered:

- Transportation
- Orientation and Navigation
- Basic Mobility and Supportive Designs in Home and Care Settings

Presentations:

Hartmut Strese, "Introduction to Mobility"

Walter Aigner[2], "Some thoughts on the needs of the elderly in the context of mobility"

In his introductory speech, Hartmut Strese mentioned that normal ageing commonly leads to changes in perceptual, cognitive and psychomotoric performance: vision declines, physical fitness and flexibility diminish, the ability to focus attention decreases, and the time necessary to react to unexpected circumstances increases. In addition to extrinsic barriers of mobility, such as inappropriate transportation infrastructures, aids and physical environments, older adults also cope with intrinsic barriers, such as fear of falling and mobility impairments. He expounded the three aspects of mobility mentioned above:

Transportation – comply with the demand patterns (time, space, quantity)

Orientation and Navigation - empower mobility in the social context, i.e. the ability to get from A to B (move or travel from home to a desired local or long-distant destination)

[1] VDI/VDE Innovation + Technik GmbH, DE.
[2] Hitec Marketing, A.

Basic Mobility - supportive designs in the home and care settings (may require an adapted environment or assistive technologies), mobility aids play an integral part in helping the ageing population, and allowing them to age where they live.

Walter Aigner presented his experiences with older people (a panel of 420, the oldest being 97 years old):

- The typical elderly person is a healthy elderly person.
- There are innovators among the elderly, but the next generation is less than happy with their being proactive, hyperactive, and disciplined.
- Many of them have higher education.
- There are specific characteristics in Austria and related cultural aspects of living, e.g. retirees never have time.
- There are unmet needs amongst the elderly e.g. experiencing depression, using public transport, or wives' fear of their husbands enjoying nature.
- When introducing new solutions, one should bear in mind the diffusion of innovations – laggards do not give up their bias towards earlier ways.
- Their interest is not necessarily in ICT but rather in food for thought.
- Advice for researchers: offer descriptions, but do not make judgements, or recommendations!

HOME CARE
(INFORMAL AND PROFESSIONAL CARE)

Hartmut Strese[1]

Today, family care is the predominant model of support for older people. However, professional care services are in many cases indispensible. Demographic changes and individualized family structures will require new concepts of care. Thus, demographic change will provide opportunities for new technological solutions for:

- moving inside the apartment, especially getting up from a bed or a chair;

- personal hygiene;

- daily meals / sufficient nutrition;

- access to toilet / incontinence;

- getting dressed, especially putting on socks and shoes.

Presentations:

Francois Pastol[2], "Smartphone benefits for psychic diseases"

Riitta Vesterinen, Marja Lehtinen-Fraser, Katri Auranne, Elina Palovaara, Harriet Finne-Soveri, Leena Pohjola,[3] "Telerehabilitation for elderly clients discharged from a rehabilitation unit"

Manfred Wojciechowski[4],"AAL Support for Home-Care Networks"

Francois Pastol spoke about his company's smart phone solution for the elderly. There are services for people suffering from psychological or cognitive illnesses: health incidents (stroke) or diseases (Parkinson, sclerosis, nervous breakdown, etc.). They help to prevent caregiver burnout, and give advice and support to both family and caregivers. The solution helps to reduce dependency on relatives and caregivers, gives a feeling of security to both sides, and enables the use of the same cell phone as everyone else. The solution had to be cost efficient, the interface had to be simple, and there had to be some kind of training. The development resulted in a

[1] VDI/VDE Innovation + Technik GmbH, DE.
[2] AlyaCom, F.
[3] All FI.
[4] Fraunhofer Institute for Software and Systems Engineering, DE.

solution with emergency calls (add €4 per month to the mobile phone contract) and user-centric health monitoring (plus another €6).

In her presentation Riitta Vesterinen spoke about a telerehabilitation project with 36 older persons (median age of 81 years) in Finland. It involved a physical exercise group, discussion groups, telenutrition, an open line, and visiting specialists (geriatrician, pastor, dental hygienist, occupational therapist). The results were measurable and very good. Telerehabilitation has enhanced how elderly clients cope at home. The service has brought a routine into their day and has served as a window to the world because it was otherwise difficult for them to participate. The discussions were a great peer support, and one could almost talk about tele-empowerment. The technology is user friendly. It was shown that elderly clients are able to learn new things and teach home-care workers the technology. The attendance was 72% in group physiotherapy. The solution requires trained personnel and reliable technical support. Telerehabilitation in this project was free of charge, but most of the clients were willing to pay for the service. The costs were higher than the elderly expected, but the total cost for the whole service was less than a solution with a physiotherapy home visit.

Manfred Wojciechowski spoke about the potential to increase efficiency in home care. Aspects are: improved communication between professional and non-professional care providers, transparency of care activities, better coordination and flexibility of care processes between all participants, and enhanced patient security at home. A home-care portal for the management of home-care networks was developed. Via the integration of the ”Home Care Portal” and the “Care Management System”, the documentation of care activities is much easier and of a higher quality. Finally, management of home-care networks, exchange of information between all participants, coordination of care activities, and the detection of emergency situations will provide help in daily living and health care situations.

GOODS AND CHORES

Pekka Kahri[1]

1. Session rationale

For an older person's independence, it is important to maintain Instrumental Activities of Daily Living (IADL). Such activities include everyday issues like preparing meals, shopping, cleaning and maintaining the home as well as managing personal economics and medication. The session presented examples and discussed how AAL solutions can support older persons in their everyday activities thus helping them to stay independent. The session was complemented with an interactive voting system which was used to ask the whole audience specific questions.

2. Speakers

Ms Simone Schmelzenbach from Institut für Marketing - Strategieberatung GmbH, Innsbruck, Austria, presented the REAAL project supported by the city of Linz and the Austrian Research Promotion Agency (FFG). The project has investigated elderly people`s problems and needs in daily life, and their expectations and attitudes towards the social services provided, and AAL technologies, in particular a "home butler" solution. People's general attitude towards technological solutions vary. Some are excited about them, others are rather reserved. The main concerns are related to fear of social isolation in case contact with relatives, friends and neighbours diminishes when certain tasks are taken over by technology. Also privacy concerns and financial aspects are important. [1]

Dr.-Ing. Frank Wallhoff is professor and director for the course of studies Assistive Technologies at the Jade University of Applied Sciences in Oldenburg, Germany. He presented insights into the project ALIAS funded under AAL Joint Programme. His presentation titled "The Adaptive Ambient Living Assistant - Bringing the end-users into the loop" concluded that engineer-driven designs may result in solutions that do not fit the real needs of older persons. Therefore projects should include multi-disciplinary design phases with representatives from user organisations, ergonomics, life sciences, engineers, etc. [2]

Ms. Marlene van Leengoed works for VanBerlo Design Strategy, a Dutch company providing services for design management, trend research & workshops, creative engineering, and communication design. Her case presentation outlined the methodology and outcomes of end-user involvement in the "Robot Rose" project. The task was to discover those needs of the target groups – both older persons and the nurses looking after them – where remote care or remotely

[1] Pekka Kahri, Tekes, Finland, works as Senior Technology Adviser at Tekes – Finnish Funding Agency for Technology and Innovation and is the Finnish NCP for the AAL Joint Programme.

controlled robots could assist the disabled and elderly in their daily life. The project used focus groups combined with design probes which allowed group members to react to each other and provided qualitative information in a fairly short period of time. The outcomes of the work propose that the most prominent possibilities for service robots are in completing small chores and boring repetitive tasks. Nurses are still needed, especially in tasks that relate to medical and psychological help. [3]

3. Interactive voting system

The session was complemented with an interactive polling/voting system, and all questions and results can be found in [4].

4. References

[1] SCHMELZENBACH, S., presentation slides from AAL Forum Odense 2010, http://www.aalforum.eu/page/track-c-aal-joint-programme.

[2] WALLHOFF, F., presentation slides from AAL Forum Odense 2010, http://www.aalforum.eu/page/track-c-aal-joint-programme.

[3] VAN LEENGOED, M., presentation slides from AAL Forum Odense 2010, http://www.aalforum.eu/page/track-c-aal-joint-programme.

[4] Results C7.pdf from Session C7 in AAL Forum Odense 2010, http://www.aalforum.eu/page/track-c-aal-joint-programme.

SAFETY AND SECURITY / PRIVACY

Péter Hanák[1]

Chair: Péter Hanák (HU), taking notes: László Kutor (HU)

Speakers

1. Marja Pijl[2]: Assistive technology: the perspective of older people
2. José Manrique López de la Fuente[3]: OHA: Open Health Assistant Care Management & Services Integration Framework
3. Mario Hoffmann[4]: WWRF – Security, Privacy, and Trust Agenda
4. Walter Hlauschek[5]: Experiences on safety and security in assistive projects for older people

Summary and suggestions for future calls

1. Safety, Security, Privacy & Trust (SSPT) are of special importance in ambient environments.
2. SSPT is an especially important area in ambient-assisted living settings because of the higher level of vulnerability of elderly persons.
3. SSPT has strong ties to ethical, ergonomic, psychological, and legal (EEPL) issues. All these areas, i.e. SSPT and EEPL, should be considered simultaneously.
4. All AAL projects should, to some extent, deal with SSPT and EEPL issues: scientists and developers should be aware of them. However, it is not recommended that all projects execute research activities in these fields.
5. SSPT & EEPL research activities, including standardization, are being undertaken at many organizations worldwide. Therefore, it is not recommended that special technology-related calls for proposals be issued within the AAL Joint Programme with regard to SSPT or EEPL.

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6. However, it is recommended to set up an AAL Task Force (or Working Group) whose task would be to collect and summarize the current results in the SSPT & EEPL area, with special emphasis on ambient-assisted living.

7. Such a Task Force (WG) can be selected as a result of a call for special support actions in the next call for proposals.

8. The report of the Task Force (WG) should be distributed among the project participants of the next regular calls with the intention of utilizing the recommendations given in their reports for those projects.

9. The Task Force (WG) should develop and offer training courses for scientists and developers participating in AAL projects. Participation in such special courses could be a formal requirement in future projects.

10. The safety of elderly persons living alone is at permanent risk, especially when they suffer from chronic diseases. Such people belong to the 'need-to-have' group in contrast to those in the 'nice-to-have' group.

11. For persons in the 'need-to-have' group, there is often no choice but to 'try-or-die'. The strict legal responsibility of potential service providers may seriously restrict their entrepreneurial courage and attitude. Studies are needed in order to determine the proper balance between riskier innovative services and legal warranties.

According to the participants, the statistics collected in session C8 show that:

a) The biggest challenge/obstacle for the success of AAL is the structure of the health care / social care service system structure (40%), and the second biggest is the lack of proper business models or funding schemes (30%).

b) Thematic areas to be focused on most in future AAL Calls include safety & security (30%), information & learning (25%), and health & wellness (25%).

c) In the innovation chain, end-user involvement is important in all phases (79%).

As a possible interpretation of these quantitative results in the light of the opinions expressed verbally (cf. “privacy is a topic to be investigated by expert groups, it needs no special AAL research”, “privacy should be inherent in every AAL project from the beginning”, and S&S/P “should not be a direct focus but rather inherent in all calls”), we may conclude that the setting up of a special Task Force, and then the dissemination and use of their results is something that we can seriously recommend . Such a Task Force should be in the position to integrate not only the questions but also most (or at least, some) of the answers in the complex landscape of ambient assisted living.

REGIONAL AAL POLICIES

Gerhard Finking[1]

The session comprised several contributions about comprehensive policies on regional level or regional scope.

- Implementation of a multichannel Service Centre in the Basque Country as part of the Solution for Chronic Patients
- The paradigm shift in care in the Region Noord Brabant in the Netherlands
- Hungarian Initiatives Promoting AAL Innovation
- The Portuguese programme AAL4ALL

The Basque programme addresses chronic diseases, one of the most important challenges for health care and social care. A critical instrument of the Basque programme to meet the challenges is the implementation of a Multichannel Healthcare Service. The Service is combined with the "Improving Chronic Care Model" as the centre of its service design and deployment. It includes new approaches to patient activation, telecare, 24/7 clinical counselling and additional customer services. The Basque programme focuses on improving living conditions for people with chronic conditions rather than following the traditional policy of restoring health –which in most cases turns out to be impossible.

This paradigm shift in health and care policy is also the focus of the second contribution from Noord Brabant. Demographic changes and changing needs lead to a change in focus of health care with more emphasis on quality of life, health and prevention, self management in one's own living environment instead of professional treatment of especially chronic conditions and long stays in institutes. A shift is therefore necessary from a provision driven to a demand driven approach. The central question is no longer not only what is needed for sustainable health care but also how we can implement successful smart solutions and how we can tackle the barriers to achieve a breakthrough. New technological products and eHealth services offer interesting opportunities to achieve a demand-driven solution. To realise these opportunities, fundamental changes in the present health and health care system are necessary. This has to be expected as a long term process. Development of respective projects and dissemination of good practice are therefore needed to speed up the innovation and learning process.

[1] Dr. Gerhard Finking, former President of the AAL Association.

Innovation policy to foster the implementation and application of AAL solutions is the focus of the Hungarian contribution. Innovation strategy comprises a set of interrelated policies. Scientific research and technology development is the starting point of a value chain ending with the market penetration of AAL systems solutions. Pilot projects and programmes like the Hungarian eVita programme are necessary drivers of the innovation process.

The Portuguese AAL4ALL programme is an important example of an innovation approach. The goal of the AAL4ALL project is the mobilization of an industrial ecosystem of products and services in the scope of Ambient Assisted Living (AAL), focused on the definition of specific standards. Only by assuring interoperability between products and services is the mitigation of investment risk possible in this emerging area and thus creating a better offer of products and services. Integration of all stakeholders is a necessity for this comprehensive approach.

THE AAL GROUP OF REGIONS INITIATIVE „COMMUNITY OF REGIONS FOR ASSISTED LIVING"

Gerhard Finking[1]

The sessions comprised of several interconnected presentations of the initiatives of some regions to establish an AAL Community of Regions.

Although AAL applications are believed to be of major significance for the EU healthcare system and economy, practice has shown that the introduction of AAL is far from straightforward. The large number of aspects that have to be taken into account sets it apart from the average, run-of-the-mill technology introduction. Especially reaching the end user turns out to be an enormous challenge.

All over the EU, regions face similar issues and see similar possibilities. Unfortunately however, a cookbook filled with AAL introduction recipes does not exist. Given the importance of the regional impact of AAL introduction, a close collaboration between regions will support them to jointly address the common challenges. The common insight that is thus created provides for much higher comfort levels with policy makers, industry and end users, and will accelerate AAL adoption.

Policy measures with a large cross-border impact require a forum for in-depth discussion, e.g. the definition of technology standards can either stimulate or impede commercial and other exchanges between regions and therefore throughout the EU.

Network Objectives:

- Develop comprehensive policy approaches
- Development and commercialisation of assistive solutions
- Development of new innovation concepts

To achieve these objectives the following network activities have been proposed:

- Exchange of policy views and experiences
- International benchmarking

[1] Dr. Gerhard Finking, former President of the AAL Association.

- Synergy creation
- AAL EU policy definition
- Regional collaboration

Collaboration and exchange between the AAL Joint programme and the Community of Regions shall create synergies especially for the deployment and dissemination of AAL solutions.

AAL FOR REGIONS WORKSHOP

Gerhard Finking[1]

The session addresses more specific problems of regions with a focus on rural areas.

- Deployment of AAL solutions in rural regions
- An integrated approach for ageing at home, deploying AAL services in rural areas
- The SENIORLAB project - Ageing Research and Development in Rural Areas

As demographic change affects and impacts especially rural regions differently, the development of a comprehensive policy is necessary to master inter alia:

- a (sometimes rapid) decrease in population
- the increase in the senior population.

The effects of migration, especially on the younger generation but also on the senior population i.e. moving into towns for all kinds of stationary care, increase the challenges for rural regions. Sustaining the rural infrastructure, especially the supply of goods and services, also to the smaller villages, and keeping young and old people in the villages is one of the most important targets of regional policy. AAL solutions provide certain opportunities to support sustainable development processes. Activating village centres by combining a supply infrastructure (of goods and services in a retail shop) and health care services, especially for preventative care is one of the promising approaches.

Similar experiences have been seen in the Parma region, utilizing AAL tools to foster the ageing at home and to fight depopulation in mountain and rural areas. The project relies on technologies developed at the University of Parma. It aims at deploying an integrated system encompassing home automation, tele-monitoring and tele-health features within the same framework. Internet communication is thoroughly exploited at different levels: within the home, LAN communication is used to gather ambient and health information, whereas WAN connections are exploited to implement remote monitoring and control. By exploiting native mainstream communication technologies, significant cost savings are realized, with respect to dedicated home-networking techniques. A hierarchical, distributed-intelligence approach is followed, which allows the system to easily scale in size, ranging from a single home unit to complex

[1] Dr. Gerhard Finking, former President of the AAL Association.

elderly housing structures. Trials have been active since 2007; at present, four pilot sites on Parma territory are fully operational.

The SENIORLAB Project-Ageing Research and Development in Rural Areas is a living lab that fosters the development of ideas and products adapted to the elderly at home; creating a collaborative environment where the elderly, administration, volunteers, researchers and companies interact to innovate.

The project has two lines of work:

- Physical SeniorLab®: Creation of a laboratory located in the CETIEX headquarters that appears as a "pilot standard home" where research will be ongoing, including the validation of products and services in collaboration with the ageing people participating in the project.

- Virtual SeniorLab®: Implementation of a living virtual network which can innovate according to the concept of Living Lab. This virtual lab will connect and display the real-time physical laboratory, and share information about activities and projects developed in the physical SeniorLAB ®.

NATIONAL INNOVATION MODELS & CLUSTERS

Søren Jensen

This session, chaired by Mr Søren Jensen of the Danish Agency for Science, Technology and Innovation, focussed on some key public programmes in the Danish and Nordic innovation contexts:

- The Danish Public Welfare Technology Foundation which supports practical demonstration and implementation projects based on existing technologies within AAL and other areas.

- The national innovation networks which promote R&D interaction between companies, knowledge institutions and users, for instance in the field of AAL focussing on the needs of older people and people with chronic diseases.

- The Welfare Tech Region of South Denmark which fosters public-private innovation within Ambient Assisted Living and related fields.

- Finnish, Baltic, and Nordic networking initiatives which support the internationalisation of innovation programmes.

The PWT Foundation

In Denmark, the national Public Welfare Technology Foundation has been set up to support the demonstration, implementation, and diffusion of innovative solutions in the public sector. Mr. Thomas Børner set out the goals and activities of the PWT Foundation. From 2009 to 2015, it will invest 400 million Euros in "welfare technologies", including AAL. To obtain support from the Foundation, projects must:

- demonstrate labour-saving potential within public service and care sectors, i.e. present a positive business case to make the public sector more efficient

- test solutions which are innovative (in particular through the use of ICT, AAL technologies or new ways of working) and generalizable (and so can be diffused and applied throughout the country)

Over time, successful local demonstration projects will feed into implementation projects at national level, also supported by the Foundation.

The PWT Foundation's affiliation with the Finance Ministry will make it possible to link national budgetary allocations for regions and municipalities to their use of new technologies and more efficient ways of working. This will give central government a means to set directions for the strategic development of the public sector.

National Innovation Networks

Mr. Morten Solgård Thomsen of the Danish Agency for Science, Technology and Innovation (DASTI) gave an overview of the role of networks and partnerships in the Danish innovation policy. The Agency sponsors more than 20 national innovation networks in sectors such as cleantech, health & pharma, production technologies, and services. The networks offer companies a conducive framework for interaction with relevant knowledge institutions and public organisations. The networks are mainly about sharing knowledge, stimulating ideas and finding partners, but they also support more close-knit collaboration on specific projects and offer training and consultancy services.

Recently, a dedicated national organisation, called "Netmatch", was set up as a central facilitator to assist the innovation networks, spread best practices and increase their visibility. Also, at the Northern European level, an international benchmarking exercise has been launched to support mutual learning and cooperation among some 150 networks and clusters in the participating countries. A major international conference will take place in Copenhagen in May 2011 as part of this effort.

AAL Innovation Networks

Ms. Dorthe Junge of the Copenhagen Regional Authority and Ms. Dorthe Kjær Pedersen of the University of Southern Denmark presented LEV VEL ("live well") and UNIK, two major Danish innovation networks. Both networks respond to the combined social challenge of a growing number of older people, a dwindling work force and increasingly strained public budgets. They promote public-private collaboration on the development of new technologies which will enable older people (LEV VEL) and people with chronic diseases (UNIK) to go on leading independent and active lives. In addition to improving the quality of life of these groups, the networks stress private-sector commercialisation as well as public-sector work optimisation and productivity growth. They each include around 100 partners, mainly companies, universities, municipalities and hospitals, trade unions and industrial associations.

Finno-Baltic Initiatives

Ms. Leena Silvennoinen of Culminatum Innovation added an important international dimension to the session by introducing the participants to four Finno-Baltic initiatives:

- The competitiveness strategy for Helsinki metropolitan area: this is a wide-ranging effort to attract people, companies, and investments to the Helsinki area, for instance by connecting to global networks.

- National Competence Cluster Programme: there are 13 such clusters made up of companies, research organizations, public authorities and end-users, and each catalyzed by 4-7

complementary, geographically distributed centres of expertise. For instance, The Helsinki Centre of Expertise for Health and Well-being specializes in the field of independent living. The programme is now putting priority on the internationalisation of the networks, both within the Baltic area and globally.

- The Baltic Sea Region Stars Programme aims to create a number of world class innovation hubs by linking expertise in the Baltic region. Priority areas are cleantech, health & wellbeing, transport and ICT.

- Active for Life is another Baltic programme. The overall objective is to keep the ageing population an active part of society by providing innovative cross-sectoral solutions and business concepts, and building a strong mutual springboard for cooperation with Asian markets.

Welfare Tech Region of South Denmark

As the last speaker, Mr. Peter Brøndum Jensen of Linak presented an important regional initiative as seen from a company perspective. The Region of South Denmark has established a market-oriented cluster for AAL technologies called Welfare Tech Region. It promotes public-private innovation and business development in the areas of telemedicine, intelligent aids & appliances, automation & robotics, and ICT.

Adopting a user-driven approach, Linak collaborates closely with the Hospital of Sønderborg to develop and test an intelligent hospital bed. In various ways, the project is benefitting from the support offered by the Welfare Tech Region to gain access to the needs and ideas of the users and to real-life testing situations and living labs, to find partners for cooperation, share knowledge, and raise funds, etc.

SCANDINAVIAN AAL PROJECTS AND BUSINESS CASES

David Grønbæk

This session, which was chaired by Mr David Grønbæk of the Danish Agency for Science, Technology and Innovation, comprised three projects concerned with creating integrated AAL platforms which will enable older people to live longer in their homes. A fourth presentation focussed on a web-based application aimed at increasing the social connectedness of older people.

Smart Assistance with Ambient Computing

As the first speaker, Professor Andreas Schrader from the Ambient Computing Group of the University of Lübeck presented the project "SmartAssist" which is funded by the German Federal Ministry of Education and Research (BMBF). In addition to the university, the consortium includes an emergency call centre, a social care institution and a company specialized in wireless sensor technology, all based in Lübeck. The project will run until 2012 and includes tests in 50 homes.

For the benefit of older people living at home, SmartAssist will develop an intelligent service platform with open interfaces for third-party service-providers. The main philosophy of the project is to support the social network of the inhabitants by using light-weight, non-invasive technical infrastructure.

Technically, the project will use non-invasive stationary and mobile sensors and context-aware support functions. At home, a wireless sensor network will monitor factors such as water and electricity consumption, temperature, humidity, air pressure, opening and closing of doors and windows, usage and movements of furniture, as well as location and movements of inhabitants. For privacy reasons, no cameras or microphones are used. A gateway sends raw data via sensor to the SmartAssist server for interpretation and event generation. The system will be able to detect changes in the inhabitants' health and update the relevant social peer, be it a neighbour, friend, family member, service provider, or care giver. Third-party developers can use the infrastructure to offer health, practical help or other services by subscribing to the context events. Privacy and data security is realized by several means of preference settings, cryptography and a novel concept called context-firewall.

An additional context-aware infrastructure is developed for mobile devices to allow for services on the move, such as remote control of home infrastructure, remote monitoring of health status

information, and adding additional sensor functions, like embedded GPS, WLAN, RFID, barcode readers, etc.

For more information see http://www.smartassist.de.

A safe and communal living environment

Dr Mikael Soini, CTO and co-founder of the Finnish company Wiktio, presented the AAL activities of his company. Wiktio develops and implements home-like, user centric and safe living environments for the elderly. The overall solution offered by Wiktio integrates different systems and devices into a comprehensive system which provides an unobtrusive environment with user-friendly communication and interaction tools for seniors, relatives, and nursing personnel. The company's turnkey type solutions can be duplicated to new destinations.

Dr Soini highlighted a number of advantages of the integrated platform:

- Seniors have the possibility of choosing services based on their own condition and needs.
- Instruments (user interface, reporting, mobile, access control) are easy to use, providing useful information for nursing. Activity, sleep rhythm, and vital functions data can be used to improve nursing quality and predictability. Long-term measurements can also be used to improve the quality of nursing and senior living.
- Calls by seniors or nurses are used to get help to the right place at the right time. Audio/video connection is used to get instant contact to seniors.
- Service providers can concentrate on their know-how since the platform includes support services.
- Relatives can follow the senior's condition, reducing uncertainty and needless inquiries.
- Access control guarantees simple and safe living inside the building (no keys). Building automation is used to improve living conditions and safety.
- Video connection is used to develop communality, provide services (medical, cultural, rehabilitation etc.), and connectivity to relatives.

Active Life Home

This interactive demonstration facility located in Active Life Village in Espoo, Finland, was presented by Mr Jar Närhi. Active Life Home offers an environment where holistic, technology-based solutions to support living at home can be displayed and demonstrated so that new service concepts building on these solutions can be concretely experienced. Active Life Home brings together the most capable and innovative companies and organizations and gives them the possibility to quickly assemble prototypes of new solutions in one facility. It enables the providers and users of services, as well as technology vendors, to cooperate and interact during the development of new processes.

At the centre of the Active Life Home concept is a communication and monitoring platform located in the home. It supports active contact with family, like-minded people, public officials, and service providers. The monitoring is user-defined (automatic or semi-automatic) and includes alert and alarm features.

Mr Närhi highlighted the following features of the service hub environment:

- Selection of personal well-being monitoring services is assigned according to the customer's needs and wishes.

- Service provision and administration is based on information collected from home infrastructure, personal records, and selected devices.

- Immediate routing of service requests and alerts to the appropriate parties, and monitoring of fulfilment.

- Service level and usage is monitored and reports provided.

Personal story-telling and social connectedness

As the final speaker, Mr Thomas Hammer-Jakobsen introduced the project Express to Connect (E2C) which began in 2010 under the AAL Joint Programme. Its overall objective is "to develop, test, and deploy a web service, which stimulates and facilitates personal storytelling, and to enable interest-based connections and communication among elderly people and thereby empowering them and enriching their life". The consortium includes universities, local authorities, user organisations, and companies.

So far ethnographic research has been conducted among 20 older people in Finland, Sweden, Denmark, and the Netherlands. From this, some central questions have been distilled, in particular concerning "how web- based storytelling can support coping with a change in identity, help smooth the transition regarding practical issues, facilitate proper ways to 'phase out', and turn memories into something concrete that helps in remembering the beauty of life and in connecting the life to come with what has already been".

The E2C project is entering the prototyping phase and will also devise implementation strategies that will allow the solution a place in the service ecology of elderly care.

ANALYSES AND SIDE EVENTS

AALBUTLER: PARTICIPANT STATISTICS OF THE AAL FORUM 2010 USING RTLS TECHNOLOGY

Kasper Hallenborg, Bjørn Grønbæk & Pedro Valente [1]

Naturally, conference attendance is of interest to organizers in order to evaluate an event, but often follow-up questionnaires do not reveal detailed information, if answered at all by the participants. Seamlessly collecting information about the participants cannot only disclose such detailed information, but we can also build live location-based services for the benefit and comfort of participants. To target both of these goals, we set up an RTLS at a large conference venue and tracked participants for a 3-day conference. In this paper, we focus on the use of a system to collect data that can provide alternative statistics and results on conference attendance.

1. Introduction

The evaluation of conference attendance is often condemned to statistics on profile information provided by participants entered at the time of registration, or follow-up questionnaires answered by only a limited number of people. Usually, such questionnaires only provide Likert-scaled evaluations of a few selected criteria focusing on anything from registration, organisation, and conference programme – "How satisfied were you with the registration process?", "Overall, how satisfied were you with the conference facilities?", "How many sessions did you attend?", "Do you plan to attend this conference again next year?"

However, this static personal information, and often incomparable after thoughts do not reveal the most interesting information about conference attendance. Mostly, it is too easy to present the possibilities for improvements and interpret the statistics so that the results reflect a positive impression of the conference. It would require much more detailed information and live monitoring of the activities at the venue if real findings are to be disclosed. Such information could be extracted by observers or appointed anthropologists, who, in more or less formal terms, could present their subjective observations. It would be both costly and would need to be carefully planned in advance to make sure the right activities were observed [1].

Using real-time location system (RTLS) technologies we have conducted a very extensive experiment by monitoring the activities of participants at the AAL Forum 2010 held in Odense, September 2010. The system continuously records the location of each participant; this is stored in a database together with identity information so that all personal information can be combined

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in a post analysis. Studying session attendance, movement patterns, and activity recognition on the recorded data will reveal interesting quantitative measures that cannot otherwise be unlocked. It may also disclose findings that were unexpected and previously unknown as the data set is so large and can be combined in numerous ways, e.g. estimating small-talking and networking between French and Polish participants. Thus, finding interesting and relevant results will be part of the post analysis.

Statistics and the evaluation of the conference were only part of the reason for setting up the RTLS and equipping all participants with an RTLS tag so their location could be tracked. The primary purpose for the installation and development of the system was to assist and guide participants during the conference days, including services such as suggesting sessions to attend (based on their preferences) and announcing events using the communication channel and display in the tag. Interactive intentions and social networking support, from a participant's perspective, were also targeted in the system, however in this paper we focus mainly on the use of the RTLS for statistics and the evaluation of the conference.

2. Related work

Location-based services were, in an early stage, predicted to be the killer application for mobile commerce [2]. With the decision by Clinton in 2000 to make GPS permanently available for civilian purposes, it triggered intensive research and an innovation tracking of outdoor location-based services and, with navigation systems and other GPS enabled applications available in smartphones, we might slowly begin to realize indications for killer applications, however with regard to indoor environments, we are still in the research phase. Indoor location technologies still present a serious research challenge, mainly due to reflections for signal traversing technologies, tagging of targets in vision-based technologies, etc., but also infrastructural costs and availability issues are crucial constraints on indoor locations systems. No ideal solution, i.e. accuracy, high update rate, no infrastructure requirements, and cost efficiency, exists as yet, or will in the near future. The Active Badge system [3] based on infra-red beacons is considered the first indoor location-based system for pervasive computing applications which was used in different applications to adapt services to the location of people wearing the badge.

Location technologies have shifted through ultra-sound, WiFi-based, RFID, UWB, CSS, cameras, etc. and have improved the performance of the systems in various directions, but also with varying pros and cons. Thus, killer applications based on indoor location-based services will, for some time to come, still remain in our hopeful thoughts, but revealing the potential benefit for users is an important step in also increasing the demand for them. Tracking conference attendance is not anything new - some conferences already track session attendance by scanning the barcode on the participants' nametags with the argument of improving future conference planning, but it is also possible to extrapolate the interests of the individual based on the combinations of sessions that he or she attends. In principle, it is no different from the extensive data mining and customer profiling that, unknown to the owner, is undertaken on the usage of shopping cards. Both Microsoft and IBM have also previously used RFID technology to track conference attendance; in 2007 at their *Information on Demand* conference in Las Vegas with 6,500 participants (2% did not want a nametag with RFID), IBM targeted purely future conference planning [4], whereas Microsoft in 2008 at the Tech.Ed conference in Sydney, Australia with around 1,000 delegates also offered the delegates an instant session record, real-time information on sessions (how many and who was there, where the *valuable players* were,

etc.) [5]. RFID systems based on passive tags are limited in tracking granularity to the number of *RFID gates* (scanners) installed, usually at session entrances. Similar systems are used for timing in sports competitions (e.g. tags on the shoes of runners), and to improve experiences for museum visitors.

More advance technologies are required if a more accurate position is required, and if social interaction between participants is to be recognized by the system. Thus, we have deployed a WiFi-based location system not only to track session attendance, but also to produce a full 2D position real-time coverage of the venue. To our knowledge, no previous event had deployed such a large location- based system in a temporary setting with so many users.

3. AAL Forum 2010

The AAL Forum 2010 [6] is an annual conference presenting the progress and new material on the AAL European Joint Programme and related topics, and it targets politicians, research, companies, end-users, and other organisations interested in the domain of Ambient Assisted Living (AAL).

The second forum was held in Odense, Denmark from September 15th to 17th 2010 and had 737 registered participants including special guests, staff, and one-day passes. In connection with the conference, two large exhibitions were arranged – one of them, *Innovation World,* had almost 3000 visitors, but it was decided not to include this area in the survey area of the RTLS system as it would require a lot of extra work, and tags could not be given to the non-registered guests of the exhibitions. The area covered by the RTLS system, which included lunch area, session rooms, hallways, plenary rooms, etc. spanned more than 7000 m^2.

The technology used is a commercially available RTLS called Ekahau which is based on a Wireless LAN (WLAN) triangulation of the tags that participants wear. It records the location of the all tags, but is limited to an update rate of 10 seconds which mean that a continued guidance and navigation of participants to e.g. session rooms is not possible. Also, the accuracy of a WLAN setup is usually no better than 3-4 meters for such large areas as at the venue which is also a constraint on the possibilities. Even though systems with better accuracy and faster update rates are available, such as the UWB-based Ubisense system, the installation work and cost is much higher, and it does not provide a 2-way communication channel to the user as does the Ekahau system.

4. System setup

The AAL Butler experiment at the AAL Forum 2010 is part of the experiments with location-based technologies for a large Danish research project in the Ambient Assisted Living domain, called IntelliCare [7] which targets a better integration of systems, people, services, and devices of the domain using agent technologies. As mentioned above, we deployed the Ekahau system in the conference venue (Odense Congress Center) with a floor area of approximately 7,000 m^2. We installed a dedicated network of 35 WiFi access points (AP) for the coverage. 8 APs were used for the data backbone of the system, and the rest were used as signal dummies for improving triangulation. We prepared 600 Ekahau tags, and almost half of them were used continuously during the 3-day conference – not all 737 participants attended all their set days, and we did not expect everyone to be willing to participate in the experiment as they were

required to sign an informed consent. Thus, it was a huge logistic task handing out the tags and collecting them every night to be recharged – and only 2 tags were lost during the conference. Due to an overload of the APs, we had to limit the update rate of the tags to 30 seconds which gave us approximately 2.6 million position records during the three days.

The tags to be worn by the participants were the Ekahau ET301-BD badges as seen in Figure 1, and the position is recorded by the Ekahau positioning engine running on a dedicated server. The tag has 3 buttons for interactions and an LCD display for messages, and the entire programming was under our control. The technical details and programming of the experiment are not given within the scope of this paper, however more can be found in [8].

Figure 1: An Ekahau ET301-BD badge

5. Results and discussion

As mentioned, the main reason for using an advanced location system was to improve the real-time services for the individual participants envisioned by pervasive computing and location-based services. Thus, in addition to the messages and interaction features provided directly through the tag, a web-based tool called the AAL Butler was created to give each participant access to a personal profile of their personal data. It also included services to contact their friends in the NING-based social network on which the conference web-site was built.

Participants could see their own track record and access slides of the presentations, or get further descriptions of the presenters, etc. In the statistic section, they can compare their own "performance" against the rest of the participants. A screenshot of the AAL Butler interface is presented in Figure 2.

Figure 2: Screenshot of the AAL Butler system

However, the scope of this paper is to focus on the use of the location system to provide more detailed and objective conference statistics based on the recordings. A (not-complete) list of extracted results is presented below with comments.

Per country participation

One of the simplest statistics usually extracted from registration information is to present the international level of the conference through a traditional pie chart showing the number of participants from each country. With the enriched dataset we have the option to go one step deeper, and also show the activity level of each category. We will no longer have to assume that the participant is attending a full set of sessions during his or her time at the conference venue – did he/she spend more time in the lunch area or the corridors than in the session room, and did he/she stay the whole session time? We can accumulate the session time per participant during the time they are at the conference venue, and then aggregate that data to show an average per country as presented in Figure 3.

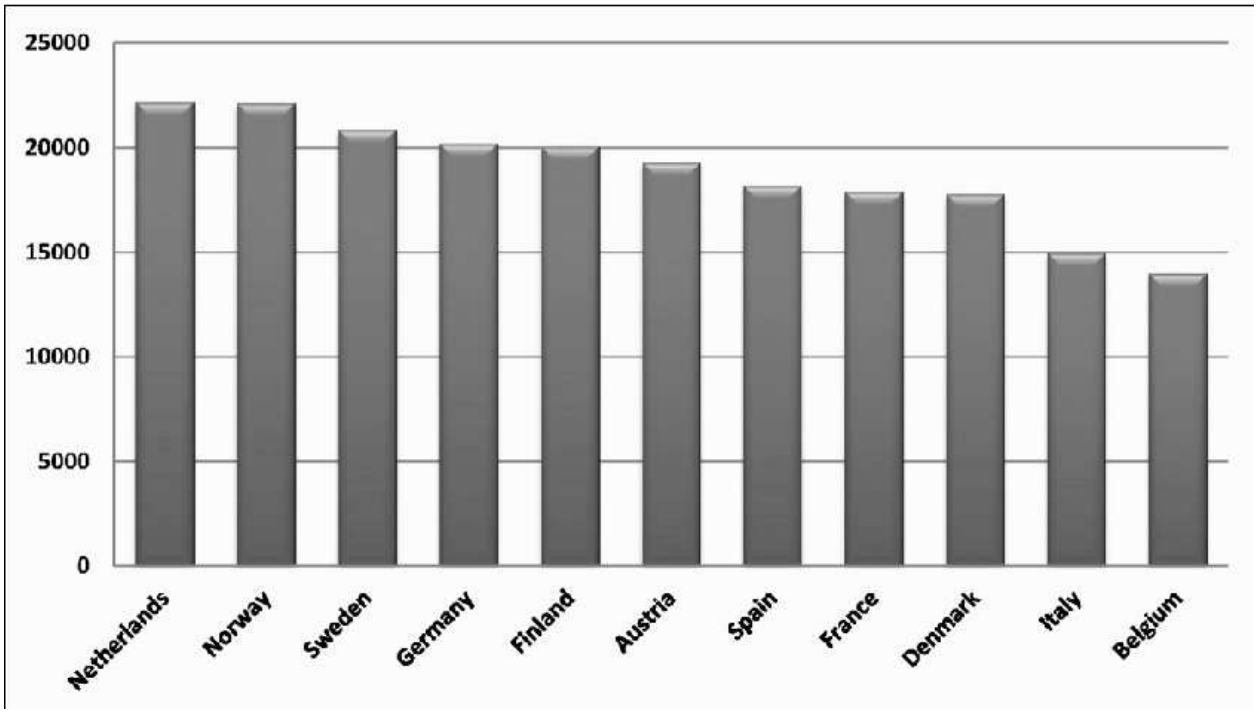

Figure 3: The average time (in seconds) spent per participant grouped by country. Only countries with more than 3 participants are shown.

The value of these results is of course questionable, if they are not used to motivate the participants to attend more sessions, and thus improve the score of their country. Furthermore, there might be several reasons behind some of the numbers, e.g. Denmark had many staff and organizing persons as the event was located in Denmark, and many of them did not have the full time to attend sessions. Also, even though people are attending a session, we cannot be sure at which level they are actually paying attention to the talks, and we will never be able to track that accurately, no matter which system we would be using, so we cannot conclude that the Dutch were the most motivated participants.

Participation per organization type

Whereas conference attendance is not a national competition, it is usually of more interest to the organizers if attendance matches the target groups. Therefore, in addition to the standard pie chart with the registration data, an attendance chart per organization type can be calculated, as presented in Figure 4. Not surprisingly, participants from political organizations have the lowest attendance despite the importance of the Ambient Assisted Living and its demographic challenges. If data had been available to divide people from political organizations into groups based on their political power, the attendance might very likely have been inversely proportional. One reason for the relatively high attendance of people with a political background might be due to the fact that some people, who only attended the conference for one or a few sessions, chose not to wear the tracking tag.

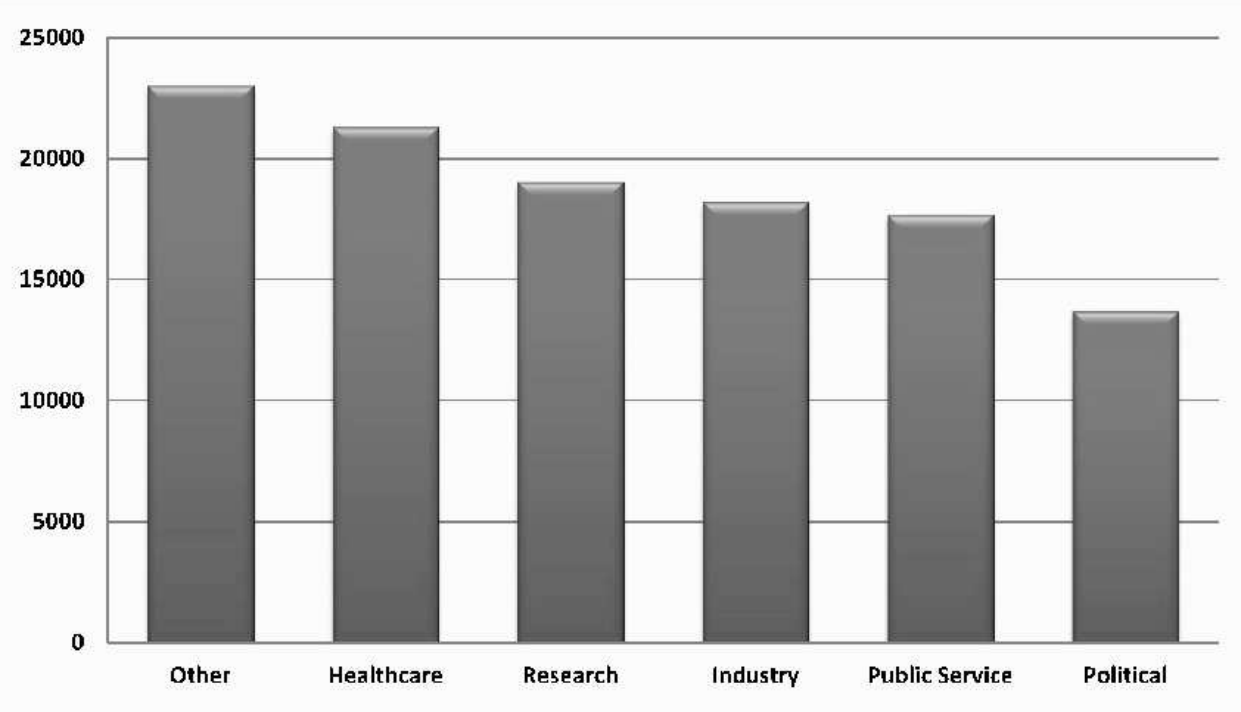

Figure 4: Average session time spent per participants grouped by organization type.

Distribution per track

Another interesting result for the organizers is the attendance at the different tracks of the conference including the distribution of the organizational background of the participants – Figure 5 shows this distribution among the tracks, and also the relative attendance between the special tracks of the conference.

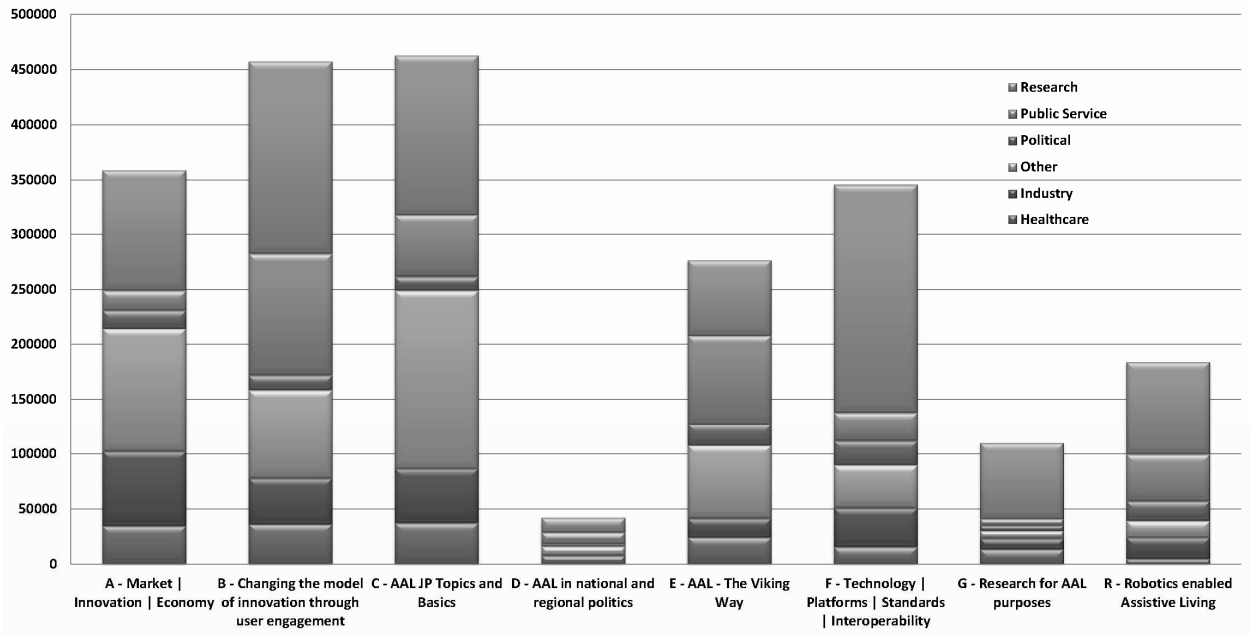

Figure 5: Distribution of organizational background within the special tracks and the relative attendance between the tracks.

From the above chart, it is interesting to see that we can actually verify some of the expected results. Proportionally, industry is well represented in the track on market, innovation and economy, which is in line with the scope of companies, and similarly research participants are overly represented in the tracks on technology and research. On the other hand, people from end-user organizations (public services) are particular interested in how innovation can be established by involving users, which is one of the main reasons that results in Track B being the most attended track. The chart also reveals that, beside the minor representation of other backgrounds, the technical tracks (F, G and R) have a high research attendance, and the other tracks with stronger focus on social sciences and political issues also attracted more people from these areas (assumingly including research from these areas as well). One explanation for the relatively high attendance of public services in the robotic track might be a long ongoing debate on robotics in elderly care institutions in Denmark, which might have awakened the interest of end-user organizations to take a glimpse of upcoming technologies (Denmark is overly represented in the total number of participants).

The chart might not be able to provide proof, but we could argue that the conference might not have succeeded to the full extent in building bridges and connecting people from technology/research, end-users and companies as they tended to attend tracks close to their own field. However, social events, exhibitions, etc. were also contributing factors to that objective.

In addition to the distribution of organizational backgrounds between the different tracks, it could also be interesting to visualize gender distribution across the tracks, as some topics might be more attractive to men than women and vice versa. Figure 6 shows this distribution, which does not reveal any unexpected results. Males are over-represented in the tracks focusing on technologies and research, whereas the participation of women was stronger in the track focusing on user involvement and innovations to change models.

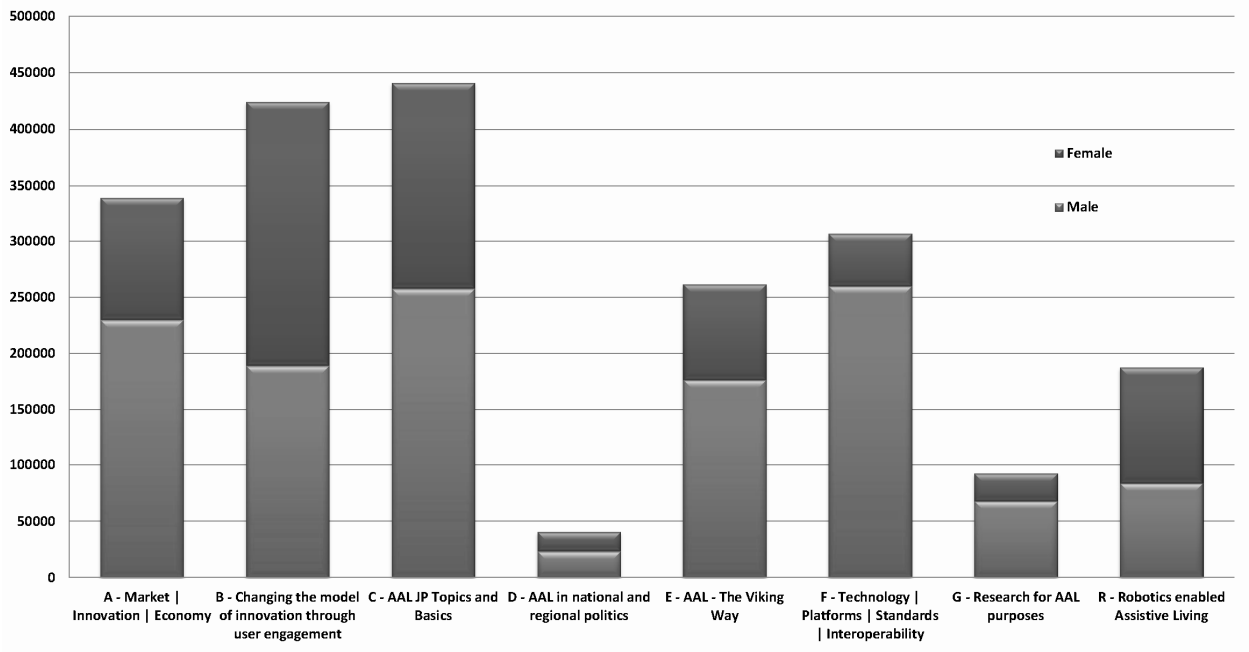

Figure 6: Distribution of gender in the special tracks.

A great amount of statistics was able to be generated on distribution by using different parameters; however one further aspect that might be of interest to the organizers, to make the programme attractive for as many participants as possible, could be the distribution per country. We have already shown the general distribution per country, but in order to analyze how to attract more people from a particular country, we can explore the interest of a country in a distribution per country as shown in

Figure 7.

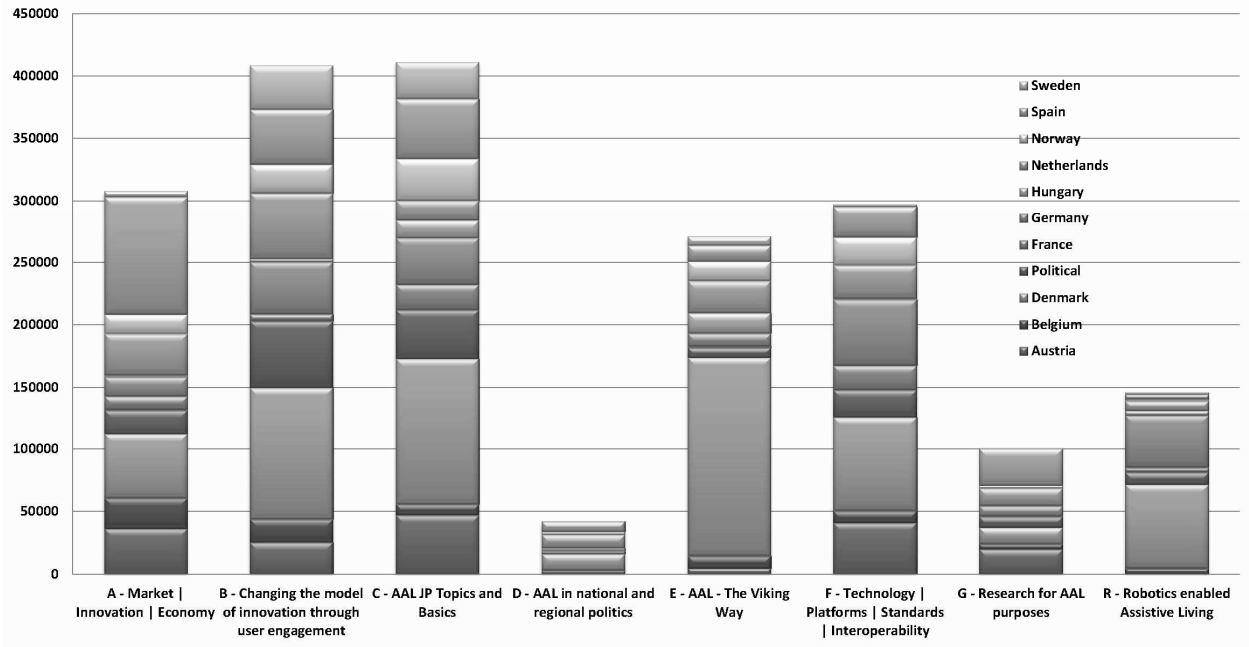

Figure 7: Distribution of countries within the special tracks - countries with minor representation have been omitted.

Besides Denmark being overly represented in most of the tracks – and even more so in the AAL – The Viking Way with its Nordic focus – which comes as no surprise – it is nevertheless interesting to see that Spain, in particular, was very interested in the market, innovation and economy track. In combination with the distribution of organizational backgrounds, this might reveal that researchers in Spain are very interested in the market aspects too, whereas the Nordic countries have a rather low participation which might be explained by the different social models of the respective countries.

Not only for the organizers, but also for the chairs and presenters, it might be of particular interest as to which sessions had the highest presence score, and naturally such statistics should be generated as well. It could be discussed whether the session time of participants or the number of attending participants was the correct metric, but as we have argued, the session time gives more information, and is enabled by the tracking system. The count does not reveal if someone was only present for a few minutes, and as sessions, in general, did not run late or finished very early, it is quite easy to compare the different sessions as all were scheduled for 1.5 hours. Figure 8 shows the top 10 sessions based on the session time of participants, and B1: Ethics in AAL emerges as the winner. However, it could be argued that such information should be scaled based on the number of actual participants on that particular day of the conference, but, on the other hand, those sessions might be the reasons for many participants attending that day. The figure follows the trends shown in Figure 5 with tracks A, B, C and F with the highest participation. Regarding track B, the reason for the high score is primarily based on the high interest in ethical issues, and following that aspect, it might be interesting to explore the discussion on gender distribution a step further as revealed in Figure 9 which shows the gender distribution for the top 7 sessions, and it reveals a strong interest from female participants in the ethical aspects.

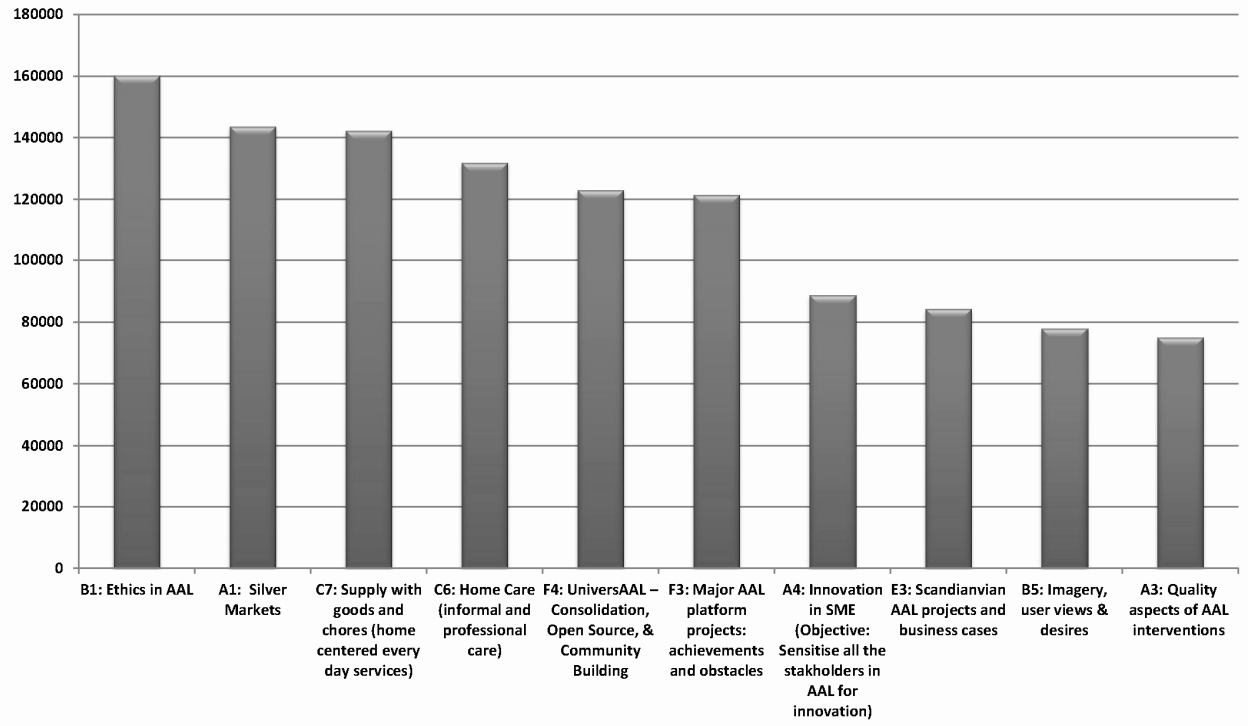

Figure 8: Top 10 sessions based on session time.

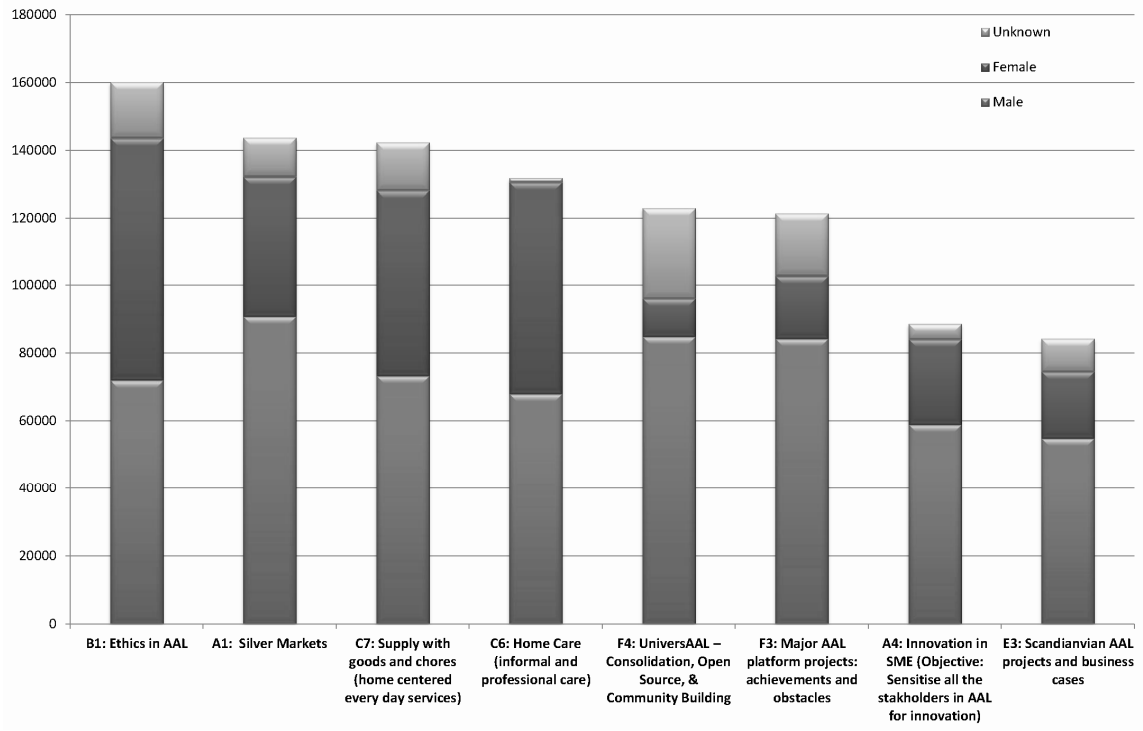

Figure 9: Top 7 sessions with gender distribution.

Finally, we present the best scoring session per track in Figure 10.

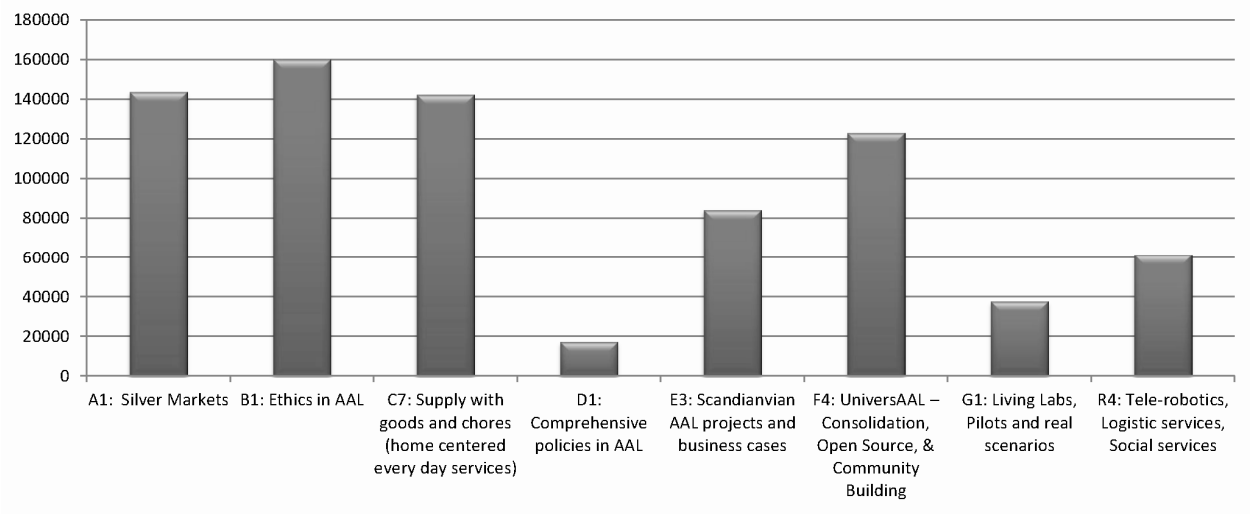

Figure 10: Best participant scoring per track based on session time

Plenary sessions

In the above, we mainly focused on the special tracks of the conference, however for completeness, the attendance level of the plenary sessions should be disclosed as well. There is

no valid reason to combine or compare them with the tracks where participants were split among the 8 tracks.

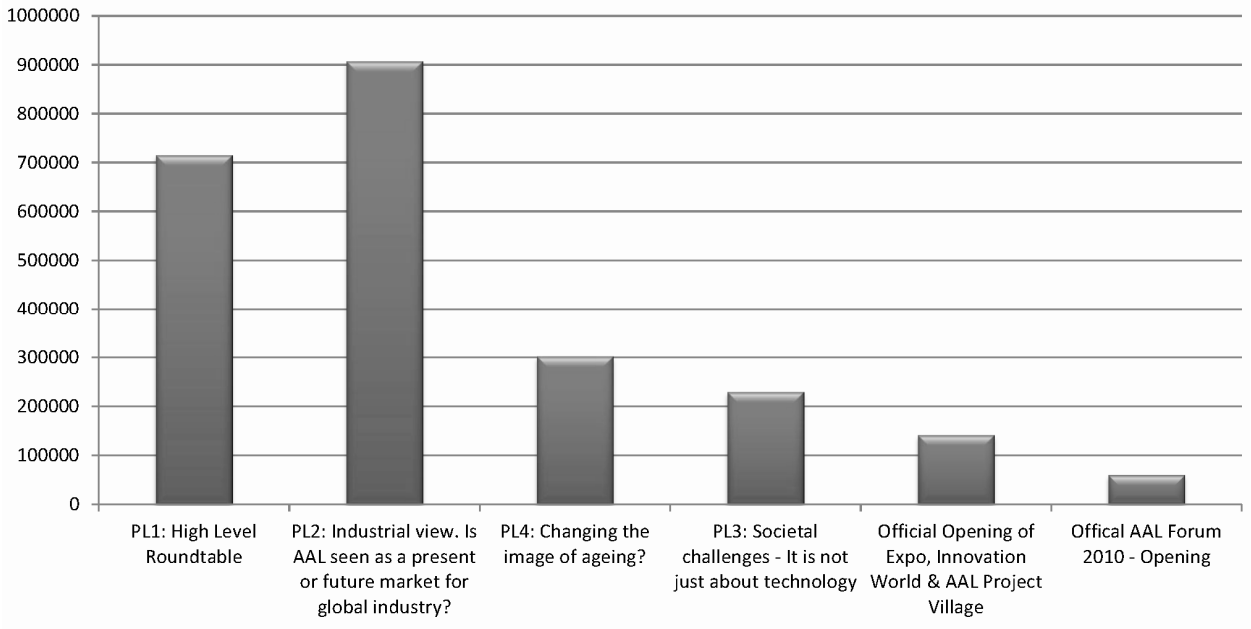

Figure 11: Attendance in the plenary sessions.

Figure 11 shows the attendance measured in session time at the plenary sessions. As these sessions vary in length, the times have been scaled for comparison as if the sessions were of equal length. The figure shows a low attendance in the two opening sessions, which is actually not correct, but is the result of some initial startup problems with the system. Other logs show that tag registrations for those two sessions were on the same level as PL1 and PL2, so the openings should correctly be on that level as well. However, the attendance in sessions PL3 and PL4 is correctly scaled, and is also explained in Figure 12 which gives the general attendance profile of the conference, and shows that September 16th had a slow start, and likewise on the last day. However, the latter can, to some extent, be explained by a low usage of tags that day, due to the fact that we had to collect tags during the night to be charged and handed out again in the morning. For the shorter last day, several participants skipped using the tag.

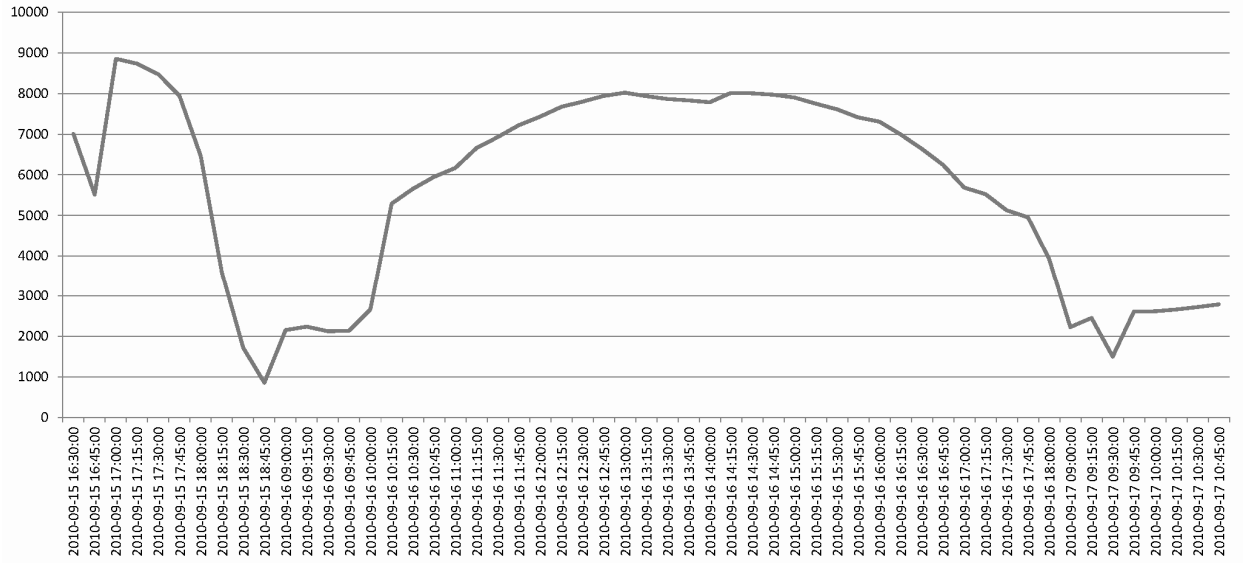

Figure 12: Attendance profile by time

Floor space analysis

Even though the statistics presented above reveal interesting information about the conference attendance that would otherwise be hard to assess without a location tracking system, they do not show the full potential of RTLS information for offline analysis of the conference. As we have collected extensive information about the movements of each participant wearing a tag (a position sample every 30 seconds), we have the possibility to visualize the movements of people within the venue which can help organizers to improve future conferences, e.g. Which areas were almost never used? Where were there bottle-necks in the corridors? Were queues building up in the registration area? How did people cluster in the lunch area, etc?

Such floor space analyses are often presented in terms of heat maps that show the presence of people over time in particular areas by the level of colouring. However, such information is hard to present in single images, as it is the changes in floor space movements and the evolution over time that are interesting. Nevertheless, an example of such a heat map is shown in Figure 13. It shows the tag registrations from the lunch area during lunch time on September 16th. However, as the picture clearly reveals a high attendance in the lunch area, there seem to be problems with the high clustering in the picture that can be explained by limitations in the technical setup of the lunch area which had the part of the installation with the lowest accuracy. However, the heat map is included for the lunch area as that would be the best period of the conference to explore spontaneous networking activities and interactions between the participants as they mainly listen to speakers during the session times, but the quality of the data makes it difficult to investigate this in depth and to draw general conclusions.

Figure 13: Heat map of people in the lunch area during lunchtime, September 16.

6. Conclusion

For the AAL Forum 2010 held in Odense in September 2010, we set up a WiFi-based RTLS capable of continuously tracking each individual participant within the venue in order to provide some location-based services for the participants, but also to give the organizers a more detailed and objective evaluation on some aspects of the conference attendance.

In this paper, we have focused on statistical results of interest to the organizers, and have shown that a deployed RTLS can reveal interesting information about the attendance that could not otherwise have been disclosed seamlessly.

We continue to use the collected data to experiment and further develop the software model in order to provide location-based services to people in the ambient assisted living domain. As described in [8], we are working on the technological side with agent-based models to integrate the RTLS in intelligent services for users which can be combined with other information about the users. The setup and models are being installed in a nursing home in Denmark as part of the IntelliCare project.

7. Acknowledgement

Expenses for the experiment were covered by one of the host organization of the AAL Forum 2010 – Odense Municipality, and parts of the presented work have been conducted under the

IntelliCare project, which is supported by The Ministry of Science, Technology and Innovation in Denmark.

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MOBITED POLLING SYSTEM IN TRACK C: AAL JP TOPICS AND BASICS

Gerda Geyer[1]

Track C of the Forum 2010 Programme focused on "AAL Joint Programme: Topics and Basics". Several sessions were dedicated to exploring specific topics and to discussing them as potential candidate topics for future calls in the AAL JP. Four out of five topical sessions were supported by a MobiTed polling system. The aim was twofold: on the one hand, to stimulate discussion, and, on the other hand, the programme sought to gather information from and about the participants. The results of the MobiTed polling system are presented in this article.

Thematic sessions

One aspect of Track C was to offer the AAL Forum participants an opportunity to take part in the preparation of future call topics. The most important core elements of the AAL Joint Programme were discussed, starting with specific user needs. The results of the sessions in Track C were meant to serve as input for the further development of the AAL Joint Programme.

Each of the sessions started with brief invited presentations (15 min. each), covering expertise from end-users, business, and research. Speakers were challenged to consider the issue of end-user, business, and technology or research perspectives.

MobiTed polling system

Four sessions in Track C were supported by a MobiTed polling system. The purpose of the MobiTed system was to ask specific questions, and to support discussions in the sessions. The number of participants in the sessions ranged from 20 to 35 persons. The voting results are presented in this article, and the analyses show the percentage of answers in relation to the questions, and not the absolute response figures.

The sessions, which used MobiTed, focused on the following topics:

Session C4: Information, Learning, and User Interfaces

Session C6: Home Care (informal and professional care)

[1] Dr. Gerda Geyer, Austrian Research Promotion Agency, Programme Manager of the national R&D funding programme *benefit*; National Contact Point for the Austrian participation in the Ambient Assisted Living Joint Programme.

Session C7: Supply with Good and Chores (home-centred, everyday services)

Session C8: Safety, Security, Privacy

The questions asked in the sessions were partly identical, and partly similar to those which had been asked in some sessions in the first AAL Forum 2009, thus allowing for comparisons.

1) What is the nature of your background organization?

Keeping in line with the thematic focus, the session on Home Care attracted with 28% the highest percentage of participants from the health and social care provider sector (see Table 1). The health and social care provider sector was also interested in the session on Supply with Goods and Chores (17% of the participants). As secondary end-users, this group can give very valuable input to the call definition, and the funded AAL-projects.

Table 1: Professional background of participants in the sessions

	C4: Information, Learning …	**C6: Home Care**	**C7: Supply with Goods and Chores**	**C8: Safety, Security, Privacy**
Health & social care provider	6%	28%	17%	5%
Research institution	47%	33%	42%	53%
Commercial company (products, technology)	12%	6%	25%	11%
Not employed, retired (end-user)	6%	0%	0%	5%
Policy makers, funding organizations	12%	11%	8%	10%
Other (e.g. consultants, etc.)	17%	22%	8%	16%
	100%	100%	100%	100%

Researchers represented the major group of participants in the topical sessions in Track C. In all the sessions under investigation, they had a clear majority, totalling more than half of the participants in Session C7 on Safety, Security, and Privacy (see Figure 1).

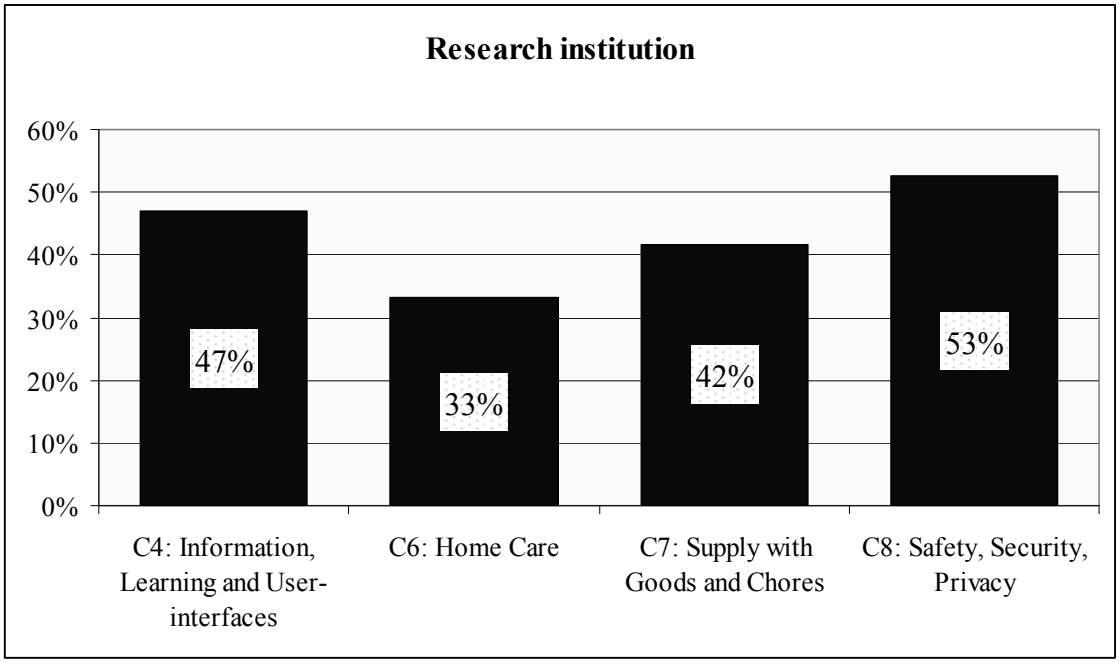

Figure 1: Session participants with research background
Source: Gerda Geyer, Leopold Hayer 2011

The number of commercial representatives attracted by the sessions was rather low, ranging between 6% and 12% in three of the four sessions. A higher percentage was reached by the session focusing on supply with goods and chores. One out of four participants in this session had a commercial background.

2) What is the greatest challenge/obstacle for the success of Ambient Assisted Living?

When asked about their opinion regarding the greatest challenge/obstacle for the success of Ambient Assisted Living, respondents opted for the business models or funding schemes as being the major barrier to the success of AAL (see Table 2). The second major obstacle was regarded to be the lack of knowledge about the needs of the elderly.

Table 2 : Major barriers/obstacles to the success of AAL

	C4: Information, Learning …	C6: Home Care	C7: Supply with Goods and Chores	C8: Safety, Security, Privacy
Lack of knowledge about the needs of the elderly (a market research / end-user involvement issue)	22%	21%	27%	5%
Lack of suitable technology and systems (a technology issue)	0%	10%	9%	10%
Identifying and creating suitable products and services (an R&D issue)	34%	11%	9%	5%
Activating the target group to make use of innovative solutions (a marketing issue)	11%	10%	18%	10%
Business models / funding schemes (an economic issue)	22%	32%	37%	30%
Social / health care service system structure (an organizational / structural issue)	11%	16%	0%	40%
	100%	100%	100%	100%

As the sessions using the MobiTed system had very different foci, it is not surprising that different obstacles were identified depending on the focus of the session. In session C8 on Safety, Security and Privacy, 40% of the respondents thought that the social/health care structure was the biggest obstacle. In contrast, nobody in session C7 on supply with goods and chores gave that answer. In session C4 on information, learning and user interfaces, the major barrier was seen in identifying and creating suitable products and services.

The variety of answers shows that, depending on the thematic areas of interest, barriers and obstacles might be of a different nature. To take up this challenge, call preparation and projects could aim at including even more different kinds of stakeholders in order to increase the chance of meeting the requirements and designing useful products, services and systems.

3) Which method of end-use involvement do you have prior experience with?

The Ambient Assisted Living Joint Programme asks for essential end-use involvement throughout the projects' lifetime. Quite in line with this requirement, many participants in the sessions indicated that they already had prior experience with several methods of end-user involvement (see Figure 2). The percentage of persons with experience in several methods of end-use involvement ranged between 26% in session C6 and as high as 56% in session C8.

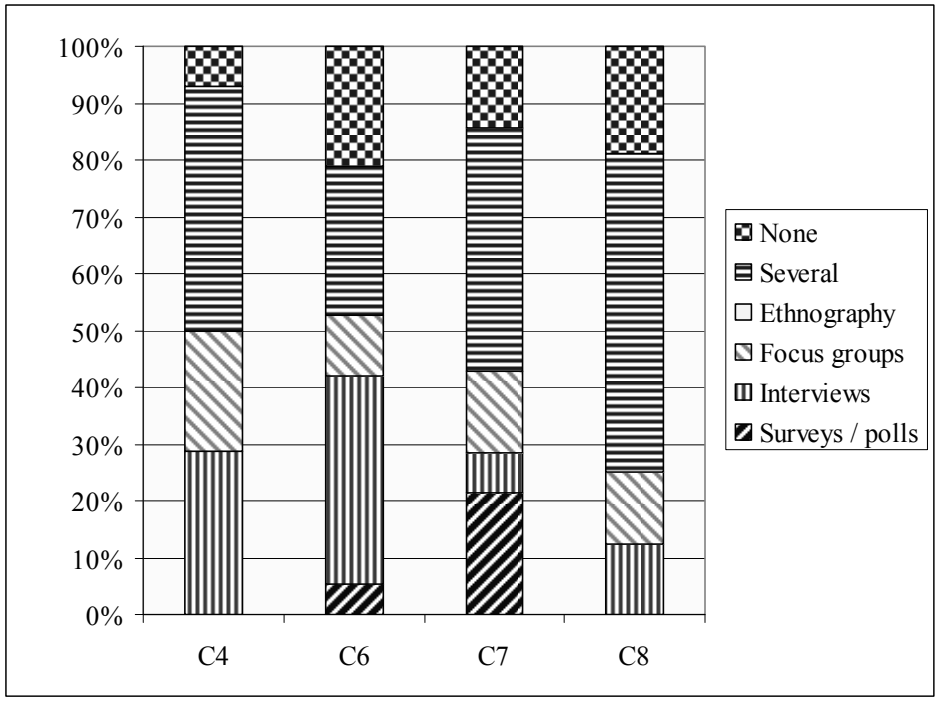

Figure 2: Experience in methods of end-use involvement
Source: Gerda Geyer, Leopold Hayer 2011

Table 3: Experience in methods of end-use involvement

	C4: Information, Learning …	C6: Home Care	C7: Supply with Goods and Chores	C8: Safety, Security, Privacy
Surveys / polls	0%	5%	22%	0%
Interviews	29%	37%	7%	13%
Focus groups	21%	11%	14%	12%
Ethnography	0%	0%	0%	0%
Several	43%	26%	43%	56%
None	7%	21%	14%	19%
	100%	100%	100%	100%

None of the participants had any experience with the method of ethnography (see Table 3). This option was never selected. However, this does not mean that participants did not have any experience at all with it. This method could also be included in the answer regarding experience with "several" methods. Evidently, focus groups and interviews proved to be the most commonly used methods of end-user involvement, as both were familiar to quite a substantial percentage of the participants. Interviews reached the peak value of 37% in session C6.

Finally, the group of persons, who had no experience at all with any of the proposed methods of end-use involvement, is also worth mentioning. 21% in session C6 and 19% in session C8 answered that they had no experience in any of the methods of end-use involvement.

4) In which phase of the innovation chain is end-use involvement most important?

Questioned about their opinion regarding the most important phase of end-use involvement in the innovation chain, the overwhelming majority of participants agreed that it was necessary throughout the whole of the innovation chain (see Figure 3). The respective percentages ranged from 53% in session C4 to 79% in session C8. According to the polling system, the second most important phase for end-use involvement was the exploratory / creative phase when needs were being investigated and defined. This answer was chosen by 22% in session C6 and by 25% in session C7.

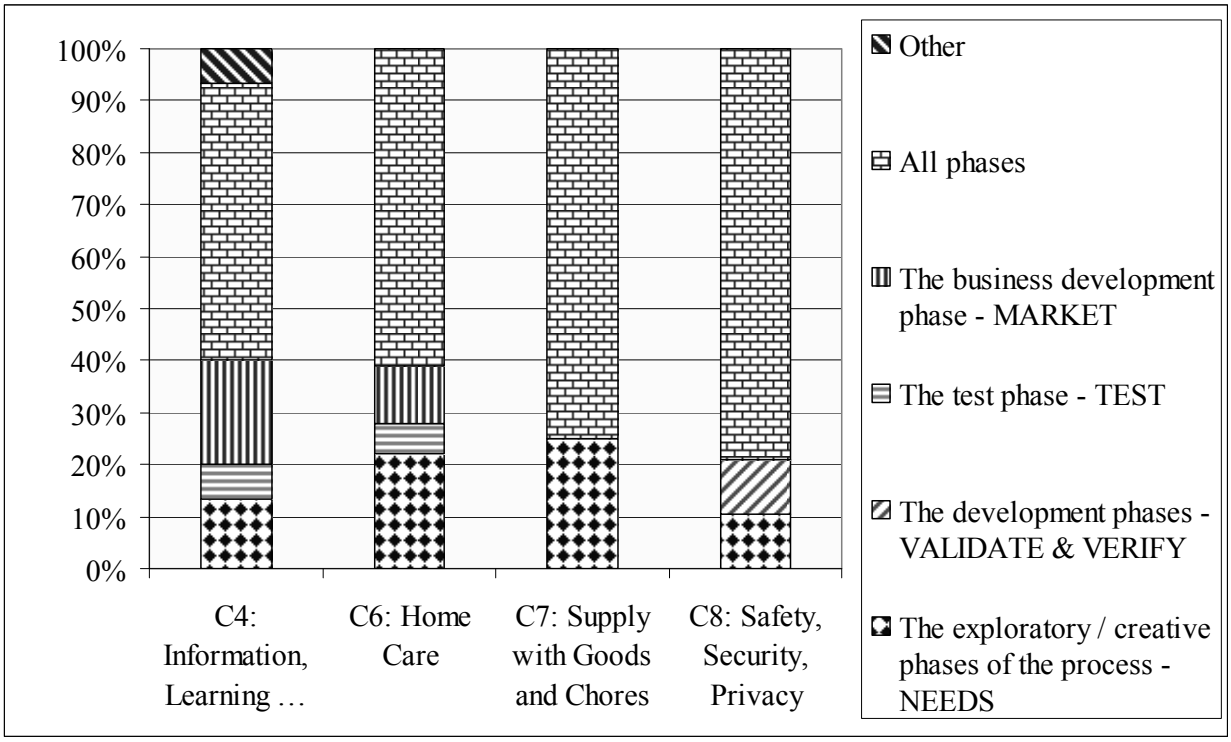

Figure 3: In which phase of the innovation chain is end-use involvement most important?
Source: Gerda Geyer, Leopold Hayer 2011

5) Which thematic area should AAL JP focus on most in future calls?

When questioned about the preferred thematic areas for future calls to be launched under the Ambient Assisted Living Joint Programme, participants, generally speaking, fell in two groups: with one group preferring health and wellness, while the other chose social interaction (see Figure 4).

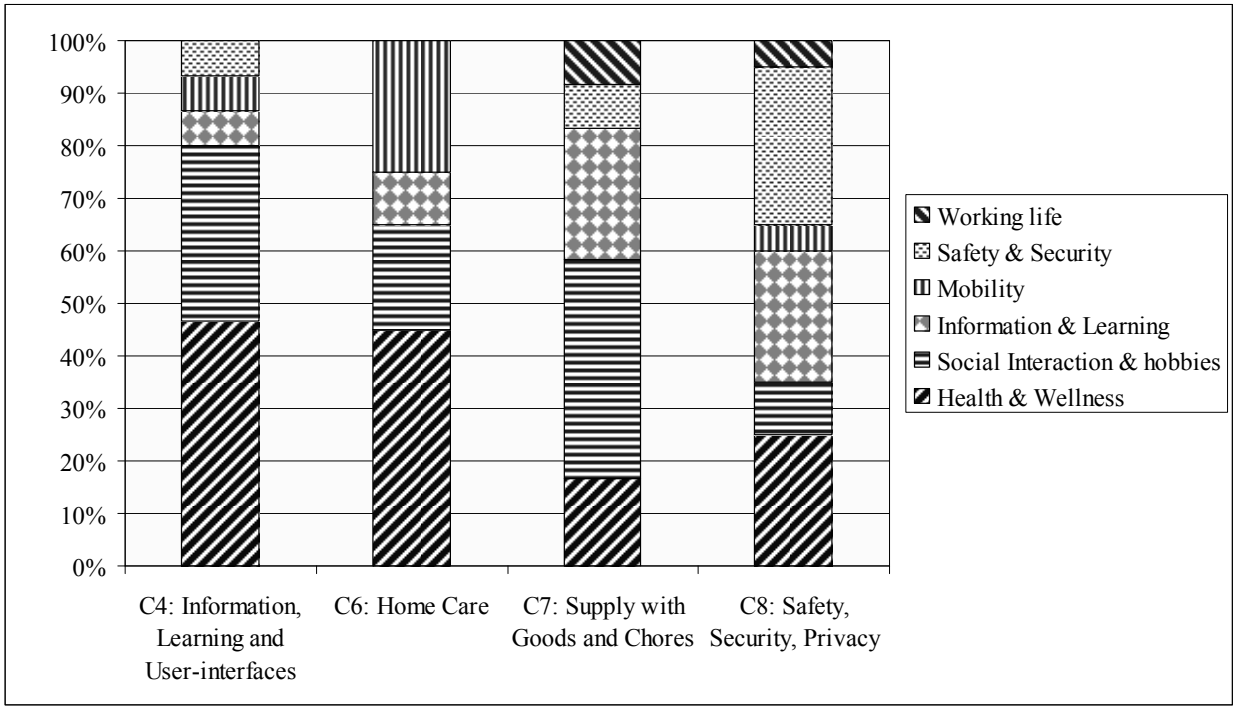

Figure 4: Preferred thematic areas for future calls in the AAL JP
Source: Gerda Geyer, Leopold Hayer 2011

Table 4: Preferred focus for future calls in the AAL JP

	C4: Information, Learning	C6: Home Care	C7: Supply with Goods and Chores	C8: Safety, Security, Privacy
Health & Wellness	47%	45%	17%	25%
Social Interaction & hobbies	33%	20%	42%	10%
Information & Learning	7%	10%	25%	25%
Mobility	7%	25%	0%	5%
Safety & Security	6%	0%	8%	30%
Working life	0%	0%	8%	5%
	100%	100%	100%	100%

Health and Wellness was favoured by nearly every second participant in session C4 and C6 with 47% and 45% respectively. As a matter of fact, the AAL JP programme did focus on the first mentioned topic in the first call for proposals and on the latter in the second call for proposals. However, we do not know whether the AAL JP focused on topics that were widely prioritized, or whether the programme contributed to the creation of this prioritization by inviting the proposal of projects in those two areas, thus giving rise to interest and expertise.

The third major topic was Information and Learning. This topic was preferred by one out of four participants in both sessions C7 and C8. Interestingly, the topic was not prioritized by the participants in the Information and Learning session, where it was supported by only 7%. In contrast, participants in session C8, focusing on Safety and Security, prioritized their session's topic. 30% answered that the AAL JP should focus mostly on Safety and Security in future calls.

Almost no one among the participants favoured AAL at work. We do not know whether the topic is just not seen to be relevant or whether it has not yet ripened enough to make it a favourite.

Discussion

The analyses showed that researchers formed the major group of participants when discussing potential future calls for proposals with the community. Depending on the thematic focus of the individual sessions, it was possible to attract other groups i.e. enterprises or representatives from the social and health care sector. Participants in the sessions outlined business models or funding schemes to be the major barrier to the success of Ambient Assisted Living. The second major barrier was detected in the lack of knowledge about user needs. Almost every second participant in the session had experience with several methods of end-use involvement. End-use involvement was seen as crucial throughout the innovation process. For future calls, participants opted for a prioritization of the topics "Health and Wellness" and "Social Interaction".

Overall, the analyses of the answers given in the polling system seem to support the basic outline of the Ambient Assisted Living Joint Programme by strongly focusing on end-use involvement throughout the funded projects' lifetime. The AAL community seems not only to think that end-use involvement is important but also acts upon it accordingly, as many participants do have experience with several methods of end-use involvement. The issue of insufficient business models needs and warrants further attention by all involved parties.

THE 1ST AAL INVESTMENT FORUM

Walter Aigner[1]

The 1st AAL Investment Forum was held on September 15th and 16th, 2010 at the Odense Conference Centre Room Fyn. This rapporteur's view presents all five sessions with some of the contributions from the audience. Contributions during the closing sessions had to be grouped together for space and redundancy reasons. Without counting informal participants, 1st AAL IF was attended by 80 participants. Affiliation is shown in the table below:

Companies	31%
Regions, public support	17%
Research	9%
AAL JP	9%
Funding organisations/bankers	8%
Investors	7%
Policy, media, consultants ...	19%

In the *Opening Session* Reinhard Goebl from Austria, Chair of the AAL Investment Forum 2010, restated the cornerstones of the AAL programme in terms of EC's committed funds and programme duration as well as sharing some experiences from the first calls. Even with significant success to encourage project consortia with 2 to 3 years to market, there was a clear bias towards research. Researchers were the first to react to the new §185 initiative. The rationale behind the AAL Investment Forum was to explicitly link to new and innovative interfaces between public and private investment. Therefore the structure of the four sessions mirrored these important elements for market impact and success in AAL:

(1) Market and Investment,

(2) Private Investing,

(3) Entrepreneurs,

(4) Public private partnerships (PPP) in the closing panel.

Mag. Reinhard Goebl thanked all his colleagues on the Investment Forum Advisory Board for their motivated and constructive cooperation when preparing for this 1st AAL Investment Forum. He announced that, for specific cultural reasons, the elevator pitch type of session with selected

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AAL entrepreneurs and all private investors would take place without public participation later in the afternoon.

Lena Gustafsson, AAL Association President from Sweden, invited the audience to take ageing not as a threat but as a huge opportunity of economic value, creating a strong market, and contributing to the big societal and economic challenges of ageing in Europe. She was optimistic that we would be able to continue the successful tradition of this European event in forthcoming years and thanked all who had worked hard to prepare the event, in particular the AAL Forum Committee and our local host Denmark, represented by Henning Thorkild Seiding.

In his presentation, Henning Seiding from the Welfare Tech Region in Denmark then explicitly linked the AAL programme as being very close to market. He emphasized the Welfare Tech Region was in an excellent position on a European level and would continue to be a very active region. He also maintained that all we needed to do was to let innovation play a role and to increase visibility besides helping the elderly. The key role was to boost the market, create new jobs, and increase welfare in Europe.

A question from the audience involved the mechanism of increasing demand by means of public sector buyers; once the technological potential was demonstrated in this role model, the public sector would come in to bridge the gap before the consumer market reached sustainable growth.

Another question related to the process of setting-up the Welfare Tech Region as a project. In his answer, Henning Seiding introduced the Welfare Tech Region as being simultaneously both a technology and a vision. Moreover, the Welfare Tech Region capitalises on *several very proactive key individuals*. Some of them created value at three levels: society level, user level, the business-growth level. Some of them were already world-leaders. Technologies range from telemedicine-assisted technologies, robotics, and information technologies. The objective for the period 2010-2012 was to create 15 new companies, 500 new jobs and 100 new projects within those 3 years. Some background and context information related to: “In Denmark we know we need each other”, “In our municipality 1000 employees will retire soon” etc. There was also a focus on education. There were 9 partners and strong political support. 22 municipalities collaborate in this region. Fresh money and investors were high on the growth roadmap for the years to come.

In a rather personal statement, a retired public official with 38 years of experience in public administration and at the CEO-level pin pointed *the key barrier as being cultural*. There were 5.000 employees in the hospital sector and 22.000 people in public administration. All of that is to become attractive under a regional venture capital scheme. Context information from the audience related to the historic dimension of the Danish ship building industry and the fishery industry both of which are disappearing. Therefore, the focus on business opportunities by means of more efficient public sector health care is linked to available resources in Denmark.

Before the first coffee break Reinhard Goebl announced *several matchmaking exercises*.

1. Young entrepreneurs and project partners from AAL-projects were pitching business angels and investors. However this exercise took place in a separate room and was not open to the public.

2. A second matchmaking exercise was on the level of regions with AAL as a programme and project space. It was anticipated that there would be financial tools to push investment projects onto a regional level – similar to what was going on in the sector "energy and environment in Europe".

3. A third kind of matchmaking brought together innovative technology projects and new end users. In AAL there would also be training activities on those financial and market aspects. Another exercise was to foresee and to map markets and market development as well as investment activities in those AAL markets.

Mag. Reinhard Goebl explicitly expressed his gratitude for the opportunity and budget earmarked for the 1st AAL Investment Forum.

In *Session 1 Market and Dynamics*, chaired by Rafael de Andrés Medina, AAL Association, Spain the first presenter, Jens Reiermann, a journalist from Denmark, raised four issues:

- How do we help people to change their habits by means of technology?
- How can we make the demographic dynamics something like the pyramid of the 21st century?
- How can we resolve the issues of demography and finances?
- How can we move forward from patients to users?

Kenneth Sandström, CEO, Investor and Entrepreneur, Medhelp Group Oy and Medineuvo Oy, Finland, presented "A business case in AAL" or, in more colloquial terms, how to avoid the project graveyard and move into business cases. An important piece of content information was the assumption that in Scandinavian countries with their high tax regimes, people were not willing to pay extra – e.g. for IT-based devices and services when they retired. *Therefore he anticipated that in the northern part of Europe, the public sector would play a significant role in taking-up technology-driven innovation and applications*. In his presentation, he focused on the typical traits of public sector clients. A known challenge was that cost effectiveness and managerial accounting was not very well developed in the public sector. One possible solution to overcoming this challenge was to bid for a "bigger piece of the pie" - bigger than the typical project size with a bigger lever on impact and financial consequences for the public sector.

George MacGinnis, PA Consulting, United Kingdom, focused on assisted living from a purchaser's perspective. He presented data from a recent OECD working paper. According to this, 200.000 people in the UK could be supported at home. 66 per cent of the male and 75 per cent of the female population older than 85 years had a long-term illness or disability. There were 1.6 million emergency admissions for 65-plus patients in 2003/2004. Some large-scale initiatives were under way. The 1990's had seen biometric monitoring – in 2010 it was lifestyle monitoring and, in 2030, this is anticipated to be intelligent therapies.

Some of the future applications and services have to acknowledge the subtle differences between consumer and formal care provider perspectives. In some form, the idea of self care has to be integrated with formal care.

An entirely different challenge was that public spending had been focusing on the most acute cases. There is a short-term ROI from avoiding emergency admissions. Business models from these most acute cases cannot be transferred to rather long-term proactive approaches. In some way, three business models are needed: one for the few cases, where you reach quick and high financial cost savings, one for the general public at the bottom and the most difficult one is for in between.

The presentation also shared a couple of reflections on the current market in the UK. The explicit conclusion was: there is a lot of hype. There is a significant gap in terms of an addressable market and some gaps shifting from the acute down to the consumer.

Hristo Stoykov from the European Investment Bank (EIB) in his very detailed presentation brought in the role of EIB to deliver on the objectives of the European Commission – mainly ICT infrastructure and the digital sphere. It is anticipated that in the programme following FP7 (now known as "Horizon 2020 - the framework Programme for Research and Innovation" the budget for EIB is to be significantly increased.

Session 2 *Private Investing* was chaired by Juan Carlos Castrosin, AAL Joint Programme Advisory Board, and Pi&Pi, Spain.

Yuval Binur, Accelerated Technologies Partners, United States, the first presenter, has been a venture capitalist for 25 years. Before his speech "Financing companies in the new environment – challenges and opportunities" he employed some of the metaphors and pictures used in other sessions – e.g.: the pyramid example. *As a person based in New York, he challenged the appropriateness of the European "wording of welfare technologies", "welfare markets", and "wellbeing business"*. "Welfare" is an antagonist for private financing. It is the state who takes care of welfare in the US. Age is not a disease. The business of the elderly is very similar to any IT-enabled life sphere. You can find the answer on the internet. The core technologies are very much the same. The role of governments in the US is to incentivise business and to control reinvestment. Yuval strongly believed into market forces to decide issues like "sick" or "healthy". The diseases of the old start at a young age. Therefore rather proactive business plans are highly relevant. You need strong industrial and academic infrastructures plus effective capital markets. A second question was what had hanged our ability to raise money for health; the. S-depression, Chinese-shift towards global markets, Russia: big change in health care. Today the challenge is not how to address the problem of an ulcer. Today's challenge of how can I reduce a very expensive surgery? From Yuval's perspective, there are no IPO markets and no exits for venture capitalists anymore. As a consequence, your financing partner needs to fund you all the way through to market roll-out. The entire venture capital community faces nine trends:

(1) Looking for products. *Currently many investment decisions are delayed because no attractive products are available*.

(2) Today 11 minutes remain between a buy and sell decision from a venture capitalist's perspective.

(3) National depts. Many governments are very close to bankruptcy. Empires fade away, and fade out. Markets follow.

(4) The Atlantic region is not the centre any more.

(5) Health care reform and unmet needs: number one killer shifted from cardio vascular to cancer followed by obesity and diabetes. Unmet needs where technology can do a lot. You cannot prevent a stroke.

(6) Regulators become more difficult and costly. FDA operates out of fear and not out of rationale. We will be paying more attention to regulation.

(7) Large corporations become more risk-averse. We cannot build distribution (retail infrastructure). We need an existing retailing partner. Therefore, enhancing the relation is a key element. Yuval was trained by one of the fathers of venture capital. Today public markets are becoming very sophisticated. Venture capitalists are also becoming risk-averse. All his investments are "under water". "Oxygen supplies" are few - only in late-stage companies.

(8) Some need to fund "early-stage technologies". "In the last five years incompetent boards killed more… "

(9) In a project you might need EUR 200 million to get through commercialisation. Historically this was done by large industry but this has disappeared. Moreover, syndication does not work due to the conflict of interest.

Yuval's recommendation when preparing to raise funds is to "think out of the box".

- Angels grant early corporate money.
- Friends and family new money.
- Plan exit on day one - based on M&A not on IPO.
- The value is in the equity – keep it!

Yuval's summary:

- focus upon unmet needs
- budget break-even
- talk to reimbursement agencies and what the barriers are
- IPO trouble

George MacGinnis from the UK in a quick remark maintained there is lack of evidence that you can sell services. In western medicine everything is evidence-based medicine: business = efficacy = shown evidence = market structures.

Roberto de Saint-Malo, Adara Venture Partners, Spain in his presentation "Seed Fund Raising: don't forget Angels!" focused on seed financing and direct equity investment. His project portfolio focused on ICT and health. His key message was that there was a mismatch between quality-opportunities and the preferred work-mode of business angels.

In *Session 3 on Entrepreneurs*, chaired by Urs Guggenbühl, University of Applied Sciences St. Gallen, Switzerland, three presentations and an ambitious discussion took the threads from the previous evening's reception and dinner at the Odense Town Hall hosted by Odense Municipality as well as some rumours on the AAL entrepreneurs' performance in the elevator pitch session.

Jérôme Arnaud, CEO DORO AB, Sweden, shared the big picture on how to evolve from a commodity-like supplier in some European markets towards a global (EU, US, Asia, South America) niche player in the care sector. In his case study on DORO's mobile phones, some key milestones were presented and reflective remarks on lessons learnt were shared.

Katy Lethbridge, SEHTA, United Kingdom, represented one of the largest health technology clusters in the world. She presented some context information on the UK long-term conditions.

Kenneth Larsen, Keystones, Denmark, in his presentation on "How to attract investors to your AAL company" tried to add something relevant after two excellent sessions and before the closing session.

Closing Panel on *What is the right mix of public and private investments?* was chaired by Peter Saraga, AAL Joint Programme Advisory Board, United Kingdom. Actual focus was on possible hybrid forms of investment and the guiding question "What can be done to address obstacles for more investment in the AAL?"

The closing session brought together a panel discussion with viewpoints from various stakeholder groups in order to elaborate on the right mix of public and private investment for a successful impact of AAL.

Mikkel Hemmingsen, Syddanmark Region, Denmark, emphasized the specific regional needs in terms of AAL-investment. There is the need for more efficient public sector services and the need to grow businesses and attractive employment opportunities. Both needs are nicely blended in Syddanmark's welfare technology strategy. This strategy brings together IT, intelligent aids, automation and telemedicine, all adding up to DKK 400 million or EUR 60 million in promotion investment.

Erika Mann, former MEP (European Parliament), Germany, is back in the business of evaluation, risk sharing, loans, etc. She emphasized the importance of looking into the challenges ahead of us and of bringing bits and pieces together onto the policy agenda (or broader agendas):

- demographics,
- technology, e.g. Google,

- Richard Florida and the concept of city and mega-cities.

Erika invited all involved players to look into Europe's innovation agenda and into the 2020 agenda. She anticipated regional and structural funds to become a significant element for technology and innovation. For what followed FP7, she anticipated a shift from the current grant instruments towards loan forms. EIB and EC would continue to work for the period 2007-2013, and EUR 13 billion were guaranteed. She already saw a significant increase for 2011-2013. There were already 70 projects in the field of energy and health care on a completely loan-driven basis.

Yuval Binur, Accelerated Technologies Partners, United States, disclosed his key messages in the form of seemingly unrelated personal statements by means of "in between the lines": (see his presentation in session 2).

(1) As a venture capitalist his contact address is Continental Airlines, seat 3C.

(2) Now it is difficult to finalise first stages.

(3) From a venture capitalist's perspective, the benchmark is: "opening a Ben&Jerry ice cream outlet on the Red Square in Moscow".

(4) Unmet needs must drive this business.

Yuval was certain that "The money will come!" Money would always go where money can make money. It was not enough to serve the elderly. It did not add anything that historically in Scandinavia elderly care was seen as a government business. The key was always to have a clear focus on which specific unmet need to tackle. Governments incentivise! Governments do not act as entrepreneurs! The elderly could become a political force.

Ulrich Jørring from Vaekstfonden, Denmark, focused on three ways to stimulate AAL:

(1) invest in venture capital,

(2) invest directly,

(3) loans.

Ulrich maintained there seemed to be reluctant venture capital behaviour in Europe. This held especially true where AAL was primarily a services business. We invest best when we have technology that is scalable.

Frans de Bruïne, International Strategy Consultants, Belgium has served as a director in EC. In his analysis, he stated AAL was less an innovation issue but rather RTD. However, a change towards innovation was long overdue. Real change came from individuals; the boulevard of broken dreams. From a history perspective, the "public effort to boost entrepreneur failed." What we need is something similar to a future internet fund. In 1990, the focus was on internet for enterprises, 2000 on consumers and web services, 2010 on internet of things. Frans maintained in his critique of EC's Framework Programme "a lot of nice projects but no real activity". "A

natural inclination of politicians was to throw money at problems without quality of funds management (the salaries of fund managers)."

Frans shared his reflective remarks based on a long career: "Civil servants will write rules and are convinced that their rules help you."

He suggested imposing restrictions on high management fees. As early money in incubation and coaching after the early stage is rather difficult, he recommended rather taking an investor on board from the beginning. Immediately go global. AAL is about change. Change is made on individuals.

An EC venture capital fund could cover the grey sphere between venture capitalists and classical banks. As an immediate reaction from Erika Mann, she objected to the idea of an EC venture capital fund. All change is market driven. The EC is not a real venture capitalist.

What followed during the closing session at this 1st AAL IF was a wealth of comments and suggestions from the audience. An audience, which significantly increased due to the high-level participants and speakers for the AAL Forum opening session, took the opportunity to join in this panel discussion and closing session. Some key elements from the interaction are:

Demographic change offers tremendous opportunities for IT-based applications and services on a global scale. *Whether Europe is in the race depends on how its emerging IT user-base compares with China, the US and other booming hot spots*. Fragmentation in terms of languages, social security models, and public authorities' cultures all add to the known challenge: access to funds for rolling-out IT-research results into still emerging markets for the elderly.

Summarising several participants' contributions, AAL IF 2010 was a success in four plus one dimensions:

- It was exactly the type of bottom-line market impact activity / community bridging activity that the EC wants to see from a mission-oriented funding programme.
- It was the first time to (unexpectedly) bring up three very different European conceptions of venture and opportunity funding:
    - Danish/Scandinavian model of incentive-based performance contracts with health institutions,
    - classical venture capital / business angel approaches,
    - European Investment Bank approaches of loans to institutional buyers (hospitals etc.)
- It was the first time to involve AAL-related High Administration into the rationale and thinking of growth and opportunity-oriented investors.
- It was the first opportunity for the pioneers and most advanced AAL SMEs to present to real investors (elevator pitch)

- The issue was raised that the concept "success" might easily become a container for superficial discourse – "what the hell is a success" – "in the absence of a clear definition, such a meeting was badly needed".

On the issue of making AAL IF a regular institution, the audience felt AAL IF needed to be continued for the following reasons:

(1) Any successful community-based event needs time / stable format to gain momentum in still separated / disjunctive communities.

(2) AAL Forums have had a project focus instead of an investment and opportunity focus. The professional investment community has so far not expected to see professional business expertise at AAL Forums.

(3) Only selected pioneers were present during the first-time event.

(4) The picture and reality of business angels and investors is neither static nor entirely homogeneous. Even several experts had to accept that text book truths from 2005 were not valid in 2010.

(5) For most to all AAL consortia, IF 2010 was considered premature – given their sequential time and action planning.

The AAL Investment Forum 2010 in Odense gathered significant presence from commercially agile key individuals – who often shy away from publicly co-funded spheres. What was said and where energy could be felt in statements and questions was significantly higher and commercially more relevant when compared to other business and market-related AAL sessions. Nine key messages from the AAL Investment Forum 2010:

(1) "All is said" – however only for those ears who listen to the expert speakers from venture capitalists, business angels and successful corporations – beyond the usual filters of polite beating around the bush and political correctness and high administration's diplomacy.

(2) Ageing is not a disease.

(3) Serving the elderly is not a business model – at least not one that is attractive for commercial investors and sustainable.

(4) European Commission initiatives to better cope with Europe's reality of highly fragmented and heterogeneous markets in terms of language, and social security regimes are currently under way.

(5) A strong new element is pre-competitive public procurement and, more generally, public procurement of innovation.

(6) Many SMEs and their managing owners find the expectations in rapid impact and rapid growth rather challenging or overwhelming (SMEs who have projects funded under the AAL-programme).

(7) Regions have become a dynamic and driving force when it comes to competing for strategic EC-projects and attracting leading international suppliers.

(8) From a global perspective, opportunities and challenges from an ageing population seem to be commercially more attractive in China, Japan, and the US.

(9) Representatives from user organisations are seen as highly attractive counter parts from the perspective of high administration in the EC and at multinational programme-level; however, there is slender evidence of their representatives contributing to filtering out ivory tower concepts and ideas, or more generally for guiding and discussing solutions with the strongest or fastest commercial impact in Europe.

This first AAL IF was rather ambitious when it came to exploring financial support and cooperation with Danish and UK stakeholders. An element that typically is beyond the radar of public programming is the role of key individuals and smart authentic roll-out plans.

Reinhard Goebl from Austria, Chair of the AAL Investment Forum 2010, summarised the first AAL Investment Forum in Odense September 2010. He outlined six key areas. These issues had not yet been at the focus of conferences within the programme AAL. The six key aspects for overcoming the gap between research and commercialisation are:

d) Pioneering regions in terms of public users/public demand for IT-based approaches to improve efficiency in health care and qualitative living for the elderly.

e) Successful European SMEs when it comes to specifically address the silver market.

f) The spectrum of financial resources for funding roll-out and market entry.

g) The unchartered field of hybrid approaches when it comes to blending public and private demand and support mechanisms.

h) The bigger picture and rationale from an EC perspective.

i) The tremendous challenge to make publicly co-funded, two-to–three-year development project consortia become fast players on still evolving proto-markets.

Reinhard Goebl also outlined some key elements that intentionally could not be covered during this 1st AAL Investment Forum – mainly due to format and budget restrictions:

Some of these issues are:

- Training issues – both in terms of raising awareness and knowledge on how to professionally interact with investors as well as on proven mechanisms in AAL-related markets.

- Extending the elevator pitch-type of interaction to an established forum of investment decision making.

- Monitoring and tracking success for EC and commercially interested stakeholders.

- Interaction and support mechanisms between individual AAL Investment Forums.

Reinhard Goebl thanked all his colleagues on the Investment Forum Advisory Board as well as all session chairs, speakers and participants for their motivated and constructive participation and invited participants to attend dedicated tracks on markets and business aspects at the second AAL Forum 2010.

YR-RISE WORKSHOP FOR YOUNG RESEARCHERS AND PHD

Ilse Kryspin-Exner, Birgit U. Stetina, Doris Weber, Anna Felnhofer, Oswald D. Kothgassner & Helmut Hlavacs [1]

This year's YR-RISE Workshop for Young Researchers and PhD in Odense constituted a follow-up of the Young Researchers and PhD Workshop held at the AAL Forum 2009 in Vienna. As such, it was meant to draw on the experiences made in Vienna and benefit from them. The goal set for this year's YR-RISE workshop mirrored the objective of the Viennese workshop. Thus, the main focus was to press for interdisciplinary dialogues between young scientists in order to enhance mutual support, enable theoretical exchange, and create networks for possible collaborations. This year's Young Researcher and PhD-RISE workshop was generously sponsored by the Austrian Federal Ministry for Transport, Innovation and Technology (bmvit) and the research program benefit.

However, given the experiences gained in Vienna, where a tight program hindered a continuous discussion among young researchers and chair experts, this year's schedule was expanded: instead of holding the workshop on one morning, it was extended to a whole day of teaser and poster presentations, discussions on Day 1 of the AAL Forum, extra poster presentations to all participants of the AAL Forum on Day 2, presentations of the three poster award winners in Track G on the last day of the Forum. This arrangement met with a great response among the young researchers, as it provided them with plenty of time to introduce their ideas to their workshop colleagues and to discuss possible obstacles and challenges both with the expert chairs and among themselves. Furthermore, granting the Forum's participants and the public access to the posters fostered the dialogue between younger and "older" researchers.

The milestones of this year's YR-RISE workshop are outlined and discussed in detail below.

The call for presentations met with a great response, and 5 topics were offered:

- Ambient Intelligence for the Elderly, Communication Technologies and Interfaces,
- Ethical Aspects of AAL and Telehealth,
- Serious Games and Social Networks.

[1] University of Vienna.

After a detailed review process, the best 22 projects were selected by the below-mentioned track chairs to be presented at the YR-RISE workshop in Odense. Finally, there were 34 participants (in some of the projects not only the speaker was present), five of them had already attended the AAL Forum and the "Young Researcher & PhD-workshop" last year in Vienna, three of whom reported the progress of their projects, and two offered new ideas.

The participants were assigned to three tracks, each of which was supervised by a senior scientist:

- Track 1 Ambient Intelligence and Healthcare in Elderly was chaired by Ilse Kryspin-Exner (Faculty of Psychology, University of Vienna),

- Track 2 Communication Technologies and Interfaces was lead by Helmut Hlavacs (Department of Distributed and Multimedia Systems, University of Vienna) and

- Track 3 Serious Games, Robotics and Social Networks was supervised by Birgit U. Stetina (Faculty of Psychology, University of Vienna).

Prior to the actual start of the workshop, the participants were invited to a so-called get-together, which was held in a typical Danish bar in the centre of Odense, where a Danish buffet was offered to all the guests. The main idea of this event was to get to know one another face-to-face, and thus establish an amicable atmosphere for the next day's workshop. This was a complete success: almost all of the 34 participants of the workshop acquainted with one another and immediately started discussing and networking, continuing through the evening and throughout the whole workshop.

The workshop itself proceeded as follows: after an introduction about procedures, topics and the overall aims, there followed short teaser presentations by the participants. They consisted of no more than three slides, giving the auditorium only a short insight into the ongoing project, its scope and purpose. Although they were assigned to the various tracks, they were not held separately, but shown to all of the chairs and participants. This was meant to enforce interaction between the three tracks and to enhance the exchange of ideas regarding projects with differing content and use of methodology. Following the teaser presentations, each poster was lead by the respective chair and presented to the whole workshop forum, and discussed in the plenum. Manifold questions and lively debates marked this phase of the workshop, and it was here that an apparent wish for a theoretical exchange on the methodological aspects of each project became evident among the participants.

In this regard, installing an online forum after last year's workshop in Vienna provided us with satisfying results. The fact that the participants of the Viennese workshop continued to exchange ideas on that platform, even after the end of the workshop, led to the idea of creating a new web-space for this year's workshop. Thus, a discussion forum, integrated in the framework of the official AAL website, was established to offer the possibility of continuous reflection on the project, its progress and results. Both a private area for the participants of the RISE workshop and a public discussion site were installed – on the one hand – to enable internal access to all the material presented at the actual workshop, and – on the other hand – to reach out beyond the workshop's boundaries and to appeal to other young researchers within the European Union and other non-European countries. The participants of the workshop showed great interest in this

platform, and thus, it became a compelling option to stay in contact with each other and to be always up to date regarding each other's research activities and novel enterprises.

In the following, each track is discussed in more detail to provide a good insight into the activities of the YR-RISE workshop.

1. Track 1: Ambient Intelligence and Healthcare in Elderly

This track was chaired by Ilse Kryspin-Exner, co-chaired by the research assistant Anna Felnhofer and centred primarily around AAL and Ambient Intelligence (AmI) issues. Smart homes, monitoring equipment, fall detection devices and situation-aware frameworks were discussed among other technological innovations to support the independence and quality of life of elderly people. The presentations in this track particularly focussed on technological developments, yet they were also considerate of end-user specific questions regarding usability, acceptability and user-friendliness. Another emphasis was placed on the requirements of an active lifestyle management of elderly people such as their acceptance of technological support. It became apparent that all of the introduced projects resembled a developmental phase and were still far from being implemented on the market. Hence, there were animated debates among all workshop participants as to whether the introduced ideas were capable of promoting well-being, providing security and preventing critical situations. It became obvious that, apart from technological and marketing issues, psychological and ethical problems deserved close consideration. At various stages of the teaser presentations and poster sessions, the following questions were discussed: Will the end-users actually use the product? Will they comply to it or will they get bored with it? How can motivation and acceptability be increased? Who defines critical situations and who defines independence? Will home-based devices confine end users to the constraints of their apartments? Will, therefore, the implementation of technology lead to more personal freedom, or will it avert it? And is it justifiable to introduce a technology to a person who is still living independently and who is not asking for it?

All the above-mentioned questions were discussed in the workshop, yet they were left open for further discussion on the online-platform.

2. Track 2: Communication Technologies and Interfaces

This track was chaired by Helmut Hlavacs, who added valuable technological background knowledge to the multidisciplinarity of the presented projects. Thus, alongside issues regarding intergenerational communications via Chat and Cooking, there were projects introducing ontology-based configurations, new e-mail interfaces, and interactive textiles. Again, manifold issues arose from the presentation and poster session, yet the main discussion predominantly centred around the feasibility of the projects, their developmental challenges and - again – user acceptance. The idea, for instance, to create a library of sounds and gestures in an interactive kitchen game system raised the question, whether it would actually increase contact between two generations, e.g. young kids and elderly people, and whether they would use it in the long run. Another project posed the issue of reduced physical interaction between grandparents and their grandchildren, and again tried to compensate this with a novel approach to cooking and food through media. Yet again, it was questioned by the forum, whether this kind of system would be used effectively by the target group. Another innovative approach to creating assistive technologies for older people originated from Singapore and contained the attempt to "breathe

life into textiles" in order to, for example, alert other pedestrians in the case of an emergency (e.g. drop of blood pressure). Another project called Confucius Chat integrated Asian philosophy in the context of enhancing intergenerational communication in order to both: improve the contact between grandparents and their grandchildren and to recover knowledge which is on the verge of disappearing. The main aspect of this approach was to ameliorate the possibilities of processing written natural language, in order to simulate a natural chat.

3. Track 3: Serious Games, Robotics and Social Networks

The final track was chaired by Birgit U. Stetina, co-chaired by the research assistant Oswald D. Kothgassner and particularly comprised projects, which were - with regards to content - close to the field of robotics, serious games and virtual social networks. Hence, the presentations centred around personalized digital games, serious health games, simple frameworks for logic games and robots to help guide visually impaired elderly people. Again, some presentations rather propagated the structural and technological background of developing games, interfaces, and communication technologies, while others clearly focused on end users. The most important issue in the debates following the presentation of each poster on Day 1 turned out to be the usability of these gaming products, namely the robot assistant (which was demonstrated in vivo). The need to provide incentives to the end users, i.e. a reason to use the game or employ the robot, excelled among other objectives, such as improving organizational aspects, enhancing value ecology and introducing the innovation to the market. It was suggested that technology should be personalized in order to render it more familiar, more significant and more accessible. Another aspect that came into discussion concerned the interdisciplinary discourse which marks the developmental phase of a technological innovation. Many young researchers reported misinterpretations and misapprehensions when communicating with stakeholders or professionals, originating from disciplines other than their own. This was often referred to as "speaking two different languages" or "pursuing different objectives", and, as the debate around this subject progressed, it became clear that this workshop contributed all the more to greatly ameliorating this interdisciplinary communication as it provided a unique platform to exchange very diverse ideas and approaches.

4. Winner Awards

By the end of Day 1, the expert chairs had elected three winners based on their performance regarding the short teaser presentation and the poster session. The first place award comprised a hand-made glass bowl designed by Claus Nielsen's (chief organiser of the AAL-Forum 2010) wife (see www.lamaglas.dk), which – together with small gifts for the second and third place winners – was presented at the official conference dinner. Additionally, the three winners were invited to present their projects in depth in research Track G on the last day of the AAL Forum.

Third place was assigned to *Xuan Wang* from Singapore and her project "*Confucius Chat: Mediating Cultural Communication between Elderly and Children using New Media*". This project particularly caught the attention of the three chairs because of its novel approach to the intergenerational communication problem using Asian philosophy in the context of recent digital media. Considering Europe's own philosophical background, this undertaking seemed promising for implications within the European context.

Second place was assigned to a young Austrian researcher, *Mario Buchmayer*, and his project "*SENIOR: Situation-aware ambient intelligence framework*". His presentation was well elaborated and incorporated manifold critical issues in an in-depth discussion. Furthermore, the AmI background of his project embraced an innovative approach to traditional AAL technologies.

The winner of the YR-RISE workshop teaser and poster session was *Ronan McDonnell* from Ireland with his project "*Designing Communication Technology for Older People in Care Settings*". This project was chosen as the winner because it addressed an exceedingly important AAL research area, a field which is widely discussed yet rarely considered: it focussed solely on the elderly person and personalized instead of objectified him or her by directly assessing the needs, hopes, wishes, and fears. This work undoubtedly constituted a very important contribution to all the other AAL related work, as it portrayed, to an extent, an element of its foundation.

In conclusion, this year's YR RISE workshop provided yet again a unique platform for young scientists from diverse disciplines and different parts of the world, not only Europe, to take part in a multidisciplinary exchange about AAL solutions for elderly people, and to engage in a wider discourse with other AAL Forum participants. As we could observe, the young researchers were extremely grateful for the opportunity to share their ideas among their peers and to get feedback from senior researchers and experts in their field of study. After the workshop, we, the organisers, received much positive feedback from participants after they had returned home. The repeated success of this event clearly points towards the need to foster further events to allow a broad, multidisciplinary debate to take place within Europe and beyond. A future goal of a similar event would be to integrate financial and marketing aspects into the program, as it became apparent during the workshop that many young researchers struggled with these issues and appreciated every support they could get. In the case of the continuation of the Young Researcher and PhD-workshop series within the AAL Forum, it has been suggested that modules of research strategies concerning financial support (third party funds) should be integrated, as well as business plans so that research and industry can be brought together more closely.

ARTICLES

KEEPING CONNECTED IN CARE: DEVELOPMENT OF TECHNOLOGY TO STIMULATE SOCIAL INTERACTION AMONG OLDER PEOPLE IN CARE FACILITIES

Ronan McDonnell, Jane Grimson [1]

An increasing amount of research is being conducted into social isolation among older people, with many studies examining ways to promote and increase social interaction and engagement among this group. Much of this research has focused on those still living at home. However, there is a significant population in care settings such as nursing homes and sheltered housing who also experience social isolation, often to a greater extent than those still at home, because of relocation from their friends, family and neighbourhoods where they may have lived all their lives.

While many care centre residents suffer from a variety of physical, mental and medical impairments, there is a significant group who are cognitively sound, but who suffer from a lack of engagement in the care centre as a result of insufficient suitable activities and resources, coupled with geographic isolation. This can have an impact on their physical and emotional well-being.

This paper gives an overview of the current research in designing communications technology for older people in care, potentially increasing their levels of social engagement. Specifically, an overview of the approach taken in this research will be provided which focuses on those in care settings in Ireland.

Introduction

The average age of the world population has consistently increased over the last number of years, with estimates that more than 2 billion people will be over 65 by the year 2050 [1]. With this comes an increase in healthcare costs as older people are generally less well than younger people. This age increase will put significant financial strain on health systems.

Efforts are currently underway to reduce these financial costs, such as an increasing emphasis on community-based care and keeping older people in their existing communities for as long as possible. Community-based care, as well as being cheaper than relocation to a nursing home, has

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psychological and emotional benefits too. When moving into care, there can be an increased risk of depression, with those who remain in contact with their existing community coping the best [2].

However, community-based care is not always possible as medical needs may require more constant supervision. As such, relocation of the elderly into care settings is a common occurrence, but this movement can still have a dramatic effect on their life. They are removed from their existing communities, and may lose contact with friends and family who may not be able to visit them. Furthermore, the cost of such care means that people may not be able to afford means of keeping in contact such as visits to relatives or use of mobile phones.

There are many studies showing the mental, physical and psychological benefits of social interaction on health [4]. Communications technology is one way of connecting people who are geographically separated, and has been shown to be beneficial in such scenarios [6]. But technology can also provide access to information and resources that could be used to alleviate the boredom and lack of engagement that can exist in nursing homes.

The purpose of this research is to examine whether technology can be used to reduce the social gap that people can experience when moved into care. By using technology both as a communications tool and as a hub for information and resource access, this study seeks to learn whether the combination of the two will lead to a measurable difference in levels of social interaction, and whether this improves social and emotional well-being. Furthermore, this study seeks to identify and examine processes that are required when designing and introducing technology into such a setting.

The ultimate goal is to produce guidelines for such a development process that, when followed, produce a more usable and successful device. As part of this, a prototype device will be produced using these guidelines and evaluated for its effectiveness in a real setting.

Previous Interventions

There have been several reviews of interventions to reduce social isolation. These studies have stated that some of the characteristics of successful interventions:

1. are group interventions providing social support;
2. have an educational or training input;
3. involve older people in the process as early as possible
4. should be within an existing service;
5. use validated measuring tools [5], [6].

There are studies that have also looked at designing communications technology with and for older adults, but these have usually taken place in the home [3].

Individuals in care usually suffer from some sort of illness or impairment which means they are unable to live independently at home. However, within care settings there exists a significant group who may need to be in care for physical or medical reasons, but who are not cognitively impaired. This is the cohort at which this research is aimed.

Current Stage of Research

Currently, the research is being conducted in two nursing homes in the Leinster Region of Ireland. There is one main centre, where the majority of participants are based, and a second centre where a former resident of the main centre is still participating.

The early stages of the research have been previously described [7]. Eleven health professionals from a variety of backgrounds were interviewed about the levels of social engagement in care centres. Following those interviews, six residents living in a care home in Ireland were interviewed about their social activities and levels of engagement before and since entering the home. Analysis of interviews indicated that group activity levels among the more cognitively able residents are quite low. This is largely due to an emphasis on providing activities for less able residents, who make up the majority of the population of the nursing home. As one resident stated "the basic activity levels are a bit low". Furthermore, a lack of access to information and resources (such as reading material, bus timetables etc) meant that these more able residents experienced long periods of boredom, and spent a significant amount of time on their own.

After analysing the interviews, nine storyboards describing technology-based activities were developed and presented to the residents. These included a library for reading books, a simple newspaper reader, a system to contact friends and family via phone and text, a virtual comment box for the nursing home, an activity reminder system for residents, a communications system for a residents' council, multiplayer games, and a book club.

The most popular storyboard was the 'book club'. It described an individual reading a book on a device, which also displayed information on when the next book club meeting was and who was attending it. The storyboard then depicted the individual participating in a book club meeting with a number of other individuals who had also read the book.

As the most popular storyboard, the book club was made the main feature of the system. It allowed for a common ground, as all the residents would read the same book, giving them something to discuss. It was also decided to run the book club meeting on a weekly basis as it gave individuals time to read the book themselves, but provided information and engagement in between the meetings. Previous studies had also mentioned participants not liking the commitment of turning up to many scheduled events [3].

Other features that were popular included the ability to contact friends and family using the device by voice and through a messaging system, reading and sharing newspaper articles, a calendar of activities in the care centre, and a library link where an individual could access, search for and read books. These were also incorporated as features of the system as they would provide further opportunities for social interaction through family and friends, as well as providing extra engagement opportunities for residents.

Those features that replaced face-to-face interaction with screen-to-screen interaction, such as multiplayer games, were the least popular. Participants felt that face-to-face communication was most important, and wanted the technology to facilitate this, rather than replace it.

Technology Selection

Many devices were considered, including netbooks and laptops, but it was decided to use the iPad developed by Apple Corporation. The iPad is a 10 inch touch screen device, operated by using fingers to touch the screen, but there is an optional keyboard for text entry only – there is no mouse available. Furthermore, the software included on the device, called iOS, is designed exclusively for finger-based interaction, and touch screen based devices have been used successfully by older people in previous studies [8].

Next Steps

The software has been developed for the iPad, and is currently in an iterative user testing process with the participants, using techniques such as the think-aloud protocol. A one-week trial is planned with participants to test any outstanding bugs, and once this is completed, a longer trial over a number of weeks will take place. During this trial, each participant will receive an iPad with the application installed. Every weekend there will be a book club where participants can meet to discuss the book of the week. The weekend is usually the quietest part of the week in the nursing home. Furthermore, they will also be able to use the other features such as reading newspapers and finding out on a daily basis what activities are scheduled in the care centre, as well as messaging their friends and family.

Throughout the trial, the impact on social engagement will be measured using validated scales (e.g. Lubben Social Network Scale). Usage data will be anonymously recorded for many interactions including screen presses, errors encountered, and length of time on a particular screen.

As well as this quantitative data, interviews with participants before and after will provide qualitative feedback.

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SENIOR: SITUATION-AWARE AMBIENT INTELLIGENCE FRAMEWORK – A RESEARCH PROPOSAL

Mario Buchmayr[1], Werner Kurschl[2]

In the past years, various Ambient Intelligence Systems were proposed to decrease costs for health care and geriatric nursing with the objective to diminish the problems caused by the ageing of the population. Although numerous ambient intelligence projects have been founded, there is still: (i) potential for improvement in detecting critical situations harmful for a resident, (ii) missing mechanisms for handling situations, (iii) a lack in analyzing future situation evolution and (iv) serious integration problems of related domain knowledge. Different available approaches are more or less feasible, depending on the views on and knowledge of the system.

To solve these problems, methodologies from the domains Knowledge Engineering and Ontology Engineering as well as Situation Awareness and Information Fusion concepts are applied. A reference architecture using ontology-based situation awareness for describing, detecting, analyzing, and reacting to critical situations is defined. Current approaches have, due to their syntactical restrictions, a lack of domain expert friendliness. Therefore, the introduction of a Domain Specific Language, serving as an independent layer for situation definition and analysis, and based on a meta and integration model for related knowledge, is proposed.

1. Introduction & Problem Description

Several *Ambient Intelligence (AmI)* / *Ambient Assisted Living (AAL)* projects have been founded, empowered by studies stating that the demographic change in our society will give rise to serious restructuring steps within existing pension and health care systems [19]. Although much effort has been spent in designing and implementing AmI Systems - or *Home Care Systems* - they still face some open or only partly solved issues. According to [7] and [6] these are:

- Interoperability problems when integrating and communicating with external or new data providers (sensors, integration of third party data).

- A limited decision-making process due to a lack of global overview of the available data.

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- A low situation awareness level is being reached (Level 1 according to Endsley [10] or Level 2 according to the JDL Data Fusion Model [18] which will be explained in section 3).

- A lack of user-centered design or insufficient inclusion of the user during the development process.

To follow the *ageing in place paradigm* [25], the aspect of *emergency treatment*, which aims at early prediction of and recovery from critical situations [23], is considered to be the core functionality of every AmI system. Therefore, a proper and reliable detection of critical situations within AmI environments is the crucial factor for such a system. Several kinds of approaches for detecting situations have been proposed, such as rule based [27] (following *if ... then ...* conditions), supervised learning [15] (classifiers are trained using historical or simulated data), the usage of finite state machines [20], or the usage of ontologies [14]. Based on the manifold requirements for AmI systems, it can easily be argued that it is hardly possible to create a solution that satisfies every requirement. Each solution has its advantages and disadvantages and is more or less feasible for certain purposes. According to the key requirement *emergency detection and treatment,* it is inevitable that a system becomes aware of the current situation before proper actions can be triggered.

"*Ontologies represent a description of the concepts and relationships"* [2] according to Baldauf. Such an ontology-based approach for gaining *Situation Awareness* is proposed by various researchers [13], [14], [10], [3]) and seems promising, even for AmI related systems. In contrast to other approaches, ontologies provide the following benefits: *(i)* they simplify sharing and integrating domain knowledge (e. g. data from third party applications), *(ii)* they serve to define a formal model for the perceived sensor data (a formal model is needed for rule-based reasoning), and *(iii)* they support the integration of additional knowledge into the reasoning process. In comparison to supervised learning systems, this approach can be more easily adapted to system changes. While supervised learning methods require the re-gathering of test data and re-training of the classifier, the ontology-based approach simply needs an adaptation of the ontology object(s) and rule(s). Beyond the extensibility and re-usability aspect, ontologies offer the benefit of supporting evolutionary requirements specifications [11]. In addition to the description of knowledge, feasible methodologies are needed to gain situation awareness from the given data (various sensors, health information) and knowledge about it (relationships between data objects). Based on Endsley's concepts for situation awareness [10], the Data Fusion community has developed a model (*JDL Data Fusion Model*) for gaining machine-based situation awareness. A detailed description of this model is shown in Table 1.

An analysis of current AmI projects showed that most of them followed a hardware-oriented (bottom-up) development methodology showing the typical advantages and disadvantages of this approach [17]. Decision making is mentioned as being an issue in all evaluated projects. Most projects are rule or fuzzy logic based or use supervised learning methods, but there are hardly any prediction mechanisms *(Impact Assessment,* see Table 1*)* available.

2. Proposed Solution

Based on a survey on current AmI systems [5], a conceptual architecture for an AmI framework supporting situation definition as well as (proactive) detection and analysis of such situations is

proposed. Figure 1 shows the conceptual architecture for an approach that tackles the aforementioned problems. For a better overview, the SENIOR framework is subdivided into four domains related to technological fields. These are: *(i)* the *real world* which relates to sensors and devices for perceiving the environment, *(ii)* the *data world* which processes, transfers and transforms various data, *(iii)* the *modelling world* which defines a formal model based on the data, and *(iv)* the *reasoning world* which allows one to define queries and perform projections on the given data.

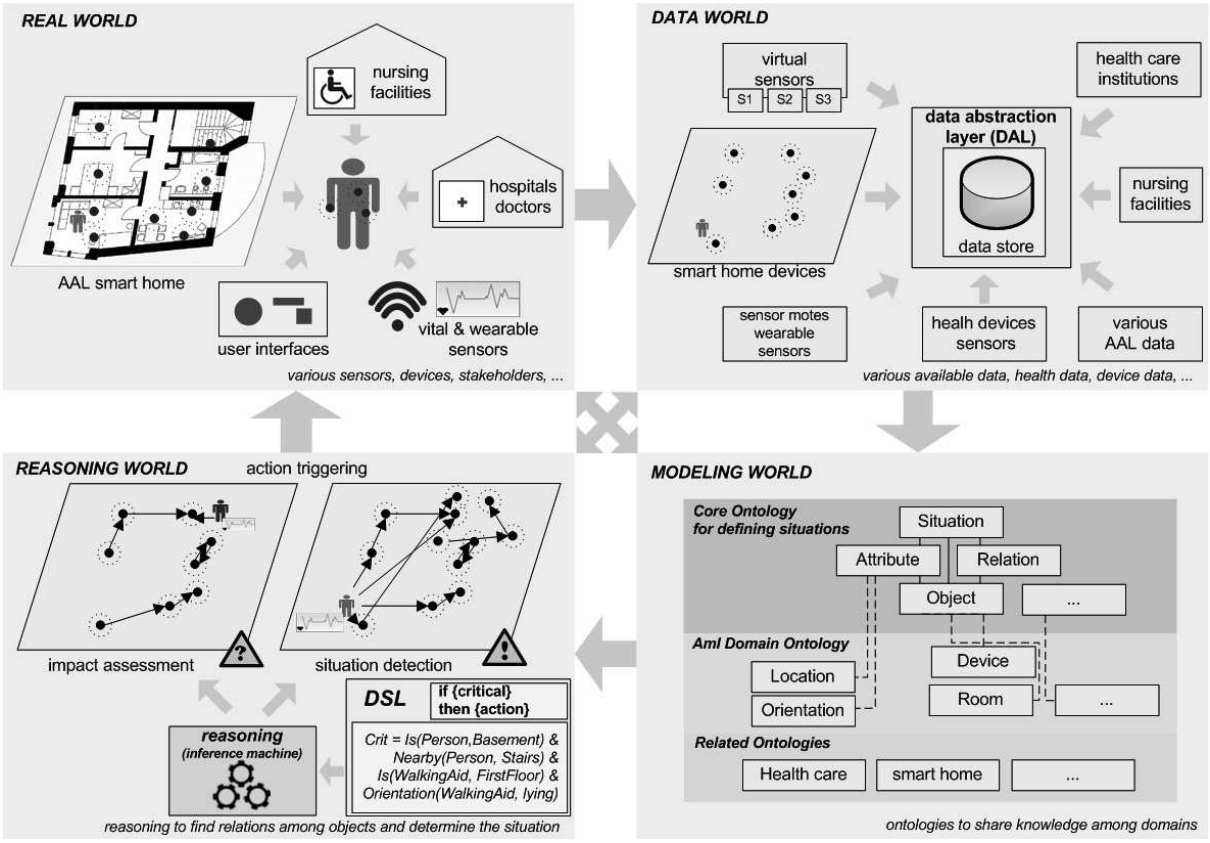

Figure 1. Big picture SENIOR Framework

Data Abstraction Layer. To avoid integration problems concerning sensor and third party data, a *Data Abstraction Layer (DAL)* was introduced. Purpose of the DAL is to abstract from the hardware specific communication infrastructure and protocols needed by various sensor devices (light, acceleration and positioning, vital sensor data, cable or wireless sensors). The DAL can be compared with the *Context Sensing Tier* mentioned in [16] and is mainly responsible for data storage, integration, and pre-processing. Sensor information, which can either be polled on demand or is periodically delivered (pull and push based approach), will be stored in a database. Most sensor environments provide data in their own proprietary format which causes problems when processing data from different sources. The solution is to transform the data into a uniform and simple representation (RDF data triples [28]) that can be easily used for further processing. Optionally, pre-processing steps can be done in advance. Data objects need not only contain single sensor data, they can consist of or combine multiple data sources (*virtual object*). These virtual objects are similar to *logical sensors* as already mentioned [2]. For example, a component can track the position of a resident using noise and movement sensors, and provide the calculated location information by a virtual object in the database.

Ontology-based Situation Awareness. To accord situation awareness within AmI, two major problems need to be solved: *(i)* how to describe a situation we are interested in and *(ii)* how to find out when this situation is taking place. The first problem is solved by using an ontology which provides basic notations for defining situations (i. e. *Objects*, *Attributes* and *Relations*) [21], [3]. According to Endsley's definition of situation awareness *"the perception of elements in the environment within a volume of time and space"* [8], temporal and spatial relations as well as probabilistic support will be additionally provided. This approach has the advantage that basic concepts for situation awareness are defined outside the AmI domain which facilitates knowledge sharing among related domains [11]. OWL was chosen as notation for the ontology for several reasons: *(i)* OWL is widespread and matured, *(ii)* there is existing sophisticated tool support, *(iii)* a variety of OWL ontologies exist for re-usage, and *(iv)* OWL provides description logic that can query RDF data. To define a critical situation, a domain expert needs to describe relation(s) among objects. In the following example, we assume an elderly resident with a *walking aid* and a *location sensor*. The sensors allow us to track the person and the walking aid's position. In addition, the walking aid contains a position sensor. The situation *'person has fallen down the stairs'* could be described as following:

$$\begin{aligned} Critical = \; & Is(Person, Basement) \text{ and } Nearby(Person, Stairs) \text{ and} \\ & Is(WalkingAid, FirstFloor) \text{ and } Orientation(WalkingId, horizontal) \end{aligned}$$

This description can be read as follows: A critical situation occurred when the person 'Is' in the basement 'Nearby' the stairs while the walking aid 'Is' lying ('Orientation'=horizontal) on the first floor. The terms 'Is' and 'Nearby' represent location relations while 'Orientation' defines an object's attribute value. More sophisticated descriptions do certainly exist which allow a more precise definition for this use case, but this is just a simple example to illustrate the potential usage. To solve the second problem - *find out if a situation is actually happening* - we have to find out *(i)* if the objects feature the given attributes, and *(ii)* if the described relations hold true among the given objects or not. To verify if a given expression can be found in the OWL data store, an OWL reasoner (inference machine) is used. Most reasoners provide multiple query interfaces for different languages, such as SPARQL or Lisp, but due to their syntax, they are not easy for AmI domain experts to use.

Domain Specific Language. Based on the fact that expressions for reasoners lack comfort and usability for domain experts, a *Domain Specific Language (DSL)* is proposed. The purpose of the DSL is to *(i)* enable a comfortable and domain-dependent formulation of reasoning expressions, *(ii)* validate reasoning expressions against the model ontology, and *(iii)* allow a description of the workflow that will be executed when a certain situation is detected (inform nursing personnel in case of an emergency). In the chosen approach, the AmI domain ontology serves as meta model for the DSL and claims a flexible and expandable DSL which can easily be adapted to changes. The solution to this problem is to build the DSL based on a general purpose language and exploit its syntax by adding domain-specific language elements. Such embedded (or integrated) DSLs do not define a fixed grammar; they are more or less a collection of library functions providing domain-related functionality. For this purpose, the language *Scala* seems promising [24], [12].

3. Related Work

Situation Awareness. Most of the situation awareness methodologies applied for the approach proposed in this paper are based on the research of Endsley [8], [9], [10] and their application in the data fusion community [26]. According to [18] and [26], the *JDL Data Fusion Model* defines a partitioning scheme which consists of four different levels (see Table 1) that were considered during the design of the SENIOR framework. The process described via this model covers the perception of sensor features (*Signal Assessment*) up to the evaluation of detected situations (*Impact Assessment*) which can, according to Endsley [10], be seen as the highest level of situation awareness.

Table 1. Data Fusion partitioning scheme according to [18] (JDL Data Fusion Model)

Data Fusion Level	Association Process	Estimation Process	Product
L0: Signal Assessment	Assignment (Observation to Feature)	Detection	Estimated Signal State
L1: Object Assessment	Assignment (Observation to Entity)	Attribute State	Estimated Entity State
L2: Situation Assessment	Relationship (Entity to Entity)	Relation	Estimated Situation State
L3: Impact Assessment	Evaluation (Situation to Target)	Theoretic Interaction	Estimated Situation Utility

Ambient Assisted Living. A variety of systems and projects exist within the AAL community. Most of them follow a principle structure [6], but, according to the domain they originated from (Home Automation, Smart Home, eHealth), they focus on specific, mostly hardware driven aspects. Prior to this paper, a survey [5] was done and a framework for categorizing AmI projects was developed. This and related surveys [6], [17] showed that the available sensor infrastructure has reached a usable degree of maturity, but there is still potential with regard to data fusion and gaining system-wide situation awareness. The SOPRANO project [29], [13] and the PERSONA project [1] are two representative projects that use an ontology-based approach for their architecture. PERSONA focuses mainly on activity monitoring, based on cameras and uses ontologies to verify incoming sensor data (*context ontology*), whereas SOPRANO uses ontologies to describe relations among events and context. Neither of these two projects traces the approach described in this paper, where an ontology provides the vocabulary to define a situation and inference machines are used to derive situations. Moreover, neither of the projects provides a DSL to describe situations and define actions in the case of an emergency. SOPRANO uses BEPEL-based *Procedure Templates* to define action execution while PERSONA uses an *Activity Monitor* that *"produces information about ongoing user activities"* [1]. PERSONA is strongly focused on activity monitoring, but does not take into consideration health data from other providers, and neither of the projects provides *Impact Assessment* or *Projection* mechanisms.

Ontologies. The SENIOR architecture is not the only one that uses ontologies for gaining situation awareness. Matheus [14] and Baumgartner [3] have already successfully applied similar architectures within different application domains. While Matheus describes various approaches and compares their advantages and disadvantages using battlefield scenarios [21] and supply logistics [22], Baumgartner applies these concepts within the road traffic domain. Matheus defines a core ontology for situation awareness which can be applied to different domains to gain situation awareness. Baumgartner uses an upper ontology approach and *"focus on the derivation of relevant relations among the objects of interest"* [4]. In this paper, the approach presented by Baumgartner et al. is favoured and additional extensions for probability support and the usage of a hierarchical ontology structure instead of the *domain mapping* used by Baumgartner is proposed.

4. Expected Contribution & Evaluation

The proposed scientific work announces four main contributions: *(i)* a flexible reference architecture for AmI systems, *(ii)* a framework prototype which demonstrates the feasibility of the proposed approach, *(iii)* an embedded DSL, and *(iv)* the infrastructure for situation awareness based prediction and projection.

Reference Architecture. Various surveys ([5], [6], [17]) on representative AmI / AAL projects were undertaken to identify the advantages and disadvantages, and to define common key requirements. One significant requirement is the *reliable detection of situations* harmful for the resident (*critical situation detection*). This includes the detection of falls, household accidents, unconsciousness, or critical values in vital parameters as already mentioned in section 1. Another requirement is the availability of *assistive solutions for daily living activities*, such as personal hygiene, toilet usage or the preparation of meals. A feasible support in daily living activities can only be ensured, if the system is aware of the user's intention. To fulfil these requirements, it is necessary to provide an infrastructure that allows the conclusion of knowledge about the intended activities and the current situation within the environment. As result of this analysis, a layered reference architecture using situation awareness methodologies is proposed.

Framework Prototype. To verify the feasibility of the system, a prototype will be implemented. The prototype is used to demonstrate the ontology-based approach for defining and detecting critical situations. Data will be either simulated via a developed simulation tool, or retrieved from an AmI sensor equipped test laboratory. The prototype infrastructure (data store, data layer, integrated third party data) is conceived to serve as a playground for different usage scenarios and reasoning approaches. It is planned to integrate an existing project for activity detection based on finite state machines, and to compare its accuracy and performance with the ontology-based approach. Furthermore, it should be evaluated as to whether a detected situation could have been projected in advance by the system.

Domain Specific Language. The DSL should ease the work for domain experts and lay the foundation for adapting and extending reasoning and workflow statements to meet the experts' needs. The main purpose is to describe critical situations and define appropriate actions (notify nursing personnel, inform emergency doctors) by using DSL statements. Additional language constructs could be provided which allow the prediction of future situation (or the resident's health) evolution, based on queries on the available data. Due to the fact that requirements and available sensor devices are subjected to a continuous process of change, one main goal of this

language will be its flexibility with regard to changes in the environment. In addition to the DSL, an interpreter must be provided to map/transform DSL statements to OWL reasoning expressions and to trigger defined actions.

Prediction. Target of the proposed work is to provide an infrastructure that allows prediction based on situation awareness concepts. It should be possible to: *(i)* detect critical situations (in advance) via a certain probability, and *(ii)* detect changes in the behaviour of a resident. According to *(i)* an inference machine can be used to retrieve all possible object and attribute values that might lead to a critical situation. Such queries can be done automatically in the background based on situation definitions. If the system detects that it is possible to fulfil the conditions for a certain (critical) situation within a certain threshold, a notification about a potential critical situation can be raised. According to *(ii,)* it should be possible to define some kind of *behavioural template*, similar to a situation definition with the difference that it encompasses a longer monitoring interval. The purpose is to detect significant deviations in the resident's behaviour pattern and support the diagnosis of diseases characterized by behavioural syndromes.

5. Current Status

So far this project is in an initial stage. An extended evaluation about existing AmI related projects has already been done. Its results were documented in a paper, and an evaluation framework was created [5] which focuses on its maturity according to applied situation awareness principles. Based on this evaluation, the described architecture, which is currently undergoing a refinement and evaluation process, was defined. Furthermore, basic research is being done in two areas: *(i)* ontology design or ontology re-use to provide a suitable ontology, and *(ii)* the design and implementation of domain specific languages.

Acknowledgements

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CONFUCIUS CHAT: MEDIATING CULTURAL COMMUNICATION BETWEEN ELDERLY AND CHILDREN USING NEW MEDIA

Xuan Wang, Adrian David Cheok, Eng Tat Khoo, Xiaoming Hu, Jun Wei [1]

Confucius Chat is a new form of cultural computing that bridges intergenerational communication by enabling the elderly and the young to interact and explore Asian cultural heritage. The system uses new media to revive the Confucius philosophy, presenting it in a social chat context. By modelling Confucian knowledge extracted from classical texts, our system allows users to have meaningful chats with a virtual Confucius. Combining the 'old' and the 'new', Confucius Chat appeals to both older and younger generations, and serves as a perfect medium for them to communicate. In this paper, we describe the architecture of the system, and present our user study results to show its positive effects on intergenerational communication.

1. Introduction

Confucius Chat is a new form of cultural computing, designed in an attempt to bridge intergenerational communication. The system uses new media to revive ancient Confucius philosophy, presenting it in a social chat context. It allows users to have an interactive chat experience with a virtual Confucius. Combining the 'old' and the 'new', Confucius Chat appeals to both older and younger generations, and serves as a perfect medium for them to communicate. It provides an opportunity for the elderly to sit with their grandchildren and chat with a virtual Confucius, thereby spending meaningful time together.

The core of the system is a virtual, Confucius-thought engine that models Confucius knowledge from the *Analects* - a record of Confucius sayings and conduct written by his disciples after his death as well as other classic texts such as the *Mencius,* the *Book of Rites* and the *Classic on Filial Piety*. Working closely with Confucianism scholars, we have built a knowledge database that contains all the sayings of Confucius. With the special thought engine, users can chat with a virtual Confucius using natural language. The thought engine analyzes user input, extracts the important words from the sentence, identifies the topics of the sentence, compares its semantic closeness with entries stored in our database, and replies with the most relevant entry. Since the outputs of the system are adapted from classic Confucianism books, it can sometimes be quite abstract and thus beyond the understanding of young children. Naturally, the elderly can then

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explain the deeper meaning behind the words to children and also relate it to their everyday life. Furthermore, this system provides incentives and enables the elderly to get closer to the unfamiliar computer world and learn from the young digital natives. Our user study shows that the elderly enjoy spending time using the system with the young, and the system is helpful in their communication. In the following sections, we will first explain our motivations and rationales for using Confucius Chat as a media to aid intergenerational communication, and then describe the system architecture in detail. The user study results are presented and analyzed before the conclusion.

2. Motivation

Intergenerational communication is becoming an important social problem in today's world. Lacking mutual life experience, elderly people often find it awkward trying to talk to their grandchildren, only to find the young have little interest in what they are talking about. On the other hand, our young digital natives are always passionate about modern technologies which are alien to the eyes of the elderly. We see the need to address this issue. Therefore, we would like to create technology that interests both the old and the young in the hope of bringing the two generations together by way of such a common communication platform.

Recent research on intergenerational communication across cultures has shown that Asian people construed older family and non-family members as being less accommodating than did people of Western nations [5]. It is possible that a lack of understanding of the elderly's culture, for example, the ethic of filial piety, makes salient age-group identities [1]. Undoubtedly as one of the most predominant cultural elements in Asian societies, Confucianism is deeply rooted in the elderly people's beliefs. However, some of the young generation consider Confucianism as old-fashioned and have little interest in it. This conflict has motivated us to present Confucius' philosophy in a new form, utilizing the media literacy of the new digital generation.

Furthermore, family harmony is deemed to be very important in Confucianism and filial piety is considered as "the root of humanity" [7]. Studies have also shown that strong traditional Confucian norms, such as filial piety and the elders' contribution to family harmony, have resulted in youths having more positive images of old age, closer psychological proximity, and thus more respectful communication with older adults in the East [4] [10]. We hope that by encouraging children to chat with Confucius, they can realize the importance of preserving harmony in the family and become more understanding towards elderly people.

By putting this Asian cultural heritage into a social chat context, our system embeds the traditional Confucian thinking into a new form of medium that is familiar to and easily acceptable by the young generation, thus providing a platform for the elderly and the young to interact. Instead of reading boring pedantic books, children can chat with the virtual Confucius online. Through the process, they are inculcated with the Confucian philosophy. It also offers the elderly an opportunity to talk more and share their life experience with the young.

3. Related Works

As early as the 1960s, people started research on artificial intelligence (AI) chatterbots. Many famous chat agents have been developed such as ELIZA [14], ALICE [13], PARRY [2], TINYMUD [9]. The aim of these programs is to produce human-like responses and to fool users

into thinking that they are talking to a real person. These chat agents use simple pattern-matching approaches and employ tricks to cover-up the failure of understanding user input [13]. The tricks could involve frequently switching topics, or rephrasing the input by replacing first person pronouns with second person pronouns and vice versa. These approaches fail to help users gain further understanding of the topic of discussion, thus offering minimal benefits to the interaction. In contrast, Confucius Chat is built for a completely different purpose. The main aim is not to fool users but to pass on knowledge and provoke meaningful interactions between the different generations. By using more advanced Natural Language Processing (NLP) techniques, Confucius Chat offers an alternative approach to existing artificial intelligence chat agents. Table 1 gives a performance comparison between Confucius Chat and other popular chatterbots.

Table 1. Performance Comparison of Different Chatterbots

Chatterbot	Advantages	Disadvantages
ALICE	1. Use of the Rogerian mode which provides unimpeachable cover for the computer. 2. If the set of carefully prepared reply rules are extensive enough, ALICE can sound intelligent on a wide range of topics. 3. Any variations of an input sentence need to be pre-defined manually. 4. When encountering unknown input, ALICE cannot make use of any existing knowledge base to derive the answer.	1. Relies on pattern matching. 2. Contains fixed number of input/output rules.
PARRY	1. Capable of changing the level of the conversation. 2. Introducing new topic, launching into a new story also called simulating paranoid behavior. This assigns the system a specific human character.	1. Admitting ignorance. 2. When encountering unknown input, PARRY cannot make use of any existing knowledge base to derive the answer.
TINYMUD	1. Capable of changing the level of the conversation. 2. Has many fragments of directed conversation stored in activation network. 3. Humorous statements to make the program seem more human. 4. Excerpting USENET News allows the system to sound updated. 5. Simulates typing by including realistic delays between characters and imitates the rhythm of a person typing.	1. Agreeing with the user without understanding, which sometimes indicates that the system is not intelligent. 2. When encountering unknown input, TINYMUD cannot make use of any existing knowledge base to derive the answer.

Hex	1. Gives a humorous response if user is silent so that conversation can carry on. 2. Gives longer replies so that it seems more human-like.	1. Introduces a new subject with a certain probability 2. When encountering unknown input, Hex cannot make use of any existing knowledge base to derive the answer.
Jabberwacky	1. Jabberwacky learns from all previous interaction and builds its database entirely based on previous conversations. 2. Jabberwacky provides the "correct me" mode, so that user can teach the system when it generates incorrect answers.	1. Jabberwacky relies entirely on previous interaction on the internet and does not verify the inputs. Thus the system is susceptible to vicious user inputs. 2. The learning mechanism may make the user feel that he/she is teaching the system rather than chatting.
Qur'an	1. Uses Machine Learning approach to retrain the ALICE chatterbot. Training process is automated. 2. Allows user to access the information system by chatting.	1. The system has no understanding of the input. 2. The output is confined within the scope of trained patterns.
Confucius Chat	1. The reply is dynamically retrieved from a rich Confucius knowledge database. 2. The reply is determined according to the semantic relatedness. 3. Makes use of the topic detection engine to ensure the output is of the same topic as the user input	1. The output is confined within the scope of the knowledge database. 2. The metaphors used in Analects and other classical texts may be difficult for the user to understand.

As shown in Table 1, the Qur'an system is also included and is a chatterbot system that enables people to learn about the ideas in the Qur'an, the holy book of Islam [11]. Similar to our system, this is also an attempt at cultural communication through the use of a chat system. Their approach is to retrain the ALICE chatterbot using machine learning techniques. The advantage of their system is that the process of retraining the chatterbot is automated and no human intervention is required. However, this comes at the cost of limited interaction because the system has no true understanding of the user input. We think that to make a truly intelligent chat agent and to provide the user with a better communication experience, it has to be able to understand what the user is talking about. Hence, we decided to use more advanced natural language processing techniques in our system which will be explained in detail in the next section.

4. System Description

Our chat system employs extensive advanced natural language processing and information retrieval techniques in order to understand the user's input and to provide the relevant output. First, the user input is subjected to a topic detection engine and a Part-of-Speech (POS) tagging [6] engine. The key information from the user's input is then compared with the entries in the database to find the best match according to Leacock Chodorow's (LCH) similarity measurement model [8], built upon a lexical database called WordNet [3].

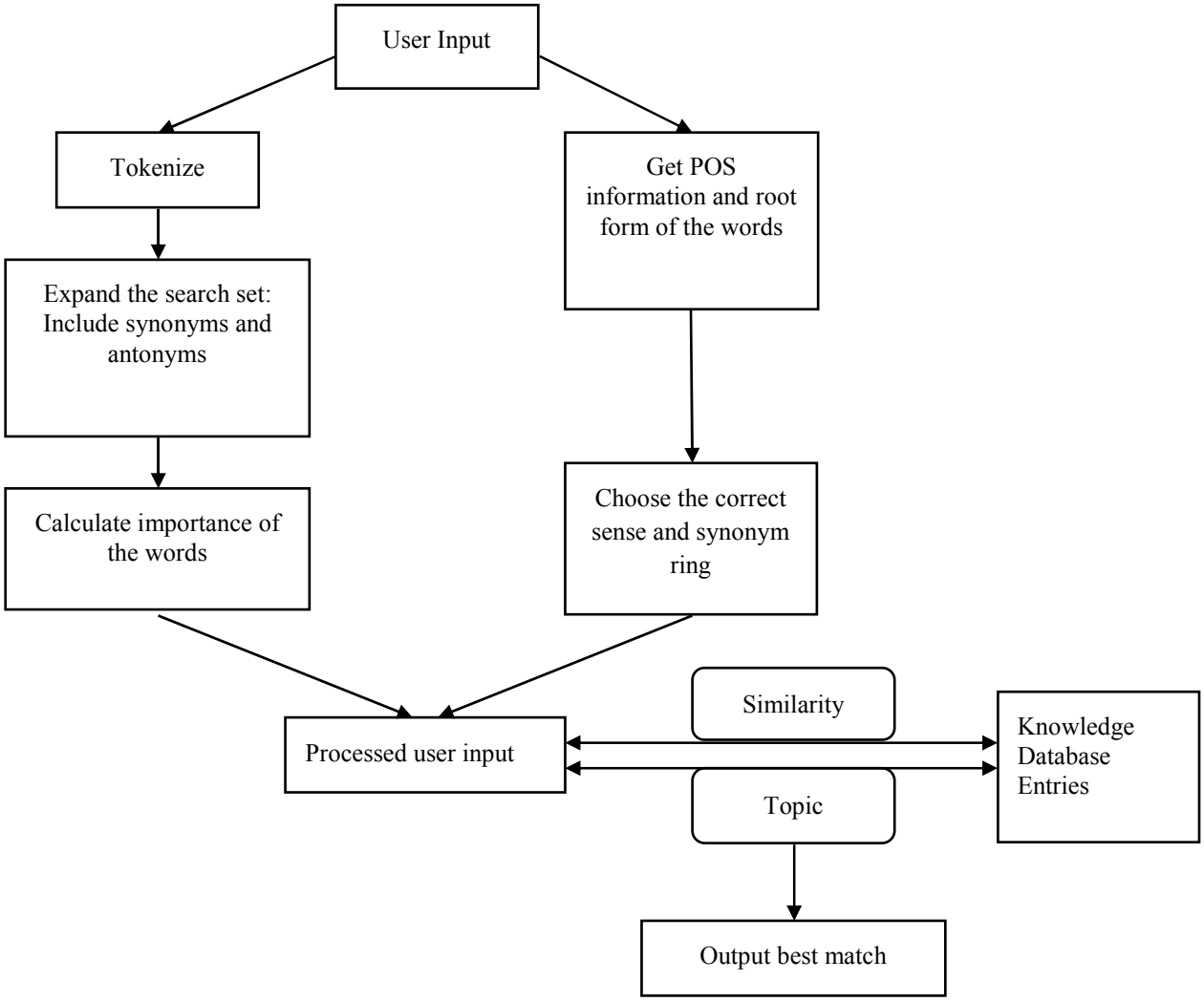

Figure 1. Algorithmic Flow Diagram of the Confucius Chat System

Figure 1 shows the technical block diagram of the entire Confucius Chat system. The details of the algorithm will now be explained. The POS tagging engine employs a standard Hidden Markov Model tagger, which has gone through supervised training of a large corpus to enhance the precision of the tagging. The topic detection engine operates in a topic vector space of n dimensions. The vector space is constructed using *n* topics as *n* dimensions, and the *n* topics are chosen according to the collection of topics from the *Analects* and other classical texts. Subsequently, every input sentence is measured against all *n* topics and the likelihood of it belonging to each topic is estimated. In this way, the sentence is positioned in the vector space, and is denoted by vector V_{input},

$$V_{input} = [t_1, t_2, .. t_n]^T$$

Similarly, each entry in the knowledge database is also digitized as a vector V_{db}. We can calculate the projection Pr of V_{input} onto V_{db} using vector dot product:

$$\Pr = V_{input} \cdot V_{db}$$

This scalar projection Pr is the measurement of likelihood with respect to all possible topics that can interlink the input and the sentences in the database.

The sentence similarity engine employs the LCH word similarity measurement which is based on the location of two words in the selected taxonomy tree structure. The similarity score is given as

$$Sim(w_1, w_2) = \frac{2 \times depth(w_{LCS})}{depth(w_1) + depth(w_2)}$$

where w_1, w_2 are the words being measured, and *depth(w)* is a function that measures the depth of word *w* in the single rooted WordNet taxonomy tree. w_{LCS} is the least common subsumer (LCS) [15] of w_1 and w_2.

With the score between every word in sentence s_1 and sentence s_2, we can calculate the weighted average of the two sentences using the following formula:

$$Sim(s_1, s_2) = \frac{\sum_{i=1}^{m} \sum_{j=1}^{n} Sim(w_i, w_j)}{m \times n}$$

where w_i is the enumeration of words in s_1, and w_j is the enumeration of words in s_2.

By calculating the similarity score of the input sentence with every sentence in the knowledge database, combined with the value of projection of the input sentences, the highest scored sentence from the database is deemed as the most relevant and is output to the user as a reply of Confucius.

A screen shot showing one user chatting with a virtual Confucius is provided on the next page.

5. User Study

We conducted a study with 12 Singaporean Chinese users in 6 parent–child pairs to test the effect of using Confucius Chat to improve intergenerational communication. The children were aged 7 to 11, while the parents were aged 38 to 52. None of the users had prior experience interacting with the Confucius Chat system. They were given a short introduction about Confucius Chat and shown a concept video. They were then shown how to use the systems and had their first try.

Each user then played in three settings: alone, with peers, and with another parent or child (intergeneration). They were asked to fill in a questionnaire after playing in these three settings.

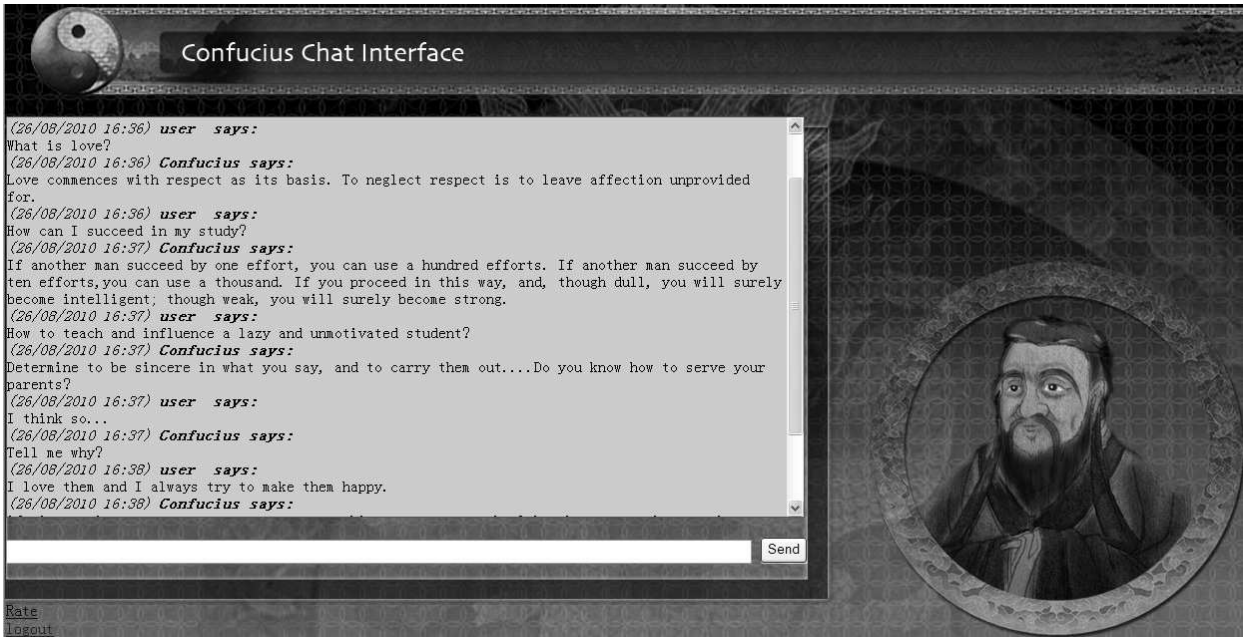

Figure 2. Screen Shot of the Confucius Chat System

The results of the study are summarized in Table 2.

Table 2. Children and Parents' Feedback after using Confucius Chat (C = Children, P = Parents)

	Disagree (%)		Neutral (%)		Agree (%)	
Question	C	P	C	P	C	P
1. I enjoy Confucius Chat	0	16.7	16.7	0	83.3	83.3
2. I enjoy using this application alone, interactingdirectly with Confucius Chat	66.7	33.3	0	16.7	33.3	50
3. I enjoy using this application together with my peers	0	16.7	16.7	33.3	83.3	50
4. I enjoy using this application together with older (younger) players	16.7	0	16.7	0	66.7	100
5. Confucius Chat can be used to improve interaction among young and old people	16.7	0	0	0	83.3	100
6. I would recommend this media to my friends	0	16.7	0	16.7	100	66.6
7. I would recommend this media to my family members	0	16.7	0	33.3	100	50

Questions 1 seeks to evaluate the user's enjoyment of interacting with Confucius Chat where users gave positive responses. 83.3% of the children and 83.3% of the parents agreed that they enjoyed Confucius Chat. Questions 2, 3, and 4 seek to understand the user's enjoyment of interacting with the systems alone, with their peers, and with another younger or older user (intergeneration).

Fifty percent of the parents were neutral or disagreed that they enjoyed using the systems alone, while 66.7% of the children disagreed that they enjoyed using the systems alone. Most of the users preferred to play Confucius Chat together with another person. Of the parents, 100% agreed that using the Confucius Computer with their children was enjoyable, and 50% of them agreed that using the system with their spouse was enjoyable. Of the children, 83.3% agreed that they enjoyed using the system with their peers and 66.7% of them agreed that they enjoyed using the system with their parents. Questions 5, 6 and 7 seek to evaluate the user's perception of the systems in improving intergenerational interaction and their readiness to recommend this media to their friends and family members. 100% of the parents and 83.3% of the children agreed that Confucius Chat could be used to improve interaction among young and old people. Of the children, 100% would recommend this media to their friends and family members, while 66.6% of the parents would recommend this media to their friends and 50% of them would recommend this media to their family members.

Rationale for relatively lower rating from parents with regard to recommending this media to children was due to their concern that the philosophies and teachings are too complex and therefore younger children may not comprehend them. However, the children did not have such concerns and they were excited about their interactions with Confucius Chat. Generally speaking, from the results of this user study, we can see that most users prefer to chat with the virtual Confucius together with another person, and most users think it is helpful in improving intergenerational communication and would like to recommend it to others.

6. Conclusion

In this paper, we introduced a new form of cultural computing called Confucius Chat that aims to improve intergenerational communication. We believe that the problem of communication between the elderly and the young originates from a mutual lack of understanding of each other's culture, and a combination of the 'old' and the 'young' may be one of the solutions. By presenting old philosophies in a new media form, Confucius Chat enables people to experience and explore ancient culture together, using the literacy of digital interactivity, and it thus increases the physical and psychological proximity of the elderly and the young, and fosters a better intergenerational relationship.

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MOBITABLE: DESIGN AND EVALUATION OF A FAMILIAR INTERFACE FOR E-INCLUSION

Chiara Leonardi, Fabio Pianesi, Massimo Zancanaro[1]

In this paper, we present familiarity-based design (FBD), an approach that aims to facilitate the design of artefacts, which naturally fit into the users' world and daily practices by means of an intensive process of mediation between users and technologists. FBD breaks down two major barriers to the accessibility of digital technologies: the lack of perceived advantages of technology, and the perception of a negative trade-off between the investment of personal resources for learning and operating them and the expected benefits. We present, in this paper, the FBD framework and how it inspired the design of the MobiTable prototype, a communication device that aims at supporting an elderly people social network. In conclusion, we provide results from a 4-month longitudinal study where elderly people could use the MobiTable to communicate with friends and family members.

1. Introduction

Despite the huge progress and the vast diffusion of ICT, most people still suffer the consequences of the digital divide. This is especially true for older people who, more than others, rely on public and social support and would greatly benefit from accessing on-line services. However, technology is still perceived by them as something not belonging to their own world, and is experienced with feelings of discomfort and anxiety [1].

There is wide consensus that such negative reactions are due to both the present hardware and software, and, in particular, to the user interfaces that are not designed to suit older people's needs, skills and interests [2]. On the one hand, most technologies, such as the majority of web-based applications, assume a one-size-fits-all user, often modelled after the North American skilled white man [3]. On the other hand, technologies that specifically target older people are often not used because they are perceived as stigmatizing [4].

Such a poor consideration of the cultural, social and psychological characteristics of older people in the design of interactive technologies results in a sense of unfamiliarity, anxiety and lack of engagement.

Contrary to the commonsensical answer (artefacts for older people must be *simpler*) we propose that these challenges can be met by designing *familiar* artefacts, i.e. technologies that users are

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ready to approach on the basis of a shared background of concepts, meanings and practices [5]. Familiarity-based design (FBD) breaks down two major barriers to accessibility to and acceptance of digital technologies: the lack of perceived advantages of technology, and the perception of a negative trade-off between the investment of personal resources in learning and operating them, and the expected benefits [6].

In the context of the Netcarity project (www.netcarity.org), more than 50 older people were involved in the design process of a device aimed to support older people's social inclusion by maintaining and nurturing their social networks. The process eventually led to the implementation of MobiTable, a gesture-based, touch-screen interface embedded in a movable device in which all standard interaction functionalities have been re-designed to fit the motor, cognitive and cultural characteristics of older users.

In this paper, we first discuss related works on familiarity and then describe the FBD framework. We then present how those principles were realized in the design of the MobiTable. Finally, the results from an ecological study are presented and their design implications discussed.

2. Related work

Studies considering computer use by older adults have received increasing attention in recent years [7]. Tuner [5] reports that the difficulties in using new technologies can be magnified by older people's perception of being too busy or too old to learn them, and by their more general feeling of alienation towards the digital world. Lagana et al. [1] focused on the relationship between age, computer anxiety, and performance in computer tasks, showing that older people had significantly higher computer anxiety than younger ones but that anxiety was unrelated to performance. According to Selwyn [8], older adults' ambivalence with respect to ICT originates from a limited perceived relevance for their daily life.

In this context, familiarity is seen as a driving principle for designing accessible and acceptable user interfaces. Familiarity-based design (FBD) requires that the focus of the relationship between people and technology be broadened from "interacting with" a technology to "being-with" the technology, starting from the assumption that "technology does not simply make tasks more efficient, it changes the underlying human practice" [5]. With the goal of reducing the burden of learning about and using the system, FBD builds on pre-existing, 'precompiled' action–perception routines and on socially (and culturally/historically) acquired 'knowhow'. It therefore capitalizes on: (i) shared social practices and cultural schemes (so as to maximize personal relevance and learnability), (ii) a careful consideration of the context in which the technology is going to be used (to maximize acceptability), and (iii) recognition of the limitation due to declining cognitive and motor skills (to improve accessibility and usability).

Furthermore, by emphasising the importance that technologies be incorporated in people's everyday life, FBD also provides guiding concepts of evaluation that are close to Silverstone's et al. [9] ideas of artefact domestication, and of acceptance as technology's inclusion in private, cultural spaces. The success of familiar technologies is therefore measured (also) according to how successful the older person has been in reconfiguring his/her own everyday life after their introduction.

3. FBD framework

The FBD framework has been developed from literature insights into the older adults' relationship with technology and from the findings obtained through an iterative human-centred design process that involved about twenty-six senior citizens aged 65 to 93 (19 women and 7 men). Contextual inquiries, scenarios and personas [10], and cultural probes [11] were used to explore older people's perception of technologies. Mock-ups and low-fi prototypes were iteratively designed and tested to explore design alternatives and define design guidelines for *familiar* artifacts (see Figure 1).

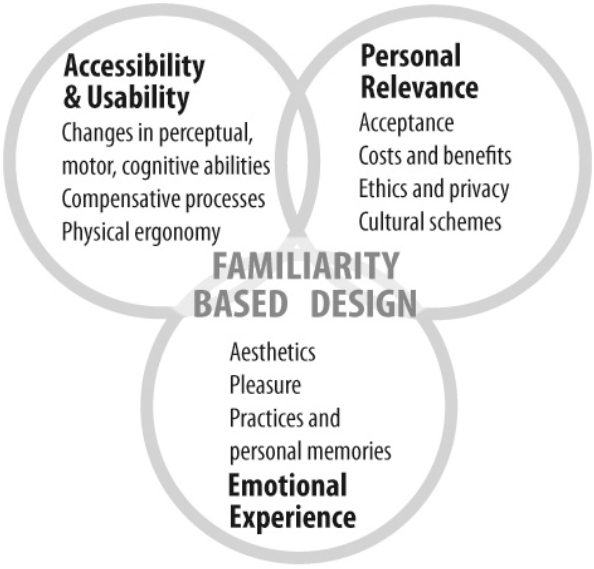

Figure 1. FBD framework

The three areas in Figure 1 correspond to the major issues to be addressed for the design of a familiar interface and to provide guidance for designers whose role is to provide solutions that accommodate functional (objective), social and aesthetical (subjective) aspects.

Usability/Accessibility: The consideration of age-related changes in perceptual, motor and cognitive abilities must be coupled with the importance of the compensatory processes that older people develop to adapt to changes, and by the role played by motivation, affect, and experience ("learning by doing") in supporting older people. The physical ergonomics of the artefact is also of major importance in improving comfort and facilitating the integration in the home environment.

Personal relevance: The intended advantages must be made clear, so as to counteract the perception of a negative trade-off between the investment of personal resources and the expected benefits [6]. In addition, ethical and privacy issues are of utmost importance.

Emotional experience: Given the richness of emotional experience taking place at home, and the role the home has in maintaining identity and personality, the design should be grounded on the affective and aesthetic value of the artefact, while considering the specific meanings, values, and memories associated with the home.

4. The MobiTable

The above-mentioned framework was the starting point in developing the MobiTable prototype and the related communication functionalities [12]. MobiTable consists of a touch-screen interface embedded in a movable device; all standard interaction functionalities were re-designed to fit the motor, cognitive and cultural characteristics of older users (see Figure 2). MobiTable is equipped with a resistive touch screen (which can be operated by means of a pen or a finger), a webcam, a wi-fi connection, and an optional wireless keyboard. Touch is the main input modality and manipulative gestures are the primary mode of interaction.

In the following sections, we discuss how FBD drove the design of the ergonomic features of the physical device, of the interaction modality, and of the representation of the digital contents.

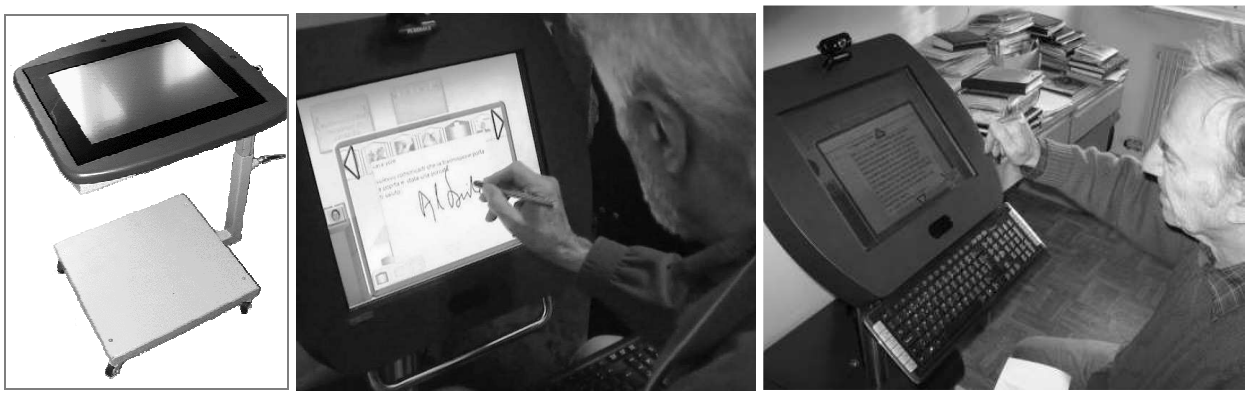

Figure 2.
a) The first prototype of the MT;
b) a participant operating the second prototype in a local senior center;
c) a participant using the MT at home

4.1. Shaping technology into a familiar domestic artefact

Traditional tables are present in every house and are an ideal place for daily activities to occur. Augmenting the furniture already existing in the home environment may be a promising way to make computers familiar, and to cope with older people's anxiety towards new technologies. During the design process we moved from initial ideas about the tabletop being a fixed device to the final, mobile solution with the following requirements:

- *Flexibility*: changing the surface inclination was a main requirement of our users. Some activities require a vertical configuration (e.g. reading or video-communication) and are best performed at a certain distance (eye-to-surface distance greater than 45 cm) and with the body markedly positioned away from the table structure. Other activities require a horizontal configuration (e.g. writing and organizing contents by manipulating digital objects on the interface) and need a shorter distance.

- *Portability/mobility*: portability guarantees the adaptation of the device to the different activities people carry out in their home. Since a mobile artefact presents risks, (e.g. elderly people can stumble over wires) safety and a light weight should be a priority, and a wireless connection and long-lasting batteries must be available.

- *Non intrusiveness:* most of the older people involved in our study live in small apartments. The device should be as less intrusive and disruptive of the home's organization as possible.

- *Non-stigmatizing artefact*: its appearance should not be stigmatizing or associable with loss of independence and disabilities.

- *Physical robustness*: besides guaranteeing users' safety, the artefact should also adapt to the activities that naturally occur on a table. It should be possible to put objects on it (glasses, remote controls, etc.) and unexpected events (e.g., spilled water) should not compromise the system's functioning. Hence, a water and shock-resistant touch-screen was used.

4.2. Familiarity supported by gesture-based interaction

In order to achieve familiarity and facilitate learning, the interaction must follow few, clear and simple rules, based on older people's daily experience. MobiTable moves away from traditional WIMP interfaces: fingers are the main pointing device and manipulative gestures are the primary interaction mode. Real-world metaphors based on familiarity are used to efficiently communicate the meaning of functionalities, while animations support awareness of asynchronous events. See [13] for more details on the FB design principles.

4.3. Familiarity in the services and in the represented domain

Two communication contexts were designed to manage private and public communications.

The *Public Square* is an asynchronous communication tool for sharing user-generated contents within larger peer groups. It is based on the metaphor of the town square where members of the local community physically meet to share knowledge and participate in social activities. The Public Square allows the asynchronous sharing of multimedia content between members of the community. Messages can be created by tracing a rectangular or square-like frame with a finger on the background of the Public Square. Text is then entered by means of the optional keyboard, a finger or with a stylus. To send the message and make it available to other people, the user simply has to drag it into a topic box.

The *Social Area* includes a synchronous video-communication tool and an email-like function to exchange written messages – called Postcards – with friends and family members. A scrollable list of house-shaped icons representing the user's virtual neighbourhood is available at the top of the screen. Video calls can be activated by tapping above one of the houses. Postcards are created in a similar way to Public Square messages and are sent by dragging them onto the recipient's house. The space organization on the interface was inspired by the ZUI paradigm (Zoomable User Interfaces [14]): every object available in the system is always accessible on the screen and tapping on an object enlarges it and shrinks the other objects.

5. Assessing the MobiTable: how older people made themselves familiar with it

A group of thirteen senior citizens (9 women and 4 men, age range 62-90, mean age 77.3) participated in a 4-month longitudinal study to investigate the appropriation process of the MobiTable, that is, the process through which technology becomes (or does not become) familiar and is (not) integrated into one's everyday life [15]. The main goal of the study was to identify factors that promote acceptance or prevent the appropriation process in the medium to long term.

Ten participants lived in the urban area of Trento (a small city in Italy) and 3 in a rural area (a small village 40 km away from Trento). All of them – except a 90-year-old lady who lived in 'sheltered accommodation' - were healthy and autonomous people living independently at home. All the subjects had participated in the previous phases of the project, so they knew each other, even if sometimes superficially.

Before the in-home installation of the necessary equipment, a questionnaire was administered to assess through 5-point Likert scales: familiarity with new technologies; the perceived value of technologies for quality of life improvement; the perceived difficulties in learning how to operate a new technology; how comfortable the participants felt in operating new technologies; how easy they perceived them to use. Questionnaires were defined starting with Goodman et al. [16] and other computer attitude scales (such as [17]). A set of 8 items were selected and modified to make the questionnaire more suited to elderly people's cognitive skills [18].

Our participants declared a low level of familiarity with new technologies (two of them were using a PC; 7 had never used one while 4 of them had used one in the past) but expected them to contribute to improving the quality of life. They also reported difficulties in operating new technologies and emphasised the problems caused by cognitive decline, the need for support and the lack of motivation to learn how to use them.

All participants received one MobiTable in their home for the entire period of the study. Three Mobitables were installed in senior centres for them to be used by the social workers as well as by older people attending the centres. Social workers were instructed as to how to provide content for the Public Square by entering information about the centres' initiatives and activities.

5.1. Methods

After the introduction of the prototype into older adults' homes, qualitative and quantitative data were collected. In particular, two different sources of data have been used to understand the temporal dimension of participant experience with the prototype: i) the automatic log collection, ii) the subjective data concerning people's experience collected by researchers through direct observation and interviews.

In-home observations were performed by researchers with the goal of investigating: i) the integration of the prototype into people's lives (how much were they using it? for which purposes? etc.); ii) difficulties in operating the system and the consequent need for external support; iii) the social experience enabled by the prototype (with whom were they establishing new relationships? how was this experience evaluated? etc.).

Beside observations, two semi-structured interviews were performed, one at mid-term and the other at the end of the study (after 3 months of usage), investigating: i) the motivations behind use/non-use of the MT; ii) their preferences and motivations towards communication modalities; iii) their evaluation of the type of sociality made available by the prototype; iv) the integration of the MobiTable in their daily life. In the final interview, we also explored whether changes had occurred in the perception of new technologies.

5.2. Findings

Four groups were identified on the basis of the type of usage of the prototype (autonomous vs. non-autonomous) and of the amount of time it was used (extensive usage vs. limited usage).

1. Autonomous and extensive usage. The first usage group - 6 cases out of 13 - is characterized by a daily and autonomous use of the prototype. Neither age, which ranged from 68 to 82 years, nor gender (3 men and 3 women) nor the initial attitudes towards computers (which were very different) explain the common usage patterns. Participants clustered in this group shared characteristics such as the willingness to improve their own skills and knowledge, the gratification related to learning to operate a new system, the desire to expand their own social network and feel useful. These factors had a knock-on effect: after a certain period of use, most of them began to use the keyboard, which they had refused in the initial stages because it was too reminiscent of the traditional computer, preferring pen or finger-based interaction. For these people, the MobiTable impacted positively on the way they related with others: while, at the beginning of the study, they defined their relationship with the other participants as one of mere acquaintance, they later on re-defined it as more intimate and trustworthy.

2. Autonomous and limited usage. The second group – 4 participants – were characterized by autonomous but infrequent use. The defining characteristics were a decreasing interest towards the prototype despite an initial positive attitude towards the whole experience; lack of time and scepticism concerning the MobiTable's social value were the motives provided.

Compared with Group 1, the motivation towards learning and improving their own skills were not as central, nor did these participants seem to find the activity pleasant. On the contrary, they forced themselves into practising it, sometimes regarding using the prototype as a "duty".

3. Non autonomous usage. Two users belong to this group, defined by a high motivation to use the prototype together with a constant need of external support (family members, researchers). They used the system relatively frequently, if we consider that usage depended on external resources. The two participants are both from the rural area, are quite old (90 and 85) and are supported by the local care service. They were strongly supported by their family in their participation in the study. Age-related problems – such as memory and hearing difficulties – made it hard for them to use the prototypes autonomously. Their profiles also show a high concern towards the prototype usage. Given the dependency in using the device, the two members of this group did not integrate the prototype in their daily lives nor did they develop routines to fit it into the spatial and temporal organization of their life.

4. Non-usage. This group includes a single participant aged 74. She had a husband with very severe dementia and had expectations that the MobiTable could be useful for him. She almost never used it and asked to return the device soon after the end of the study. The main

characteristic is having the wrong expectations about the technology and a lack of interest towards establishing relationships with the rest of the participants.

6. Discussion

In this paper, we have introduced the FBD framework and discussed the relevance of the concept of familiarity for the design and evaluation of interactive devices targeting older adults.

Our work has shed light on how older people with low computer literacy levels learned to use a prototype supporting social inclusion, and which factors had an impact on the users' experiences. It is worth noting that our findings do not relate to age differences and technology-related skills. On the contrary, they were related to factors such as their attitudes towards learning and towards improving their own skills; the relevance they attribute to expanding and deepening social contacts within the community; prior expectations concerning the prototype.

These factors strongly impacted the overall user experience and led to different appropriation patterns. Participants clustered in Group 1 fully appropriated the prototype within their daily life, developing new routines based on the system or modifying existing routines in order to fit the prototype usage into the social and temporal structure of their life. For these participants, a high motivation towards improving their own skills, an early gratification by experiencing improvements, along with a positive social experience achieved through the prototype, all led to a quick integration of the prototype in their daily life.

Results also show that a positive attitude towards a system perceived as something "learnable" is crucial for older adults and that a familiar design based on touch-based interaction can improve it. Even those participants who did not reach a level of autonomous use during the period of the study – such as those clustered in Group 3 - recognized the simplicity of the interface and this reassured them that, sooner or later, they would manage it. These considerations let us conclude that familiar interface is always worth its price and that the gratification felt by becoming aware that using a new device is possible, also facilitates senior citizens' approach to devices they would otherwise consider out of their reach, as the keyboard demonstrated.

From our findings, the importance also emerged of the support provided by the community around the older person with regard to adopting the system. For some participants, the pressure exerted by their social workers or family was important for motivating them to keep trying in spite of initial difficulties. The senior centres and the social workers played a main role in mediating the access to the MobiTable usage for elderly people and provided continuous psychological support during the study.

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SYNERGETIC SUPPORT OF HEALTH CARE AND ECONOMIC GROWTH

Peter Brøndum Jensen[1]

LINAK is a global company producing actuator solutions with the primary market being hospital and health care equipment. The market is extremely competitive and product development is essential to maintain and increase the share of the market. The market for health and care services and for products improving efficiency is expected to expand rapidly in the coming years, and LINAK is using the regional "infrastructure" by engaging in a triple helix co-operation. The cluster Welfare Tech Region provides the framework for such a co-operation with its action-oriented network aimed at making "technologies meet users" in order to bring new so-called welfare technologies to the market.

1. LINAK, a global Danish company involved in AAL

LINAK is as global company with approximately 1,600 employees in 35 countries. The LINAK group headquarters is in Guderup in Southern Denmark, close to the German border. From the beginning of the 20th century to the 1970's, the company, which later became LINAK, was a small enterprise with less than 10 employees, but after a generational change in the family-owned company, and the invention and marketing of a completely new product, a new era with rapid development and expansion was launched.

The new product was a linear actuator, launched in 1979 by the new CEO and owner, Bent Jensen. The electric linear actuator is a device capable of pushing or pulling objects, and today operating with a lifting capacity of 200 -12,000 Newton. The idea originated while Brent Jensen was working on improving a wheelchair for a disabled fellow student who was left with partial mobility after an accident. So, from the very beginning, perfection of movement and the wish to make innovative solutions were interlinked to improve people's quality of life and working environment.

In the beginning, the linear actuator was sold to the agricultural sector for forage harvesters, but today it facilitates ergonomic improvements in workplaces as diverse as offices, hospitals, comfort furniture, farms and industry. The market potential is illustrated by the turnover development of the LINAK Group which increased from 8 million euros in 1989-1990 to 250 million euros in 2008-2009.

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1.1. The expanding market for health and care services

Statistical forecasts of the demographic development in the highly developed countries show that we are facing dramatic changes and a serious demographic challenge. The changes in age distribution will have a strong influence on societal sustainability with a very large increase in the proportion of elderly and a parallel decrease in the working force. As a result, productivity and efficiency in providing health and care services will have to increase accordingly just to maintain the current amount and quality of services.

The market for health and care services and for products improving efficiency is expected to expand rapidly, and the LINAK Group is already trying to sow the seeds for the new emerging markets in AAL and "welfare technologies" as they are termed in the Scandinavian context. LINAK is divided into 5 divisions with *Medline & Careline* being the one providing innovative actuator solutions for hospital and healthcare equipment. The expected boom in this market calls for further development in this area with more holistic solutions developed on the basis of and complementing the actuator solutions in integrated and flexible systems.

1.2. Product development in a competitive market

The provision of actuator systems used for beds in hospitals and nursing homes is the primary market of the LINAK Group. The market is extremely competitive and alone in China LINAK faces more than 100 competitors. At the same time, the global health sector is under heavy pressure due to necessary budget reductions and the forthcoming challenges resulting from demographic changes. This will put downward pressure on prices, at least in the short run, but in the longer run we expect customers to be aware of the need for intelligent solutions and beds as an integrated part of daily operations in order to optimize work processes. This will require a visionary sector with intelligent demand, investing in long-term sustainable solutions as an integral part of the general infrastructure at hospitals and nursing homes.

In order to develop the right solutions for the future, the identification and involvement of the customers in a broad sense, i.e. bed producers, professional health and care providers and end users, is at the very top of the agenda. This is very much a question of balancing the level of price, quality, and innovation content. In order to optimize this process LINAK has invested in front loading tools facilitating the path from idea to useable product, sometimes termed "from idea to invoice".

In this development process, LINAK is dependent on having visionary, skilful and communicative dialogue partners, and, at the same time as an organisation, has to be very flexible and agile.

Each product development process is unique – as are the different phases involved – and many different stakeholders are considered as dialogue partners, e.g. anthropologists, physiotherapists, nurses, physicians, designers, relatives.

2. Public-private co-operation as a driving force

LINAK has experienced a fruitful co-operation with the local health and care service environment. The *Sonderborg Nursing Home* as well as *Sonderborg Hospital* have inspired the

development of new products and assisted with useful feedback on existing concepts through constructive dialogue with the users. This has been the case in the context of developing the intelligent bed and testing a number of add-on features to the Intelligent LINAK platform. Despite this positive experience, there is no doubt that many barriers to public-private innovation still exist, some of which are related to the differences in culture and work processes of the public and private sector. Other barriers result from lack of skills, e.g. in innovation management and new forms of public procurement. Overcoming these barriers will be one of the main challenges of both the public and private sectors in order to push the development of the market for welfare technologies.

2.1. Welfare Tech Alliance and the (South) Danish context

In the Danish context many new initiatives have been launched during the last three years to overcome the above-mentioned barriers.

At the national level, the *PWT Foundation* is providing grants for testing and implementing new welfare technological solutions in the public sector, and the projects are managed by the public service providers. The purpose of the PWT foundation is to implement labour saving technologies nationwide to meet the demographic challenge and to reduce expenses. The total grant budget over the period 2009-2015 is 400 million euros. Other national support programs have been introduced to support public-private innovation with special focus on welfare technologies, and some of them are targeting the development of private enterprises and commercialisation of new technological solutions. One of the topics is the new intelligent forms of procurement where Denmark is only in a pilot phase, despite the fact that EU legislation has been in place since 2008.

At regional and local level there is an increasing awareness of the need to take action in the face of the demographic challenge, and the *Region of Southern Denmark* has taken the lead by creating a common platform for supporting the innovation process and – especially – the implementation and realisation of possible efficiency gains.

The initiative is called *Welfare Tech Alliance* and was established in April 2009 with the vision to create an international centre of excellence for the development, implementation and dissemination of welfare technology within the social and health sectors. The initiative was taken by the *Region of Southern Denmark*, the *Municipality of Odense* and the *University of Southern Denmark* together with the *National Board of Social Services*. The initiative is aiming at combining the public sector's need for new technological solutions with the private sector's need for new market opportunities in the same field. Several stakeholders have joined the initiative, including private companies, municipalities, hospitals, and knowledge and educational institutions.

The established organisation behind the initiative has established new common organisations to support cross sector co-operation and the rapid development "from idea to invoice". Among the established organisations are living labs for the health and care sector, a project idea exchange combined with an innovation panel, an investment fund for welfare technologies and a cluster organisation targeting the private companies.

The result has so far been a growing number of public-private innovation projects and an improved sharing of knowledge and experience. A national knowledge centre for public-private innovation and welfare technologies, based in Odense, has been established to organise knowledge sharing. The problem so far has often been a fragmentation of the initiatives with too many parallel and uncoordinated activities, a lack of relevant business cases based on a common model and lack of demand from the public sector. All these problems are intended to be solved through the regional initiative.

The success of the initiative is dependent on very strong support from the political level, and at the same time, there is an awareness that the initiative will have to develop a national platform to get the necessary momentum.

2.2. Welfare Tech Region: Bringing partners together and "making things happen"

The contact point for private companies is *Welfare Tech Region*, a business cluster promoting new business opportunities and technological products for health care, elderly care, rehabilitation, etc. New welfare technologies are developed and implemented in a dynamic interplay between businesses, hospitals, municipalities, universities, non-governmental organisations and others. Welfare Tech Region offers a unique framework for this collaboration with its network and supporting activities like matchmaking, fundraising and project development.

LINAK has joined Welfare Tech Region to find better ways to engage in closer dialogue with users, potential partner companies, research, and experts in order to get feedback on new ideas, find new user-driven ideas, develop new products and bring them to the market. Often it is difficult to find the relevant partners and knowledge, and this is exactly the task of Welfare Tech Region. In this way, this "expanded supply chain" is intended to create the products of tomorrow where different technologies and processes are expected to function in an integrated and cross sector framework, based on a common platform. No company or organisation can create components for this set-up on its own, and therefore a "meeting place" like Welfare Tech Region is needed.

The objective of Welfare Tech Region is to establish 50 new companies and 500 new jobs within three years. These objectives will only be reached by an action-oriented network with a very practical approach, and with an appeal to all parties involved, but primarily public companies and public customers. This can be done, for example, by bringing technologies and users together, and by elaborating reliable business cases relevant for both private companies and a wide range of public purchasers. This also implies that a large proportion of the concrete projects initiated in the network should have a large market potential in a time span of only 1-3 years.

2.3. Case: The ICare project

As part of the activities in Welfare Tech Region, the project *ICare* has been initiated with LINAK as inventor of the idea and lead partner. The objective of the project is to develop the intelligent care bed that meets the demographical challenges and to develop the bed into an active tool in the IT-infrastructure and daily care routines.

In the project, new knowledge concerning the intelligent bed designed for hospitals, and social and health care will be developed and collected. In addition, new features and functionality will be developed. The new concepts will optimise the structural frameworks in relation to the staff in order to reduce man-hours spent on practical and mechanical tasks. This offers the possibility to reallocate these resources to tasks requiring personal contact, and to improve the services available to the citizens. Personal autonomy and improved safety is a high priority in developing these new concepts.

Documentation showing how the technologies and concepts add value and reduce costs will be a key element in the project. Furthermore, it is also required that the system can be integrated with software systems from suppliers that are not project participants, thus allowing other systems access to the data generated by the bed. This is in line with the visions for the care sector: modular built products that are compatible with each other, to avoid a fragmented and diverse infrastructure that ruins the synergy across regions and boarders.

3. The international context

The Welfare Tech Alliance and Welfare Tech Region have a vision to develop into an international centre of excellence, and therefore co-operation on both national and international level is a high priority.

Welfare Tech Alliance has initiated two national projects, one dealing with the innovation of new technologies for chronic diseases, the other being the national centre for public-private innovation*, OPI Lab*. Welfare Tech Region is attracting members from all over the country. The first foreign member has been admitted, and strategic cooperation with sister organisations has been pursued from the beginning.

Welfare Tech Region has established cooperation with international companies and cluster organisations, and, at the same time, the organisation is currently involved in three applications for EU-funding, two for the 7th Framework programme and one for the Interreg programme. Taking part in the *HealthCareVan 2010* in California is also an element in international activities, and this year a repay visit from the USA is planned for the autumn.

Hosting the AAL Forum 2010 in Odense gave an excellent opportunity to present the results obtained so far, and, at the same time, useful international contacts were established. Welfare Tech Region is looking forward to the future co-operation in the AAL network and the AAL programme.

REAL LIFE AND VIRTUAL INTERACTIONS: EXPLORING NEW WAYS IN EMOTION RESEARCH AND INTERVENTIONS

Birgit U. Stetina, Oswald D. Kothgassner, Elisabeth Kastenhofer & Ilse Kryspin-Exner [1]

The current research deals with interesting new approaches in emotion research and virtual simulations for the elderly using psychophysiological parameters.

1. Introduction

Technology has revolutionized interaction and communication over the last decades. Although new media and all information and communication technologies (ICT) enhance our daily lives, we crave direct social and especially emotional contact.

More recent research in the field of therapy and psychological intervention research focuses on virtual simulations as treatments for behaviour modification. These virtual realities apply to computer-simulated environments that can simulate an imaginary or real world. This technical assistance is widely used in the treatment of specific phobia, panic disorders and post-traumatic stress disorder (e.g. Kenwright, Liness & Marks, 2001; Riva, 2005; Knaevelsrud & Maercker, 2007). Due to the efficacy of this treatment, Griffith (2002) further showed high values in acceptance and therapy motivation involving computer-assisted interventions using virtual environments.

An expedient expansion of virtual reality is the combination of a computer-assisted enriched environment and an interacting avatar component. These virtual-devised interaction sequences should have the same basic components as video games with high social interaction sequences (Caplan, Williams & Yee, 2009; Kothgassner, Stetina, Lehenbauer, Seif & Kryspin-Exner, 2010; Stetina, Kothgassner, Lehenbauer & Kryspin-Exner, in press). Social interaction sequences in virtual environments were highly associated with an increase in the players' social and emotional competences (e.g. Webster-Stratton & Reid, 2003; Kothgassner & Stetina, 2010), psychological well-being (e.g. Caplan, Williams & Yee, 2009), and affective and cognitive skills (e.g. Reinecke, 2009).

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Former research in the field of virtual treatments showed that psychophysiological arousal and also emotional stress could be reduced using virtual simulations (e.g. Wiederhold, Gevirtz & Wiederhold, 1998; Wiederhold, Jang, Kim & Wiederhold, 2002). This leads to questions about the impact of virtual presence and interactions compared with living beings. The impact of interactions with living animals on emotional skills and human well-being has been shown in several studies (e.g. Kotrschal & Ortbauer, 2003; Stetina et al., 2009). However, animal-like robots induce the same emotional relationship in humans (e.g. Donath, 2004; Kaplan, 2001, 2002).

2. Results of an experimental pilot study

2.1 Aims and Research Questions

The intended research addresses differences between living and virtual presence of an animal-stimulus and simple interaction sequences of human operators with these animal-stimuli, as well as its impact on human behavior. The following aims introduce questions regarding psychophysiological correlates and emotional affects of two different forms of presence and interaction:

- *RQ 1:* Does the presence of a living stimulus/virtual stimulus increase heart rate variability and reduce emotional stress measured by skin conductance levels?

- *RQ 2:* Are there comparable effects concerning the impact of living stimuli and virtual stimuli on heart rate variability and on emotional stress measured by skin conductance levels?

- *RQ 3:* Do comparable effects exist concerning heart rate variability and skin concordance levels?

- *RQ 4:* Are there any differences between the presence of living stimulus or virtual stimulus concerning the human operator's emotional affects?

2.2 Procedures and Participants

To test the differences between living and virtual presence and simple interaction sequences, we decided to run an experimental pilot study. According to the procedures mentioned in former studies (e.g. Donath, 2004; Kaplan, 2001, 2002), we decided to use a canine as the stimulus presented in the different groups. Using animals as stimuli to evoke emotional reactions and psychophysiological changes has several advantages. Using animals leads to the exclusion of verbal cues as confounding variables, therefore the human operator has to rely on intuitive and not cognitive assessments (Prothmann, Albrecht, Dietrich, Hornfeck, Stieber & Ettrich, 2005). The encounter between the human operator and an animal seems to reflect a strong and evolutionary- based emotional attachment with an inimitable communication (e.g. Serpell, 1996; Triebenbacher, 1998). Another point regarding the human-animal relationship should be mentioned: Serpell (1996) described the human-animal bond as free from any prejudices because animals accept humans unconditionally and without obligation.

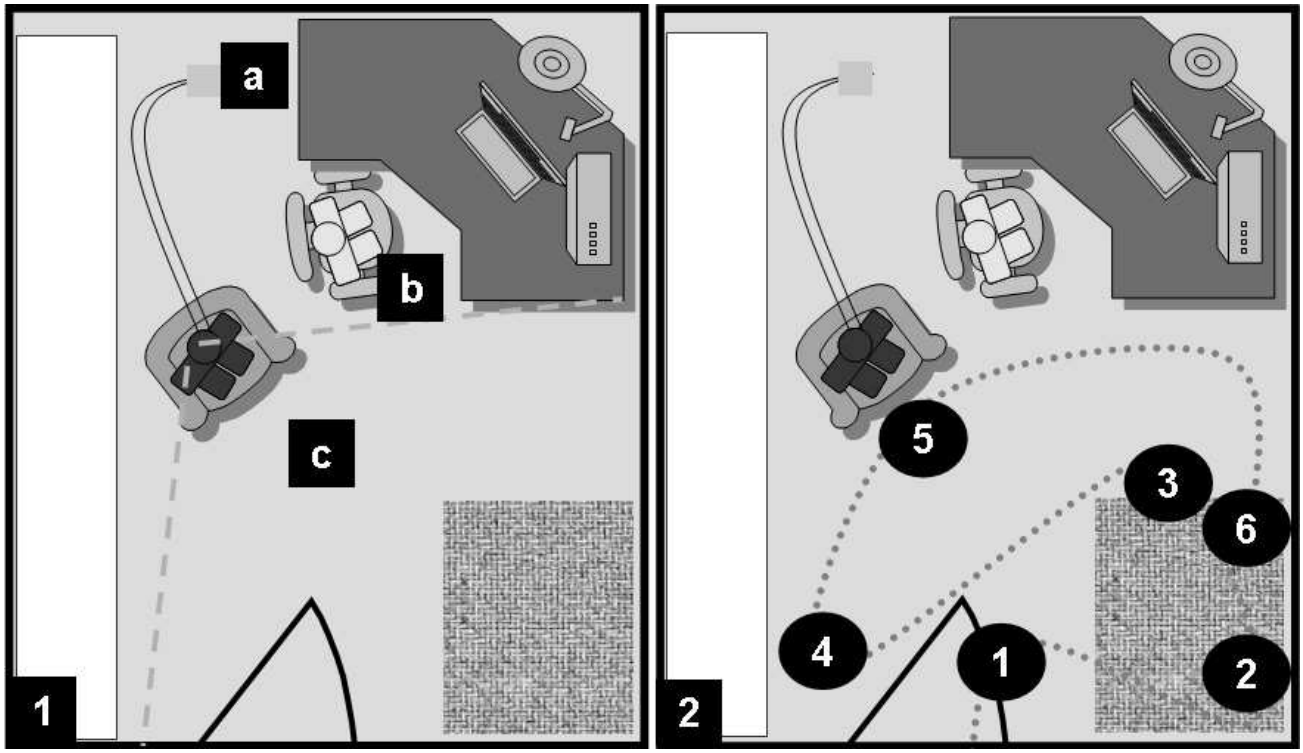

Fig. 1: Procedure. Frame 1.1. a) HMD connection with PC. b) researcher, observing the VR environment. c) the participant sees the lab as a virtual simulation via HMD including a virtual canine. Frame 1.2. Same for the living and virtual interaction sequences 1) Canine comes in. 2) Canine looks for food. 3) Canine looks at participant. 4) Canine goes around the participant. 5) Canine lies down. 6) Canine leaves the room.

The experimental design shows three independent groups for testing differences between living and virtual presence, and simple interactions. The first experimental group (EG 1) was exposed to a well-trained, living canine doing standardized interaction sequences (e.g. look at the participant; go around the participant; lie down in front of the participant) while in the second experimental group (EG 2), a virtual canine with the same visual attributes does the same standardized interaction sequences. We presented the virtual canine using an i-glasses i3pc HMD (Head Mounted Display). The third group was a control trial without any intervention or manipulation. The duration of each session was 8 minutes between the canine entering and leaving the room (Figure 1).

The 80 participants, who took part in this research, were students from several psychology courses with a mean age of 27.2 years (ranging from 20 to 35). The total number of participants was made up of 25 male and 55 female participants, who were allocated to each group accordingly: EG 1 consisted of 25 participants (8 male, 17 female), EG 2 consisted of 25 participants (8 male, 17 female) and the control group consisted of 30 participants (9 male, 21 female).

2.3 Measurements

The emotional status according to Watson, Clark and Tellegen (1988), can be characterized as an indicator variable for a person's instantaneous perceived level of activation and distress (or poor coping strategies). The extent to which a person feels enthusiastic, full of energy or highly concentrated should be recapped as a form of a positive emotional affect. A negative emotional

affect can be recognized as a feeling of aversive mood states, including, for example, disgust, fear and anger. We used an adapted version of the PANAS (Positive and Negative Affect Schedule; Watson, Clack & Tellegen, 1988) as a self-description assessment for the emotional affects with two indicated components (PA = positive affects; NA = negative affects) after running a factor analysis followed by Varimax rotation (α = .89 for PA and .85 for NA).

To measure the psychophysiological stress level, we applied two different and independent assessments; we used the heart rate variability and the skin conductance level as two indicators of psychophysiological stress. The heart rate variability (HRV) is the variation of beat-to-beat intervals, also known as R-R intervals or N-N intervals (Normal-to-Normal intervals). Healthy individuals are characterized by a high HRV since greater variability is associated with a greater ability of the participant to adapt to altering environmental demands, whereas low HRV is associated with cardiac morbidity and mortality. A decrease in HRV was repeatedly observed in patients with anxiety (e.g. Licht, De Geus, Van Dyck & Penninx, 2009) and affective disorders (e.g. Carney et al., 2005). Physiological arousal may impair well-being and health through altered cardiac activity. Anxiety, neuroticism and negative affects have been linked to decreased cardiovascular reactivity (Chida & Hamer, 2008). The assessment of HRV variables can be classified into time domain and frequency domain analyses. Time domain methods are based on the time series of normal R-R intervals, whereas frequency domain methods provide information on the frequency bands of the heart rate signal. We used RMSSD (root mean square of successive R-R differences) which is commonly used as a short-term measurement of HRV. RMSSD reflects parasympathetically mediated changes in heart rate and is reported in units of milliseconds. An increase in RMSSD is associated with an increase in parasympathetic activity. To measure HRV, three electrodes need to be placed on the participant's body (Figure 2). The skin conductance level (SCL) reflects the physiological arousal of the participant. SCL is mainly influenced by the activity of the perspiratory glands which are controlled by the vegetative nervous system. An increase in psychophysiological arousal (e.g. increase in anxiety or worry) causes an increase in SCL since the participant starts to sweat and the skin's ability to conduct electricity increases. SCL is reported in microsiemens.

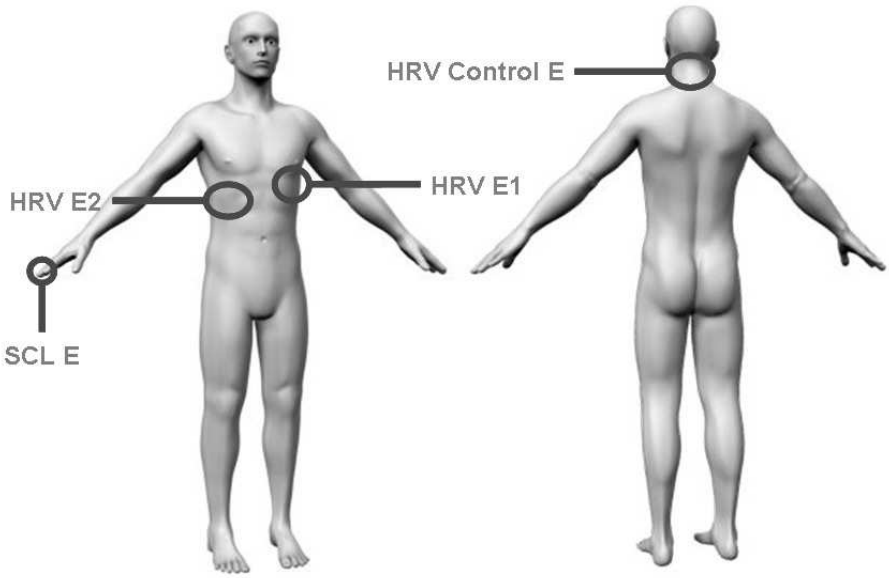

Fig. 2: Psychophysiological Assessments. HRV electrodes are placed below the chest and a control electrode on the cervical vertebra. The SCL electrode is placed on the middle finger of the non-dominant hand.

The SYS-DSM-IV (Symptom Screening according to DSM-IV; Stetina, Kastenhofer & Kothgassner, 2010) is a screening questionnaire used to indicate DSM-IV mental diseases. To enable differential diagnostics and to assess comorbidities, the Structured Clinical Interview for DSM-IV (SKID) is used, if SYS-DSM-IV criteria are fulfilled. It is necessary to test for this measurement to ensure that the participants have no mental or cognitive impairments at the time of the assessment.

2.4 Results and Conclusion

Statistical analyses between the groups were tested by running a one-factorial ANOVA with post hoc tests according to Bonferroni. Results indicate significant differences between the groups with regard to emotional stress measured by HRV RMSSD (F (2, 78) = 3.661; p = .030), and also differences with tendencies towards significance between the groups regarding emotional stress measured by SCL (F (2, 78) = 2.420; p = 0.061). Post hoc analyses show no differences regarding participants' increase in HRV or participants' decrease in SCL between the living and the virtual canine but there are significant differences between the experimental groups and the control group. Moreover, there are comparable effects between heart rate variability and the SCL, but the HRV level shows a significant increase while the decrease in the SCL shows only a tendency towards significance (Figure 3).

There are significant differences in positive emotional affects after the short-time intervention between the control and the experimental groups (F (2, 78) = 2.002; p = .048). No significant effects are found between the experimental groups. However, there are no differences in negative emotional affects after the short-time intervention between the control and the experimental groups (F (2, 78) = 1.002; p = .398).

The results show that living and virtual stimuli are able to produce the same effects on human participants with regard to their psychophysiological stress level. Moreover, both stimuli

increase significantly when compared with a control trial. The same effects can be reported regarding positive emotional affects.

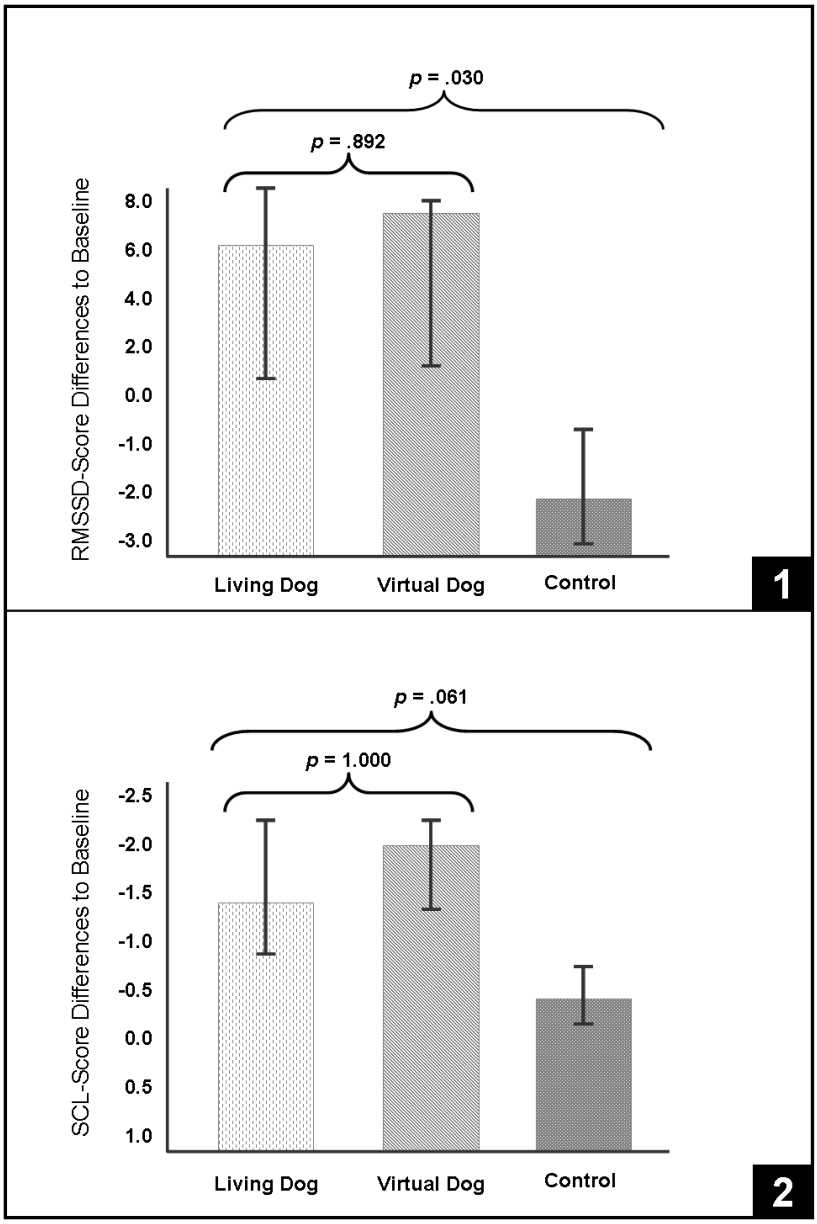

Fig. 3: Statistical significances of the psychophysiological assessments. Frame 3.1. HRV RMSSD-Score differences between the three groups. High values show an increase regarding distress. Frame 3.2. SCL Score differences between the three groups. Low values show an increase regarding distress.

3. Implications for AAL purposes

There is a great potential for using virtual simulations in several fields, oftentimes designed for entertainment and younger people. Social interaction (e.g. Caplan, Williams & Yee, 2009; Kothgassner, Stetina, Lehenbauer, Seif & Kryspin-Exner, 2010; Stetina, Kothgassner, Lehenbauer & Kryspin-Exner, in press), virtual treatments (e.g. Reinecke, 2009; Wiederhold,

Gevirtz & Wiederhold, 1998; Wiederhold et al., 2002; Webster-Stratton & Reid, 2003), and many other applications are using these new technologies.

In this case, the current development also shows a great potential for elderly people. The implementation of virtual simulations into the lives of the elderly could focus on their social interactions and not only to stay in contact with old friends or the family. Virtual simulations would make it possible to interact directly with other people around the world while sitting in a virtual diner or attending a lecture at a digital university. However, it could also be used as entertainment or treatment features for the elderly. Consequently, Basak, Voss and Kramer (2008) showed that virtual simulations by way of a video game could also increase cognitive skills, or Blit-Cohen and Litwin (2005) reported that using computer systems in later life was associated with personal satisfaction and well-being.

The results of our pilot study above indicate that the experience of living and virtual presence and non-verbal interaction sequences show a comparable increase in positive emotional affects between living and virtual stimuli. Consequently, virtual animals could be used as training avatars in treatments focusing on emotional stress caused by physical or mental impairments of the elderly. Another aspect would be an online health promotion centre or virtual measures in form of e-health applications in which elderly people could go through a real building and would stay in contact with a virtual avatar who provides instructions and a connection to a medical doctor close to the elderly person's home.

All these assumptions and considerations should be focused on increasing elderly people's acceptance of these systems. Usable solutions with high accessibility (e.g. via social networks) are possible, but accepting virtual interactions also seems to be connected with other factors such as enjoyment, intimacy and emotional contiguousness (Weber, Kothgassner, Stetina, Oppenauer-Meerskraut & Kryspin-Exner, 2010).

However, virtual simulations are not only applications for younger people. Virtual simulations can offer many benefits to elderly people's lives. Further research by the authors will focus on elderly people's acceptance of virtual simulations and on the role that the social interaction component plays in virtual environments. There is a lack of experience in the Virtual Reality treatment of older people; further research should answer questions about therapy acceptance by the elderly regarding new technology systems and about improving the usability of such systems for users and therapists (e.g. Kenwrite, Liness & Marks, 2001). In conclusion, virtual simulations have a large spectrum of applications that should also be used for elderly people.

4. Critical Statements

One limitation that we would like to mention is that we worked with a canine stimulus and not with a human being, so the results should be interpreted based on knowledge about the human-animal relationship. Another aspect, which should be taken into consideration, is that only presence or simple interactions were tested. The question is: what level of interaction complexity would lead to relevant changes? Taking current lifestyles into consideration, the aging of the Western world, and technological possibilities, we should rather pose the question: What are the differences between real-life interaction and interaction in virtual reality? Do we feel (emotion research) and perceive (cognition research) the same way? Although technology is developing

fast, the creation of a living being in a virtual world is still a challenge with its increasing complexity of interactions and life-like appearance.

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THE EVAAL PROJECT: EVALUATING AAL SYSTEMS THROUGH COMPETITIVE BENCHMARKING

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The Evaluation of Ambient Assisted Living (AAL) systems is particularly challenging due to the complexity of such systems and to the variety of solutions adopted and services offered. This problem is related to the evaluation of pervasive and ubiquitous systems that has been the focus of many researchers in recent years and that is still awaiting solutions. On the other hand, analyzing and comparing AAL solutions is paramount for the assessment of research results in this area. EvAAL (Evaluating AAL Systems Through Competitive Benchmarking) is a recently established international competition that aims to address this problem so that the benchmarking and comparison methodologies of the AAL systems can emerge from the experience. This work describes the framework under which EvAAL operates (more specifically the AAL open association AALOA, www.aaloa.org), and it presents the EvAAL objectives, strategy and organization.

1. Introduction

Ambient Assisted Living (AAL) [2], an innovation funding program issued by the European Commission, aims at improving the quality of life of elderly persons by increasing their autonomy, assisting them in their daily activities, and by enabling them to feel involved, secure, protected and supported. AAL spaces are physical places, where the user lives or works, that integrate a number of Ambient Intelligence (AmI) technologies [7], ranging from environmental sensors and actuators to sensors, services, and the intelligence that supports the integration of

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such services. Examples of AAL spaces are, for instance, a home where a user lives, or a place where the user works, and even public buildings such as hospitals or airports.

A typical AAL system involves a number of activities that include sensing, acting, reasoning, interacting, etc. These activities are generally implemented by a number of software components (such as context managers, profile and service managers, reasoners, user interfaces, security managers, etc), which, in turn, are integrated in a number of devices distributed in that environment (including sensors and actuators, gateways, appliances, domotic devices, communication devices, smart phones, etc.). As a result, AAL systems are typically complex, distributed systems that make use of middleware/platforms to support communication and the integration of different components.

In recent years, the interest of the research community and industry in AAL gave rise to the development of a large number of platforms and systems for AAL [3,6,11,13,14,15,16,18,19] that are often incompatible with each other and that also differ from each other with regard to requirements, the design of the architecture, performance, and the use cases being addressed, etc. It is clear that, in this scenario, a widely accepted method of evaluating and comparing different AAL solutions and platforms would enable all the interested stakeholders (including researchers, industries, service providers, users, etc) to identify the best solutions and, in perspective, to adopt a common platform. However, as a consequence of their intrinsic complexity, full AAL systems are hardly comparable to one another, and, in fact, the evaluation and comparison of such systems is a challenging problem that is still far from being solved [5].

EvAAL (*Evaluating AAL Systems through Competitive Benchmarking)* is an international competition promoted by the universAAL project [17]. It aims at advancing the state of the art in the evaluation and comparison of AAL platforms and architectures by creating an environment in which researchers, students, and even industries can compare their solutions and exchange ideas, and in which the comparison of AAL systems may become feasible. In particular, EvAAL adopts a step-by-step approach by dividing the problem into smaller elements. In an initial phase, it promotes competitions on specific, small scale topics in order to create a large data set and to evolve benchmarks and evaluation methodologies. In a second phase, when the methodologies and tools of EvAAL become more developed, complex services and even complete systems can be evaluated and compared. EvAAL can be applied in a wider strategy aimed at creating an AAL community that brings together the resources, tools and people involved in AAL in a single forum, where all stakeholders are represented, in order to reach consensus about AAL issues, and to promote the convergence of AAL solutions towards a common platform.

This paper presents an overall strategy for the creation of a community that addresses such AAL issues as given in Section 2, and it discusses the role of EvAAL in this strategy (Section 3). Then, in Section 4, it describes the organization of EvAAL, and gives a preliminary roadmap in Section 5. Section 6 draws the conclusions.

2. The Overall Strategy

The EvAAL competition is a part of a wider strategy for the construction of an AAL community aimed at promoting the technological advance of AAL and its convergence towards a common platform for the design of services and solutions. This strategy consists of three main initiatives, each supporting the others:

- The AAL Manifesto [12] which is a live document expressing the vision, objectives, and challenges in AAL.

- The AALOA Association [1] which should support the community by providing an open forum where all interested stakeholders can openly meet and discuss their vision of AAL, and propose and evaluate solutions. The association is also intended as a federation of projects addressing different aspects of the development of AAL.

- The AAL Competition (EvAAL), which is a means of creating consensus and interest among practitioners, service providers, developers, etc in and around the community and the association. The competition is organized as a project within the AAL association as described in the above point.

The objectives of these initiatives are: to raise the interest of industry (by opening an open discussion about market and business opportunities) and of the academic world (in particular by attracting PhD students and, in turn, fresh ideas); to raise interest in the Association (by promoting attractive initiatives, one of which will be the EvAAL competition), and to gain the support of key people and key research labs whom the Manifest primarily addresses.

It should be noted that this strategy has been devised by observing similar strategies adopted in other fields where communities of successful associations have been formed (for example [9,4]).

Within this strategy, the EvAAL competition has thus the main role of attracting different stakeholders from academia, industry service providers and even end-users to the community. However, such a goal can only be achieved if the competition has a solid scientific background and definite objectives. Under this aspect, the competition should address several specific objectives that can be summarized in the following points:

1. it should contribute to creating consensus with regard to relevant AAL problems and to addressing them;

2. it should become widely recognized as a valuable international community;

3. it should promote the aggregation of research and industry;

4. it should stimulate young developers to bring fresh ideas and create new solutions;

5. it should allow the publication of needs, requirements, and issues in AAL.

We recognize that, by achieving consensus in the scientific world on relevant and important AAL issues, EvAAL will be creating a byproduct, namely the contributions to EvAAL made by the competitors and the experts serving on AAL scientific committees. For this reason, it is also important that EvAAL remains open to new ideas that may come from a better cooperation between industry and research, and also from young developers and students. The proposals of new ideas for the competition will also make the competition fast to react to developments in technology, and to new ideas coming from the AAL communities. Furthermore, EvAAL should attract the best minds of the scientific and industrial communities, as well as the best students

and competitors, and this is only possible, if it is widely recognized by the international community that operates within the AAL.

With regard to Point 5 above, it should be noted that this is actually a consequence of the process of organizing and sustaining such a competition in the coming years. In fact, AAL is a wide research field that encompasses several areas of science. Any non-trivial AAL system is, in practice, configured as a complex pervasive, context-aware system that inherits solutions from several specific scientific areas such as sensing, communication, reasoning, interaction, etc. The need for the evaluation and comparison of heterogeneous solutions, which is mandatory in any competition, will naturally give rise to the need for widely accepted scenarios, benchmarks and evaluation criteria, but also for interfaces, and tools for the automation of the competition and for a fair evaluation. In other words, this work will give rise to the need for a common platform on which to develop the competing artifacts in such a way that all the competitors are able to develop their artifacts under the same, equal conditions.

3. Purpose of the EvAAL Competition

EvAAL aims at contributing to AAL disciplines in the same way as other competitions have contributed to their respective areas. In this respect, EvAAL is inspired by successful competitions such as the Trading Agent Competition [17] (TAC) and DARPA Grand Challenge [8].

Contrary to the above-mentioned competitions, and apart from supporting the growth of the AAL community, the main technical objectives of the competitions organized by EvAAL are to:

- enable the comparison of different AAL solutions
- experiment with benchmarking and evaluation methods
- identify relevant AAL problems, requirements and issues
- identify new, original solutions for AAL

EvAAL aims at enabling the comparison of different AAL solutions by establishing suitable benchmarks and evaluation metrics that will be progressively refined and improved over time. In particular, EvAAL will focus not only on the comparison of algorithms but also on cost, deployment effort, and user acceptance, etc. Gradually EvAAL will also increase its capacity of offering more and increasingly sophisticated and realistic environments to host the challenges. Nevertheless, evaluating and comparing different AAL systems by means of competitive benchmarking gives rise to a number of issues due to the complexity of such solutions and to the diversity of environments and users' requirements. Hence a one-size-fits-all approach to evaluating AAL systems is unrealistic. One possible solution is to break down core system functionalities into components and to pair each component with specific evaluation strategies. However, to date, a clear consensus among researchers about the evaluation methods and objectives has yet to be reached, and current approaches to the evaluation of AAL systems tend to be subjective or piecemeal [5].

EvAAL's objective is to fill the gap by working around evaluation issues and by offering researchers an arena to try, test and experiment not only with AAL solutions but also with benchmarks and evaluation methods. For this purpose, EvAAL will be open to all issues related to the test environment (living laboratories vs. "into the wild"), to the benchmarking (automatic vs. based on users' evaluations), and to the tools supporting the competition, etc. The outcome would be a toolkit of techniques from which system developers could draw. Making these techniques open, available, and easy to use will enable comparative evaluations between similar components across systems and, finally, of whole AAL systems.

However, EvAAL recognizes that to address the full complexity of the evaluation of AAL systems is not feasible in its early phase and, in fact, a clear vision of methods of evaluating full, complex AAL systems has still to be attained. For this reason, EvAAL will initially focus on specific technological challenges related to AAL, and will use the results achieved from the competitions on these subjects to set up a set of tools and methodologies with a view to approach the whole problem in a subsequent phase. Under this aspect, some of the themes that may be considered in the initial phase of EvAAL could be: sensing (covering the aspects of collecting any kind of context information from the environment), seasoning (concerned with the problem of transforming context data into knowledge), acting (concerned with environment control through actuators), communication, and interaction (between user and the AAL system), etc.

Of course, these themes will be extended and their focus even changed in the years to come in order to adapt to technological evolutions and breakthroughs in AAL. The input to this evolution of EvAAL will come from the experience gained from earlier EvAAL competitions and from the community that will gradually be built around EvAAL.

Once the evaluation tools, benchmarks, and methodologies developed by EvAAL become more advanced, EvAAL will extend (or even change) its focus in order to address services and platforms rather than basic features. The reason for this shift in focus by EvAAL (summarized in Figure 1), is that basic features and their technologies will in time become more stable, and at that point it will be natural to address more challenging issues related to full platforms. Although it is currently not possible to establish when this shift will occur, EvAAL has set itself the goal to facilitate this after a few of the initial events.

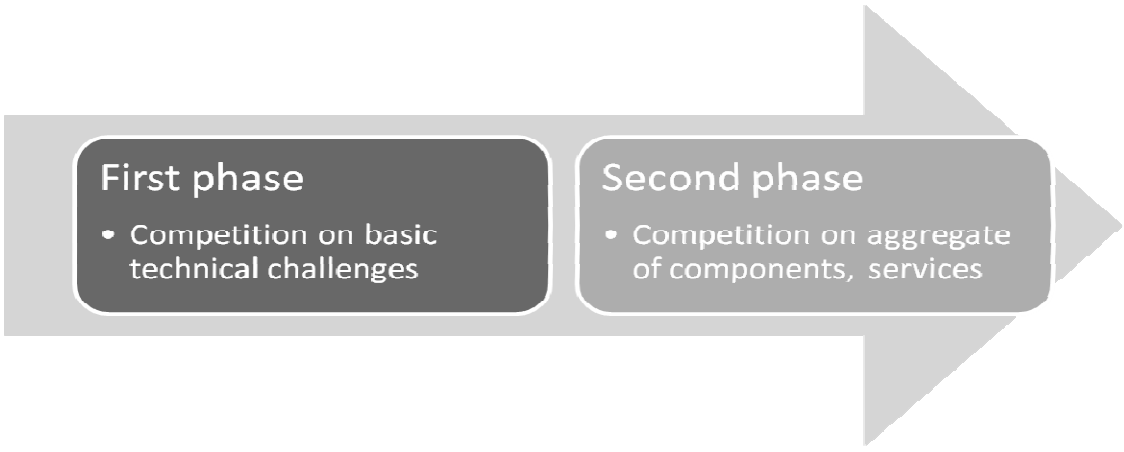

Figure 1. The EvAAL focus shift

4. EvAAL Structure and Organization

The EvAAL competition has been developed as a project under the AALOA association [1]. This will afford EvAAL the possibility of disseminating its activities under the umbrella of AALOA and it will facilitate direct access and easier acceptance of EvAAL in the AALOA community. This will also enable EvAAL to support the activities of the association.
Once EvAAL have been established and widely recognized, it will be run as an independent event which will take place in sites selected by the organizers. Living labs will be given preference over other sites. However, as EvAAL does not have enough resources in its initial versions to be organized as an independent event, it will be organized as an accompanying event of a major conference on AAL.

EvAAL is run by a Steering Board (SB) which organizes the competition each year. The Advisory Board (AB) supports the activities of the SB by giving advice regarding the strategic decision-making process. Sometimes the AB may pose questions to the whole group, sometimes it consults individual members. On the other hand, the AB does not have any authority to vote or to make decisions.

For the purpose of the organization of the competition, the SB annually issues a *call for ideas* which is addressed to all relevant stakeholders (including not only technology experts, but also service providers, industries, and end users) in order to collect ideas about methods, issues to be studied, benchmarks, etc. The call for ideas is disseminated using all the available dissemination channels, including presentations at conferences/workshops, personal mails directed at possibly interested people, and publications on mailing lists/web sites, etc.

All the collected ideas and suggestions are evaluated and selected by the Steering Board in order to constitute the basis for the subsequent *call for competition*. In particular, the call for ideas requests either just simple ideas, or full proposals for the special themes competition. In the latter case, the submissions to the call for ideas should indicate a detailed plan for the organization of a special theme competition, a chair for the special theme competition, and a preliminary scientific board.

The SB thus collects all the submissions to the call for ideas, and selects a number of special theme competitions. The selection is based on the quality of the submission, on the feasibility of the organization plan, on the availability of resources, on the scientific reputation of the proposers, and on the possibility of recruiting the chair of the special theme competition as well as other volunteers to form the final Scientific Committee of the special theme competition.

For each special theme competition, the SB then establishes one Special Theme Chair and one Scientific Committee whose primary role is to prepare a *call for the special theme competition.* The SB then collects all the calls for the special theme competitions into the call for competition which is disseminated through all the available channels (mailing lists of researchers interested in AAL, websites, journals and conferences on AAL, etc.).

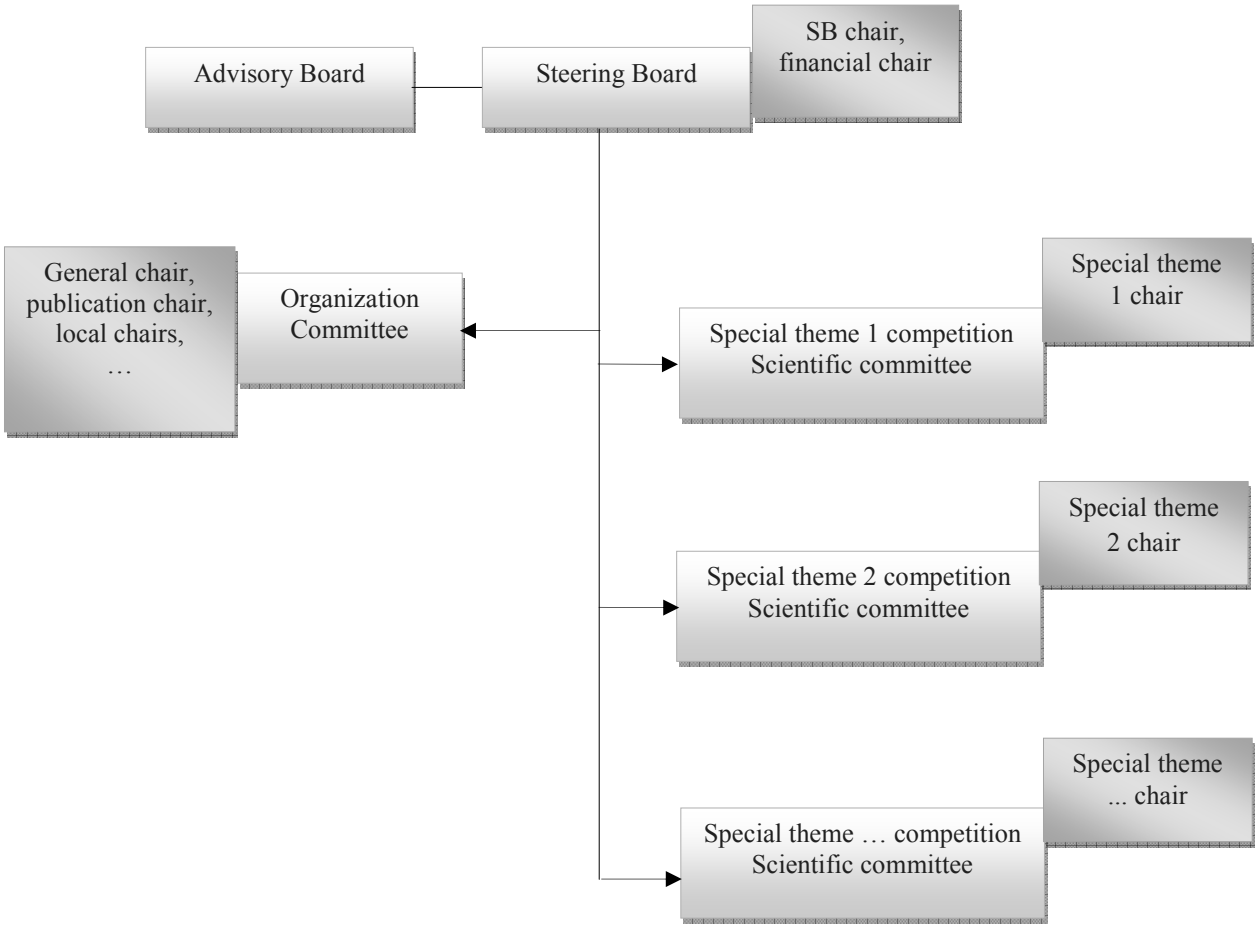

Figure 2. The Steering board and the committees of a competition

At the same time, the Steering Board nominates the General Chair and the Organizing Committee of the competition. The General Chair has the role of coordinating the Scientific Committees and the Organization Committee to ensure the success of the competition, while the Organizing Committee is responsible for the logistics issues of the whole competition. Figure 2 represents the SB and the competition committees. It particularly highlights the chairs involved in each committee.

5. Current status and roadmap of EvAAL

In its first years, the organization of EvAAL faces the difficulty of organizing an event aimed at a community that does not yet exist,and for this reason, EvAAL may initially take on a different and more simple form. The general plan for the annual competition follows these main points:

1. The Steering Board (SB) finds a site for the competition and nominates the General Chairs (GC) and the organizing committees,

2. The SB issues the Call for Ideas.

3. The SB collects and evaluates the responses to the call for ideas and nominates the Special Theme Competition Chair(s) (CC), and the Scientific Committees (SC) for the Special Theme Competitions.

4. The CCs prepare the Special Theme Call for Competition.

5. The SB collects the Special Theme Call for Competition and issues the Call for Competition (CfC).

6. Each CC collects the applications for the CfC and, with its SC, selects the participants for its special theme competition.

7. There is a shepherding phase in which each SC provides a competition toolkit to the competitors of the Special Theme Competition in order to allow them to prepare their competing artifacts according to given interfaces and standards. During this phase, each SC also prepares the benchmarks to be used for the comparison and evaluation of the competing artifacts.

8. Parallel to Points 2-7 the Organizing Committee makes the necessary preparations for the logistics of the competition.

9. Finally, the competition takes place: the CCs and SCs selects the winners, the SB awards the prizes, and the next competition is announced (venue, GC, organizing chairs, etc.),

10. The SB evaluates the competition and makes the necessary adjustments for the organization of the next competition.

For the first year, EvAAL has selected “Indoor Localization and Tracking” as a special theme of the competition. The motivation is that localization is a key component for achieving context-awareness, and recent years have witnessed an increasing trend in location-based services and applications. In most cases, however, location information is limited by the accessibility to Global Navigation Satellite Systems (GNSS), largely unavailable for indoor environments. The scope of this competition is to award the best indoor localization system from the point of view of Ambient Assisted Living (AAL) applications. To this end, much research has been done in both the sensor network community and the ubiquitous computing community to provide techniques for localization and tracking in smart environments. This competition will offer an opportunity to bring together both academic and industrial research communities to work together on challenging and open problems, to evaluate various approaches, and to envisage new research opportunities.

The Call for Competition was issued in March, and now the first EvAAL competition is entering its final phase. The competitors will be selected based on the quality and originality of their solutions, and they are expected to challenge each other on 25-29 July at the CIAMI Living Lab in Valencia. The winner will receive their award at the EvAAL workshop that will be held in conjunction with the AAL Forum (26-28 September 2011).

The Call for Competition, the technical annex and general information about this year`s competition has been published on the EvAAL web site [10].

6. Conclusions

EvAAL is an initiative aimed at promoting the development of AAL technologies and at developing methodologies, criteria and tools for the evaluation and comparison of full AAL systems and services. The EvAAL approach consists of organizing an annual competition on themes that can be freely proposed by any individual or group of individuals interested in AAL, and of providing a forum to these people where they can discuss and compare ideas by participating in the competition or by contributing to its organization. As EvAAL has just been created, it needs fresh ideas, participants, supporters, volunteers and funds in order to grow. For this reason, whoever shares this vision is invited to contribute by subscribing to the EvAAL community and by participating in the related activities which are defined on the EvAAL web site [10].

7. Acknowledgements

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PERSONA PROJECT
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ICF USER ASSESSMENT EVALUATION METHODOLOGIES

PERSONA
PERceptive Spaces prOmoting iNdependent Ageing

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1. Introduction

In many European projects in the Ageing Well and Ambient Assisted Living area, there is often a tendency to focus more on the users' health-related disability, instead of focusing on their resources to cope with the activities of daily life (ADL). To describe a user by only looking at his specific diagnoses, using tools like IDC-10 and simple questionnaires about Quality of Life (QoL) is not appropriate for understanding the complexity of their social, physical and mental capabilities.

The PERSONA project has selected a holistic user assessment approach. This is vital for a number of reasons; firstly because the general (non expert) view of the elderly person is often seen as a weak person, without resources (i.e. the elderly are portrayed in some road signs, which apparently warn drivers to be aware of wild elderly people with walking sticks running all over the roads). The same view is also common in many of the technological research and development projects, where the user often is referred to as a patient instead of a citizen. The "elderly as fragile and weak" approach could often lead to technological AAL solutions or

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[2] UPM Universidad Politécnica de Madrid.
[3] NST Norwegian Centre for Integrated Care and Telemedicine.
[4] ITACA Asociación Instituto de Aplicaciones de las Tecnologías de la Información y de las Comunicaciones Avanzadas.
[5] R&S R&S INFO srl.

services that easily counter-react to the goals of elderly care. A holistic approach to describe the user profile is a way of shifting from the disability focus to the resources focus.

Figure 5: Elderly portrayed on road sign

This can be explained by considering the everyday preventive interventions in elderly care performed with the (care) goal of either raising or maintaining the functional level of the end user's ability to do a certain activity (i.e. dressing, shopping, cleaning or visiting friends) instead of being dependent on public or private services. Maintaining physical capabilities often requires physical or mental training. Modern AAL homes are intended to be equipped with technology where every physical activity (i.e. like closing and opening a window) can be substituted by touching a remote and perhaps even voice-activated, or performed by service robots. This can lead to a reduction in the physical activity level, and the result could be an increasing need for public or private services, instead of reducing them as was originally expected. Here the AAL technology could counteract the goals of elderly care and rehabilitation. This is why the tools used to monitor the effects of a technological intervention have to include a holistic, end-user centric approach to ensure that most aspects of the end users' wishes and needs to live an independent life are fulfilled.

Figure 6

Many future European projects will focus on how to "measure" the impact of the intervention of AAL technology in the end user' life in order to establish evidence whether investing in AAL products is feasible in business cases. A key point in establishing this evidence is to find a simple methodology that can measure improvements or the deterioration of ADL-functions (Activities of Daily Living) over time. This is vital in order to document the effects of the intervention of AAL technology in this application area, and is essential for the future growth of a European "AAL market".

The PERSONA project has developed a new user profile methodology and, hopefully, a common European holistic approach for describing end users, either elderly people or people with functional disabilities. The goal in PERSONA is not to produce evidence-based data of each service capability (e.g. reduce the workload of the care sector in the future, or to produce reliable data in the trial to monitor changes in ADL over time) but to develop and evaluate a common European approach to a user assessment methodology. The research conducted in the field of user assessment and user profiling throughout Europe and worldwide has resulted in the selection of two essential and universal tools that are suitable to test as a common methodology: ICF and SF-36v2.

- WHO's International Classification of Functioning, Disability and Health

The first and most essential methodology is the WHO's International Classification of Functioning, Disability and Health, commonly known as ICF. It provides a common standard language and framework for the description of health and health-related conditions.

The classification is very comprehensive and complex. In order to use ICF in a real life context, it is necessary to perform a careful selection of the essential parameters for describing users and user needs. A enquiry throughout Europe showed that at least one country has implemented the ICF model as a universal tool for making user assessments in the electronic care records systems. In Denmark almost 40% of the municipalities use ICF in ICT-systems to describe and document elderly persons' ADL functions. The tool helps to decide the level of services needed, and to document changes of ADL over time to ensure valid statistics and data at all levels of the systems providing care. Inspired by Danish research and the practical implementation of the ICF tool, the PERSONA project has adopted this approach, but with some minor changes. We have called this the ICF Persona version. The ICF persona version is heavily inspired by the Danish common- language II project led by the Local Government Denmark, the Ministry of the Interior and Social Affairs, and several other public, private and research partners. We would especially like to thank the Project Manager, Mette Vinther Poulsen, and Chief Consultant Tina Jørgensen from the Local Government Denmark for enabling direct access to their in depth findings and work involving user assessment methodologies.

- Use of the SF-36v2 Health survey

SF-36 is a multi-purpose, short-form health survey with only 36 questions. It yields an 8-scale profile of functional health and well-being scores as well as psychometrically-based physical and mental health summary measures, and a preference-based health utility index. It is a generic measure, differing from the ones that target a specific age, disease, or treatment group. SF-36 has proved to be useful in surveys of general and specific populations,

comparing a relative burden of diseases, and differentiating the health benefits produced by a wide range of different treatments.

The SF-36 was constructed to satisfy minimum psychometric standards necessary for group comparisons. The eight health concepts were selected from 40 included in the Medical Outcomes Study (MOS). The ones selected represent the most frequently measured concepts in widely-used health surveys and those most affected by disease and treatment. The questionnaire items selected also represent multiple operational indicators of health including: behavioural function and dysfunction, distress and well-being, objective reports and subjective ratings, and both favourable and unfavourable self-evaluations of general health status.

2. Using the ICF within the scope of PERSONA

2.1. ICF – An overview framework

There are many factors that affect and have an influence on the citizen's functional ability and, consequently, on the decisions made as to what type of service is needed, either provided by care staff, relatives, aid appliances and/or technology. In practice, there is not a great deal that separates the determination of a need, the analysis, partial conclusion and the decision. For this reason, it can be difficult to systemize the information that can influence a decision; however, this systematization is important when decisions or the assessment of user needs have to be classified.

The WHO's ICF systemizes the overall elements of the citizen's functional ability. The ICF structure differentiates between the body, the activity, participation and contextual factors which are used in the "ICF Persona version". The following description of the fundamental structure in the ICF supports the understanding of the structure of the "ICF Persona version and, thereby, the overall evaluation. Finally, the description also contributes to understanding the links between the concrete data boxes.

The ICF defines the body, the activity and participation as elements of the citizen's functional ability. Additionally, it considers contextual factors (surroundings) and personal factors as components that can enhance or limit this functional ability, depending on how the citizen experiences limitations (i.e. due to possible weakness, illness and/or handicap). The structure is illustrated in the figure below.

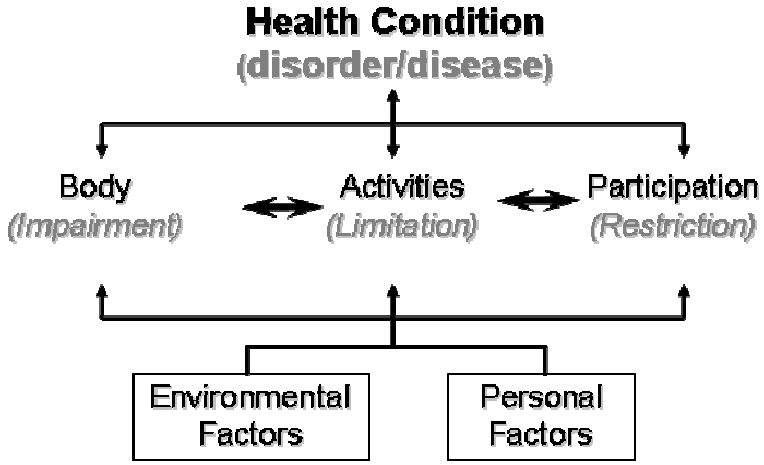

Figure 7: Interaction of ICF concepts

A description of each of the ICF elements is given below:

- Activity

Activities are the citizen's execution of assignments and tasks. Difficulties with these activities are noted as activity limitations.

Limitations are usually due to function depreciation of bodily functions (i.e. weakness, illness, and/or handicap). When the citizen's ability to do activities is evaluated, the consequences of function depreciation become clear (i.e. health problems, diagnosis, etc.). The documentation of activities is therefore vital in the "ICF Persona version where this element is called “professional evaluation” (B1).

- Participation

Participation covers a range of the citizen's involvement in his daily life and society. Difficulties in participation are classified as participation limitations.

The degree of limitation that a citizen experiences in his participation is initially subjective, as only the individual himself can evaluate it.

Participation limitations can be caused by weakness, illness, and/or a handicap. There is also a limitation when the citizen is not able to do activities according to his own standards of what is considered acceptable.

In the “ICF Persona version”, participation is understood to be the citizen’s everyday life (A) and it focuses on the experienced limitations, wishes, and priorities.

- Body

The body's functions entail the citizen’s physiological functions.

The ICF defines physical function depreciation as any problem that the citizen has with his bodily functions. Physical function depreciations can, in principle, have no consequences on the citizen's ability to do activities, especially if there is a help aid that compensates for the particular function depreciation (i.e. a citizen with weak eyesight wearing glasses would not have a limitation; a citizen with a missing leg wearing a prosthesis would be able to do activities). The physical function depreciations are often the reasons why the citizen is limited in his activities.

- Contextual factors

The contextual factors are the surroundings and personal factors which either enhance or limit the citizen's functionality. These factors are indirectly understood in the sections for the evaluation of participation and activity; however, they are important when explaining certain situations (i.e. two citizens with the same diagnosis/physical function depreciation may have different limitations when it comes to activities and participation).

The surroundings in "ICF Persona version" are limited to the citizen's home. The interior structure of the home/apartment (C1) can, for example, mean that the citizen, regardless of weakness, illness and/or handicap, does not have an activity limitation. The home's interior make-up is an explanatory factor and can therefore be documented.

- Personal factors

The personal factors (C2) entail elements that make people different and unique, such as intelligence, temperament, and personality.

"ICF Persona version" is focused on the citizen's capacity to master stresses and strains, and new situations. Differences in the capacity to master them are a possible explanation as to why citizens with the same physical function depreciations do not have the same limitations when doing various activities. For example, when it is windy outside, some citizens will put up wind shelters, whilst others put up windmills i.e. depending on whether one looks upon changes as strenuous or as a challenge bringing new options.

2.2. “ICF Persona version”

This section describes the particularization of the ICF for the PERSONA project. It includes a description of the elements considered as well as the methods used for gathering the data needed to define them. The elements defined in “ICF Persona version” are the following:

A - Everyday Life

B1 - Professional evaluation

B2 – Health condition

C – Contextual factors

2.2.1. Everyday life (A)

The information needed for determining the citizen's everyday life: (A) limitations are recorded in a conversation with the citizen which is called the "assessment dialogue". This dialogue must be conducted in an open and flexible way, always leaving the citizen to decide which parts of the conversation are relevant and necessary. The interviewer or user expert has to adjust the forms or questionnaires to each individual citizen, and by using open questions, he gives the citizen control over the information given.

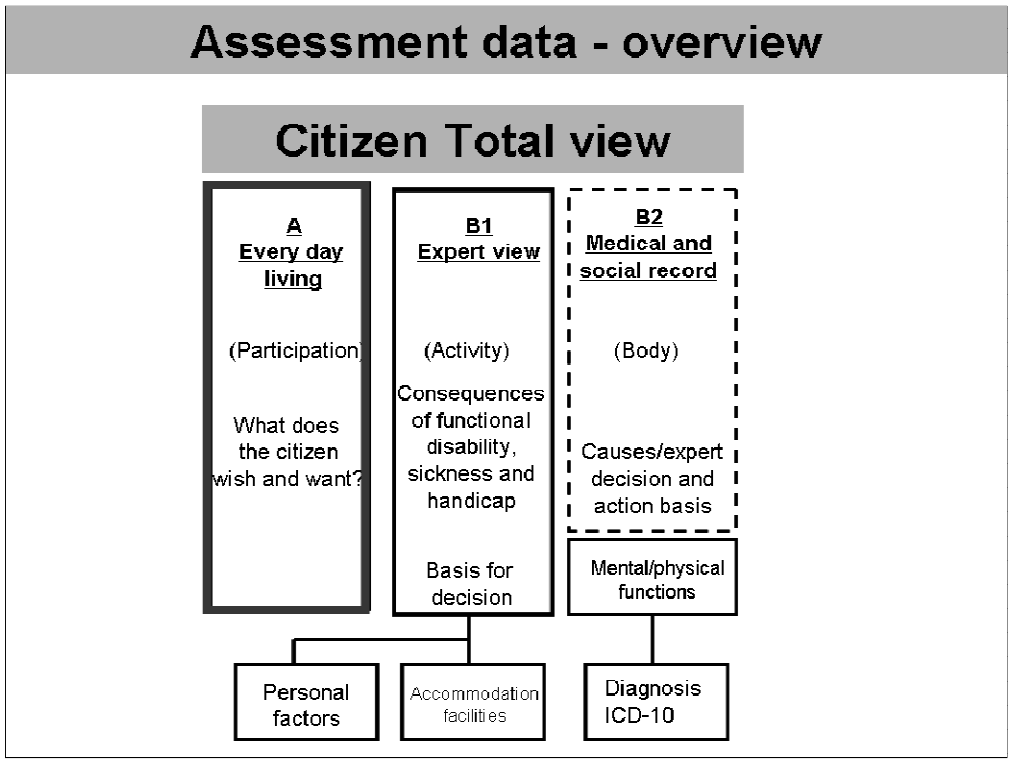

Figure 8: Citizen Total View (Everyday life)

The "assessment dialogue" is supported by a form with check boxes and comment boxes that the user expert fills in during the conversation with the citizen based on his comments. A citizen's everyday life session merely creates a picture of which limitations the citizen is experiencing with regard to the nine general activities. These activities are based on what the individual deems to be important in order to be capable of living an independent life. The activities are described by means of everyday vocabulary which enables the user expert to use this vocabulary in a direct dialogue with the citizen. The figure and table below list the activities, the definitions and the vocabulary used.

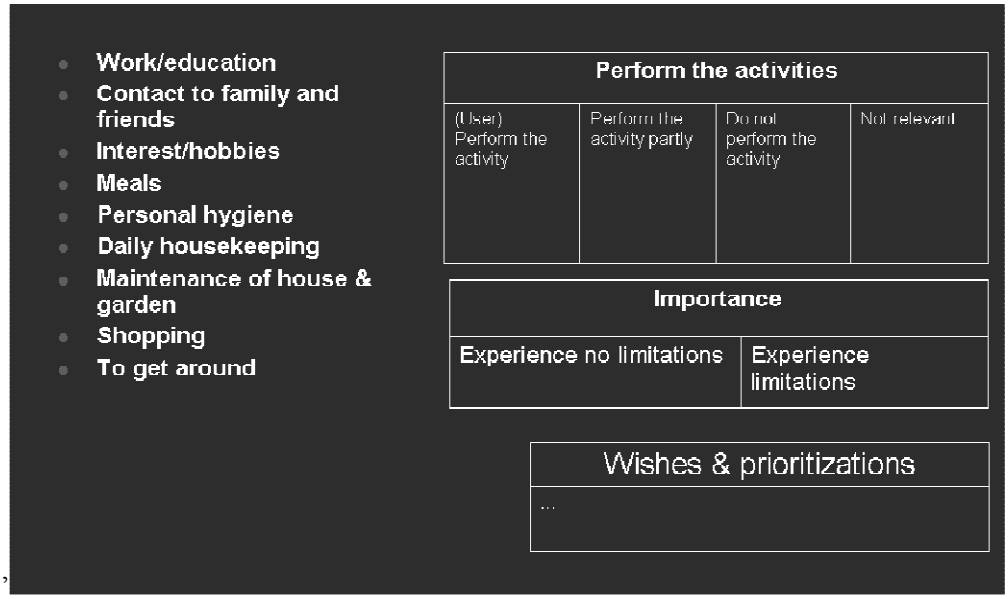

Figure 9: Educational presentation of activities in everyday life

Table 5: Detailed explanation of the activities in everyday life

Activities in everyday life	**Definition of the activity**	**Comment**
A1 Work/education	All kinds of work, both paid and unpaid	This activity is relevant for young or working persons
A2 Contact to family and friends	Contact to relatives and friends, acquaintances or friends, and others who are important to the individual. The activity can also include showing compassion for others for example children.	
A3 Interests/hobbies	Activities that are important to the person because he/she wants to do them. Regardless as to whether the activity is completed or not, it is included here, at home, out, on their own or - also even if it is undertaken together with others (incl. religion).	Please note that the other activities (A1, A2, A4, A5, A6, A7, A8 and A9) are not taken into account here, even if they have the characteristics of interests/hobbies.
A4 Meals	Activities in relation to meals, for example, the preparation, setting up, and consumption of food/drink incl. tidying up/ washing up, depending on the person's wishes, habits and needs - also the social aspects related to the meal.	

Activities in everyday life	Definition of the activity	Comment
A5 Personal hygiene	Bath/wash, toilet visits, and personal hygiene which is necessary for the individual to experience a sense of having been taken care of.	
A6 Daily housekeeping	Practical activities such as housekeeping, cleaning, watering the plants, and washing clothes, etc. which are necessary for the individual to experience a feeling of well-being at home.	Including e.g. watering the flowers
A7 Maintenance of the home and garden	Activities which are necessary for the person to feel that the everyday upkeep of the home and garden, i.e. indoors and outdoors, is being maintained.	This is exclusively daily cleaning as this is mostly relevant for a citizen living, for example, in their own home.
A8 Shopping	Shopping for everyday goods, clothes and other necessities.	The activity also entails planning the shopping.
A9 Mobility	Mobility, indoors and outdoors, that is vital for the person to move freely in keeping with the individual's wishes, habits, and needs.	

It is expected that, with adequate guidance during the interview, the citizen himself will take the initiative to about his problems. However, sometimes there can be certain problems that the citizen is unwilling to mention. In these cases, the user expert has to ask a direct question and ensure that the primary cause for each specific need is identified.

The documentation on the citizen's everyday life (A) should be consistent with what the person has said during the “assessment dialogue”. This means that the user expert should not evaluate or interpret the information communicated by the citizen. If the citizen does not have the ability to communicate his problems, then the documentation on the citizen's everyday life (A) is left incomplete. In this case, relatives or friends, who know the citizen well, can be a source for obtaining the missing information. However, this circumstance must be well documented and a differentiation between the relatives’ and citizen’s comments has to be explicitly mentioned. In this sense, the forms used for assessing the citizen's everyday life (A) include a specific comment box for including relatives’ comments.

If the citizen is able to complete the forms on his own, he can do so. However, it should be taken into consideration that the citizen's everyday life (A) is a professional tool at the same level as the rest of elements in "ICF Persona version", and that the fields to be filled in are not self-explanatory and are not designed to be further explained to the citizen. The citizen has to understand that the documentation is just one of the elements of the whole decision process, and not the only basis for the final decision.

The template used for gathering the everyday life information is as follows:

ADL ↓	Answer Category →	Performance				Relevance	
		Perform	Perform Part of	Do not perform	Not relevant	Do not experience limitations	Experience limitations
Work/ Education							
Contact to family & friends							
Interests / hobbies							
Meals							
Personal hygiene							
Daily housekeeping							
Maintenance of house and garden							
Shopping							

Figure 10: Data input template for everyday life

The terminology descriptions are relative; an activity should include those aspects which are important to the specific individual. By documenting the results, user experts ensure that the citizen's point of view is recorded correctly in the nine activities, as given in the above definitions.

The template allows the activities that are carried out by the user to be recorded, along with the individual levels of performance. The performance is registered and catalogued in 4 categories which are mutually exclusive:

- Performing the activity: the citizen may be able to perform the activity without any difficulty or with difficulty which can create time issues during the activity.

- The citizen performs a part of the activity: this may or may not be difficult. The rest of the activity is either not completed or the citizen receives help from others in order to perform the rest of the activity. In this case, it is, therefore, not relevant exactly who assists the citizen (network and/or professional).

- The citizen does not perform the activity: either the activity is not accomplished, or it is performed by others on behalf of the citizen. It is therefore, in this case, not relevant exactly who assists the citizen (network and /or professional).

- Not relevant: this answer category is used, if the activity is no longer relevant for the individual. This can, for example, be categories such as work/education if the citizen is retired. Finally, this answer category can be used, if the user expert has not had the opportunity to ask about the citizen's experience with regard to the specific activity.

Additionally, the template enables the relevancy to be recorded and defined as to the existence or absence of limitations in performing an activity. The possible options are, again, mutually exclusive:

- The citizen does not experience limitations: the citizen does not want to change the way the activity is performed. The answer category, therefore, also contains the citizen's wish to perform the activity even though it may be difficult. The citizen has accepted the limitations that exist when the activity is performed.

- The citizen experiences limitations: in this category, it is understood that the citizen wants the performance of the activity to be changed. The citizen has not accepted, or is not satisfied with the way things are and wants either the actual activity or the results to be changed.

Finally, in order to determine whether the citizen is motivated to change the performance of the activities, the user expert will ask for the reasons for the experienced limitations. In the dialogue with the citizen, there should be a specific focus on determining whether the citizen is motivated to put an effort into becoming more independent, or whether there is a basis to motivate the citizen to realize his own resources, so that he can become independent.

2.2.2. The Professional Evaluation (B1)

The Professional Evaluation (B1) part of the “ICF Persona version” is focuses on identifying and documenting all the vital information with regard to the individual's functional ability. It is here that the consequences of weakness, illness and/or a handicap are brought to light.

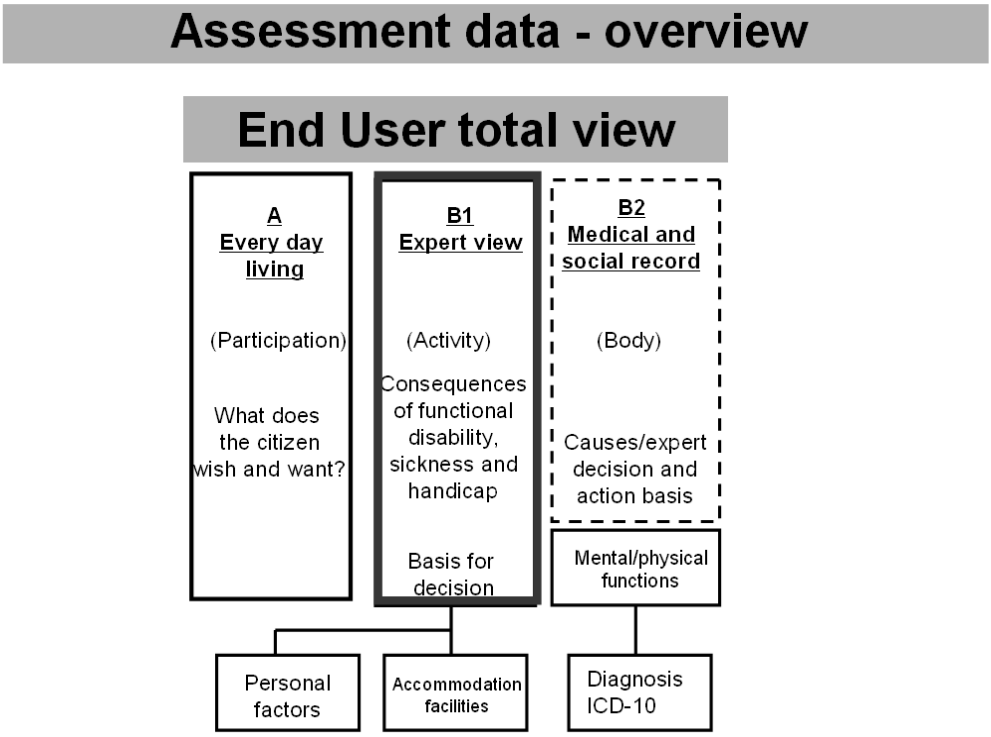

Figure 11: Assessment data overview – B1 professional evaluation

The evaluation of the citizen's functional ability is based on the opinions of the citizens themselves, their relatives, professionals, user experts' experiences, observations, and practical tests in which the user expert asks the citizen to show how he tackles particular activities. In the Professional Evaluation (B1), an activity observation is conducted. The user expert documents the consequences of illness, weakness and/or a handicap for the individual.

The Professional Evaluation (B1) documents what the citizen accomplishes during the evaluation. The citizen's ability to accomplish a chosen activity is evaluated independently of the citizen's interests, gender, culture, etc.

The general personal activities include the basic daily activities which are necessary for everyone, independent of gender, culture, living quarters, and interests. If a citizen does not perform personal activities, it is due to his limitations (i.e. low physical or psychological function ability or special social problems). Additionally, there are more complex activities which are also essential for living an independent life in society. Combined activities are affected by the citizen's interests, gender, culture, etc. The prioritization of these combined activities is different for each selected citizen.

The Professional Evaluation (B1) entails 17 activities selected from a trained professional user expert evaluation to describe a user profile. These activities are described in the following table:

Table 6. Professional Evaluation (B1) activities

ICF-Code	Activity in the user expert evaluation (B1)	Concept definition
B1-1	To eat	Take food up to the mouth and eat, to cut or break food into pieces and to use eating utensils (knife, fork, spoon) when food is served
B1-2a	To drink	Take fluid up to the mouth and drink, mix or stir fluids and use drinking utensils (straws) when fluid is served
B1-3	To take a bath	Wash the whole body using soap and water, and dry with a towel
B1-4	To wash	To wash body parts using soap and water and dry with a towel, for example a complete body wash, or just the hands and face etc.
B1-5	To groom the body	To look after the body, skin, face, teeth, hair, nails, and private parts which need a different way of washing and drying
B1-6	To get dressed and undressed	To dress and undress with the use of aids for clothes, footwear; furthermore, the choice of appropriate clothes (social context and the weather)
B1-7	To go to the toilet	Toilet visits and completion thereof, (incl. emptying and changing catheters or colostomy bags), and personal hygiene; including putting on and taking off clothes, putting on a nappy, a bag etc.); entails controlling urine and excrement
B1-8	To get around in the home	Mobility: the ability to move from one room to another (kitchen, bathroom, toilet, lounge and bedroom), and the ability to move in each of the rooms
B1-9	To shop for daily necessities	To go shopping, plan and buy everyday goods*; shopping and transport of goods, which are necessary for everyday life, such as food, drink, etc; finally, the activity entails being able to put the bought articles away
B1-10	To prepare food/meals	To cook*/prepare food (incl. opening/closing packaging), and serve food and drink for oneself, when all ingredients are on hand; the activity includes tidying and washing up before and after
B1-11	To clean	To clean*/tidy up, vacuum, use appliances, soap/water and cloths to keep the floor and surfaces in the particular rooms clean
B1-12	To do laundry/linen	To wash clothes*, the ability to keep clothes, towels, face cloths and bed sheets clean; entails sorting, washing, washing clothes using a washing machine or washing by hand, drying clothes, hanging them to dry, and putting the clothes away again, etc.
B1-13	To move around outside	Ability to function outside*: get in and out of one's own home, and the ability to get about outside; furthermore, the ability to get in and out of other buildings

ICF-Code	Activity in the user expert evaluation (B1)	Concept definition
B1-14	To use public transportation	To plan a journey, to get on and off public transport* such as the bus/train (use of taxi services is not included in this activity)
B1-15	To get around	To move oneself, for example, by getting up from the bed, move back and forth to one's chair; ability to change one's physical position between various positions, for example, lying, sitting, kneeling and standing; to sustain one's physical position (to keep the body in the same position depending on the need, for example, to stay lying down, seated, or standing)
B1-16	To prevent diseases or deterioration in functional ability	Prepare and plan, initiate and avoid actions which are detrimental to functional ability, so that activities are completed in accordance with what is necessary and appropriate in relation to the person's illness and general health
B1-17	To secure continuity in activities of daily life	To mutually ensure that plans are actively implemented in everyday activities, so that all activities are interlinked; an appropriate sequence of everyday activities is also necessary

The following terms have been used for the definition of the activities:

- To ensure/to plan and activate completion of an activity (to make sure that something is being done/completed): the activity is either completed by oneself or one is capable of activating others to complete the task, if one is unable to do so alone.

- To plan/to define what is needed in order for the activity to be completed: this means identifying and analyzing various options and thereby deciding which should be put into action. Also, here this includes the ability to connect actions and create a system.

- To activate/to take the initiative to complete an activity (i.e. to activate something).

It is important that the definitions of the activities are used as precisely as possible so that judgment can be made based on a background of combined definitions rather than the individual user expert's personal understanding of what an activity should entail. The idea is to create a clear image of the resources the citizen has in relation to the particular activity. For example, if we look at the activity "To take a bath" (B1-3), the citizen's ability to take a bath is evaluated when the citizen is in the bathroom. Limitations in the ability for the citizen to go into the bathroom are clarified in the evaluation of the activity. The ability to move around in one's own home is considered in B1-8 and limitations due to the current home will be documented under the home's interior design (C1) section. The activity "To take a bath" (B1-3) is mainly concerned with the mobility which is necessary for the individual to bath himself. It is, therefore, necessary to combine the evaluation of more activities (and factors) in order to retrieve a realistic image of the citizen's options for completing specific activities.

It must be mentioned that direct links cannot automatically be made between the evaluation of individual activities and the provision/refusal of services. If this occurs, then the council is not abiding by the law which states that decisions should be based on an overall evaluation.

Interpretational support to the individual activities

Interpretational support is a pedagogical guideline which cannot be placed under the definition of the activity but which can be equally necessary for evaluating the activity. This occurs when the definition of an activity is not clear enough to be understood. Normally, not all defined activities need interpretational support. There is a set of 6 activities given below that are considered to require further interpretation due to previous experience gained in conducting professional evaluations (B1):

- To eat (B1-1) and To drink (B1-2)

  The evaluation of "To eat" (B1-1) and "To drink" (B1-2) does not contain a normative evaluation of exactly what the citizen eats and drinks. If the user experts' evaluate that the diet is inadequate or that alcohol consumption is too high, then this may be included under the activity "To limit a worsening of illness/decline in functional ability" (B1-16).

- To cook food (B1-10)

  To cook food involves the preparation of both simple and combined meals. The functional level is reflected if the citizen, for example, is only able to prepare simple meals (breakfast and sandwiches) and is no longer able to prepare a warm meal. A citizen who uses a food service in the form of cold/warm meals is limited in the activity "To cook food" as the citizen cannot prepare food with all the elements that this entails. Opening packets and serving food is also included in the activity "To cook food" but is not to be included in the evaluation of the activities: "To eat/drink".

- To move around in one's own home (B1-8)

  The definition of "To move around in one's own home" includes limitations to the ability to move around the necessary rooms at home, which are the kitchen, bathroom, bedroom and living room. Factors that do not affect everyday decisions are not reflected in the judgment of functional level.

  Here, an evaluation of the citizen's functional level rather than an evaluation of the citizen's home is considered (i.e. Jens lives in a two-floor villa and cannot use the stairs any longer, but he wants to stay in this house. So he moves around on the lower floor and no longer needs to go upstairs in his everyday life. With this solution, Jens has the ability to move around the necessary rooms. It is naturally not the most optimal solution because he cannot go upstairs, but it does not affect the decision of the evaluation. If Jens experiences this situation as a problem, then it will be visible in the documentation in the citizen's everyday life (A) – and can also be noted in the description of Jen's home).

- The use of public transport (B1-14)

  To use public transport (B1-14) is exclusively focused on coming to and from public transport. The use of a taxi service is not incorporated. The citizen's ability to use public transport is largely dependent on the surroundings. Those situations, where there are no bus/train options available in his area or region can also be taken into consideration in the evaluation of the citizen's functional level. In these cases, it is recommended that the user expert records the activity as "not relevant".

- To limit the worsening of illness/ decline in functional ability (B1-16)

  In the previous activities, the evaluation of the citizen's ability to do a task is judged on a here-and-now perspective. However, the B1-16 evaluation is based on a normative estimation of the consequences that a citizen's behaviour has on his illness and functional level at a specific point in time.

  This normative estimation introduces the risk of conducting a subjective evaluation. In order to ensure an objective comparative evaluation, there is a need to be precise in the definition of when the citizen is limited in the activity (i.e. most people know that eating too much, being inactive, smoking, and drinking alcohol are all unhealthy, but these factors do not per definition limit activities).

  The citizen is limited in his ability to prevent a worsening of an illness or the loss of functional ability, if he is in a dangerous situation, or when his behaviour in the short and long term provokes a deterioration in his health. Even if the citizen is aware of the consequences of his actions, he may still continue to act irresponsibly (i.e. Birthe, who has smoker's lungs, continues to smoke regardless of recommendations from his doctor).

  There is a limitation when there is a high probability of the citizen's health status worsening due to his behaviour or habits, resulting in an unnecessary decline in functional ability. There must be a direct connection between the citizen's behaviour or habit and an expected worsening of his illness before any conclusion can be drawn with regard to limitations. The prognosis must be relatively certain; the focus here is on secondary and tertiary prevention.

2.2.3. The Functional levels

The user expert's professional evaluation of what the citizen is able or unable to do is documented within a framework of five functional levels (see the table below).

Table 7: Functional levels

0 No limitations	1 Light limitations	2 Moderate limitations	3 Severe limitations	4 Total limitations
The citizen is **independent** and has no **need for personal assistance** in order to perform the activity	The citizen is the **active part** and can with **light personal assistance** perform the activity	The citizen is the **active part** and can under the precondition of **moderate personal assistance** perform the activity	The citizen **participate** and can under the precondition of a comprehensive personal assistance perform the activity	The citizen is **unable by own participation** to perform the activity and **needs total personal assistance** to perform the activity

Each functional level describes what the citizen is able to do in relation to one specific activity. The functional level in the "ICF Persona version" shows to what degree the citizen is able to effect/complete the activity and to what degree the citizen needs and is dependent on help from others. If the citizen needs help to effect and/or complete an activity, then the citizen is by definition limited (2, 3) when a professional evaluation is made. The functional level does not state the reason for the limitation. In many cases limitations are due to physical function depreciation. These are documented in the Professional Journal (B2), also with regard to the classification of physical functions. Limitations can also be due to the unbeneficial interior design of the citizen's home; see the interior design of the home (C1).

The evaluation includes the medication received by the citizen and help appliances that the citizen uses at the time of the evaluation. The ability to complete the activity is evaluated for all activities. Previously, the activities are more defined and concrete whereas here the various elements connected to the individual activity are documented.

By looking at the citizen's own effort and potential need for help, it is easier to understand what is meant by the above-mentioned definitions; None/unimportant (0), slight (1), moderate (2), difficult (3) and total (4) limitations.

Personal assistance can be obtained from professional networks or similar. In this case, it is irrelevant who assists the citizen. Whether the citizen's help is covered by professionals or by their network is shown under the catalogue of effort areas (E).

The evaluation has to consider what the citizens themselves can do, also when a partner helps them to complete the tasks. Experience shows a tendency to document that the functional level is better or worse, depending on whether their partner helps with the task at hand. The user expert must verify where the partner is helping the citizen, and what the citizen can do by himself. The question is not how much help the citizen receives but rather how much help the citizen needs in order to be able to complete the activity at that moment in time of the evaluation.

The table below identifies the functional levels for the Professional Evaluation activities (B1).

Table 8: Functional levels in Professional Evaluation activities (B1)

Activities	Functional level	Not relevant
To eat	0 1 2 3 4	
To drink	0 1 2 3 4	
To take a bath	0 1 2 3 4	
To wash	0 1 2 3 4	
To nurse the body	0 1 2 3 4	
To get dressed and undressed	0 1 2 3 4	
To go to the toilet	0 1 2 3 4	
To get around in own accommodation	0 1 2 3 4	
To secure shopping of daily necessities	0 1 2 3 4	
To make food/meals	0 1 2 3 4	
To clean	0 1 2 3 4	
To do laundry/linen	0 1 2 3 4	
To move around outside	0 1 2 3 4	
To use public transportation	0 1 2 3 4	
To get around	0 1 2 3 4	
To prevent diseases or deterioration in functional ability	0 1 2 3 4	
To secure continuity in activities of daily life	0 1 2 3 4	

2.2.4. Health condition (B2-1)

PERSONA is not focused on offering health services to the users. Therefore, a basic classification of the citizen's health condition is sufficient. In this sense, it has been decided to use the ICD-10 (International Statistical Classification of Diseases and Related Health Problems) for assessing this element in the "ICF Persona version".

2.2.5. Contextual factors (C)

Documentation for reflecting the contextual factors has been limited in the "ICF Persona version" to contain general expressions about the home's interior design (C1) and personal factors (C2).

The Home's Interior Design (C1)

The environment, both inside and outside the home, may affect the citizen's ability to complete activities. In the "ICF Persona version", the scope is limited to an evaluation of the citizen's own home. Limitation in the citizen's home reflects the user expert's specific area of action. The interior design of the home can either promote or limit the citizen's ability to complete the tasks.

The records of the home's interior design (C1) are connected to the documentation in the Professional Evaluation (B1). The "ICF Persona version" includes an assessment of the degree of

limitation that the home's interior design may present in the citizen's ability to complete the activities:

- C1-1 The entry/exit of the home (from in the home to the outside)
- C1-2 The design of the kitchen
- C1-3 The design of the living room
- C1-4 The design of the bedroom
- C1-5 The design of the toilet
- C1-6 The design of the bathroom

The evaluation of C1-1 to C1-6 is recorded within the following framework:

Degree of compatibility	Design	Description
Compatible	Interior design	Does not present any limitations in the citizen's ability to complete daily activities.
Slightly incompatible	Interior design	Presents slight limitations in the citizen's ability to complete daily activities.
Moderately incompatible	Interior design	Presents moderate limitations in the citizen's ability to complete daily activities
Very incompatible	Interior design	Presents direct limitations in the citizen's ability to complete daily activities.
Totally incompatibility	Interior design	Totally limits the citizen's ability to complete daily activities.

Personal factors (C2)

Personal factors are what make humans different and unique. The "ICF Persona version" focuses on the citizen's capacity to master activities. The capacity to master events shows which resources (capacity) the citizen has in relation to his ability to act when unprepared situations occur, where the citizen does not necessarily know how to react.

The citizen's resources are, among others, a result of the socialization process which people experience throughout their life. People are influenced by living conditions, up-bringing, education, religion, etc. The citizen's mastering capacity determines how a citizen reacts and handles demands resulting from stressful situations, events and occurrences in life (stress

factors). It can, for example, result from sudden illness/a handicap, death, divorce or a weakness that has caused a loss in functional ability.

Stress factors lead to a cognitive and emotional state of tension creating a need to act with the intention of solving the problem (i.e. to eliminate stress). The effectiveness of this action depends on how attainable the citizen perceives the situation/demands to be. Situations are surmountable when one experiences internal and external stimulants which make sense, meaning that information is orderly, connected and structured (instead of being chaotic, confused, coincidental and unexplainable), and manageable (i.e. that the citizen experiences that he/she has the necessary resources to deal with the demands he/she is facing), and meaningful (situations that make sense and are considered as challenges worth getting involved in). That being the case, the citizen will be in a position to act and contemplate the effects/demands which he is experiencing.

A citizen, who experiences the situation as manageable, understandable and meaningful, masters the situation and uses resources to solve the problem actively, thinking ahead and in a positive manner. By focusing on the capacity to master a situation, the employee becomes aware of whether the citizen has the necessary resources to deal with the situation. If the necessary resources are not present, the employee can either develop or increase the citizen's resources or seek to adjust the demands made by his environment, so that the citizen experiences a connection and can therefore take appropriate action to take care of themselves, their family and their own situation.

In the "ICF Persona version", there is a general record of whether a citizen's capacity to master a situation is relatively low, middle or high. The comment is related to the Professional Evaluation (B1) and is connected to the specific decision. This is the creation of a momentary picture which serves as an indicator when working with management information.

3. SF-36 v2 Health survey in the scope of Persona

The SF-36 is a multi-purpose, short-form health survey with only 36 questions. It yields an 8-scale profile of functional health and well-being scores as well as psychometrically-based physical and mental health summary measures and a preference-based health utility index. It is a generic measure, as opposed to one that targets a specific age, disease, or treatment group. Accordingly, the SF-36 has proved useful in surveys of general and specific populations, comparing the relative burden of diseases, and in differentiating the health benefits produced by a wide range of different treatments.

The SF-36 survey will be used in PERSONA in combination with the previously described “ICF Persona version” as a supporting method for defining the user profile.

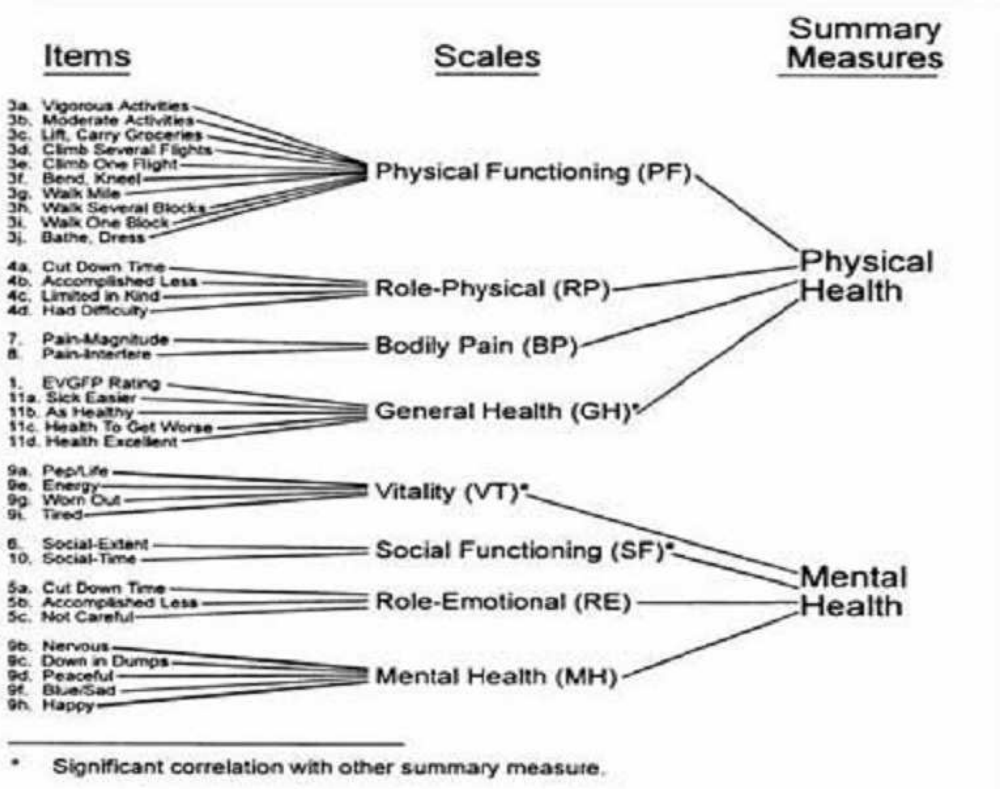

Figure 12: SF-36 v2

ANNEX

PROJECTS FUNDED UNDER THE AMBIENT ASSISTED LIVING JOINT PROGRAMME AAL JP

The First Call for Proposals AAL-2008-1

The first call aimed at launching European collaborative projects providing innovative ICT based solutions for elderly persons with identified risk factors and/or chronic conditions. The call envisaged the development of new solutions with a holistic approach, which includes prevention, management, support services and the social and socio-economic environment related to chronic conditions.

Funded projects must have a clear European dimension with high relevance for and maximum impact on the development of ICT. The call was published on 25 April 2008 and closed on 21 August 2008.

This list gives an overview on all 23 projects that are funded under the first call. All projects started in 2009 and run between 30 and 36 months.

Please visit www.aal-europe.eu to learn more details and to catch the latest information on the projects.

a^2e^2	Total Funding: € 2.6 million
Adaptive Ambient Empowerment of the Elderly Coordinator: Ute Ritterfeld, University of Amsterdam, VUA (NL) Partners: Amsta (NL), Hospital IT AS (NO), VTT Technical Research Centre of Finland (FI), Mawell Ltd (FI)	
a^2e^2 stands for an innovative ICT solution designed to prevent or/and manage elderly individuals' chronic diseases through an increase in physical activity, resulting in better physical and mental health, ultimately improving the quality of life of its users.	

AGNES	Total funding: € 2.6 million
User-Sensitive Home-based Systems for Successful Ageing in a Networked Society Coordinator: John Waterworth, Umeå University (SE) Partners: CanControls (DE), Research and Education Laboratory in Information Technologies-Athens Information Technology (GR), Graz University of Technology (AT), Universidad Nacional de Educación a Distancia (ES), ModernFamilies (AT), KMOP (EL), Onda Communication S.p.A. (IT), Fundacion Instituto Gerontologico Matía (ES), Skellefteå Kommun (SE)	
The vision is to provide a user-sensitive ICT-based home environment that supports a person-centric care process by detecting, communicating, and meaningfully responding to relevant states, situations, and activities of the elderly person with regard to mild cognitive impairment or dementia.	

ALADDIN	Total funding: € 1.4 million
A Technology Platform for the Assisted Living of Dementia Elderly Individuals and their Carers Coordinator: Maria Haritou, NTUA (GR) Partners: Aethia (IT), ATOS Origin (ES), Badalona Serveis Assistencials (ES), Psychiatric Hospital Of Attica (EL), Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. (DE), Institute of Communication & Computer Systems (EL), The National Hospital for Neurology & Neurosurgery (UK), Universita di Bologna (IT)	
The aim of the project is to utilise state-of-the-art in ICT in order to develop an integrated solution for the self-management of dementia patients, and develop innovative tools to support this procedure. This solution can be conceived as an integrated platform enabling distant monitoring of patient status and facilitating personalised intervention and adaptive care.	

AMICA	Total Funding: € 1.8 million
Autonomy, Motivation & Individual Self-Management for COPD patients Coordinator: Luis Felipe Crespo, Universidad de Cádiz (ES) Partners: Foundation for Biomedical Research Management of Cadiz (ES), Forschungszentrum Informatik (DE), Institute of Communication and Computer Systems (EL), Innovaciones Sociosanitarias S.L. (ES), MSC Gleichmann (ES), Vitaphone GmbH (DE)	
AMICA aims at providing medical management and medical care to patients suffering from Chronic Obstructive Pulmonary Disease (COPD) and to address these challenges by developing and assessing long-term COPD management solutions based on innovative Information and Communication Technologies.	

BEDMOND	Total Funding: € 1.3 million
Behaviour Pattern Based Assistant for Early Detection and Management Of Neurodegenerative Diseases Coordinator: Alberto Martínez, Fundación ROBOTIKER (ES) Partners: AIT Austrian Institute of Technology GmbH (AT), Center for Usability Research and Engineering (AT), Fundación Instituto Gerontológico Matía (ES), Meticube - Sistemas de Informação, Comunicação e Multimedia, Lda. (PT), Ibernex Ingeniería (ES)	
BEDMOND is an assistant for the health professional, a daily behaviour information provider to early diagnose mild cognitive impairment (MCI) stages as a first step of neurodegenerative diseases, focused in elderly people while living at home.	

CAPMOUSE	Total Funding: € 1.3 million
Development of a Non-Invasive Capacitive Sensor Oral Mouse Interface for the Disabled Elderly Coordinator: Tomas Brusell, Brusell Dental AS (NO) Partners: HMC International NV (BE), Pensionärernas Riksorganisation (SE), Lots Design (SE), Stinct (SE)	
With a non-invasive modus operandi, CAP MOUSE will use external capacitive sensors mounted on a CAP MOUSE headset to scan tongue movement and feed the signal into a processing unit that extracts and translates features from the signal into e.g. mouse clicks and commands of the integrated Mobile Device, thereby replacing the keyboard, the remote control and other electronic devices.	

CARE	Total Funding: € 1.7 million
Safe Private Homes for Elderly Persons Coordinator: Ahmed Nabil Belbachir, AIT Austrian Institute of Technology GmbH (AT) Partners: Budapest University of Technology and Economics, Biomedical Engineering Knowledge Centre (HU), Oy Exrei Ab (FI), SensoCube GmbH (DE), Senioren Wohnpark Weser GmbH (DE), Yrjö ja Hanna Ltd (FI)	
CARE targets the automated recognition and alarming of critical situations (like fall detection) using optical sensor and real-time processing while preserving the privacy and taking into account system dependability issues, especially ensuring reliability, availability, security, and safety from a holistic point of view.	

CCE	Total Funding: € 2.2 million
Connected Care for Elderly Persons Suffering from Dementia Coordinator: Dr. Ranjit Bassi, Building Research Establishment (UK) Partners: Budapest University of Technology and Economics, Biomedical Engineering Knowledge Centre (HU), Building Research Establishment (UK), Centrihealth (UK), Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. (DE), Hereward College (UK), Innomed Medical Inc. (HU), MedCom GmbH (DE), Hungarian Association of Home Care and Hospice (HU), Philips (NL), Peverel (UK), User Interface Design GmbH (DE)	
The project supports the development of an open, standardised, integrated European platform to deliver connected ICT-based assistive living solutions for the elderly.	

DOMEO	Total Funding: € 2.0 million
Domestic robot for Elderly Assistance Coordinator: Vincent Dupourque, Robosoft (FR) Partners: Université Pierre et Marie Curie – Paris 6 (FR), Centre Hospitalier Universitaire de Toulouse (FR), Országos Orvosi Rehabilitációs Intézet / National Institute for Medical Rehabilitation (HU), Vienna University of Technology (AT), Budapest University of Technology and Economics (HU), Meditech (HU), Thales Alenia Space (FR)	
The project will design and demonstrate the technical efficiency and the medical relevance of an open integration platform for eldercare robots configuration and deployment in real-world environment and for everyday life requirements.	

eCAALYX	Total Funding: € 2.7 million
Enhanced Complete Ambient Assisted Experiment Coordinator: Mª Carmen Margelí, CETEMMSA (ES) Partners: Telefónica Investigación y Desarrollo (ES), Instituto de Engenharia de Sistemas e Computadores do Porto (PT), University of Plymouth Enterprise Ltd (UK), University of Limerick (IE), Fundació Hospital Comarcal Sant Antoni Abat (ES), Fraunhofer Portugal (PT), Corscience GmbH & Co KG (DE), Ev. Krankenhaus Witten GmbH (DE)	
eCAALYX will develop an efficient AAL solution for several chronic conditions that can provide reliable long-term and maintenance-free operation in non-technical environments, thus, ready for real-world deployment.	

EMOTIONAAL	Total Funding: € 2.7 million
The Emotional Village: Integrated Preventive AAL Concept For the Rural Aging Society in Europe Coordinator: Dr. Hans-Otto Maier, BBRAUN Melsungen AG (DE) Partners: Opsolution NanoPhotonics GmbH (DE), German Retail Federation/ EHV Hesse-North e.V. (DE), University of Marburg (DE), University of Kassel (DE), Diaconia University of Applied Sciences (FI), Vitaphone GmbH (AT), German Aerospace Centre (DE), Protestant University of Applied Sciences (DE), Activesoft LTD (FI)	
EMOTIONAAL specifically targets at elderly persons living in rural areas and offers them an integrated seamless solution including social services and new technologies to support self care, prevention and assistance to carry out daily activities, health and activity monitoring and enhances safety and security.	

H@H	Total Funding: € 1.4 million
Health@Home Coordinator: Luca Fanucci, Consorzio Pisa Ricerce (IT) Partners: Caen Aurelia Space (IT), Caribel Programmazione Srl (IT), Centro Andaluz de Innovación y Tecnologías de la Información y las Comunicaciones (ES), Consorzio Pisa Ricerche (IT), Fondazione Gabriele Monasterio (IT), Mediasoft Ltd (SI), Hospitales Universitarios "Virgen del Rocío" (ES), Zdravstveni dom Koper (SI)	
The H@H addresses elderly citizens affected by Chronic Heart Failure (CHF), providing them with wearable sensor devices for monitoring of cardiovascular and respiratory parameters and, at the same time, enabling the medical staff to remotely supervise their situations and taking actions by involving public/private healthcare organizations.	

Happy Ageing	Total Funding: € 0.9 million
A Home Based Approach to the Years of Ageing Coordinator: Fiorella Marcellini, Istituto Nazionale di Riposo e cura per Anziani V.E. II (IT) Partners: Fundació Privada Cetemmsa (ES), Speed Automazione Srl (IT), Global Security Intelligence Limited (UK), AB.ACUS SRL (IT), Institute of Sociology, Hungarian Academy of Sciences (HU), The Association of Catholic Organisations of Senior Citizens in the Netherlands (NL)	
The HAPPY AGEING project approaches main limitations due to chronic diseases, low vision or malnutrition and dehydration and manages the individual needs of dietary control, safety and wellbeing. The HAPPY AGEING system will be composed of three modules, including a lifestyle monitor for recording main activities, a navigation assistant to support user's mobility in close environment and a personal assistant to support performing distinct actions.	

HELP	Total Funding: € 2.5 million
Home-based Empowered Living for Parkinson's Disease Patients Coordinator: Luis Pablo del Arbol Perez, Telefonica Investigacion y Desarrollo (ES) Partners: Hahn-Schickard-Gesellschaft für angewandte Forschung e.V. (DE), Nevet Ltd (IL), Mobile Solution Group GmbH (DE), SALIWELL Ltd (IL), Telefonica Investigacion y Desarrollo Sociedad Anonima Unipersonal (ES), Telecom Italia S.p.A. (IT), University and Hospital of Palermo (IT)	
The project integrates a complex system that dynamically monitors and treats Parkinson's Disease patients. The system comprises a non-invasive intra-oral drug delivery device, a pump to deliver rescue medication, a PAN (Personal Area Network) to gather user's environment information, a telecommunication and services infrastructure to transfer information between the user and an automated system and a remote point-of-care unit to supervise the patients.	

HERA	Total Funding: € 1.2 million
Home Services for Specialised Elderly Assisted Living Coordinator: Heidrun Häfele, Telekom Austria TA AG (AT) Partners: Alcatel Lucent Deutschland AG (DE), Forschungsinstitut des Roten Kreuzes (AT), DIAGNOSTIC AND THERAPEUTIC CENTER OF ATHENS- "HYGEIA" SOCIETE ANONYME (GR), Paris Descartes University (FR), SingularLogic S.A (GR), SOLINET GmbH Telecommunications (DE)	
The HERA project aims at providing a platform with cost-effective specialised assisted living services for the elderly people suffering from mild Alzheimer or cardiovascular diseases with identified risk factors, which will significantly improve the quality of their home life, extend its duration and at the same time reinforce social networking.	

HMFM	Total Funding: € 1.5 million
Hear Me Feel Me - Compensating for Eyesight with Mobile Technology Coordinator: Minna Isomursu, Technical Research Centre of Finland (FI) Partners: Fundación ROBOTIKER (ES), Organización Nacional de Ciegos Españoles (ES), Nokia Corporation (FI), ToP Tunniste Oy (FI), Caritas Foundation (FI), Finnish Federation of the Visually Impaired (FI), Oulun 6. Joutsen apteekki (FI), National Center for Scientific Research "Demokritos" (GR)	
The HMFM project explores services related to medication and medicine related information and services, and to health monitoring and diet information. Enabling technologies for the services will be mobile devices and near field communication (NFC) technology.	

HOPE	Total Funding: € 1.1 million
Smart Home for Elderly People Coordinator: Dimitrios Kilias, RTEL SA (GR) Partners: Unita Operativa Geriatria & Laboratorio di Recerca Gerontologia-Geriatria - IRCCS Casa Sollievo della Sofferenza, San Giovanni Rotondo (IT), CETEMMSA Technology Centre (ES), Andalusian Centre of Innovation, Information and Communication Technologies (CITIC Foundation) (ES), KMOP Organization (GR), Integrated Information systems SA (GR), TRACS SRL (IT), FORUS SRL (IT)	
The Hope project addresses elderly people that suffer from Alzheimer's disease to achieve a richer lifestyle. An ICT system will enable persons to perform activities they were not able to do before and which are important for their daily personal life. The proposed system provides a basis for integrating further services, e.g. control of the home environment.	

IS-ACTIVE	Total Funding: € 1.3 million
Inertial Sensing Systems for Advanced Chronic Condition Monitoring and Risk Prevention Coordinator: Paul Havinga, University of Twente, CTIT (NL) Partners: University Hospital Elias (RO), Inertia Technology (NL), Northern Research Institute Tromsø (NO), Norwegian Centre for Telemedicine, University Hospital of North Norway (NO), PROSYS PC (RO), Roessingh Research & Development (NL)	
The IS-ACTIVE project emphasises the role of the home as care environment, by providing real-time support to patients in order to monitor, self-manage and improve their physical condition according to their specific situation. The project addresses all development phases of a prototype wireless sensing platform, from hardware platforms and software packages to algorithms and user interfacing and aims to introduce the platform 2 years after the project end.	

PAMAP	Total Funding: € 1.8 million
Physical Activity Monitoring for Aging People Coordinator: Didier Stricker, Deutsches Forschungszentrum für Künstliche Intelligenz GmbH (DE) Partners: Foundation Alfred de Rothschild (FR), Intracom Telecom S.A. (EL), Trivisio Prototyping GmbH (DE), Université de Technologie de Compiègne (FR)	
PAMAP will develop an unobtrusive and fully mobile system that enables the accurate monitoring of the physical activities of aging people. The system will be based on a set of tiny MEMS sensor units and dedicated software for professional and private use. It will rely on a sounded bio-mechanical model of the human body, measure accurately the motions and efforts of the upper and lower limbs, thanks to an appropriate parameterization.	

REMOTE	Total Funding: € 2.2 million
Remote Health and Social Care for Independent Living of Isolated Elderly with Chronic Conditions Coordinator: María García Robledo, SIEMENS S.A. (ES) Partners: Fraunhofer Gesellschaft zur Förderung der angewandten Forschung e.V. (DE), Fundación para la Investigación Médica Aplicada (ES), Foundation for Research and Technology - Hellas (EL), MEDEA SRL (IT), Netscouts gemeinnuetzige GmbH (DE), Norwegian Centre for Telemedicine (NO), Ortholine LTD (IS), Saliwell Ltd. (IS), TSB Soluciones S.A. (ES), Universidad Politecnica de Madrid (ES)	
REMOTE will advance the Software Architecture in fields of tele-healthcare by enhancing the elderly's home with audio-visual, sensor/motoric monitoring and automation abilities to trace vital signs, activity, behaviour and health condition, and detect risks and critical situations, as well as provide, effective and efficient support at home.	

RGS	Total Funding: € 1.8 million
Rehabilitation Gaming System Coordinator: Dr. Paul Verschure, Universitat Pompeu Fabra (ES) Partners: Fundación Privada Tic I Salut (ES), Guger Technologies OEG (AT), University Hospital Düsseldorf, Heinrich-Heine-Universität Düsseldorf (DE), Hospital del Mar i de la Esperança (ES), Hospital Vall d'Hebron (ES), Tyromotion GmbH (AT)	
The Rehabilitation Gaming System consortium will develop and test a virtual reality based system that will allow an elderly person who suffered a stroke, to take advantage of a novel ICT based product to manage their chronic condition. RGS deploys an individualized and specific deficit oriented training that combines movement execution with the observation of a correlated action by virtual limbs that are displayed in a first-person perspective.	

ROSETTA	Total Funding: € 2.3 million
Guidance and Awareness Services for Independent Living Coordinator: Irek Karkowski, TNO Defence, Security and Safety (NL) Partners: Avics B.V. (NL), CPS Europe BV (NL), EATON ELECTRIC bv (NL), Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. - Institute ESE (DE), I+ S.r.l. (IT), Landsbond Christelijke Mutualiteiten (BE), Novay (NL), TNO Defence, Security and Safety (NL), Vilans (NL), VU medisch centrum (EMGO Instituut) (NL), Westpfalz-Klinikum GmbH (DE), Stichting Zorgpalet Baarn-Soest (NL), CIBEK technology + trading GmbH (DE)	
ROSETTA will help community dwelling people with progressive chronic disabilities (i.e. Alzheimer's Disease and Parkinson's Disease) to retain their autonomy and quality of life as much as possible and to support their (in)formal caregivers by developing and providing an ICT system that offers activity guidance and awareness services for independent living.	

SOFTCARE	Total Funding: € 0.7 million
Kit for Elderly Behaviour Monitoring by Localisation Recognition and Remote Sensoring Coordinator: Irene Larroy, Centre de Recerca i Investigatió de Catalunya S.A. (ES) Partners: Capex Health Ltd. (UK), Forschungsinstitut des Wiener Roten Kreuzes (AT), Ceit Raltec (AT), Meshworks Wireless Ltd. (FI)	
The proposed SOFTCARE technology will use behavioural patterns recognition and ZIGBEE sensing nodes to create an integral system for home monitoring which will greatly expand upon existing home-based health monitoring system, as it will take into account more than one chronic condition.	

The Second Call for Proposals AAL-2009-2

The objective of Call 2 in the AAL JP "ICT-based Solutions for Advancement of Social Interaction of Elderly People" was to launch European collaborative projects providing innovative ICT based solutions aimed at helping people to be active, joyful and socially connected in the society as they age, from both a societal and personal perspective, effectively contributing to their health, overall quality of life and to social inclusion.

The call closed on 5 May 2009. 104 projects were submitted.

ALIAS	Total Funding: € 2.3 million
Adaptable Ambient Living Assistant Coordinator: Dr. Frank Wallhoff, Technische Universität München (DE) Partners: Cognesys (DE), EURECOM (FR), Guger Technologies (AT), MetraLabs (DE), PME Familienservice GmbH (DE), Synergiums, Esch-sur-Alzette (LUX), Technische Universität Ilmenau (DE), YOUSE GmbH (DE)	
The objective of the project is the development of a mobile robot system that interacts with elderly users, monitoring and providing cognitive assistance in daily life, and also promoting social inclusion by creating connections to people and events in the wider world. The system is designed for people living at home alone or in care facilities such as nursing homes. www.aal-alias.eu	

ALICE	Total Funding: € 1.1 million
Advanced Lifestyle Improvement System & new Communication Experience Coordinator: Karin Rehatschek , Joanneum Research Forschungsgesellschaft mbH (AT) Partners: Zydacron Austria GmbH (AT), Thuisconnect iTip b.v. (NL), Ina Koning Verzoging BV (NL), AT4 Wireless S.A. (ES)	
Elderly people have limited mobility and are often bound to their home. The challenge addressed within ALICE is to prepare for elder years to become acceptable, meaningful and socially enjoyable. The project will research, develop and integrate a set of ICT- based services into the existing TV set, allowing elderly people to enjoy experiences of communication and social interaction based on ICT.	

AMCOSOP	Total Funding: € 1.4 million
Ambient Communication for Sense of Presence Coordinator: Jukka Vanhala, Tampere University of Technology (FI) Partners: Center for Usability Research & Engineering (AT), Space Hellas SA (GR), Saint George S.A (GR), Pirkanmaan Senioripalvelut Oy (FI)	
The AMCOSOP system aims to reduce the loneliness and fears of the elderly, living independently, by providing its users with a sense of presence with their family, friends, and health care personnel, i.e. to develop a software platform to manage communication and user-friendly terminal devices. Information is collected from "safety net" people and made visible to elderly people, giving them the ability to decide when to have social connections or other activities, or to use a service provided by the system.	

AWARE	Total Funding: € 0.7 million
Ageing Workforce towards an Active Retirement Coordinator: Alberto Ferreras, Instituto de Biomecánica de Valencia (ES) Partners: Calvet, Vila & Arriaga Consulting, S.L. (ES), Ayuntamiento de Gandía (ES), Unión Democrática de Pensionistas y Jubilados de España (ES), Media Touch (IT), Milecastle Consultancy Ltd (UK), Institut für Arbeitswissenschaft (DE)	
The AWARE project aims at developing a solution at European level for the social inclusion of retired, elderly people and at preparing older workers for the transition to retirement. The project will develop: a new Social Network, hosted on a telematic platform to provide innovative services to the target groups, a user-oriented platform (including chat, blogging, etc.), learning systems for training, a Knowledge Management and Sharing module, services enabling flexible workplaces and adaptations of home environments. http://aware.ibv.org	

Co-LIVING	Total Funding: € 2.7 million
Virtual Collaborative Social Living Community for the Elderly Coordinator: Jos Kemmerling, Orbis Medical & Care Group (NL) Partners: Philips Electronics Nederland B.V. (NL), University of Cyprus (CY), Stiftelsen SINTEF (NO), Instituto Pedro Nunes - Associação Para A Inovação E Desenvolvimento Em Ciência E Tecnologia (PT), Inovamais S.A. (PT), Citard Services LTD (CY), Andago Ingeniería S.L. (ES), Trondheim Kommune (NO)	
The goal of the project is the development of an ICT-based Virtual Collaborative Social Living Community for Elderly (Co-LIVING) people, aiming to stimulate and prolong their independent and active living in an outward environment through an advancement in elderly people's social interaction, thus contributing positively to their well-being. Co-LIVING is based on an innovative Social Community network (SoCo-net), integrating different mobile wireless ICT-based services addressing the elderly social-interaction context categories of Care & Wellness, Guidance and Mobility monitoring.	

CVN Network	Total Funding: € 1.9 million
Connected Vitality, the Personal Telepresence Network Coordinator: Robbert Smit, Presence Displays (NL) Partners: University of Cyprus(CY), Sensire (NL), Fundacion Andaluza de Servicios Sociales (ES), Gezondheidsinstituut NIGZ (NL), Municipality of Arvika (SE), University of Salzburg, ICT&S Center (AT), Budapest University of Technology and Economics (HU), FamCorner (IL)	
The consortium proposes to link groups of senior citizens into a client-server designed video communications network, coined Connected Vitality, the Personal Telepresence Network (CVN). The goal of the project is to have a small scale CVN network operational that is highly regarded by the elderly to fulfill meaningful social contacts and is intuitively suited to their needs and abilities. www.connectedvitality.eu	

E2C	Total Funding: € 1.7 million
Express to Connect Coordinator: Thomas Hammer-Jakobsen, Copenhagen Living Lab (DK) Partners: Waag Society (NL), Forum Virium Helsinki (FI), Laurea-ammattikorkeakoulu Oy (FI), Halmstad University (SE), Substanz (DK), Heutink (NL), Multi Media Table BV (NL), Halmstad Municipality (SE)	
The objective for the E2C is to develop, test and deploy a web service which stimulates and facilitates personal storytelling, and to enable interest-based connections and communications among elderly people. This is done by applying specific, relevant media-content and social media principles (for instance YouTube and Facebook) which are not broadly used by elderly people today. The E2C solution is targeted at a point in the service ecology (value chain) where it can contribute to a decrease in care and health related social costs, and a rise in the quality of life among elderly people. www.express2connect.org	

EasyReach	Total Funding: € 1.3 million
Fostering the social interactions of home-bound and less educated elderly people Coordinator: Roberto Bisiani, Università degli Studi di Milano-Bicocca (IT) Partners: Fondazione Ugo Bordoni (IT), Consiglio Nazionale delle Ricerche (IT), FIMI S.r.l. (IT), Center for Research and Technology Thessaly (GR), iKnowHow Informatics S.A. (GR), Universitaet Potsdam (DE)	
The project will build a system, called EasyReach that supports many styles of social interaction between users. ICT solutions will allow elderly and less educated people to participate in the benefits of IT-based social interactions. The software will run in a set-top box that has a DVB-T decoder, a GSM/UMTS modem and a TV output. Social exchanges will be managed and aided by a "social interaction agent" that resides in the set-top box.	

ELDER-SPACES	Total Funding: € 1.3 million
Managing Elderly Social Relationships for better Communication, Activation and Interaction Coordinator: Nicolaos Bezerianos, BYTE COMPUTER SA (GR) Partners: Origo Media and Communication Ltd. (HU), e-TRIKALA (GR), Evangelische Stiftung Volmarstein, Forschungsinstitut Technologie und Behinderung (DE), Semmelweis University (HU), SingularLogic Information Systems & Applications SA (GR), Cybion Srl (IT)	
Elder-Spaces aim to enable senior adults to benefit from social networking in terms of social activation, active living and overall quality of life. Elder-Spaces will design a novel ICT-based social networking platform (beyond existing elderly networks) along with a range of applications that will be delivered over this platform. It intends to become synonymous to ICT-based social networking for the elderly, much in the same way platforms such as facebook.com and myspace.com are for younger generations.	

ExCITE	Total Funding: € 1.4 million
Enabling Social Interaction Through Embodiment Coordinator: Silvia Coradeschi, Örebro University (SE) Partners: Giraff AB (SE), Consiglio Nazionale delle Ricerche – ISTC (IT), RatioConsulta SpA (IT), University of Malaga (ES), Örebro City Council (SE)	
The purpose of EXCITE is - on an in-situ, longitudinal, and pan-European scale - to evaluate users' requirements for robotic telepresence employing the Giraff robotive platform. The two main goals of the proposal are to learn how to improve the quality of life for the elderly living at home by enabling social connection through telepresence embodiment, and to begin deployment of a commercial robotic telepresence product within 2-3 years of the study start. www.excite.org	

FamConnector	Total Funding: € 1 million
Activity based, inter-generational ICT interactions Coordinator: Dror Oberman, FamCorner Ltd (IL) Partners: Yrjö and Hanna Foundation (FI), Grandparents Plus (UK), HILFSWERK SALZBURG (AT), University of Salzburg (AT), University St. Gallen (CH), terz Stiftung (CH)	
FamConnector is designed to establish and nurture older adults' connection to their grandchildren and loved ones, enriching their lives, engaging their minds and fostering meaningful relationships through new, content-rich experiences. The aim is to be Europe's leading generic product in the field of meaningful, online inter-generational interactions between older adults and young children, and other geographically distant family members.	

FoSIBLE	Total Funding: € 2.1 million
Fostering Social Interactions for a Better Life of the Elderly Coordinator: Jurgen Ziegler, University of Duisburg-Essen (DE) Partners: Fraunhofer Institute of Microelectronic Circuits and Systems (DE), University of Siegen (DE), UTT Troyes (FR), Kaasa solution GmbH (DE), Mauser Einrichtungssysteme GmbH & Co. KG (DE), Center for Usability Research & Engineering (AT), Austrian Institute of Technology (AT), Les Arcades (FR)	
FoSIBLE project is twofold: 1. The development of an innovative social media platform which opens up the homes of elderly people into a social interaction space which is to access, to use and to control intuitively for people not being familiar with new media. 2. The development of innovative methodologies for user-centered and practice-based ICT, designed to succeed in addressing the needs of the EU.	

Go-myLife	Total Funding: € 1.5 million
Going on line: my social Life Coordinator: Francesco Dandria, ATOS Origin Sociedad Anonima Espanola (ES) Partners: THE 451 Group Limited (UK), Institute of Communication and Computer Systems (GR), Centre for Social Innovation (AT), IS Communications Ltd (UK), Andago Ingeniería S.L. (ES), Stowarzyszenie Spoleczenstwa Wiedzy (PL)	
Go-myLife will provide an online social network (OSN) platform built around the needs of elderly people. It will be fully integrated with existing OSNs, from where elderly people can post messages, receive updates, and take part in discussions across a variety of other OSNs, thus bringing existing communities together. The platform will be designed as a mobile one, optimized for access via a Smartphone.	

HELASCoL	Total Funding: € 0.93 million
Helping elders to live an active and socially connected life by involving them in digital society Coordinator: Bela Batizi Pocsi, Metacom Holding (HU) Partners: Meticube - Engenharia de Software (PT), Scuola Universitaria Professionale della Svizzera Italiana (CH), Ericsson Magyarország Kft. (HU), Parco Maraini Residence - Clinica al Parco SA (CH), City of Kecel Local Government (HU)	
The project aims at bringing services to elderly people's preferred technological platform, i.e. the television, and helping them to be active members of a Digital Society, living an active and meaningful life connected to their surroundings, families, friends and neighbors. The result will be a service package based on 5 pillars: 1. communication (e.g. chat, video), 2. entertainment (e.g. mind training games, social network), 3. accessibility (e.g. voice recognition, reading aloud), 4. active lifestyle and keeping healthy 5. smart energy efficiency management.	

HOMEdotOLD	Total Funding: € 1.8 million
HOME services aDvancing the sOcial inTeractiOn of eLDerly people Coordinator: Gianna Tsakou, Singkioular Lotzik Anonymos Etairia Pliroforiakon Systimaton & Efarmogon (GR) Partners: Telekom Austria TA AG (AT), Philips Consumer Lifestyle B.V. (NL), TELETEL SA (GR), SOLINET GmbH Telecommunications (DE), Forschungsinstitut des Roten Kreuzes (AT), Municipality of Kropia (GR), Stichting Nationaal Ouderenfonds (NL)	
HOMEdotOLD is TV-based platform with cost-effective services. The project delivers an open platform for services advancing the social interaction of elderly people. The focus will be on the development of the following two main categories of services: 1. Personal motivation services, i.e. services for staying socially active, preventing loneliness and isolation, enabling voluntariness, motivation. 2. Social networking services, i.e. services for bridging distances (relatives, friends).	

HOPES	Total Funding: € 2.29 million
Help and social interaction for the elderly On a multimedia Platform with E-Social best practices Coordinator: Christian Schoen, GTN SAS (FR) Partners: Microsoft UK (UK), Universität Stuttgart IAT (DE), LUISS Guido Carli CerSI (IT), Hôpital Avicenne, CHU Bobigny APHP (FR), Sport Initiative et Loisir Bleu (FR), Cup2000 (IT)	
HOPES aims at developing an intelligent multimedia platform providing innovative social e-services for European elderly persons and their social entourage. The project will create a European network dedicated to social interactions of the elderly and self-animated by its adherents.	

Join-in	Total Funding: € 2.0 million
Senior Citizens Overcoming Barriers by Joining Fun Activities Coordinator: Claudia Hildebrand, Helmholtz Zentrum München German Research Center for Environmental Health GmbH (DE) Partners: Bull Hungary (HU), Diakonie München Moosach (DE), Institute of Technology (IE), Northern Research Institute (NO), Norwegian Centre for Telemedicine (NO), Pasife GmbH (DE), Valentia Technologies (IE), HappyWise Ltd. (FI), Bethesda Hospital of the Hungarian Reformed Church (HU)	
Join-in will assess possibilities of counteracting isolation and find out whether these are the same in the different participating countries. The project will create an environment that lets elderly people socialise, play (social) computer games and exercise (exergames) either on a PC or on a TV using a low-cost set-top box. The project will develop a set-top box based on Free Open Source Software, adapt video games and other facilities to meet the special needs of the elderly.	

NoBits	Total Funding: € 1.9 million
Nostalgia Bits Coordinator: Daniel Bits, Origo Media and Communication Services Ltd. (HU) Partners: Aranyalkony (HU), GFTH (HU), Product Value Systems AG (DE), University of Applied Sciences West-Switzerland (CH), Hepta.aereo (CH), FIMI PHILIPS (IT), Istituto Auxologico Italiano (IT), FamCorner Ltd (IL), Atlantis Consulting (GR), Mobility and Multimedia Coordination Office Nonprofit Ltd. (HU)	
The project is developing a program to help elderly people to connect with their children through capturing the historical data of their life experiences. Their grandchildren should be involved by helping their parent to digitize "nostalgia bits": old photographs, postcards, newspapers, films, letters and audio content.	

PeerAssist	Total Funding: € 2.15 million
A P2P platform supporting virtual communities to assist independent living for senior citizens Coordinator: Lazaros Merakos, University of Athens (GR) Partners: seekda GmbH (AT), inAccess Networks (GR), Warp Networks, S.L. (ES), Fundación Instituto Gerontologico Matia (ES), Municipality of Athens Development Agency (GR), Semantic Technology Institute Innsbruck (AT)	
The objectives of the project are the conceptualisation, design, implementation and demonstration of a flexible end-to-end, Peer-to-Peer platform, which allows elderly people to build virtual communities dynamically, based on the interests and needs they share. P2P interaction is achieved using information extracted from peer roles, profiles and user models, and contexts describing the overall user environment, and is driven by a specific elder-user request for service.	

SeniorChannel	Total Funding: € 2.3 million
An Interactive Digital TV Channel for Promoting Social Interaction amongst Elderly People Coordinator: Yolanda Hernandez, INDRA Software Lab (ES) Partners: University of Padova (IT), Brainstorm Multimedia, S.L (ES), Audemat (FR), WinMedia (FR), LInköping University (SE), M31 Spa (Italy)	
The goal is to build on advances in ICT to develop an innovative, easy-to-use solution for addressing the problem of isolation among elderly people who may find themselves prohibited in their ability to socialize and interact in the community for a number of reasons e.g. physical, psychological, psycho-social or cultural. Furthermore, the project will give elderly care professionals an innovative approach to managing the specific social needs of the elderly in the wider community.	

Seniorengage	Total Funding: € 0.88 million
Virtual network to empower the integration of senior citizens into an active community in post retirement Coordinator: Alberto Nieto, Centre de Recerca i Investigació de Catalunya S.A (ES) Partners: Feltalálói És Kutató Központ Szolgátató Kft (HU), Center for Usability Research & Engineering (AT), JAMK University of Applied Sciences (FI), Microlink PC Ltd (UK), Care Giving Relatives Of Jyväskylä Region (FI)	
The project will offer a web-based learning system adapted for senior citizens. The platform will represent a virtual environment where senior citizens (retired professionals) can, on the one hand learn, and on the other hand, be connected to others, offering their expertise and continuing to actively participate in their profession for a mutually beneficial educational and social exchange.	

SilverGame	Total Funding: € 1.85 million
SilverGame Cordinator: Joachim Senger, Exozet Berlin GmbH (DE) Partners: Audio Riders Oy (FI), Austrian Research Centers GmbH (AT), The Golden-Oldies Charitable Trust (UK), Fraunhofer Institute for Computer Architecture and Software Technology (DE), Rehazentrum Lübben - Fachklinik für Orthopädie und Onkologie (DE)	
SilverGame aims to provide attractive and stimulating game-based multimedia applications that foster the social connection and interaction of elderly people with society. The European silver gaming platform draws on a new approach, combining the stimulation of human senses via entertainment-based interaction and web-based information services. www.silvergame.eu	

SI-Screen	Total Funding: € 1.6 million
Social Interaction Screen Coordinator: Katja Popp, SportKreativWerkstatt GmbH (DE) Partners: Instituto De Biomecánica De Valencia (ES), tioman & partners, s.l. (ES), Vios Medien GmbH (DE), Bundeswehr University Munich (DE), FONOLAR - Servicios De Teleasistencia, S.A. (ES), Federació d'Associacions de Gent Gran de Catalunya (ES), Data United GmbH (DE), Porsche Design GmbH (AT), helios SNC di Kofler Patrick & C. - Agenzia di comunicazione audiovisiva (IT)	
The project aims to create a new user-oriented social interaction tool that enables elderly people to stay or get in touch with family, friends and neighbors, and which helps to find local activities, health and well-being offers. The basic product functions are easy drag and drop features, slideshows, (video) calls with family, friends and care providers, suitable activity offers for physical and emotional needs and interests, and the integration of local services.	

SoMedAll	Total Funding: € 0.79 million
Social Media for All elderly people Coordinator: Tuula Petakoski-Hult, Technical Research Centre of Finland (FI) Partners: Miina Sillanpää Säätiö (FI), Aldia Societa' Cooperativa (IT), National Inter-University Consortium for Telecommunications (IT), Mediasoft Ltd (SI), Conga Group (FI)	
Objective is to make social media usable for elderly people by: building social media applications and activities around the content; providing easy ways to create, store and share knowledge, experiences and memories; supporting online communication, and creating social networks (e.g. family and friends, former colleagues); developing tools that support co-experience and co-presence; developing easy, adaptable and guided user interfaces for creating, managing and sharing content.	

TAO	Total Funding: € 1.95 million
TAO Community & Collaboration (TAO = Third Age Online) Coordinator: Beat Estermann, Bern University of Applied Sciences + 8 Swiss partners (CH) Partners: UNU-MERIT (NL), Zentrum für Allgemeine Wissenschaftliche Weiterbildung der Universität Ulm (DE), Seniorweb Netherlands (NL), Wikimedia Deutschland - Gesellschaft zur Förderung Freien Wissens e. V. (DE)	
The project aims at facilitating and promoting access for elderly and early retired people to online collaboration projects. It addresses two major challenges: (1) the development, testing and dissemination of effective methods to encourage elderly people to take an active part in online communities and to facilitate intergenerational integration in such communities; (2) user interface design and functionality design tailored to the special needs of the elderly. www.thirdageonline.eu	

Osteolink (T-Break)	Total Funding: € 1.54 million
T-Break campaign Coordinator: Victoria Monti, University of Geneva, Faculty of Medicine, Division for bone disease (CH) Partners: Amgen (Europe) GmbH (CH), International Osteoporosis Foundation (CH), Hill & Knowlton (UK), Blue State Digital (UK), Action for Healthy Bones (AT)	
T-Break is the first European collaboration designed to develop a service to be utilized by a multifaceted market segment. This includes end users (i.e. individuals diagnosed with osteoporosis), end user groups including patient support groups, doctors, companies interested in osteoporosis, and public policy makers.	

TRAINUTRI	Total Funding: € 1.66 million
TRAINUTRI Coordinator: Inma Luengo, Planet Media Studios SL (ES) Partners: Universidad Politécnica de Madrid (ES), Kendro Merimnas Oikoyenias kai Pediou (GR), Universidad Carlos III de Madrid (ES), University Geneva (CH), NetUnion SarL Lausanne (CH), arx iT SA Geneva (CH)	
TRAINUTRI will offer services oriented to achieve: 1. A network of peers involved with healthy living habits and goals (users and fellow users, trainers, nutrition experts, etc). 2. Healthy eating habits evaluation and support for sensible nutrition. 3. Adequate and enjoyable exercise evaluation and support for physical and mental training. Virtual reality tools will be the basis of these services.	

WeCare	Total Funding: € 1.86 million
AAL WeCare 2.0 Coordinator: Christine Balch, Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek (NL) Partners: Ericsson Telecommunicatie B.V. (NL), ShareCare (NL), Algemene nederlandse bond voor ouderen (NL), Institute of Innovation for Human Wellbeing (ES), Fundación Andaluza de Servicios Sociales (ES), VTT Technical Research Centre of Finland (FI), Videra Ltd. (FI), Caritas Foundation (FI), Skytek Ltd. (IE)	
WeCare will develop attractive and stimulating game-based multimedia applications that foster the social connection and interaction of elderly people with society. One internet service, WeCare 2.0, will integrate communication, coordination and information, and will help people to participate within and between social networks using adaptable Graphical User Interface technologies that focus on the needs and abilities of the end user and that can be deployed on multiple types of hardware ranging from mobile phones to interactive displays.	

V2me	Total Funding: € 2.4 million
Virtual Coach reaches out "to me" Coordinator: Reiner Wichert, Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung (DE) Partners: Diakonie Neuendettelsau (DE), Hospital IT AS (NO), MAWELL LTD (FI), User Interface Design GmbH (DE), VTT Technical Research Centre (FI), Technical University Graz (AT), University of Luxemburg (LUX), Vrije Universiteit Amsterdam, Center for Advanced Media Research Amsterdam (CAMeRA) (NL)	
V2me proposes an adaptive and cost-effective solution for the advancement of social interaction of senior individuals. This unique V2me approach combines state-of-the-art social science knowledge with high-tech R&D expertise to develop, evaluate and market an innovative ICT solution that excels in terms of (a) end user acceptance, (b) the potential to increase social connectedness and (c) personal well-being, and (d) reduced care costs.	

3rD-Life	Total Funding: € 0.8 million
3D virtual environment for social interaction of elderly people Coordinator: Cristina Buiza, Instituto Gerontológico Matía (ES) Partners: University of Ljubljana (SI), ONE2TRIBE sp. z o.o. (PL), Information & Image Management Systems, S.A (ES), Center for usability, research & engineering (AT)	
The 3rD-Life project aims to create a 3D virtual environment allowing end users, from their own homes and with only a normal PC and an Internet connection, to access a virtual world, where the users can establish social relationships with known or new persons, learn new things through e-learning tools, look up the latest news, and play games, etc.	

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