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**D9.11**

**Final Dissemination Report**

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**Dementia Ambient Care: Multi-Sensing  
Monitoring for Intelligent Remote Management  
and Decision Support**

**Dem@Care - FP7-288199**

## Deliverable Information

|   |              |   |
|---|--------------|---|
| <b>Project Ref. No.</b>                 |              | FP7-288199  |
| <b>Project Acronym</b>                  |              | Dem@Care  |
| <b>Project Full Title</b>               |              | Dementia Ambient Care: Multi-Sensing Monitoring for Intelligence Remote Management and Decision Support   |
| <b>Dissemination level:</b>             |              | Public  |
| <b>Contractual date of delivery:</b>    |              | Month 48, 31 October 2015   |
| <b>Actual date of delivery:</b>         |              | Month 48, 31 October 2015   |
| <b>Deliverable No.</b>                  |              | D9.11   |
| <b>Deliverable Title</b>                |              | Final Dissemination Report  |
| <b>Type:</b>                            |              | Report  |
| <b>Approval Status:</b>                 |              | Approved  |
| <b>Version:</b>                         |              | v09   |
| <b>Number of pages:</b>                 |              | 69  |
| <b>WP:</b>                              |              | WP9   |
| <b>Task:</b>                            |              | T9.1 Dissemination and Knowledge Transfer   |
| <b>WP/Task responsible:</b>             |              | Vispera Information Technologies  |
| <b>Other contributors:</b>              |              | CERTH   |
| <b>Authors (Partner)</b>                |              | Ceyhun Burak Akgül (VIT), Vivi Nrtigkogia (CERTH)   |
| <b>Responsible Author</b>               | <b>Name</b>  | Ceyhun Burak Akgül (VIT)  |
|   | <b>Email</b> | <a href="mailto:cb.akgul@vispera.co">cb.akgul@vispera.co</a>  |
| <b>Internal Reviewer(s)</b>             |              | Ioannis Kompatsiaris  |
| <b>EC Project Officer</b>               |              | Stefanos Gouvas   |
| <b>Abstract<br/>(for dissemination)</b> |              | This document presents the Dem@Care dissemination strategy and reports all such activities accomplished in the project in the course of four years from 2011 to 2015. |

## Version Log

| Version | Date       | Change  | Author                   |
|---------|------------|---|--------------------------|
| v01     | 04/11/2015 | Initial version, ToC created  | Ceyhun Burak Akgül (VIT) |
| v02     | 06/11/2015 | Progressed on content   | Ceyhun Burak Akgül (VIT) |
| v03     | 09/11/2015 | Sections 3.3 and 3.4.3, other updates   | Vivi Nrtigkogia (CERTH)  |
| v04     | 10/11/2015 | Progressed on content, reformatting   | Ceyhun Burak Akgül (VIT) |
| v05     | 11/11/2015 | Corrected table and figure numbers, reformatting, finalized   | Ceyhun Burak Akgül (VIT) |
| v06     | 11/11/2015 | Final draft   | Ceyhun Burak Akgül (VIT) |
| v07     | 12/11/2015 | Additions after internal review   | Vivi Nrtigkogia (CERTH)  |
| v08     | 12/11/2015 | Format corrections, version for PMB approval  | Ceyhun Burak Akgül (VIT) |
| v09     | 12/01/2016 | Duplicate citations removed, academic publication counts revised and corrected, broken http links removed | Ceyhun Burak Akgül (VIT) |

## Executive Summary

This document presents the final dissemination report of the Dem@Care project covering the activities from the start to the end of project (2011-2015). The detailed summary of all activities is reported with particular emphasis on the final year.

Dem@Care partners have been quite active in terms of dissemination, accomplishing 318 unique activities during the whole project. Last year in particular has witnessed more activities than previous years as we anticipated at the beginning of the project and a stable increase in terms of activities across years is observed (43 in 2012, 73 in 2013, 85 in 2014 and 114 in 2015). Dem@Care is also strongly present across various social network channels as well.

A major component of Dem@Care dissemination has been academic dissemination. Dem@Care researchers published 191 academic publications (including books and PhD dissertations) in the course of four years in high-impact journals and conferences.

In conclusion, Dem@Care dissemination has added to the recognition of dementia-related disorders across the general public and made people more aware of ICT-based monitoring and enablement solutions in the service of people with dementia. The project has received a lot of attention in the events participated and has established a telling web presence. It can be concluded that Dem@Care has accomplished its initially set dissemination objectives.



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# 1 Introduction

The Dem@Care project as a multi-disciplinary, multi-partner research endeavour aspires to contribute to the independence and autonomy of people with dementia. The social, economic and research dimensions of the Dem@Care project made dissemination activities carried out in the context of the project of paramount importance for several reasons.

First and foremost, Dem@Care dissemination activities should address as many people as possible, at different levels (citizens, social stakeholders, local decision makers), to make them more aware of the complexities of the healthy ageing problems and of existing technologies, as well as of national and local strategies for tackling them. This can and should be achieved by strengthening diffusion and circulation of information among relevant stakeholders and the public at large.

Second, as on one hand the Dem@Care approach to healthy aging strongly depend on extensive data collection and analysis, and on the other hand, its success relies on the acceptance of such a system by its potential users be they patients and their relatives, healthcare professionals or organizations, the project should establish persistent connections for collaborating with relevant people and organizations to be engaged with the goals set by the Dem@Care project.

Third, the Dem@Care system components, which resulted from cutting edge research, should be promoted and advertised to key players in the healthcare industry, as well as to healthcare providers, who have an interest in remote management and care.

Finally, as a research project raising considerable expectations, Dem@Care is expected to deliver important scientific and technological outputs. These should be shared with academia and research organizations through academic dissemination channels so that more and more ICT and medical researchers become mobilized towards the research goals in remote healthcare and ICT-enabled healthy aging. In that sense as well, Dem@Care strived to make significant contributions in this emerging domain.

In this final version of Dem@Care dissemination report, after presenting our dissemination strategy and execution approach in Chapter 2, we summarize four years of Dem@Care dissemination in Chapter 3. In Section 3.1, we describe Dem@Care web presence and related statistics. In Section 3.2, we provide a summary of the strong Dem@Care academic dissemination in terms of publications and academic event organizations. In Section 3.3, we report our clustering activities with other EU projects and bodies. Section 3.4 (and Appendix E) lists the sheer amount of our other activities in terms of presentations at events and exhibitions, our invited talks, media appearances and interviews. In Section 3.5, we provide an overall summary. In Chapter 4, we conclude this final dissemination report.

## 2 Dem@Care Dissemination Strategy and Execution

The dissemination strategy of the Dem@Care project has been constructed on the following key aspects:

- Dissemination activities supporting project overall goal and specific objectives,
- Categorization of different target audiences,
- Pursuing a phased dissemination approach,
- Use of diverse dissemination media and methods,
- Planning, execution, and evaluation.

These are explained in the following sections.

### 2.1 Project Goal and Dissemination Objectives

The overall goal of the Dem@Care project is to provide an integrated remote care and management solution for people with dementia by bringing together leading experts in dementia, video and audio analysis, physiological sensor data monitoring, life-logging, lifestyle analysis, data mining and fusion, knowledge modelling and semantic inference. This goal has been supported by strategically designed dissemination activities with the following specific objectives:

- *To raise a general awareness within the society* on the social and economic aspects of dementia,
- *To inform people affected by dementia* (either as themselves or as relatives of other people with dementia) *and the general public* (individuals, organizations, governmental bodies) that, in the context of Dem@Care, leading medical and ICT experts are actively working on non-classical paradigms and approaches that will ease the unfortunate consequences of dementia,
- *To inform other medical and ICT researchers* from academia and the industry on the scientific and technological achievements obtained throughout the project,
- *To engage people and organizations* with the research results obtained throughout the project in order to get input and feedback,
- *To promote the project among decision makers and enterprises in the medical domain as well as governmental bodies* by periodically demonstrating useful, tangible, and promising research and technology outcomes of the project.

### 2.2 Target Audiences

People must be reached by the new knowledge or results produced by the project so that they can benefit from them. To this end, in Dem@Care dissemination activities, we aimed at identifying different individuals, groups, and organisations and their specific interest in the potential outcomes of the project. We also pursued to inform and engage stakeholders. A stakeholder can be defined as *any group or individual who can affect, or be affected by the achievement of the research projects - or can influence these results*. Dem@Care knowledge

and results are also exchanged with other European projects, with the scientific community and with standardisation bodies.

Specification of the target audiences is also important in that the expectations and interests can vary from group to group. For instance, while a certain technical result of Dem@Care may be significant for a group of researchers, it might not raise sufficient interest among the actual users of the prospective Dem@Care system unless the implications of this technical result are properly communicated. Naturally, the right message should be given to the right audience. In this respect, the Dem@Care dissemination strategy is committed to systematically and continuously identify different individuals, groups and organisations, and their specific expectations, as well as to keep their interests alive throughout the project.

In the light of these aspects, Dem@Care target audiences are categorized in terms of the following groups:

- General public,
- Patients, their families and relatives,
- Medical professionals,
- Scientific community (medical / ICT / psychologists / neuroscientists),
- Healthcare organizations (non-commercial / commercial),
- Governmental organizations.

## 2.3 Phased Dissemination

For a four-year project as Dem@Care, it was necessary to decide when a particular dissemination activity is most relevant, as messages varied during the timeframe of the project. For example, while at the start it was better to focus on raising awareness concerning the project, at the end, promotion activities naturally gained more importance. We also kept in mind that usually a message should hit the receivers several times (the average is at least three) until an action is initiated. Therefore the messages have been repeated several times, potentially through various channels and tools.

The Dem@Care dissemination strategy has set objectives that change over time in synchrony with project milestones. This dissemination approach is in line with the three-stage research and development approach of the Dem@Care project. As such, the Dem@Care dissemination plan has been organized into three phases:

- Initial phase (First two years): Awareness-raising, partnering and informing activities,
- Intermediate phase (Third year): Informing and engagement activities,
- Final phase (Fourth year): Engagement and promotion activities.

## 2.4 Dissemination Media and Methods

A wide variety of dissemination methods are leveraged during Dem@Care. Appropriate knowledge and skills are necessary to select the right one to communicate the message to the target audience and achieve the purpose of the dissemination strategy. The means of dissemination used throughout the project are explained in the sequel.

*Web Presence:* The Internet is admittedly one of the most effective methods to render a public image for individual and organizational entities not only over websites but also via social networks. In Dem@Care dissemination, we extensively used a web-based approach.

*Academic Dissemination:* Dem@Care being a research project involving a significant number of academics gave strong importance to academic dissemination in terms of publications in top conferences and journals, special sessions organization, special issue editorship and PhD dissertations. To this end at the beginning of the project, we have identified major ICT and healthcare conferences and journals. Each academic and research partner published several journal and conference papers on a yearly average basis.

*Dissemination within EU Commission:* The Dem@Care Consortium closely cooperated with the EU Commission to disseminate information through EU supported R&D initiatives: ICT related events, scientific and political events of the EC, international conferences, workshops and symposia. These were useful for increasing awareness about the project within the EU and identifying and also for promptly seizing possibilities for cooperation with other EU-funded projects. In the same line, we performed several clustering activities as described in the report.

*Events and Exhibitions:* Dem@Care presented and demonstrated project prototypes and results in professional and public healthcare ICT exhibitions. We considered this type of activity as one of the most important means to advertise the project among healthcare professionals as well as to for better understanding the acceptability of Dem@Care-style remote healthcare solutions.

*Press Releases and Media Interviews, Newsletters:* Press releases and media interviews are effective methods especially for raising awareness among the general public. Opportunities for public media-related communications are seriously taken into account in the Dem@Care dissemination strategy.

## 2.5 Planning and Execution

Thorough planning at the early phase of the project ensured the implementation of the Dem@Care dissemination strategy. The first step has been the collection of dissemination activity sheets from all partners for each individually planned activity for the entire course of the project. The activity sheet template has been constructed in view of the above strategy – the template is provided in Appendix A. Specifically, each dissemination item has been categorized in terms of its purpose (Sec. 2.1), its target audience (Sec. 2.2), its prospective timing in line with the stated strategy (Sec. 2.3), and its method (Sec. 2.4).

This approach of defining plans as upfront as possible has guided the partners to strategically think on their individual dissemination activities as well as on planning their dissemination purposes and efforts in conjunction with the overall dissemination strategy. After this collection of per-partner plans, dissemination activities have been merged into tables, one for each partner, which are maintained during the course of the project in order to ensure timely execution, monitoring and evaluation of the stated plans. Major dissemination activities and statistics extracted from these tables are presented in Table 6, which puts forward the variety of dissemination activities achieved by the Dem@Care project.



## 3 Dem@Care Dissemination Activities

### 3.1 Web Presence

#### 3.1.1 Project Website

The Dem@Care project website<sup>1</sup> has been designed, implemented and activated in the very beginning of the project. It has been maintained and regularly updated throughout project life time and will be live for at least 3 years after the end of the project, making information related to Dem@Care available to a wide audience. It is intended to provide an overview of the project concept, vision and goals, to present the Dem@Care consortium and the sheer amount of project results, share dementia-related news, establish direct links with Dem@Care social network accounts, all in all to serve as the main gateway for making Dem@Care publicly visible. Project outcomes are presented with public documents that are available for download.

The website has been structured in terms of the following sections and elements:

- The **Home** page (Figure 2) presents a brief description of the project and latest news from the project and eHealth news via RSS. The Dem@Care concept video (Figure 2) can also be watched in this page.
- The **Project** page provides a summary of the vision, objectives and challenges as well as information related to project pilots.
- From the **Results** page, web users can download public deliverables and can access the list of publications and presentations of the project. Project datasets, ontologies and software are also listed in this section and are available upon request. Users can download the project factsheet for Dem@Care (Appendix C).
- Dem@Care related news and events can be seen from the **News/Events** section.
- In the **Partners** section, consortium partners are presented and their respective roles in the project are described.
- **User Group** section is dedicated to inform and motivate users related to Dem@Care and to provide input and create synergies with Dem@Care; this page collects details for interested external stakeholders of Dem@Care.
- **Contact** section provides the contact details of the project and the coordinator.

The website statistics are tracked regularly using Google Analytics. The number of visitors systematically increased and the website maintained a high percentage of new users across the years throughout the project. In Figure 3, we provide as evidence a comparison of Dem@Care website statistics in the third and fourth years of the project.

<sup>1</sup> [www.demcare.eu](http://www.demcare.eu)

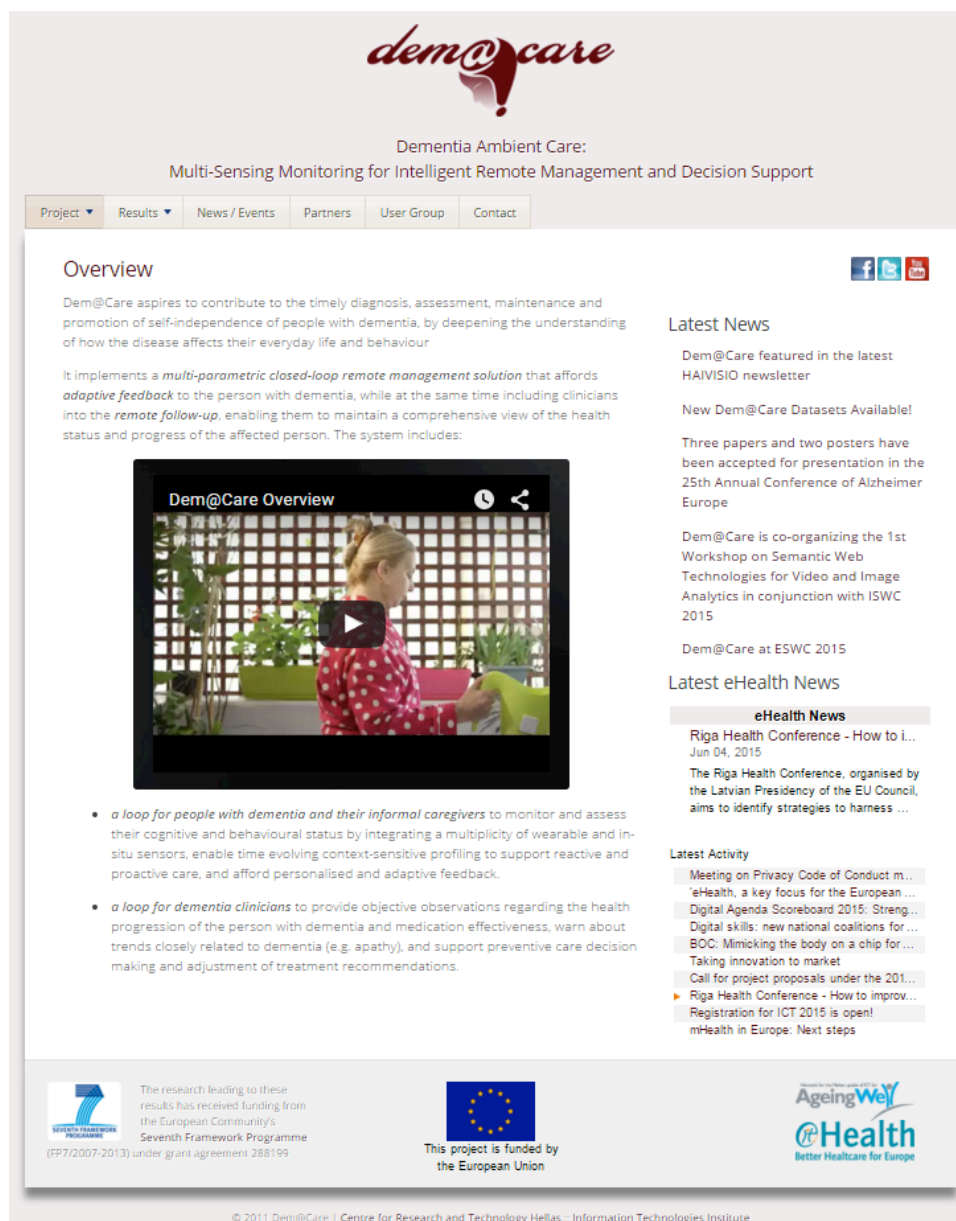


Figure 1 Homepage of the Dem@Care project website



Figure 2 Snapshots from Dem@Care concept video

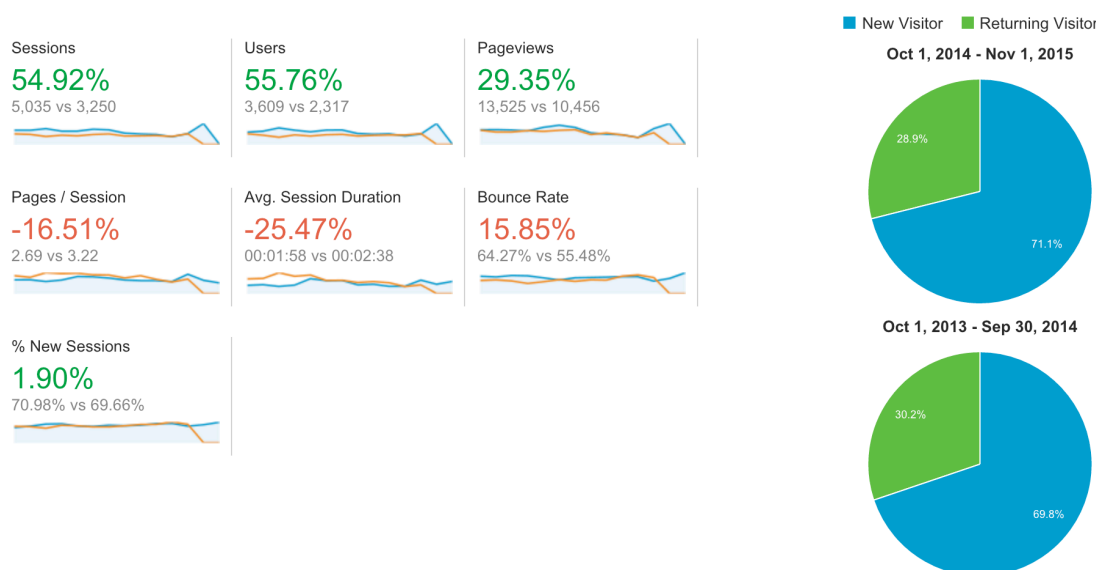


Figure 3 Comparison of Dem@Care website statistics in the third and fourth years of the project

### 3.1.2 Activities in Social Networks

Social networks are becoming more and more important in advertising research projects in our days. Starting from this observation, we have built public Facebook<sup>2</sup> and Twitter<sup>3</sup> accounts as well as a LinkedIn discussion group in order to notify researchers and the general public with project-related news and information. Snapshots of Facebook and Twitter pages of Dem@Care are shown in Figure 4 and Figure 5 respectively.

Dem@Care Facebook page likes have increased throughout the project as shown in Figure 6. The time stamps of post reach peaks shown in Figure 7 correspond to major events and exhibitions where Dem@Care has participated. During such times, we have extensively used Facebook and Twitter to share our event-related activities and increase our public visibility. The demographics of Dem@Care Facebook fans are shown in Figure 8.

<sup>2</sup> <https://www.facebook.com/DemCare-FP7-Project-147922858638342/>

<sup>3</sup> [https://twitter.com/demcare\\_ip](https://twitter.com/demcare_ip)

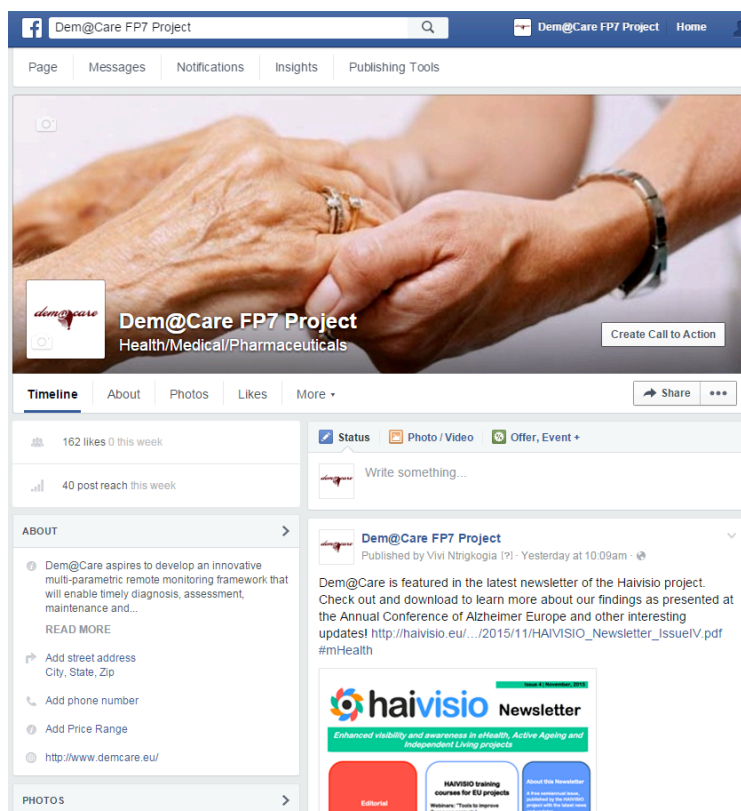


Figure 4 A snapshot from Dem@Care Facebook page

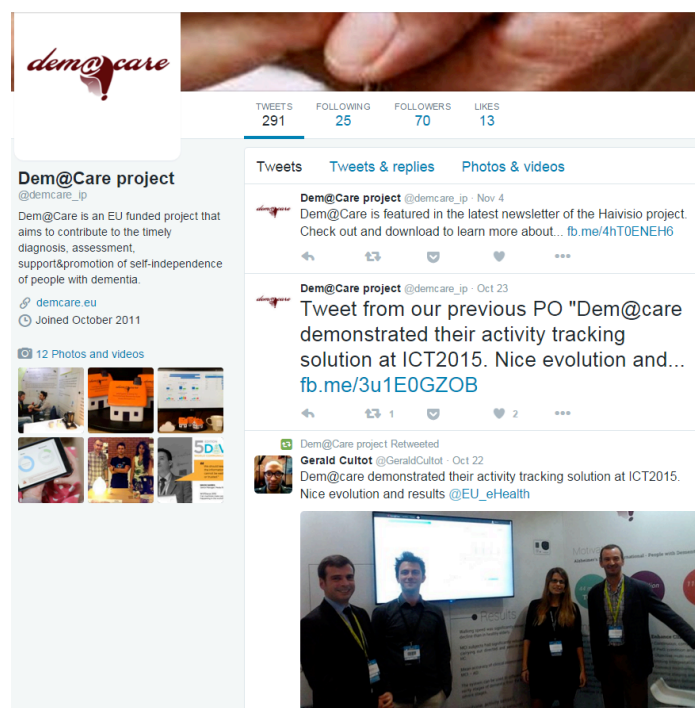


Figure 5 A snapshot from Dem@Care Twitter page



Figure 6 Progression of Dem@Care Facebook page likes in the last two years



Figure 7 Progression of Dem@Care Facebook post reaches in the last two years

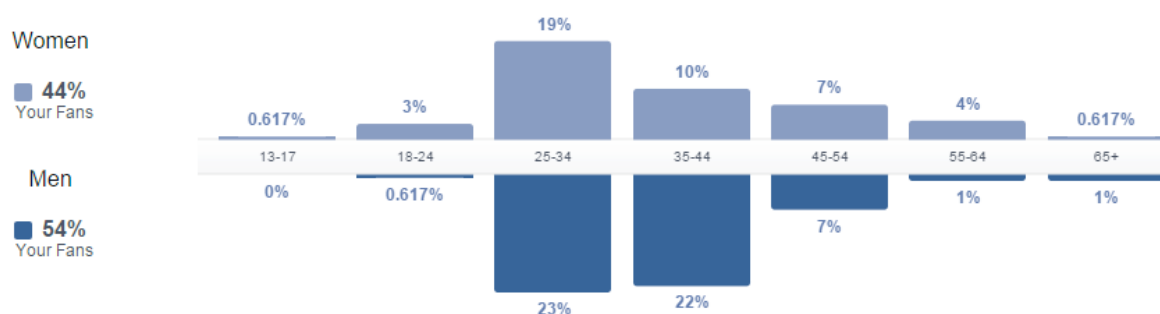


Figure 8 Demographics of Dem@Care Facebook fans

### 3.1.3 Dem@Care YouTube Channel

We set up the Dem@Care YouTube channel<sup>4</sup> in order to share Dem@Care concept, demonstrator and pilot videos with the web community. The channel hosts 24 videos visually illustrating the multi-sensing monitoring aspects of Dem@Care in both an integrated and component-wise fashion. Component demo videos include wearable camera sensing, audio-based dementia assessment, and RGBD-based detection of activities of daily living. Video

<sup>4</sup> <https://www.youtube.com/user/DemCareVideoChannel>



sequences of Thessaloniki pilots are also available for viewing. Figure 9 depicts a snapshot of the Dem@Care YouTube Channel.

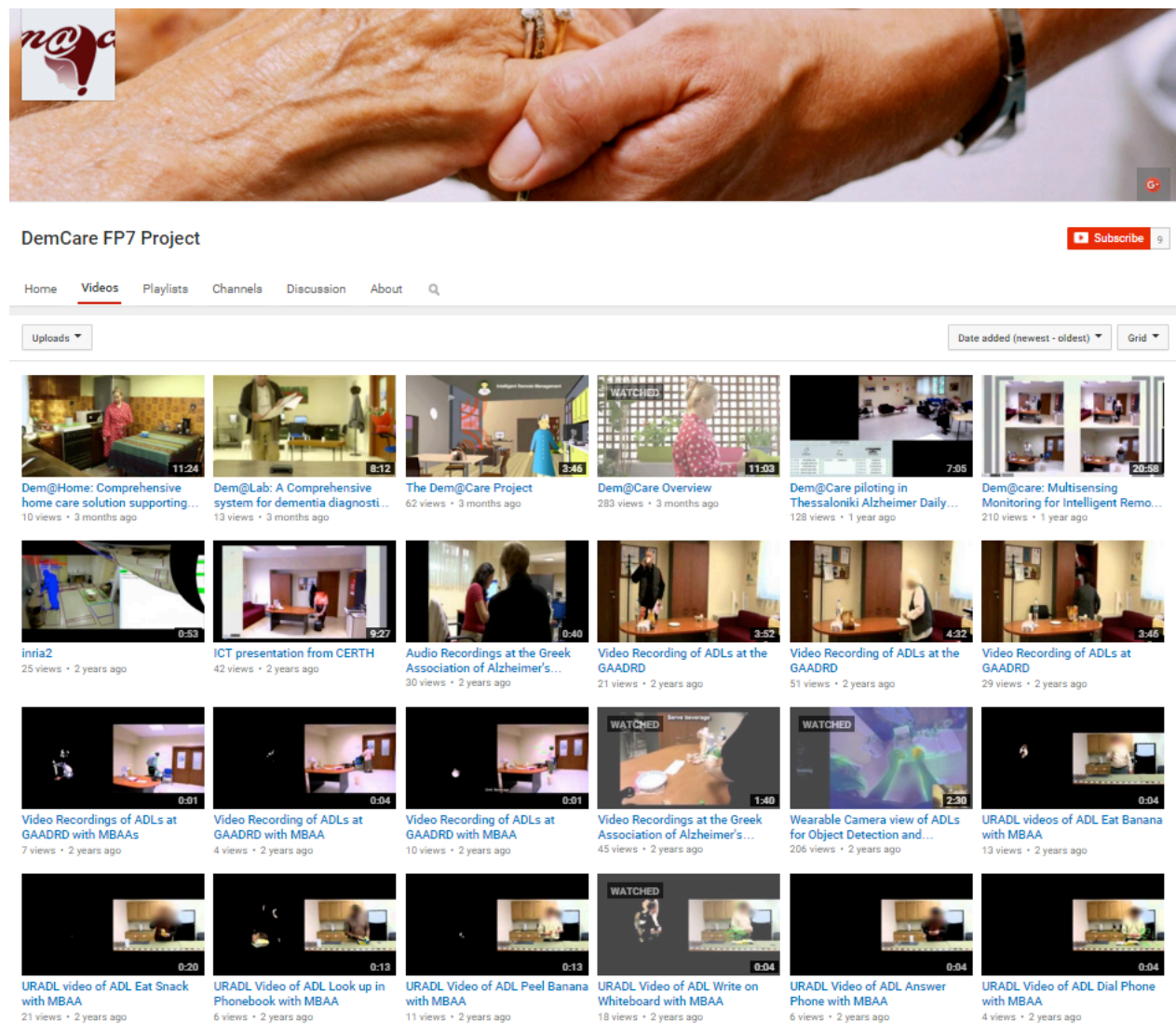


Figure 9 Dem@Care YouTube Channel

### 3.2 Academic Dissemination

Dem@Care being a research project involving a significant number of academics gave strong importance to academic dissemination in terms of publications in top conferences and journals, summer school participations, special session organizations, invited talks and lectures, special issue editorships and PhD dissertations. In the subsequent sections, we present the outcomes of these important activities.

### 3.2.1 Academic Publications

Table 1 shows the overall number of Dem@Care related academic publications of the consortium partners in the categories of book, book chapter, PhD Dissertation, journal paper, and conference/workshop paper. Dem@Care produced 191 academic publications in these categories during the whole project. We believe this significant number demonstrates the academic and research strength of Dem@Care consortium.

We explicitly cite below the books and PhD Dissertations published by Dem@Care partners.

- Book: B. Ionescu, J. Benois-Pineau, T. Piatrik, G. Quénot Cham, “Fusion in Computer Vision: Understanding complex Visual content , Series Advances in Computer Vision”, Heidelberg, New York, Dordrecht, London : Springer, 269, 2014.
- Book: A. Briassouli, J. Benois-Pineau, A. Hauptmann, Alexander, “Health Monitoring and Personalized Feedback using Multimedia Data”, Springer, 2015.
- PhD Dissertation: Basel Kikhia, “Remember me! Supporting Reminiscence through Digital Capture of Lifestories and Activity Recognition”, Luleå, Sweden, 2014.
- PhD Dissertation: Alexandra König, “The Use of ICT for the assessment of patients with AD and related disorders”, Maastricht, Netherlands, 2015.
- PhD Dissertation: Konstantinos Avgerinakis, “Video processing and background subtraction for change detection and activity recognition”, University of Surrey, UK, 2015.
- PhD Dissertation: Thanos Stavropoulos, "Web Services in Ambient Intelligence Environments", Department of Informatics, Aristotle University of Thessaloniki, Greece, 2015
- PhD Dissertation: Vincent Buso - "Perceptual Object-Of-Interest Recognition: Application to the Interpretation of Instrumental Activities Of Daily Living For Dementia Studies" - University of Bordeaux
- PhD Dissertation: Guillaume Bourmaud - "Estimation de paramètres évoluant sur des groupes de Lie: Application à la cartographie et à la localisation d'une caméra monoculaire" - University of Bordeaux
- PhD Dissertation: Feiyan Hu, "Periodicity Detection in Lifelogs", PhD thesis, 2016, Dublin City University
- PhD Dissertation: Peter Novitzky, "Ethics of Ambient Assisted Living", PhD thesis, 2016, Dublin City University

It's worth noting that as a culmination of her PhD studies, Alexandra König has been granted the AGE-WELL Postdoctoral Award in Technology and Aging from the AGE-WELL Network of Centres of Excellence in Canada. AGE-WELL is committed to attracting, developing, and retaining outstanding Highly Qualified Personnel (HQP) in Canada (training, mentorship, and partnership, earn the AGE-WELL Innovators of Tomorrow Certificate that showcases transferable skills and comprehensive knowledge of the field.

The complete list of academic publications per partner is provided in Appendix B. In Table 2, we list a selection of top journal and conference publications by Dem@Care partners.

An exceptional case of a joint publication to a top-class journal *is* the submission of our research regarding fusion of heterogeneous visual modalities for activity recognition to the special issue on Multimodal Human Pose Recovery and Behavior Analysis of IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI). With an impact factor of 5.781, TPAMI is one of the most prestigious journals in the areas of computer vision and image understanding, pattern analysis and recognition, with a particular emphasis on machine learning for pattern analysis. The paper, which is under a minor revision with quite positive first-round comments, proposes and extensively evaluates a novel probabilistic and knowledge-driven framework for event representation and recognition, combining different visual sensors (video camera, color-depth and wearable video camera).

Table 1 Summary of Academic Publications by Dem@Care Partners

| Partner            | Type                             | Main Author | Supporting Author |
|--------------------|----------------------------------|-------------|-------------------|
| CERTH              | Book                             | 1           |                   |
| CERTH              | PhD Thesis                       | 2           |                   |
| CERTH              | Book chapter                     | 2           |                   |
| CERTH              | Journal (published or to appear) | 7           |                   |
| CERTH              | Journal (under review)           | 5           | 1                 |
| CERTH              | Journal (in preparation)         | 1           |                   |
| CERTH              | Conference                       | 28          |                   |
| <b>CERTH Total</b> |                                  | <b>46</b>   |                   |
| CHUN               | PhD Thesis                       | 1           |                   |
| CHUN               | Journal (published or to appear) | 7           |                   |
| CHUN               | Journal (under review)           |             | 1                 |
| CHUN               | Journal (in preparation)         | 2           |                   |
| CHUN               | Conference                       | 14          |                   |
| <b>CHUN Total</b>  |                                  | <b>24</b>   |                   |
| DCU                | PhD Thesis                       | 2           |                   |
| DCU                | Journal (published or to appear) | 1           |                   |
| DCU                | Journal (under review)           | 3           |                   |
| DCU                | Conference                       | 24          |                   |
| <b>DCU Total</b>   |                                  | <b>30</b>   |                   |
| IBM                | Journal (published or to appear) | 1           |                   |
| IBM                | Conference                       | 7           |                   |
| <b>IBM Total</b>   |                                  | <b>8</b>    |                   |
| INRIA              | Journal (published or to appear) | 6           | 2                 |
| INRIA              | Journal (under review)           | 2           |                   |
| INRIA              | Conference                       | 27          |                   |
| <b>INRIA Total</b> |                                  | <b>35</b>   |                   |
| LTU                | PhD Thesis                       | 1           |                   |
| LTU                | Journal (published or to appear) | 3           |                   |
| LTU                | Journal (under review)           | 2           |                   |
| LTU                | Conference                       | 10          |                   |



|                       |                                  |            |   |
|-----------------------|----------------------------------|------------|---|
| <b>LTU Total</b>      |                                  | <b>16</b>  |   |
| PENB                  | Conference                       | 1          |   |
| <b>PENB Total</b>     |                                  | <b>1</b>   |   |
| UBX                   | Book                             | 1          | 1 |
| UBX                   | Book chapter                     | 2          |   |
| UBX                   | Journal (published or to appear) | 3          |   |
| UBX                   | Journal (under review)           | 4          | 1 |
| UBX                   | Conference                       | 18         |   |
| <b>UBX Total</b>      |                                  | <b>28</b>  |   |
| <b>Dem@Care Total</b> |                                  | <b>188</b> |   |

Table 2 Top Conference and Journal Papers by Dem@Care Partners

| Conference Papers  | Journal Papers   |
|--|--|
| König, A., Crispim-Junior, C., Bremond, F., Karakostas, A. Tsolaki, M. & Robert, PH. Functional Assessment of Patients with Dementia and Mild Cognitive Impairment with the Help of a Multiple Sensor System. Oral presentation at the Alzheimer's Association International Conference (AAIC) 2015, July 18-23, Washington, USA.            | Alexandra König, Aharon Satt; Alexander Sorin; Ron Hoory; Alexandre Derreumaux; Valeria Manera; Renaud David; Frans Verhey; Pauline Aalten; Philippe Robert, Automatic speech analysis for the assessment of pre-demented and Alzheimer patients. Alzheimer's & Dementia: Diagnosis, Assessment and Disease Monitoring, 2015 1(1) : 112-124.   |
| Hopper, Louise and Joyce, Rachael and Melander, Catharina and Kikhia, Basel and Karakostas, Anastasios and Savenstedt, Stefan and Irving (Iupton), Kate (2015) Dementia ambient care: a holistic approach to the management of dementia in multiple care settings. In: 25th Alzheimer Europe Conference, 1-4 Sept 2015, Ljubljana, Slovenia. | Alexandra König, Carlos fernando Crispim Junior, Alexandre Derreumaux, Gregory Bensadoun, Pierre-David Petit, François Bremond, Renaud David, Frans Verhey, Pauline Aalten, Philippe Robert. Validation of an automatic video monitoring system for the detection of Instrumental Activities of Daily Living in dementia patients, Journal of Alzheimer's disease, 2015; 44(2):675-85. doi: 10.3233/JAD-141767 |
| Hopper, Louise and Joyce, Rachael and Newman, Eamonn and Smeaton, Alan F. and Irving, Kate (2015) Ageing in place: a multi-sensor system for home-based enablement of people with dementia. In:  | König A, Crispim-Junior CF, Covella AGU, Bremond F, Derreumaux A, Bensadoun G, David R, Verhey F, Aalten P and Robert P (2015) Ecological assessment of autonomy in instrumental activities of daily living in dementia patients by the means of an automatic video monitoring system. Front. Aging Neurosci. 7:98. doi: 10.3389/fnagi.2015.00098  |

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|---|---|
| Alzheimer Association International Conference 2015, 18-23 July 2015, Washington DC, MA.  |   |
| McHugh, Joanna and Smeaton, Alan F. and Irving, Kate and Newman, Eamonn (2013) Designing for and with vulnerable people: The Dem@Care "toolbox" approach. In: SIGCHI Workshop on Designing For-And-With Vulnerable People, 27 Apr - 2 May, 2013, CHI 2013, Paris, France.   | Novitzky, Peter and Smeaton, Alan F. and Chen, Cynthia and Irving, Kate and Jacquemard, Tim and Obrolchain, Fiachra and O'Mathuna, Donal and Gordijn, Bert (2014) A review of contemporary work on the ethics of ambient assisted living technologies for people with dementia. Science and Engineering Ethics . ISSN 1353-3452 |
| Hu, Feiyan and Smeaton, Alan F. and Newman, Eamonn (2014) Periodicity detection in lifelog data with missing and irregularly sampled data. In: The Role of Quantified Self for Personal Healthcare (QSPH'14) in conjunction with IEEE BIBM 2014, 2-5 Nov 2014, Belfast, UK. | Vladislavs Dovgalecs, Rémi Mégret, and Yannick Berthoumieu. Multiple Feature Fusion Based on Co-Training Approach and Time Regularization for Place Classification in Wearable Video. Advances in Multimedia Volume 2013 (2013), Article ID 175064, accepted 5 December 2012.   |
| Hopper, Louise and Newman, Eamonn and Smeaton, Alan F. and Irving (Lupton), Kate (2014) Dementia ambient care: multi-sensor support to enable independent home-based living for people with dementia. In: 24th Alzheimer Europe Conference, 20-23 Oct 2014, Glasgow, UK.    | G. Bourmaud, R. Mégret, M. Arnaudon and A. Giremus, Continuous-Discrete Extended Kalman Filter on Matrix Lie Groups Using Concentrated Gaussian Distributions, Journal of Mathematical Imaging and Vision, accepted (2014)  |
| H. Boujut, V. Buso, J. Benois-Pineau, "Perceptual object recognition in egocentric videos", IEEE ICIP'2013  | V. Buso, I. Gonzales-Diaz, J. Benois-Pineau, "Goal-oriented top-down probabilistic visual attention model for recognition of manipulated objects in egocentric videos » SignalProcessing:Image Communication, journal, Elsevier, Available online 3 June 2015   |
| G.Bourmaud, R.Megret, A.Giremus and Y.Berthoumieu, Global Motion Estimation from Relative Measurements Using Iterated Extended Kalman Filter on Matrix Lie Groups, IEEE ICIP'2014   | V. Buso, J. Benois-Pineau, J.-Ph. Domenger, "Geometrical Cues in Visual Saliency Models for Active Object Recognition in Egocentric Videos », <a href="#">Multimedia Tools Appl. 74(22)</a> : 10077-10095 (2015), Springer  |

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|---|--|
| <p>V. Buso, J. Benois-Pineau, I. Gonzalez – Diaz, "Object recognition with top-down visual attention modelling for behavioural studies », IEEE ICIP'20</p>  | <p>H. Boujut, A. Bugeau, J. Benois-Pineau. Object Recognition form wearable video: what people really see. CRC WorldPress, book chapter</p> <p>Iván González-Díaz, Jenny Benois-Pineau, Vincent Buso and Hugo Boujut « Fusion of Multiple Visual Cues fro Object Recognition in Video», in Fusion in Computer Vision: understanding complex visual content, series « Advances in Computer Vision and Pattern Recognition »,Eds. B. Ionescu, J. Benois-Pineau, T. Piatrik, G. Quénot, Springer 2014, ISBN 978-3-319-05695-1, DOI 10.1007/978-3-319-05696-8_4, pp 79 – 108</p> |
| <p>V. Buso, J. Benois-Pineau, I. Gonzalez-diaz, « Object recognition in egocentric videos with saliency-based non uniform sampling and variable resolution space for features selection », IEEE CVPR'2014, 3rd WS on egocentric vision. Proc. CVPR, pp 1-2</p>              | <p>A. König, G. Sacco, G. Bensadoun, F. Bremond, R. David, F. Verhey, P. Aalten, P.H. Robert and V. Manera. <a href="#">The role of Information and Communication Technologies in clinical trials with patients with Alzheimer's disease and related disorders</a>, <i>Frontiers in Aging Neuroscience - open access publication</i> - <a href="http://dx.doi.org/10.3389/fnagi.2015.00110">http://dx.doi.org/10.3389/fnagi.2015.00110</a>, 09 June 2015.</p>  |
| <p>G.Bourmaud, R.Megret, A.Giremus and Y.Berthoumieu, Indoor Trajectory Estimation from Wearable Camera for Activity Monitoring, 3rd Workshop on Egocentric Vision, Conference on Computer Vision and Pattern Recognition (CVPR), 2014</p>                                  | <p>C. Crispim, Q. Ma, B. Fosty, R. Romdhane, F. Bremond and M. Thonnat. <a href="#">Combining Multiple Sensors for Event Detection of Older People</a>. Chapter 9 (Pages 179-194) in <i>the book "Health Monitoring and Personalized Feedback Using Multimedia Data"</i>, edited by A. Briassouli, J. Benois-Pineau, A. Hauptmann, Publisher: <a href="#">Springer online amazon</a>, (see <a href="#">flyer</a>), 283 p., ISBN-10: 3319179624, ISBN-13: 978-3319179629, Online: July 14, 2015.</p>  |
| <p>P. Bilinski and F. Bremond. <a href="#">Video Covariance Matrix Logarithm for Human Action Recognition in Videos</a>. <i>The International Joint Conference on Artificial Intelligence, IJCAI 2015, Buenos Aires, Argentina from July 25th to July 31st, 2015.</i></p>   | <p>Georgios Meditskos, Stamatia Dasiopoulou, Ioannis Kompatsiaris, MetaQ: A knowledge-driven framework for context-aware activity recognition combining SPARQL and OWL 2 activity patterns, Pervasive and Mobile Computing, Available online 2 February 2015, ISSN 1574-1192, <a href="http://dx.doi.org/10.1016/j.pmcj.2015.01.007">http://dx.doi.org/10.1016/j.pmcj.2015.01.007</a> (Impact Factor 2014: 2.079)</p>  |
| <p>F. Negin, S. Cosar, M. Koperski, and F. Bremond. <a href="#">Generating Unsupervised Models for Online Long-Term Daily Living Activity Recognition</a>. <i>The 3rd IAPR Asian Conference on Pattern Recognition, ACPR2015, Kuala Lumpur, Malaysia, 4-6 November,</i></p> | <p>K. Avgerinakis, A. Briassouli, and I. Kompatsiaris, "Activity detection using sequential statistical boundary detection (SSBD)", To appear in Computer Vision and Image Understanding (CVIU), 2015.</p>   |

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|---|--|
| 2015.   |  |
| S. Poularakis, K. Avgerinakis, A. Briassouli, Y. Kompatsiaris, "Computationally efficient recognition of activities of daily living", IEEE International Conference on Image Processing (ICIP), Quebec city, Canada, Sep. 2015. | Basel Kikhia, "Remember me! Supporting Reminiscence through Digital Capture of Lifestories and Activity Recognition", Luleå University of Technology, Luleå, Sweden, 2014.<br><a href="http://pure.ltu.se/portal/en/publications/remember-me-supporting-reminiscence-through-digital-capture-of-lifestories-and-activity-recognition(e6514acf-3a22-4ccb-bb70-0b5bd2035573)/export.html">http://pure.ltu.se/portal/en/publications/remember-me-supporting-reminiscence-through-digital-capture-of-lifestories-and-activity-recognition(e6514acf-3a22-4ccb-bb70-0b5bd2035573)/export.html</a> (PhD dissertation) |
| S. Tachos, K. Avgerinakis, A. Briassouli, I. Kompatsiaris, "Appearance and Depth for Rapid Human Activity Recognition in Real Applications", British Machine Vision Conference (BMVC), Sep. 2015                                | Eva Karlsson, Stefan Sävenstedt, Karin Axelsson, Karin Zingmark, "Stories about life narrated by people with Alzheimer's disease", Journal of Advanced Nursing, Wiley Online Library, Volume 70, Issue 12, pp2791-2799, 2014. <a href="http://onlinelibrary.wiley.com/doi/10.1111/jan.12429/abstract">http://onlinelibrary.wiley.com/doi/10.1111/jan.12429/abstract</a>  |
|   | Basel Kikhia, Thanos G. Stavropoulos, Georgios Meditskos, Ioannis Kompatsiaris, Josef Hallberg, Stefan Sävenstedt, Catharina Melander, "Utilizing Ambient and Wearable Sensors to Monitor Sleep and Stress for People with BPSD in Nursing Homes", Journal of Ambient Intelligence and Humanized Computing, SUBMITTED, 2015-10.-20.  |

### 3.2.2 Workshop and Special Session Organizations

Dem@Care partners organized the following workshops and special sessions during the project:

- Special Session: "Information Fusion in Computer Vision for Concept Recognition" (IFCVCR 2012) at ECCV 2012, Firenze, Italy. (UB1)
- IA (Innovation Alzheimer) Workshop 2012: Intersection between ICT& Health – defining guidelines in 2012, Monaco, France. (CHUN)
- 1st ACM MM Multimedia Indexing and Information Retrieval Workshop 2013. (CERTH and UBX)
- Invited Session Ambient Telecare at InMed 2013. (CERTH and UBX)
- Special session, part of International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications (VISAPP), Lisbon, Portugal, 5-8 January 2014. (INRIA)
- Special Session: "Image/Video Indexing and Retrieval for Healthcare", ICIP 2015 - International Conference on Image Processing, 2015. (CERTH)
- 1st Workshop on Semantic Web Technologies for Video and Image Analytics, 2015. (CERTH)

### 3.2.3 Establishment of a new ACM MM area in 2014: *Multimedia & Society*

Due to the success of MIRH (Multimedia Information Retrieval for Health) Workshop at ACM MM 2013 (chairs A. Briassouli, CERTH-ITI, J. Benois-Pineau (UBX) and Alex Hauptmann (CMU)), the SIGMM and steering committee of ACM MM conference decided to open a new area at ACM MM 2014 named *Multimedia and Society* (see Figure 10). The co-chairs of this area were Dr. Wallapack Tavanapong, Iowa State University (USA) and Prof. Jenny Benois-Pineau, LABRI/UBX (France). The preparatory work for the call for papers and the submitted papers has shown that the multimedia research community is very much interested in the fundamental questions of development of IT technologies for Healthcare. 13 short papers and 10 full papers were submitted from around the world, including China, France, Israel, Japan, Netherlands, Singapore, Thailand, and United States.



Figure 10 Dem@Care and the 22nd ACM Annual Conference on Multimedia

The acceptance rate corresponded to the overall rate for the conference, and only one long paper and 2 short papers were accepted for the conference. The acceptance rate was thus 13%, which was slightly lower than for ACM MM (about 20%). This is due to the fact that from a methodological point of view it is difficult to propose drastically new tools, which would give satisfactory scores for healthcare applications. Furthermore, the *sine qua non* condition at ACM MM conference was that the research has to be fulfilled on all media: images, video and audio as a minimum. Not all papers satisfied this requirement. Nevertheless, the area has been maintained, and Dr. Tavanapong and Prof. Benois-Pineau will chair a session devoted to Privacy, Health and Well-being in future ACM MM editions. Furthermore, Dem@Care was mentioned as a project supporting ACM MM 2014 (due to the intervention of its members and costs for travel for participation in the program committed meeting of ACM MM).

### 3.2.4 The DemAAL Summer School

A major important Dem@Care dissemination activity was the preparation, announcement and successful running of a summer school open to all clinical and ICT researchers, entitled Dem@Care Summer School on Ambient Assisted Living (DemAAL)<sup>5</sup>. The summer school was held on 16-20 September 2013, Chania, Crete, Greece. The programme was announced

<sup>5</sup> <http://mklab.iti.gr/demaal2013/>



on the project webpage, in several mailing lists in ICT and healthcare, on social network pages, as well as in EU eHealth in focus (Newsletter update 23/04/2013). CERTH has coordinated this task with participation by VIV, DCU and Philips.

The DemAAL summer school was primarily targeted at postgraduate (PhD or MSc) students, postdocs and researchers investigating clinical and technical aspects related to Ambient Assisted Living (AAL) technologies for remote health management, ageing well and independent living. Leading researchers from academia and industry covered theoretical and practical aspects pertinent to pervasive/ubiquitous computing technologies for Ambient Intelligence (AmI) applications, while special focus was given to the role and opportunities of such technologies for dementia management. The rich and diverse programme of DemAAL can be seen in Appendix D. More specifically, the following topics were covered:

- Video & voice-based analytics for monitoring and assessment,
- Semantic Complex Event Processing,
- Wearable and pervasive computing,
- Sensor networks,
- Sensor correlation and fusion,
- Context modelling,
- Activity monitoring and recognition,
- Contextual reasoning in Ambient Intelligence,
- Assistive technologies for cognitive support and wellbeing.

Lecture material was augmented with hands-on practical sessions. Participants were provided with electronic versions of all programme lectures and all necessary tools and environments for the hands-on sessions. In addition, participants had the opportunity to present their work and obtain feedback during a dedicated poster session intended to further facilitate interactions and the exchange of ideas. 36 participants (12 female, 24 male) from ICT and clinical backgrounds attended the summer school. The Dem@Care project granted 10 scholarships of 450 EUR each covering the full summer school registration fee including lectures, materials, accommodation, lunches and social events. Preference was given to PhD students with subjects relevant to the summer school topics and from organizations and countries where access to funds is limited.

### 3.3 Clustering Activities with Other EU Projects

As of last year, Dem@Care has clustered with Haivisio to ensure visibility, awareness and dissemination of results in lots of interested stakeholders. As an ambitious Coordination and Support Action, the Haivisio project aimed at enhancing visibility and awareness of the results generated by eHealth, Active Ageing and Independent Living projects, supporting community building around these results, through a series of communication and synergy exploitation activities.

The proposed project invites relevant projects to engage in a collective and synergetic way, identifying best-practices, involving the most active partners and stakeholders and disseminating widely the added value and assets generated from each of these projects. HAIVISIO links and works in tandem with almost all relevant projects funded by the

European Commission in an attempt to increase their impact on the society and to bridge the existing gap between ICT research and innovation results in eHealth, Active Ageing and Independent Living and the routine provision of services to the European citizens.

As a member of the Haivisio network we worked closely with them to enhance our visibility and promote our findings and the work that has been accomplished in the context of the project. To this end, Dem@Care has been featured in the latest newsletter of the project (Figure 11).



Figure 11: Dem@Care featured in the Haivisio newsletter

This Newsletter<sup>6</sup> is delivered to an audience of around 1500 contact including EU Research and Innovation projects (FP7: CIP, CSA Thematic Networks, AAL), European Innovation Partnership on Active and Healthy Ageing (EIP-AHA), European Knowledge and Innovation Communities (KICs), Joint Programming Initiative (JPI) "More Years, Better Lives" and External stakeholders (contacts from the European Commission, universities and research institutes, NGOs and industry), etc. The newsletter can be found in this link:

<sup>6</sup> [http://haivisio.eu/wp-content/uploads/2015/11/HAIVISIO\\_Newsletter\\_IssueIV.pdf](http://haivisio.eu/wp-content/uploads/2015/11/HAIVISIO_Newsletter_IssueIV.pdf)

Various stakeholders have received the newsletter that resulted in another partnership for the Dem@Care Project with a H2020 project called Uncap, which deals with ubiquitous care for ageing people with mild cognitive impairments. The objectives and the settings are very similar to Dem@Care, as described on their website<sup>7</sup>. Therefore as they are in charge of preparing the study protocol and facing ethical issues (they have 11 pilot sites in 5 different countries), we shared our D2.4 deliverable with them as a roadmap to Ethical Approval Procedures and Documentation.

Dem@Care also this year became a member of the AFE-INNOVNET network. The overarching goal of AFE-INNOVNET is to set up a large EU wide community of local and regional authorities and other relevant EU stakeholders who want to work together to find smart and innovative evidence based solutions to support active and healthy ageing and develop age-friendly environments across the EU.

The AFE-INNOVNET consortium and supporting partners have joined forces to:

- mobilise a wide range of local and regional authorities and other stakeholders – industries, including SMEs, research centre/universities, civil society organizations – to link up, benefit from each other's experience and work together to promote initiatives on age-friendly environments across the EU;
- develop methodologies to help local and regional authorities assess the socioeconomic impact of age-friendly environments and the benefits of involving older people in the co-production of age-friendly environments solutions;
- develop a repository of notable and replicable practices in innovative ICT and services solutions with associated socio-economic evidence;
- facilitate pilot projects clustering to stimulate local/regional investment in ICT and services innovation and thus local/regional economic activity (with a focus on SMEs);
- facilitate public access to research/expertise and generic methodologies in the field of age-friendly environments;
- ensure convergence and strong coordination with WHO Age-Friendly Cities and Healthy Cities initiatives;
- facilitate information sharing between all interested stakeholders in the field of age-friendly environments;
- launch an EU Covenant on Demographic Change to create the necessary political and technical framework to bring together in a more formal and long-term structure local and regional authorities – and other stakeholders - across the EU who want to cooperate and implement smart and innovative evidence based solutions. The proposed Covenant will be inspired by the existing Covenant on sustainable energy.

The AFE-INNOVNET repository displays notable examples of innovative solutions for age-friendly environments in Europe. Its objective is to exchange knowledge, foster synergies and contribute to the scaling up of these initiatives. Dem@Care submitted our innovative solutions for personalized dementia care and is now featured in the AFE-INNOVNET website<sup>8</sup> with an objective to attract interested stakeholders and disseminate the work that has been accomplished.

<sup>7</sup> <http://www.uncap.eu/>

<sup>8</sup> <http://afeinnovnet.eu/node/678>



## 3.4 Events and Exhibitions: Highlights since 2011

### 3.4.1 Exhibition at EU ICT 2013

Dem@Care participated in the ICT Exhibition, which took place in Vilnius, Lithuania, from Nov 6 – 9, 2013. Several interactive demos are presented in an appropriately designed booth, showcasing the project's potential for helping people live at home independently longer. For the design of the Dem@Care booth and banners, we collaborated with a professional company of graphics designers. The Dem@Care booth location was in a central location of the venue and attracted many visitors. Our exhibit in ICT 2013 aimed to show in a realistic and interactive manner how Dem@Care multi-sensing can be incorporated in the daily life of a person with dementia, monitor their daily activities, enabling appropriate, easy to understand remote feedback and care.

A simulation of a kitchen/living area was set up, with tables, chairs, objects of daily living, where visitors can test the system and watch explanatory demos. Visitors were able to play the role of a person with dementia, undertaking some of the daily activities examined in Dem@Care, recorded by ambient and wearable cameras. In one demo, the system is run on a notebook, with RGB-D camera input and online activity recognition results, also shown on a post-processing visualization tool. In another demo, recognition from Dem@Care and benchmark static camera data of over 10 activities of daily living (ADLs) with state-of-the-art accuracy is demonstrated in illustrative videos of both intermediate and final processing steps. A sample living area with characteristic results from RGB-D data can be seen in Figure 12.



Figure 12 A sample living area with characteristic results from RGB-D data (demonstrated during ICT 2013)

Visitors were also able to try the wearable camera and see its video streamed to a smartphone, to understand what information on ADLs can be extracted. Demos illustrated how salient scene elements are automatically extracted to improve object recognition. Several levels of granularity are extracted for location and posture recognition of a person: room/location, 3D position/orientation of the person.

The potential of audio as a meaningful, accurate and affordable marker for early dementia detection is also presented in a video including a talk by neurologist-psychiatrist Prof. Tsolaki.

All sensor demos are accompanied by portable, easy to use, wireless interaction and feedback devices of all sizes, which visitors can test out to see how they give feedback triggered by

video-based activity detection in a synchronized manner, and showed innovative life-logging photo-diaries from before and during the exhibition.

### 3.4.2 Presentation at MobiHealth 2014

Dem@Care contributed to the Satellite Event on "Transforming healthcare through mobile and wireless technologies: Innovative Systems and Services", which took place on November 3-5 2014 in Athens, in parallel to the 4th International Conference on Wireless Mobile Communication and Healthcare (MobiHealth 2014)<sup>9</sup>. Aspects of the Dem@Care solution and its suitability for deployment via mobile networks are presented in MobiHealth, showing its strong presence in m-health, ageing well in the information society, healthcare telemetry and telemedicine. Dem@Care experience is shared with the MobiHealth participants along with demos of Dem@Care mobile interfaces working in practice and feedback from end users like clinicians, people with dementia and informal caregivers.

### 3.4.3 Exhibition at EU ICT 2015

Dem@Care has successfully participated in this year's ICT that took place in Lisbon. On 20-22 October 2015, the ICT 2015 exhibition at the Centro de Congressos de Lisboa will be woven around the three main messages of ICT 2015:

- Innovate: focusing on Innovation and Creativity
- Connect: focusing on people and the digital society
- Transform: focusing on industry, business and the digital economy

The interactive exhibition dynamically showcased the best-in-class results of the existing European ICT Research & Innovation, presenting very advanced research, future visions and being a showcase for activities with a high potential impact on the European industry, competitiveness and the future life and well-being of European citizens.

The Dem@Care booth demonstrated an instance of Ambient Assisted Living solutions for dementia assessment and care. Visitors had the opportunity to play with real-life physical objects such as a book, lighting, a tea kettle, cup and pillboxes simulating the activities in our home, nursing home and lab scenarios. According to their performance, they were ranked among each other and compared to hundreds of Dem@Care participants giving them a comprehensive glimpse of how clinical assessment and care is provided with ICT solutions. The giveaway that was selected from the consortium - an antistress squeezable object in the format of a small home (Figure 13) - was also very much appreciated from the booth visitors and attracted lots of people to our booth who tried our demo and claimed their "prize".

During the exhibition, many industrials and academia representatives had the opportunity to try the Dem@Care platform in real-time and express their interest in it, in the form of future collaborations. The institutes and companies highly interested in Dem@Care and its exploitation are presented below in Tables 3, 4, and 5 along with their major activities and areas of focus.

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<sup>9</sup> <http://mobihealth.name/2014/show/home>



Figure 13 Dem@Care's giveaway to visitors of the ICT booth

Table 3 R &amp; D in participatory design, accessibility and elderly care through clinical pilots, either in a lab, home or nursing home setting:

| Organization  | Contacts   | Activities   |
|---|--|--|
| Dept. of Computing Engineering and Digital Systems, University of Sao Paulo | Dr. Moacyr Martucci Jr,<br>Dr. Gustavo Moreira Calixto | Large-scale clinical pilots in Brazil  |
| Sintef ICT  | Thomas Carlyle Vilarinho                               | Elderly care,<br>Participatory design,<br>Clinical pilots in Norway                                  |
| Kickstart Germany   | Maximilian Hoffmann                                    | Clinical nursing home pilots in Germany  |
| Cracow University of Technology   | Dr. Joanna Kolodziej                                   | Dementia care,<br>Clinical home pilots in Poland   |
| COMARCH Technologies  | Grzegorz Sowa  | Sensor manufacturer,<br>Security,<br>Cloud infrastructure,<br>Clinical nursing home pilots in Poland |
| Silisian University of Technology   | Dr. Piotr Czekalski<br>Dr Krzysztof Tokarz             | Clinical pilots in Poland  |

Table 4 Exploitation in end-user commercial products

| Organization | Contacts              | Activities                                |
|--------------|-----------------------|---|
| Filisia      | Eirini Malliaraki     | End-user feedback industrial applications |
| Loja Senior  | Aba Nargaruda Nireura | Geriatric products                        |

Table 5 Research efforts towards AAL and IoT integration, taking security, cloud and Big Data analytics into account

| Organization | Contacts                 | Activities                                       |
|--------------|--------------------------|--|
| HI-iberia    | Raul Santos de la Camara | R & D in Big Data analytics and Alzheimer's care |
| CEA          | Driss Aboukassimi        | Security in AAL                                  |
| EAI          | Peter Pongracz           | Connection AAL to IoT                            |
| Nurogames    | Andrew Pomazanskyi       | Immersive 3D Gaming for Elderly care and AAL     |
| Globo group  | Dr. Aggelos Lipais       | Cloud and sensor analytics in eHealth            |
| Activeeaon   | Dr. Iyad Alshabani       | Edge processing, IoT                             |

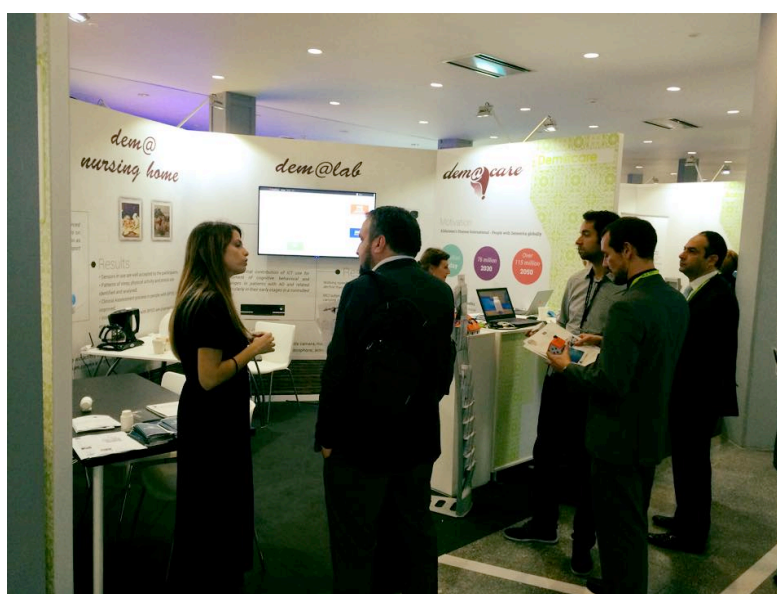


Figure 14 Visitors interested in Dem@Care during ICT2015

Media coverage was also noteworthy before, during and after the event. Before the beginning of ICT our EC directory published a great article on Dem@Care that spurred discussions and interest in social media (Figures 14 and 15). During the event Dr. Thanos Stavropoulos from CERTH was interviewed by a German journalist to give all the answers about the Dem@Care approach and the work that has been accomplished in the context of the project and visitors

also shared their experience with Dem@Care after the event. For the project, ICT 2015 was a very valuable experience as we met many interesting people and gained constructive feedback on the results.



Figure 15 Digital Agenda tweets about Dem@Care before ICT2015

### 3.4.3.1 Article by EC on Dem@Care

In the context of ICT, EC published an article about Dem@Care right before the exhibition<sup>10</sup>. An outstanding user involvement was monitored in Twitter and a lot of buzz was created as many people were impressed by the initiative and the results of the Dem@Care project.

The article “Using mobile devices to detect early-stage dementia and to improve care” provided an overview of the project, what motivated this initiative as well as a summary from the results of the pilots Lab, Nursing Home and Home that have been running in four countries namely France, Sweden, Ireland and Greece (see Figures 16 and 17). The article was a social media success as it attracted approximately **105** tweets/retweets on Twitter and **32** likes and **19** shares on facebook.

<sup>10</sup> <https://ec.europa.eu/digital-agenda/en/news/using-mobile-devices-detect-early-stage-dementia-and-improve-care>





Figure 16: Using mobile devices to detect early-stage dementia and to improve care | Article by the EC on Dem@Care



Figure 17: Tweets about EC's article on Dem@Care

### 3.4.4 ICIP Special Session: Image/Video Indexing and Retrieval for Healthcare

Dem@Care organized "Image/Video Indexing and Retrieval for Healthcare" during the prestigious IEEE International Conference on Image Processing (ICIP) 2015. Wearable visual sensors can give a picture of a person's daily activities from their own perspective, recording how they perform daily activities (such as washing dishes, making a phone call), what objects

they interact with, who they interact with. They can thus provide in depth understanding of a person's lifestyle, their abilities to carry out everyday activities, their level of sociability, the environment and context in which they live. In the realm of healthcare applications, the deployment of wearable visual sensors allows the monitoring of progress or deterioration of a person's condition, as they clearly show how the individual carries out daily activities and how these abilities may change over time. They may also show how their lifestyle and sociability levels change over time, through long-term profiling of activity levels, daily life routines, places they frequent, as well as detect emergencies in real time.

The automated analysis of data from ambient visual sensors can provide a picture of a person's daily activities and daily routine, from an observer's standpoint. Ambient visual sensors allow the detection and recognition of activities of daily living, and provide valuable information about the way these are carried out since they show the entire person. As for wearable visual sensing, emergencies can also be detected in real time. Color and depth information complement each other for the recognition of daily activities when several people are in a room. An added benefit of these visual sensors is their unobtrusiveness, which allows individuals to go about their daily life as usual. This Special Session aims to present the latest advances in image and video processing of both ambient and wearable visual sensors, with particular focus on healthcare applications, such as the recognition of activities of daily living of elderly in a hospital lab environment, or in their home. Its goal is to support and promote advances in visual sensing for healthcare, as this modality can provide a comprehensive picture of the lifestyle of individuals, of their condition, and these change over time. Safety applications such as the online detection of emergencies are also a useful by-product of such sensing.

Finally, medical image analysis has received significant attention in the past years, and is expected to continue to play a central role in modern healthcare. The proliferation of imagery in medical devices and the continuous improvements in its quality and availability make its automated analysis a necessity, where interesting research is taking place.

Five papers have been presented, these are:

- “Computationally efficient recognition of activities of daily living”, Stergios Poularakis, Konstantinos Avgerinakis, Alexia Briassouli, Ioannis Kompatsiaris,
- “Object Recognition with top-down Visual attention modeling for behavioral studies”, Vincent Buso, Jenny Benois-Pineau, Ivan Gonzalez-Diaz,
- “Barcode Annotations for Medical Image Retrieval: A Preliminary Investigation”, Hamid R. Tizhoosh,
- “Feature Saliency Analysis for Perceptual Similarity of Clustered Microcalcifications”, Juan Wang, Yongyi Yang,
- “Identifying Epileptic Seizures Based On A Template-based Eyeball Detection Technique”, Supriya Sathyanarayana, Ravi Kumar Satzoda, Suchitra Sathyanarayana, Srikanthan Thambipillai.



Figure 18: ICIP Special Session

### 3.4.5 Dem@Care Symposium in AAIC 2015

Our submitted Featured Research Session about the Dem@Care project entitled: **Innovative Analytics for Assessment and Monitoring of People with Dementia and Mild Cognitive Impairment** was accepted in this year's Alzheimer's Association International Conference.

The symposium was chaired by Prof. Philippe Robert and took place on Monday, July 20, 2015: 08:00 AM - 09:30 AM under the 'Dementia Care Research and Practice Track' in Washington DC.

The sessions on Alzheimer's and dementia in this conference attracted 5,000 attendees from over 70 countries for discussion and networking. More than 90 sessions and 475 presentations focused on basic science, dementia care research and practice, imaging, technology and more.



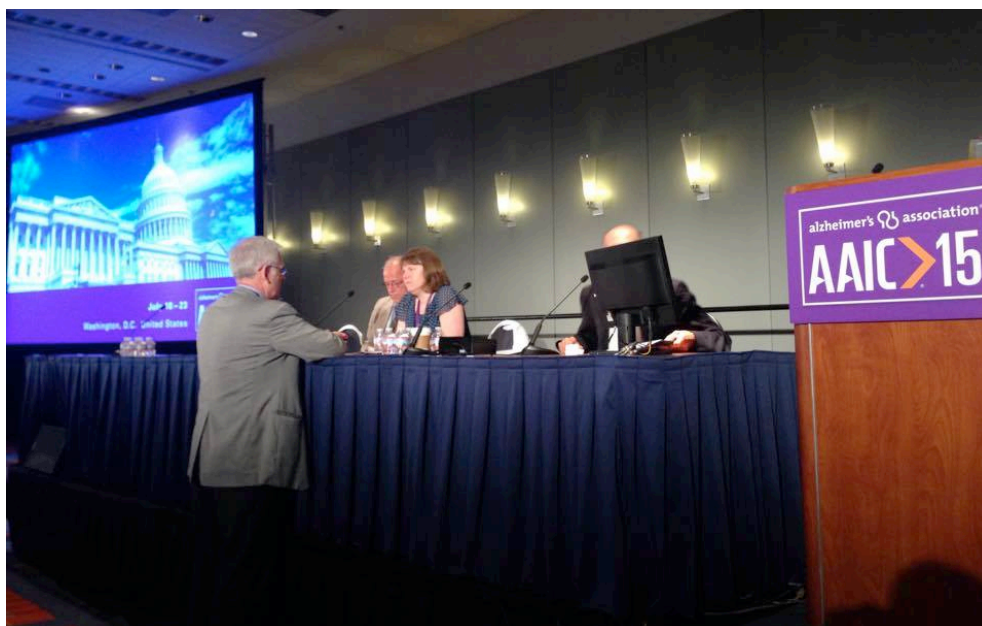


Figure 19 Members of the Dem@Care Consortium presenting in AAIC15



Figure 20 Dem@Care poster in AAIC15

### 3.4.6 Presentation in the Federation of European Neuroscience Societies (FENS) FFRM2015

FENS task is to promote all aspects of neuroscience and be at the service of the European neuroscience community and all member societies. With a mission to support education and training of young neuroscientists FENS offers a recurrent programme of state-of-the-art European schools on timely topics in neuroscience. Two first-rate annual neuroscience

schools are implemented in collaboration with longstanding partners of FENS: the FENS Summer School in cooperation with the Society for Neuroscience (SfN) and the FENS Winter School in collaboration with the Hertie Foundation.

In the odd years FENS supports the FENS Featured Regional Meeting (FFRM). FENS Featured Regional Meetings are national or regional scientific meetings organised by FENS member societies with FENS support and label. FFRMs are biennial meetings, alternating with the FENS Forums, which are held on even years and the last one took place in Thessaloniki October 7, 2015. In this last edition, we presented our poster entitled *Supporting Cognitive Skills of People Suffering from Dementia through a Sensor-based System* (**Authors:** Ioulietta Lazarou, Anastasios Karakostas, Georgios Meditskos, Thanos G. Stavropoulos, Ioannis Kompatsiaris, Magda Tsolaki).

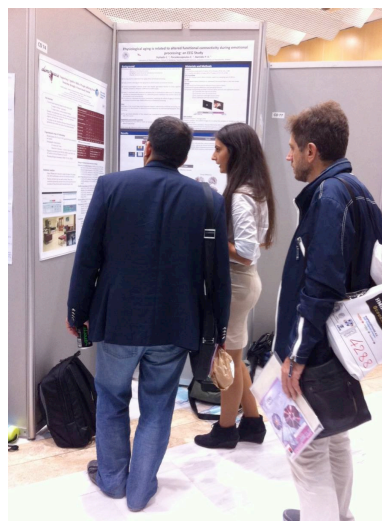


Figure 21: Dem@Care Poster Presentation in FENS FFRM 2015

The **European Journal of Neuroscience (EJN)** is the official journal of FENS. It publishes papers on a broad range of topics, aiming to advance our understanding of the nervous system in health and disease, thereby improving the diagnosis and treatment of disorders. It is published biweekly.

### 3.4.7 Dem@Care in the 25th Annual Conference of Alzheimer Europe

Dem@Care was also presented in the 25th Annual Conference of Alzheimer Europe that took place in Ljubljana, Slovenia from 2-4 September 2015. The annual Alzheimer Europe conference was, as ever, unique in bringing together a range of participants, including people with dementia and their carers, policy makers and civil servants, care and health professionals, academics and researchers, staff and volunteers of Alzheimer associations and representatives of the pharmaceutical industry. The theme for this year was “**Dementia:** putting strategies and research into practice”.

During the conference, we acquainted attendants with ICT in the care of dementia. We also had the opportunity to present and discuss our clinical and experimental findings towards improving care and quality of life for people with dementia.

Smart mobile sensors can monitor one’s health parameters, activity levels and even emotional and cognitive status. “Multi-sensor monitoring outcomes can then be **fused intelligently** to

form a clear picture of the person's condition and lifestyle, so that **personalized remote care, feedback and support** can be provided to them and their clinicians coupling clinical and domain knowledge with profile contextual history and care plans" said Dr. Giorgos Meditskos from CERTH-ITI.



Figure 22 Giorgos Meditskos from CERTH presenting "Remote Monitoring of people with dementia: The Dem@Care experience"

Further, in her presentation Dr. Alexandra König from CHUN explained *that* currently, the gold standard for the assessment of cognitive and functional abilities involves questionnaires and clinical rating scales. However, these are often limited in their ability to provide objective and sensitive information. In contrast, information and communication technologies (ICT) may overcome these limitations by capturing more fully the disturbances associated with Alzheimer disease (AD). We investigated the use of different sensors, such as an accelerometer, video monitoring system or audio analyses for the assessment of people with dementia and mild cognitive (MCI) impairment. Dem@Care has already provided critical diagnostic aid reliably and accurately discriminating 82% of healthy, MCI and AD individuals.

In Dublin (Ireland) and Thessaloniki (Greece) the Dem@Care system is already deployed in the homes of people with dementia most of whom are living alone. Object and utility usage, sleep and physical activity are monitored 24/7, which provides in-depth and reliable information for clinicians. Results indicate that such sensor-based information can have a positive impact on the assessment of BPSD in residential care settings. While at home, the person with dementia and their family caregiver can monitor summaries of their own activities, and read personalized messages, prompts and advice, thus providing timely support and enabling independent living for longer, Dr Louise Hopper from DCU added.



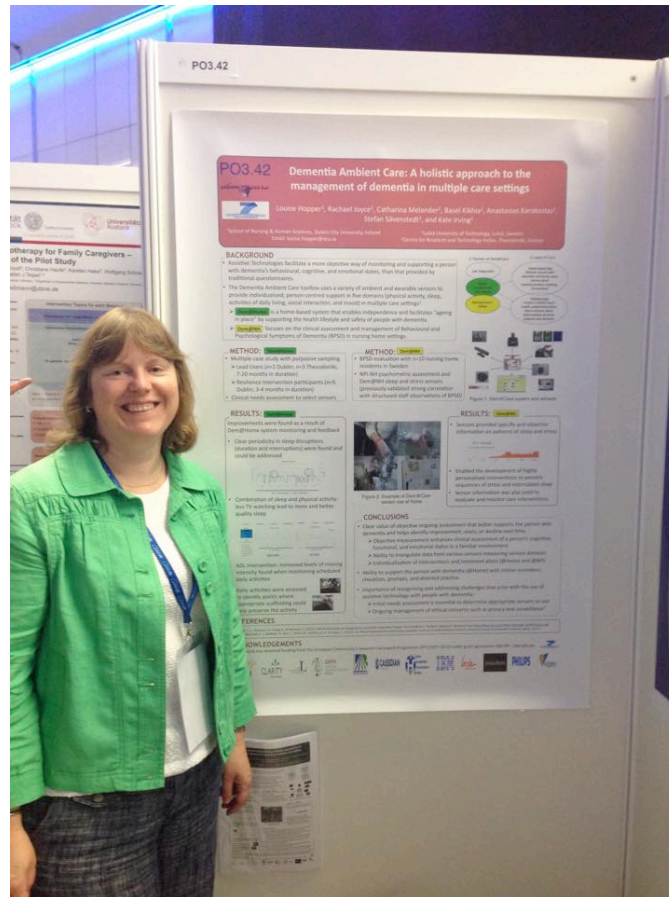


Figure 23 Dr Louise Hopper from DCU presenting Dem@Care as a holistic approach to the management of dementia in multiple care settings

An intervention study was also presented comprising of residents from three specialist dementia care units in northern Sweden; two in the experimental group and one in the control group. In each setting, sensor data were analysed using state-of-the-art knowledge-driven interpretation techniques based on Semantic Web technologies. Patterns of sleep, physical activity, daily living activities, and stress/anxiety over time were identified. Through specific user interfaces, clinicians and formal caregivers were able to monitor the sensor recordings and the relevant analysis in order to propose new, or to adapt older, supports and interventions. Results indicate that such sensor-based information can have a positive impact on the assessment of BPSD in residential care settings.

### 3.4.8 Other Activities: Presentations and Invited Talks at Events and Exhibitions, Media Appearances and Interviews

Dem@Care has been also very active in presenting and demonstrating project prototypes and progress in professional and public healthcare ICT exhibitions, as well as in sister project meetings. Furthermore, several appearances and interviews in the press reinforced the case of Dem@Care. We considered such types of activities as among the most important means to advertise the project among healthcare professionals and to better understand the acceptability of Dem@Care-style remote healthcare solutions. The list of such activities in terms of presentations, invited talks, media appearances and interviews is provided in Appendix E.

### 3.5 Summary

Table 6 provides the cumulative summary of Dem@Care dissemination activities throughout the project years. As can be seen from the table, Dem@Care consortium increased the pace of dissemination each year and reached a total of 318 activities. As a useful summary statistic, we provide the average number of activities per week for each year in the last row of the table. On average throughout the project, we produced 2 activities in every 3 weeks. These figures and the diversity of the activities underline the strength of the dissemination strategy executed by Dem@Care consortium.

Table 6 Cumulative Summary of Dem@Care Dissemination Activities

| Activity                       | 2011     | 2012      | 2013      | 2014      | 2015       | TOTAL      |
|--------------------------------|----------|-----------|-----------|-----------|------------|------------|
| Book                           | -        | -         | -         | 1         | 1          | 2          |
| Book chapter                   | -        | -         | 1         | 1         | 2          | 4          |
| Conference/Workshop            | -        | 4         | 39        | 36        | 50         | 129        |
| Demonstration                  | -        | 3         | 10        | 9         | 2          | 24         |
| Exhibition                     | -        |           | 1         |           | 2          | 3          |
| Interview (Radio, press, etc.) | -        | 2         | 2         | 2         |            | 6          |
| Journal paper                  | -        | 1         | 4         | 10        | 33         | 47         |
| Newsletter, Web appearance     | -        | 8         |           | 1         | 3          | 12         |
| Other event                    | -        | 12        | 6         | 2         | 9          | 29         |
| PhD Dissertation               | -        | -         | -         | 1         | 8          | 9          |
| Press appearance               | 2        | 2         | -         | -         | -          | 4          |
| Printed material               | 1        | 3         | -         | -         | -          | 4          |
| Special session organization   | -        | -         | -         | -         | 1          | 1          |
| Summer school organization     | -        | -         | 1         | -         | -          | 1          |
| Summer school participation    | -        | 2         | -         | -         | -          | 2          |
| Talk/Lecture                   | -        | 4         | 6         | 18        | 6          | 34         |
| TV Program                     | -        | -         | -         | 1         | -          | 1          |
| Workshop organization          | -        | 2         | 2         | 1         | 1          | 6          |
| <b>ALL</b>                     | <b>3</b> | <b>43</b> | <b>72</b> | <b>83</b> | <b>118</b> | <b>318</b> |
| <b>Activities per week</b>     | n/a      | 0.8       | 1.4       | 1.6       | 2.3        | <b>1.5</b> |

## 4 Conclusion

In this document, we presented the final dissemination report of the Dem@Care project covering the activities from the start to the end of project (2011-2015). While we placed particular emphasis on the final year, we reported the detailed summary of all activities.

Dem@Care partners have been quite active in terms of dissemination, accomplishing 318 unique activities during the whole project. Last year in particular has witnessed more activities than previous years as we anticipated at the beginning of the project. Table 6 shows the stable increase in terms of activities across years (43 in 2012, 73 in 2013, 85 in 2014 and 114 in 2015). Continuous activities in terms of web presence are not included in these numbers. We must also add that Dem@Care is strongly present across various social network channels as well.

A major component of Dem@Care dissemination has been academic dissemination as can be expected from our strongly research-oriented consortium. Dem@Care researchers published 191 academic publications (including books and PhD dissertations) in the course of four years in high-impact journals and conferences.

In conclusion, we posit that Dem@Care dissemination has added to the recognition of dementia-related disorders across the general public and made people more aware of ICT-based monitoring and enablement solutions in the service of people with dementia. The project has received a lot of attention in the events participated and has established a telling web presence. All in all, we believe Dem@Care has accomplished its initially set dissemination objectives.

## A Dem@Care Activity Table Template

|   |   |
|---|---|
| <b>(1) Title of Activity</b>                  | <p><i>State a descriptive title for the activity</i></p> <p><i>e.g., talk at Int. Conference on ICT in Healthcare, Year or Interview on RadioHealthcare</i></p>   |
| <b>(2) Official Title of the Event</b>        | <p><i>State the official title of the related event if applicable</i></p>   |
| <b>(3) Date/Place of Activity</b>             | <p><i>State the date and place of the activity if applicable</i></p> <p><i>State if the activity is periodic, continuous or conditional upon a certain milestone</i></p>  |
| <b>(4) Target Audience Category</b>           | <p><i>Select from one of the following categories:</i></p> <ul style="list-style-type: none"> <li>- General public</li> <li>- Scientific community</li> <li>- Healthcare center (specify if applicable)</li> <li>- Enterprise (specify if applicable)</li> <li>- Family/relatives (specify if applicable)</li> <li>- Governmental organization (specify if applicable)</li> <li>- Non-governmental organization (specify if applicable)</li> </ul>  |
| <b>(5) Dissemination Type/Medium</b>          | <p><i>Select from one of the following categories:</i></p> <ul style="list-style-type: none"> <li>- Public website (specify if your organization plans to allocate web space for the project within the organization website)</li> <li>- Press release</li> <li>- Leaflet</li> <li>- Newsletter</li> <li>- Conference paper and/or talk</li> <li>- Event in conference (as attendee)</li> <li>- Journal paper</li> <li>- Booth in exhibition/conference</li> <li>- Talk</li> <li>- Demonstration</li> <li>- Interview (TV, newspaper, website)</li> <li>- Personal communication</li> </ul> |
| <b>(5) Purpose of Activity</b>                | <p><i>Select from one of the following categories:</i></p> <ul style="list-style-type: none"> <li>- Raise awareness – let others know what we are doing</li> <li>- Inform – educate the community</li> <li>- Engage – get input/feedback from the community</li> <li>- Promote – “sell” outputs and results</li> </ul>  |
| <b>(6) No. of People Addressed (Expected)</b> | <p><i>Provide an estimate of the number of people who will attend the event or be the target of the dissemination activity</i></p>  |



## B Academic Publications

### B.1. CERTH

#### PHD DISSERTATIONS

- Konstantinos Avgerinakis, “Video processing and background subtraction for change detection and activity recognition”, University of Surrey, UK, 2015.
- Thanos Stavropoulos, "Web Services in Ambient Intelligence Environments", Department of Informatics, Aristotle University of Thessaloniki, Greece, 2015

#### BOOKS

- Alexia Briassouli, Jenny Benois-Pineau, Alexander Hauptmann (Editors), "Health Monitoring and Personalized Feedback using Multimedia Data", Springer, 2015.

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- K. Avgerinakis, A. Briassouli, I. Kompatsiaris, Activities of Daily Living recognition using optimal trajectories from motion boundaries, Journal of Ambient Intelligence and Smart Environments , *submitted*, 2014.
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- G. Meditskos, P. Mitzias, I. Kompatsiaris, "iKnow: Ontology-driven activity recognition and synthetic ADL datasets", Journal of Web Semantics, Elsevier, *in preparation*, 2015.
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## B.2. CHUN

### PHD DISSERTATION

- Alexandra König, < The Use of ICT for the assessment of patients with AD and related disorders, Maastricht University, Maastricht, Netherlands, 2015.

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## B.5. UB1

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- PhD Dissertation: Guillaume Bourmaud - "Estimation de paramètres évoluant sur des groupes de Lie: Application à la cartographie et à la localisation d'une caméra monoculaire" - University of Bordeaux

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## B.7. PENB

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## B.8. IBM

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## C Dem@Care Project Factsheet



**Dem@Care**

**Dementia Ambient Care: Multi-sensing Monitoring for Intelligent Remote Management and Decision Support**

Dem@Care aspires to develop an innovative multi-parametric remote monitoring framework that will enable timely diagnosis, assessment, maintenance and promotion of self-independence of people with dementia

### Objectives of the project

**Clinical context**  
Dementia, a leading cause of disability in the elderly, currently affects nearly 10 million people in Europe and over 35 million worldwide. Rising at unprecedented rates, these figures are projected to increase to 14 and 65.7 millions respectively by 2030. The socioeconomic repercussions are equally staggering. In Europe alone, the total costs of dementia amount to over €180 billion in 2010 and are estimated to exceed €250 billion by 2030.

The aforementioned inflict a significant burden on healthcare systems, society and the economy, necessitating effective treatment means, while preserving quality of life for the people affected and for their carers.

**The project**  
Dem@Care develops a remote care solution that will contribute to enhanced diagnosis and timely, personalised support by deepening the understanding of how the disease affects everyday life and behaviour among people with dementia.

Dem@Care's main objectives are:

- Advance clinical research, by correlating behavioural and cognitive monitoring parameters with dementia-specific patterns.
- Timely diagnosis, continuous follow-up and personalised, adaptive feedback, by enhancing clinical workflows and enabling objective assessment of health status and progress.
- Sustain self-independence, autonomy, safety and sense of security, by direct support to people with dementia and their carers.
- Raise awareness of ICT solutions for ageing well.

### Project Description

Current clinical workflow for dementia involves geriatric assessment by clinicians through visits and questionnaires, where diagnosis is based on changes in cognitive functions, behaviour and activities of daily life, characteristic of the dementia syndrome and its underlying diseases.

Dem@Care aspires to enhance current practices through a closed-loop remote management solution that affords interactive feedback to the person with dementia, while at the same time including clinicians into the remote follow-up, enabling them to maintain a comprehensive view of the health status and progress of the affected person. Specifically, it implements:

- A loop for people with dementia and their informal caregivers that: i) monitors and assesses their cognitive and behavioural status by integrating a multiplicity of wearable and in-situ sensors, ii) enables time evolving context-sensitive profiling to support reactive and proactive care, iii) provides personalised and adaptive support.
- A professional loop that: i) provides objective observations regarding the health progression of the person with dementia and medication effectiveness, ii) warns about trends closely related to dementia (e.g. apathy), iii) supports preventive care decision making and adjustment of treatment recommendations.

To alleviate the subjectivity of current clinical practices, while accounting for the complexity and heterogeneity of the disease, Dem@Care follows a multi-parametric behaviour interpretation of sensors for monitoring daily activities, lifestyle patterns, speech impediments, state of mood, and vital signs.

Clinicians, people with dementia and their carers are involved throughout the analysis, design, development and testing phases in order to maximise the afforded impact. Additionally, ethical assessment ensures that the dignity and privacy of people with dementia is not affected more than is motivated by the benefits that the system will bring to them, while ways of protecting identifiable personal data in an unobtrusive manner are included.

For validation, three pilots will be carried out in Ireland, France and Sweden, in collaboration with regional clinics, residential care centres and health councils. In each pilot, system implementations of increasing functionality will be evaluated.

### PRACTICAL EXAMPLE

In Dem@Care, people with dementia will be monitored by various sensors in everyday life tasks such as cooking or watching TV, cognitive activities and social interactions. At first stages this will take place in controlled environments and later in the homes of people with dementia. These observations will be automatically analyzed and interpreted allowing the correlation of specific behavioral patterns with the disease progress and also direct, personalized feedback. For example, long-term apathy detection can contribute to the understanding of how the disease affects every day life and behavior and on the same time provide feedback and stimulation towards a more active lifestyle.

Figure 24 Dem@Care Project Factsheet (front)

Appropriate experimentation and evaluation protocols will be defined so as to robustly address clinical assessment as well as critical quality aspects including acceptability, usability, functionality, reliability and safety.

## Expected Results & Impacts

Dem@Care expects to enhance current clinical practices and afford new knowledge related to the diagnosis and management of dementia. More specifically, Dem@Care is anticipated to result in:

- clinical protocols that will effectively correlate sensorial inputs related to behavioural and cognitive patterns with dementia-specific parameters;
- elicitation and validation of new clinical knowledge for improved diagnostic precision and effectiveness.

These results will allow Dem@Care to have a strong impact on the quality of life of people with dementia, with direct effects on their informal carers as well, by providing:

- Improved quality of care, through objective, comprehensive diagnosis, and customised reactive and proactive support;
- Increased safety and sense of security, through real-time adaptive feedback and alarms;
- Timely treatment of disease symptoms, afforded through early detection of health status degradation and through personalised cognitive support;
- Sustained independence and autonomy, enabling to better cope with daily life functions, while reducing the need for constant monitoring.

In parallel, Dem@Care expects to have significant socioeconomic benefits, including:

- reduced cost of clinical care
- reduced cost of monitoring
- delayed admittance to nursing facilities
- sustainable at-home care solutions




**Dem@Care**  
Dementia Ambient Care: Multi-sensing  
Monitoring for Intelligent Remote  
Management and Decision Support

**Project co-ordinator:**  
Centre for Research and Technology Hellas

**Contact person:**  
Dr. Ioannis Kompotiatis  
Tel: +30 2311 257774  
Fax: +30 2310 474128  
Email: ikompoti@cti.gr  
Website: www.dem@care.eu

**Partners:**

- Centre for Research and Technology Hellas (Greece)
- Université de Bordeaux I (France)
- Cassidian SAS (France)
- Institut National de Recherche en Informatique et en Automatique (France)
- Luleå Tekniska Universitet (Sweden)
- Dublin City University (Ireland)
- IBM Israel – Science and Technology LTD (Israel)
- Philips Electronics Nederland B.V. (Netherlands)
- CNRS de Nice (France)
- Vitrak İnce Vizyon Yapay Görmeye ve Otomasyon Sanayi ve Ticaret Anonim Şirketi (Turkey)
- Link Care Services SA (France)

**Timescale:** from November 2011 to November 2015

**Total cost:** € 10,761,967

**EC funding:** € 7,300,000

**Instrument:** IP

**Project Identifier:** FP7-ICT-2011-7-288199

**KEYWORDS**  
Multi-parametric behaviour interpretation,  
Personalised health, Remote management of people  
with dementia, Continuous multi-sensor monitoring,  
Context-aware adaptive feedback

Figure 25 Dem@Care Project Factsheet (back)



## D Dem@Care Summer School Programme

|       | Monday 16/09   | Tuesday 17/09   | Wednesday 18/09  | Thursday 19/09   | Friday 20/09   |
|-------|--|---|--|--|--|
| 8:30  | <b>Registration</b>  |   |  |  |  |
| 9:00  |  | <b>Practical Session Introduction</b>   | <b>Francois Bremond</b><br>"Video Monitoring for assessment of Alzheimer's Disease symptoms"       | <b>Claudio Bettini</b><br>"Context modelling and reasoning, ontology-based context-aware activity recognition" | <b>Mounir Mokhtari</b><br>"Quality of Life of ageing people having mild dementia"                                |
| 9:30  | <b>DemAAL Introduction</b>   | <b>Alan Smeaton</b><br>"Introduction and Overview of Sensing Technologies for Monitoring Human Behaviour" | <b>Coffee Break</b>  | <b>Coffee Break</b>  | <b>Kåre Synnes</b><br>"Social Sensing – utilizing Individual Communication Patterns for Cognitive Interventions" |
| 10:00 | <b>Magda Tsolaki</b><br>"Alzheimer's Disease and the need of New Technologies"                             | <b>Coffee Break</b>   | <b>Jenny Benois-Pineaut</b><br>"Elements of behaviour recognition with ego-centric visual sensors" | <b>Antonis Bikakis</b><br>"Rule-based Contextual Reasoning in Ambient Intelligence"                            | <b>Coffee Break</b>  |
| 10:30 | <b>Coffee Break</b>  | <b>Daniel Roggen</b><br>"Human activity recognition. Opportunistic, collective, crowd-sourced"            | <b>Ceyhan Burak Akgül</b><br>"Machine Learning Models for Action Recognition"                      | <b>Adrian Paschke</b><br>"Semantic Complex Event Processing"   | <b>Chris Nugent</b><br>"Designing and evaluating Cognitive Prosthetics for persons with mild dementia"           |
| 11:00 | <b>Coffee Break</b>  | <b>Lunch</b>  | <b>Lunch</b>   | <b>Lunch</b>   | <b>Lunch</b>   |
| 11:30 | <b>Laura Klaming</b><br>"(Neuro)psychology of dementia, lifestyle factors and dementia"                    | <b>Cem Ersoy</b><br>"Sensor Networks"   | <b>Alexander Sorin</b><br>"Voice analytics for dementia symptoms assessment"                       | <b>Practical Session</b>   | <b>Panagiotis Bamidis</b><br>"Cognitive and physical training games for elderly: how effective are they?"        |
| 12:00 | <b>Lunch</b>   | <b>Coffee Break</b>   | <b>Coffee Break</b>  | <b>Coffee Break</b>  | <b>Practical Session</b>   |
| 12:30 | <b>Lunch</b>   | <b>Practical Session</b>  | <b>Practical Session</b>   | <b>Practical Session</b>   | <b>Coffee Break</b>  |
| 13:00 | <b>Lunch</b>   | <b>Practical Session</b>  | <b>Practical Session</b>   | <b>Practical Session</b>   | <b>Student Practical Session Presentations &amp; Awards</b>  |
| 13:30 | <b>Lunch</b>   | <b>Practical Session</b>  | <b>Practical Session</b>   | <b>Practical Session</b>   | <b>Student Practical Session Presentations &amp; Awards</b>  |
| 14:00 | <b>Kate Irving</b><br>"Ethnographic approaches to ambient assisted living design for people with dementia" | <b>Practical Session</b>  | <b>Practical Session</b>   | <b>Practical Session</b>   | <b>Student Practical Session Presentations &amp; Awards</b>  |
| 14:30 | <b>Osman Ugur Sezerman</b><br>"JADE: ICT for Independent Living of Elderly"                                | <b>Practical Session</b>  | <b>Practical Session</b>   | <b>Practical Session</b>   | <b>Student Practical Session Presentations &amp; Awards</b>  |
| 15:00 | <b>Coffee Break</b>  | <b>Practical Session</b>  | <b>Practical Session</b>   | <b>Practical Session</b>   | <b>Student Practical Session Presentations &amp; Awards</b>  |
| 15:30 | <b>Student Poster Session</b>  | <b>Practical Session</b>  | <b>Practical Session</b>   | <b>Practical Session</b>   | <b>Student Practical Session Presentations &amp; Awards</b>  |
| 16:00 | <b>Student Poster Session</b>  | <b>Practical Session</b>  | <b>Practical Session</b>   | <b>Practical Session</b>   | <b>Student Practical Session Presentations &amp; Awards</b>  |
| 16:30 | <b>Student Poster Session</b>  | <b>Practical Session</b>  | <b>Practical Session</b>   | <b>Practical Session</b>   | <b>Student Practical Session Presentations &amp; Awards</b>  |
| 17:00 | <b>Student Poster Session</b>  | <b>Practical Session</b>  | <b>Practical Session</b>   | <b>Practical Session</b>   | <b>Student Practical Session Presentations &amp; Awards</b>  |
| 17:30 | <b>Student Poster Session</b>  | <b>Practical Session</b>  | <b>Practical Session</b>   | <b>Practical Session</b>   | <b>Student Practical Session Presentations &amp; Awards</b>  |
| 18:00 | <b>Student Poster Session</b>  | <b>Practical Session</b>  | <b>Practical Session</b>   | <b>Practical Session</b>   | <b>Student Practical Session Presentations &amp; Awards</b>  |
| 18:30 | <b>Student Poster Session</b>  | <b>Practical Session</b>  | <b>Practical Session</b>   | <b>Practical Session</b>   | <b>Student Practical Session Presentations &amp; Awards</b>  |
| 19:00 | <b>Student Poster Session</b>  | <b>Practical Session</b>  | <b>Practical Session</b>   | <b>Practical Session</b>   | <b>Student Practical Session Presentations &amp; Awards</b>  |
| 19:30 | <b>Welcome Dinner</b>  | <b>Guided sightseeing tour to the city of Chania</b>  | <b>Cocktail party</b>  | <b>Beach excursion</b>   | <b>Student Practical Session Presentations &amp; Awards</b>  |

Figure 26 Dem@Care Summer School Programme

## E Other Activities: Presentations at Events and Exhibitions, Invited Talks, Media Appearances and Interviews

### E.1. Presentations

- Poster presentation at CLARITY site review, 2012. (DCU)
- Colloquium Fondation Médéric Alzheimer European Dementia Biomedical Outlook, 2012. (INRIA)
- “Alzheimer : la mémoire qui fait des faux ?”, at Librairie Georges, Talence, France, 2012. (UBX)
- Presentation during Alzheimer day (“journée Mondiale Alzheimer”), organized by Association France Alzheimer on 20/09/2012 at EHPAD, COS Villa Pia, Bordeaux, France, 2012. (UBX)
- Presentation at JADE Workshop, 2012. (VIV)
- Participation to In2Societies, Brussels, Belgium, 2012. (VIV)
- Presentation of the Dem@Care Project at the Technology Pitching Session in AUTM Asia 2012 Commercialising Technologies to Sustain a Better World, 2012. (VIV)
- CLARITY National Day (2 posters presented), Clontarf Castle, Dublin, 2012. (DCU)
- MyLife Walkthrough - exhibition at GAME, Science Gallery, Dublin, 2013. (DCU)
- Presentation of the Dem@Care project for the French Ministry of Defense, 2013. (CS)
- Presentation at REACTION clustering event, Heraklion, Crete, Greece, 2013. (CERTH)
- Poster presentation at AAL Forum conference, Norrkoing, Sweden, 2013. (LTU)
- Presentation of IBM work in Dem@Care and demonstration of the Tablet application for dementia assessment to Nice Municipality Administration at IBM Research - Haifa, 2014. (IBM and CHUN)
- Presentation at 13th édition des Trophées de la Communication, 2014. (INRIA)
- EU Project Networking Session - ESWC2015, Dementia Ambient Care: Multi-Sensing Monitoring for Intelligent Remote Management and Decision Support, 2015. (CERTH)
- Presentation at AFE-Innovnet: Towards and Age-Friendly Europe, Dementia Ambient Care: Multi-Sensing Monitoring for Intelligent Remote Management and Decision Support, 2015. (CERTH)
- Poster presentations at DCU School of Nursing and Human Sciences Staff and Graduate Student Research Expo, Dublin, 2015. (DCU)
- Participation to European Innovation Partnership on Active and Healthy Ageing, 2015. (LTU)

## E.2. Invited Talks

- State of the art lecture at European Psychiatric Association Congress, 2012. (CHUN)
- Lecture at “Semaine du Cerveau”, 2012. (CHUN)
- Second International Conference on Ambient Computing, Applications, Services and Technologies (AMBIENT 2012) Barcelona – Spain, 2012. (INRIA)
- Keynote speech at International Workshop on Innovation in eHealth and Networking in the Kolarctic Region hosted by KITENPI Project, Kemi-Tornio UAS, Finland, 1-2nd Nov 2012. (LTU)
- Keynote speech at the 2nd Healthcare ICT Summit (by Prof. Ercil), Istanbul, Turkey, 2013. (VIV)
- Dementia at Home: Technologies for remote monitoring and independent living, INNOVAge, 2013. (CERth)
- O. Toledo-Ronen, “Introduction to Voice-Based Emotion Recognition”, Cognitive Computing Symposium, Sagol School of Neuroscience, Tel-Aviv University, Israel, May 2013. (IBM)
- The Second Short Spring School on Surveillance (S5), Modena, Italy, 7-9 May 2013. (INRIA)
- IX Journée de la Fédération CMRR du Sud de la France, Nice, France, 29 March 2013. (INRIA)
- Seminar at CMU Carnegie Melon University, Pittsburg, USA Jenny Benois-Pineau. “Fusion of multiple cues in recognition of activities in wearable video for Dementia Studies”, VASC Seminar at CMU, 28/01/2013, Pittsburgh, PA, USA. (UBX)
- Health and Information Technologies Exhibition Hall, Porte de Versailles, Paris J. Benois-Pineau « Dementia Ambient Care. Monitoring Multi-Sensoriel, Suivi à distance et aide au diagnostic », Presentation of Dem@care project, 2014. (UBX)
- Mediterranean Students Days, 2014. (INRIA)
- Conference des métiers, International Lycée (CIV) in Sophia, 2014. (INRIA)
- VideoSense Summer School on Privacy-respecting video analytics, Eurecom premises in Sophia Antipolis, 2014. (INRIA)
- SMILE Lab on Activity recognition, Tainan, Taiwan, 2014. (INRIA)
- 13th édition des Trophées de la Communication, Nice, France, 2014. (INRIA)
- PETS on Tracking and surveillance, Seoul Korea, 2014. (INRIA)
- SAME, "Enabling the Cloud of THINGS", Sophia Antipolis, 2014. (INRIA)

- Invited talk at University of Kagenfurt, Austria J. Benois-Pineau, Video Analysis and dIndexing for medical applications, 2014. (UBX)
- Digital Health Summit Turkey Istanbul, Turkey Invited talk for DemCare presentation, 2014. (VIT)
- Dagstuhl Seminar "Robots Learning from Experiences" Dagstuhl, Germany François Brémont was invited at the Dagstuhl Seminar "Robots Learning from Experiences", Dagstuhl, Germany, 17-21 February 2014.
- 4th Sino-French Symposium on Virtual Reality in conjunction with CAD Graphics 2015 Xian, China Talk "Scene Understanding for Human Activity Recognition: a look at Senior Monitoring", 2015. (INRIA)
- COST Action IC1307 network Heidelberg, Germany François Brémont was invited to give a talk at the COST Action IC1307 network, Heidelberg, Germany, 11-12 March 2015. (INRIA)
- Meddays Sophia Antipolis, France François Brémont was invited to give a talk at Meddays, Sophia Antipolis, 20 February 2015. (INRIA)
- Meeting in Kalix (Sweden) for the municipalities federation, Catharina Melander, Can sensors strengthen the assessment of Behavioral and Psychological Symptoms in Dementia?, 2015. (LTU)
- Talk at Monash University, Melbourne, Australia, "Dem@care: Multi-Sensing Monitoring for Intelligent Remote Management and Decision Support", 2015. (LTU)
- Talk at the University of Western Sydney (UWS), Sydney, Australia, "Basel Kikhia, Dem@care: Multi-Sensing Monitoring for Intelligent Remote Management and Decision Support", 2015. (LTU)

### E.3. Media Appearances

#### Press release appeared on EC eHealth Newsletter (Mar 1, 2012)

<http://www.demcare.eu/news/28-demcare-press-release>

##### NEWS ARTICLE

**Dem@Care: development of an integrated solution for the remote monitoring, diagnosis and support of people with dementia**

(1 March 2012) The great increase in incidence of dementia, in parallel with the constantly growing average age of the population, are rendering dementia a central problem in modern societies. The consequences of the disease on the quality of life of the people with dementia and their environment are particularly severe, while its socio-economic extensions incur significant burden on the society, health-care systems and the economy. Research efforts in new fields are thus becoming necessary. The four year European research program project **Dem@Care**, aims to make a substantial contribution in this direction, by combining the experience and new research results of 11 partners.

Contact: [ehhealth@ec.europa.eu](mailto:ehhealth@ec.europa.eu)

See also: **other EC eHealth funded projects**

## Agelioforos (Nov 4, 2011 – Greece)

### Interview with Dem@Care researcher Dr. Philippe Robert (CHUN)

<http://investincotedazur.com/en/newsletter/nice-university-hospital-the-contribution-of-digital-technology-in-the-field-of-&artid=act10499>

INNOVATION 13/02/2012



**Nice University Hospital: The contribution of digital technology in the field of mental health**

*Through the CobTek team, the Memory Resource and Research Centre (CMRR), is combining fundamental and clinical research focusing on new technologies*

Interview with Professor Philippe ROBERT, Professor of Psychiatry, Director of the University Host Institution, CobTek and coordinator of the Nice University Hospital Memory Resource and Research Centre (CMRR).

**1) Professor Robert, can you tell us about your career and the activity of the CMRR?**  
The Memory Resource and Research Centre (CMRR) at Nice University Hospital is one of 27 CMRRs in France. Like every CMRR, it has several purposes, including treatment, education, coordination of networks and research as part of the diagnosis, monitoring and care of people with Alzheimer's or another related disease. The Nice University Hospital CMRR is recognised for its expertise in the field of behavioural issues and drug-free treatments as well as in the development of databases and computing. This has led, as part of the 2008-2012 National Alzheimer Plan to its coordination of Measure 34 intended to develop a computerised record system in France, shared by all Memory Centres.

**2) What is CobTek? What are the objectives of this university team?**  
CobTek (Cognition Behaviour Technology) is a University Host Institution which aims to develop new information and communication technologies in the field of healthcare and particularly the areas of mental health and independence. Research focuses in particular on Alzheimer's and related diseases, but also on the prevention of dependence and loss of autonomy, as much in the elderly as adults and even children. This team has been developed by the CMRR and INRIA's STARS team managed by François BREMOND. It could be said that the CobTek team is the merger of fundamental and clinical research aspects focusing on new technologies. This association is a remarkable and essential first for our region.

**3) What can digital technology contribute to the field of mental health?**  
Very simply, it can help in 2 key areas. Firstly, that of assessing behaviours, independence and cognition such as memory or language.  
However, it is also of major interest in improving care, education and stimulation.

**4) Can you tell us about a few of CobTek's projects?**  
We have two European FP7 projects, one called DEM@CARE which, with international partners, is trying to develop instruments that can be used to assess the patient equally well within a care facility or at home. The second European project is called VERVE and aims to

## Le Figaro Article on the works of Dem@Care Researchers (INRIA)

<http://www.lefigaro.fr/sciences/2012/02/16/01008-20120216ARTFIG00693-la-robotique-au-service-de-l-autonomie-des-personnes.php>

Mise à jour 09:12

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### La robotique au service de l'autonomie des personnes

Mots clés : Inria, Robotique, Autonomie, François Brémont

Par [Cyrille Vanierberghe](#)

Publié le 16/02/2012 à 19:07 Réactions (2)

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Des chercheurs de l'Inria inventent des systèmes intelligents pour l'assistance des personnes fragiles.

«Savez-vous quelle est la taille minimale pour qu'un robot humanoïde puisse soulever un adulte? demande Jean-Pierre Merlet, chercheur Inria à Sophia Antipolis près d'Antibes. Il faut un robot qui fait au minimum 180 kg, avec toute la complexité et les limites d'autonomie qui vont avec.»

Loin des visions futuristes de robots bipèdes dont raffolent les Japonais, le scientifique et son équipe ont plutôt mis au point un dispositif robuste et simplissime, baptisé robot à câbles, qui peut aider les personnes malades ou handicapées à se lever, s'asseoir, se coucher ou se déplacer de manière autonome dans une chambre.

Un coût de mille euros

**Presentation of Dem@care at large public scientific conference in Bordeaux, France.**





#### E.4. Interviews

- Kate Irving (DCU) interviewed by Today with Pat Kenny, RTE Radio 1, 2012. (DCU)
- Jenny Benois-Pineau (UBX), Radio interview at Radio Campus Bordeaux, France, 2012. (UBX)
- Large Audience interview with Jenny Benois-Pineau in Electronic Scientific NewsLetter “Actualités Une caméra embarquée diagnostiquera Alzheimer”, 2013. (UBX)
- Interview of Francois Bremond for the french newspaper “Les Echos”, 2013. (INRIA)
- A. Sorin and A. Satt gave interview to a journalist writing for Discover popular science journal, <http://discovermagazine.com/topics/health-medicine>, 2014. (IBM)
- Francois Bremond was interviewed by Nice matin on CoBTek and Alzheimer issues, Opening of ICP, Nice, 2014. (INRIA)
- INRIA Team interviewed by Monaco TV on MONAA and Autism issues, 2014. (INRIA)