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PROJECT FINAL REPORT

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Executive summary

The Accompany project embarked on developing a companion robot alongside an intelligent home environment, towards assisting elderly people to maintain their independence in their home. The project started by identifying useful tasks and functions that can contribute to maintaining personal independence. An extensive systematic review alongside multi-centre focus groups identified three groups of at risk activities consisting of tasks related to mobility, self-care and social isolation [Bedaf, 2013a, 2013b]. These tasks were then considered as a list of user requirements for defining three project scenarios. A process as shown in Figure 1 was followed to arrive at a list of system requirements demonstrated by three project scenarios:

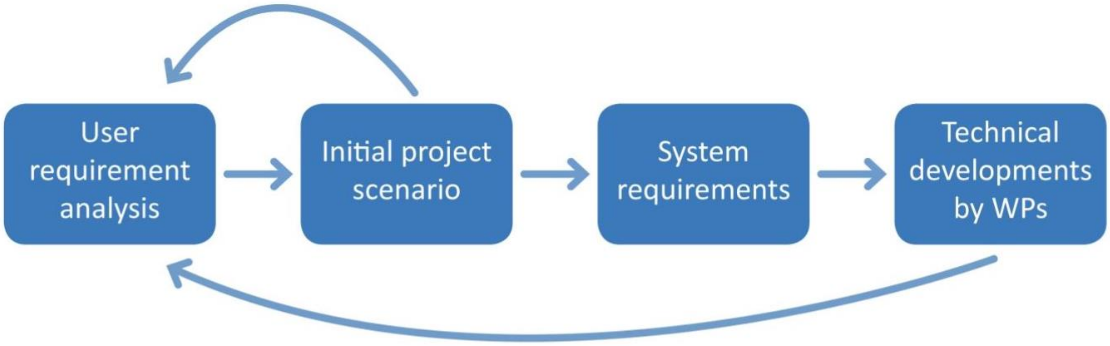


Figure 1: WP1 process of identifying system requirements based on user requirements. As one of the user centred design processes, scenarios are used to facilitate this process. The process is further explained in project deliverables D1.1, D1.2 and D1.3.

The three project scenarios, as well as the requirement list, were then used to guide and assess the project technical developments throughout the project lifetime. The Accompany project provides a unique combination of novel challenges in the following areas: (a)social and empathic interaction design; (b)robot learning and adaptive interaction; (c)environment and activity monitoring. A further challenge, (d), is to integrate such a diverse range of technical developments under one platform. These 4 areas (also 4 distinct project work packages 2, 3, 4 and 5) present the technical development branch of the project. In parallel, the evaluation branch of the project consisted of: (e) formative evaluation of the project developments; (f) ethical evaluation and an emerging ethical framework; (g) user acceptance evaluation and long-term influential factors; (h) summative evaluation of the project using a multi-centred usage evaluation. Formative evaluation is conducted within each work package and as part of focus group studies conducted under work package 1, while summative, ethical and acceptance evaluations are part of work package 6. Work package 7 has been responsible for public engagement, dissemination and exploitation of the project results.

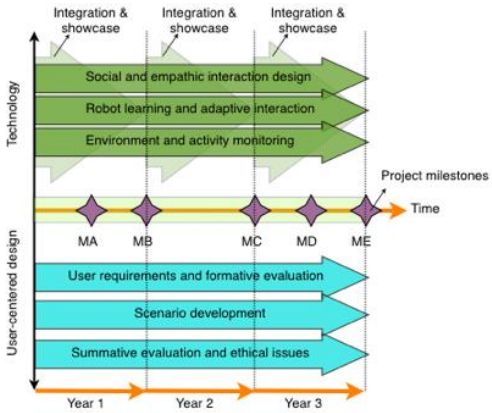


Figure 2. Project objectives and the two branches, development and evaluation

With this structure in mind (Figure 2), the project progressed in each year by achieving one of the scenarios. In short and as a summary, it is important to note that all milestones identified in Figure 2, have been successfully achieved within their allocated timeline. Section 4.1.2 describes these achievements in full details by reporting progress made by each work package.

A summary description of project context and objectives

The project proposal considered aligning project objectives with each of the project work packages, so that each work package will inherently aim at developing and achieving its dedicated objective.

Objective 1, WP1, User requirement analysis and scenario definition

During the first year of the project, activities carried out mainly related to user requirement and system requirement definition and detailing the three project scenarios. Focus groups as well as a literature review and desk-based research indicated in order for the robot to be able to provide a contribution towards one's independence, it should be able to support activities within the domains of mobility, self-care and social participation. The scenarios offered provide a matching between the requirements and the project technological developments, in line with what was achievable with the project platform.

Based on these, technological developments focused on achieving these scenarios. Five sets of focus groups (each in 3 or 4 partner sites) were planned, two taking place in the first year, two during the second year and the final one during the third year of the project. The planned focus groups acted as a formative evaluation mechanism for the project developments evaluating the following aspects:

Focus group number	Focus group objective	Project month
1	Problem assessment and requirement analysis	5
2	Scenario evaluation	8
3	Assessment of ethical norms	15
4	Empathic interaction	20
5	Role acceptance	27

Table 1- focus groups, their objectives and the project months conducted

A total number of 186 elderly people, 137 formal carers and 134 informal caregivers were involved in the focus groups as detailed in table 2.

Focus group No.	Country	Elderly	Formal carers	Informal carers	Total per group	Total per focus group
1	NL	11	7	14	32	113
	UK	5	5	4	14	
	FR	25	20	22	67	
2	NL	13	12	6	31	97
	UK	5	3	4	12	
	FR	21	19	14	54	

3	NL	10	14	11	35	123
	UK	26[2]	6	4	36	
	FR	19	18	15	52	
4	NL	2			2	
	FR	18	16	16	50	52
5	FR	14	7	11	32	32
4+5	NL	14	10	10	34	42
	UK	5		3	8	
	Total	186	137	134	457	

Table 2. Number of participants included in Focus groups conducted during the project

This objective has been achieved by completing 5 project deliverables, including insights on user requirements, system requirements and finally scenarios and their evolution throughout the project. The overall scenarios might appear simple and easy, yet each of the scenarios realised, rely on achieving different tasks on work packages 2, 3, 4, 5 and 6. Also it is notable that these scenarios are achieved in an autonomous way, without interference or remote control.

A general observation can be made regarding the openness of the participants involved in our studies, regards the idea of using a robot companion at home, but only when the "social intelligence" of the robot could match this. A bossy, but ignorant robot was deemed unacceptable while a bossy, but considerate robot would be OK. This constitutes a large challenge to robot development after Accompany but this lesson could only be learned to this extent by exposing so many individuals to an actual robot in the Accompany project. Furthermore, focus groups and a desk-based literature search identified activities in three of the ICF[3] categories, mobility, self-care and social isolation as those most impacting on one's independence. While the project embarked on demonstrating the potential to enable/re-able the user in some of these tasks, further work is essential to achieve a higher technological readiness level, for using our results within everyday homes.

Objective 1 and its potential impact:

The contribution of WP1 to the potential impact of the project lies in the agenda WP1 has formulated for the development of service robots in support of independent living of the elderly. Based on the input we gathered in WP1 from end users and their formal and informal caregivers, we have been able to obtain insights from three countries and altogether an impressive number of people. All these individuals have been carefully informed and as much as possible exposed to the Accompany system as an example of what service robots might be. On the basis of this we have gathered their responses to the robots and the scenarios developed. The resulting requirements have been used in the project itself but more importantly the results will have an impact on future generations of service robots. Despite the technological advances in the project the end state of the robot is still far off from actually being able to act as a stand-alone and autonomous service robot in the daily life of an elderly person. Not only the non-commercial nature but also mainly the functional limitations have been teased out and can be used for future developments in this area. When a

[2] This focus group included 21 participants from University of Birmingham, UK, in addition to the promised numbers.

[3] International Classification of Functioning, Disability and Health, www.who.int/classifications/icf/

service robot is to function as a true support for living independently, the functional abilities should increase and cover a much wider range of activities it can support. Besides this, the capabilities to learn about (changing) user preferences and how to modify its behaviour to this preference turned out to be essential to users. Most importantly users and certainly the end-users proved to be very open to the concept of letting service robots enter their homes. The publications derived from the work of WP1 made an effort towards making this agenda available to all.

Objective 2, WP2, Social and empathic interaction design

Work package 2 achieved its objective by completing the multiple tasks planned. At the start of the project and as a part of requirement elicitation, it was observed that the robot tray, and subsequently the tablet interface, was inaccessible and unusable for a number of potential users for example those sitting on a wheelchair. This led to changes in tray design, which are documented under WP5. The solution offered a new arm with additional degrees of freedom that catered for height adjustment, as well as a removable tablet interface. An easy to use graphical interface was then implemented, allowing user-centred, robot-centred and overall views. The robot-centred view provided a chance for seeing through the robot eyes when it is physically located at a different location to the user. This benefitted from programmed action possibilities offering actions relevant to the context of interaction. For example in scenario 2, when a user has not had a drink for some time, the robot highlights the need to drink with action possibilities on the screen offering to fetch a drink with the user. Such an action re-enforces the re-ablement of the user, while also demonstrating competence on context analysis and context sensitivity of actions offered. Supporting this was another task in the work package related to context-aware planning.

The context-aware planner

The aim of Task 2.4 was the implementation and testing of a context-aware planner for empathic behaviour generation, specifically as related to proxemic behaviour (the negotiation of shared social space).

Approaching the user is normally the first step when initiating interaction; it is essential that the Care-O-bot is able to successfully do this in a socially appropriate, friendly and pleasant manner. This aim was achieved by developing a context-aware proxemic planner that was not only able to provide appropriate target coordinates for the Care-O-bot to approach the user but also allowed users to personalise their proxemic preferences. The planner is capable of coping with different contexts (i.e. approaching a person who is sitting on a sofa and relaxing may be different from when they are watching TV). In addition it can overcome the issues related to approaching users in "robot-unfriendly" locations, such as, for example, in the presence of dynamic obstacles or where the user is in small confined spaces. These types of issues are very common in domestic environments.

The context-aware planner consists of 3 main components: general proxemics preference algorithm, exception cases proxemics preference algorithm and location ontology algorithm.

The *general proxemics preference algorithm* provides the robot with ranked target coordinates for the robot, based on the user's preferences. This allows the robot to use the most preferred target coordinate to approach the user and only resort to a lower ranked coordinate when the prior coordinate is inaccessible. This algorithm can handle most situations encountered in domestic environments including when the user is in “robot-unfriendly” situations, with the exception of small confined spaces.

The *exceptional cases proxemics preference algorithm* allows the user to set specific preferred target coordinates for the robot based on specific situations. This can be based on the activation or deactivation of sensors by the user (i.e. for situations where the user is watching TV or opening the fridge etc.), or the location of the user (i.e. when the user is in a confined space such as the UH Robot House Kitchen).

The *location ontology algorithm* allows the robot to approach a user even when they are in a “robot-unfriendly” area by allowing it to pick the nearest “robot-friendly location”. This algorithm is used when exception cases proxemics preference cannot be found for a “robot-unfriendly” location (also relevant in the case of a new user that has not yet had the opportunity to personalise their preferences for a specific location).

The novel aspect of the context-aware planner is that it was designed to be independent from the Care-O-bot's navigation system (i.e. costmap, path planner etc.). This means that it is not limited to a particular navigation planner and can be easily adopted on different robotic platforms with only a minimum of reconfiguration or modification.

The reliability results from the formative evaluation conducted at the UH experimentation site (the UH Robot House) shows that the Care-O-bot successfully approached the user in all of the 132 trials that evaluated each of the 42 test configurations (for example: Living room Sofa A with dynamic obstacle for left handed expert user in a fetch and carry scenario) for 3 times. The performance results show that on average, the context-aware planner took less than 30ms response time to provide valid target coordinates that the robot could use to approach the user.

Empathic behaviour and robot expressiveness

Work also progressed with regards to empathic behaviour and robot expressiveness. Different prototypes of the squeeze me interface were developed and tested (see Marti et al, 2014). This interface allows for reacting to different levels of pressure on the tablet to tune robot's speed of response. Also, dynamic expressive masks were developed in a participatory design process with 6 elderly persons in a care home in Siena, Italy. These masks allow the robot to express neutral, joy, fear, and sad expressions. (Figure 3, also see Iacono & Marti 2014). These are then utilised and evaluated within the project scenarios.

Figure 3. Expressive masks used in participatory design process, from top: neutral, joy, fear and sad.

Perceptual crossing for interaction design

Research and development also focused on perceptual crossing and interaction design, where three different scenarios ("Walk with me"; "Let's move" and "Walking together") were presented to sixty subjects, aged between 18 to 92 years old, in forms of videos. The videos were shown in two conditions: with and without perceptual-crossing to assess which condition was the most appreciated by the subjects involved in the study. The results of the study show a clear preference for the condition with perceptual crossing[4].

Development and integration of perceptual crossing scenarios from T2.3 into the Accompany System for the Care-O-bot was then successfully completed. The development of the "*I See You Seeing Me*" set of empathic behaviours allows the Care-O-bot to initiate interaction with its users as they enter the robot's social space. Figure 4 shows the implementation algorithm for I See You Seeing Me empathic behaviour. In addition, the implementation of the "*Walk with Me*" empathic behaviours allows the Care-O-bot to accompany the user by moving to the same location in a shared space.

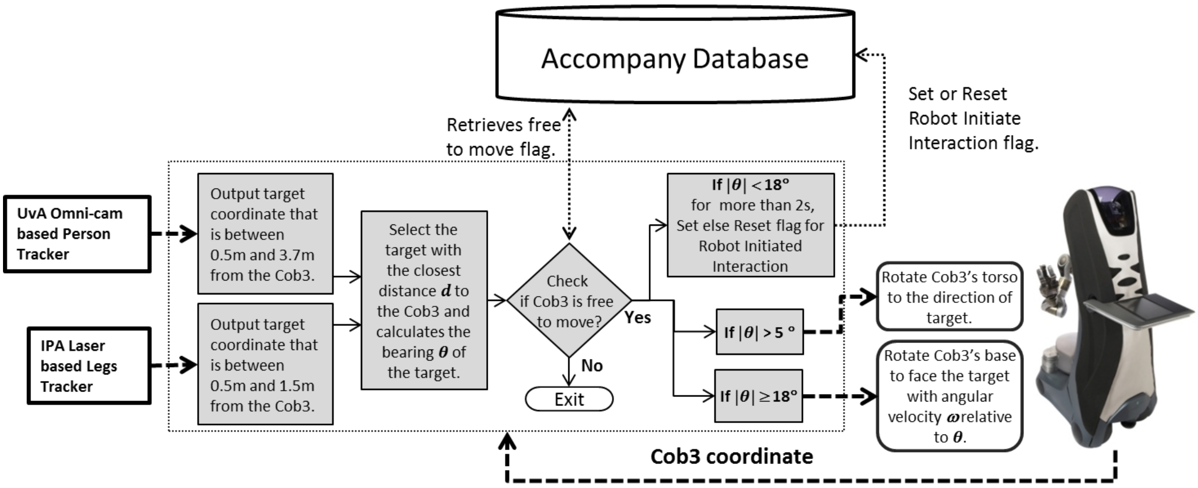


Figure 4. An overview of the I See You Seeing Me empathic behaviour implementation.

Objective 2 and its potential impact:

Results achieved in WP2 are potentially exploitable, and UNISI has the intention to explore such possibilities mainly in relation to the following prototypes: the GUI and the Squeeze Me. Both prototypes can be applied in different domains, other than health care applications. For example, the GUI could be used as a general-purpose interface that overcomes traditional menu-based interfaces, thus exploiting contextual features.

Squeeze Me contains a number of innovative features that could be exploitable on the market. The adopted implementation allows the cover to work as a standalone device, completely independent from the tablet. It is suitable in contexts where expressivity in action can play a relevant role in what the user tries to achieve. This opens a wide range of possibilities for new applications of the device, from gaming to video-shooting applications. UNISI has a plan to develop a game application to explore the potential of the tools.

Squeeze Me was demonstrated at Maker Faire in Rome (http://www.makerfairerome.eu/).where it raised the interest of companies, researchers and practitioners in the field of 3D printing and smart materials.

[4] They are detailed in a paper presented at the Fourth Joint IEEE International Conference on. Development and Learning and on Epigenetic Robotics, Genova, Italy, October 2014.

Furthermore, all components of the work carried out in T2.4 employ standard high level computer languages (C++), widely used robotic libraries and tools (ROS) and are available via open-source repositories (GitHub). This allows open access to those interested in integrating the context-aware planner into their robotic system to provide proxemics behaviours.

The novel features of the context-aware planner include utilising contextual information for advancing robots' proxemics behaviour and a planner that is independent from the navigation system.

The implementation of I See You Seeing Me empathic behaviour allows research in the field of human-robot proxemics to further explore and refine robots' social space.

The main results of WP2 are related to the theoretical exploration, design and development of socially interactive behaviours for Care-O-bot.
In particular WP2 defined and implemented social behaviours through four different designs:

- a context-dependent GUI allowing meaning to emerge in interaction,
- a dynamic expressive mask allowing the person to share the perspective of the robot,
- perceptual crossing behaviours influenced by the way in which the person and the robot perceive each other, and
- Squeeze Me, a graspable squeezable device that supports expressive communication between the person and robot.

All designs were successfully integrated in the Care-O-bot platform.

A by-product that was not originally planned in the Description of Work of the project is the definition of a methodology for engaging older persons in participatory design. This methodology was successfully applied during the formative evaluations carried out in Siena and published in a paper presented at NordiCHI 2014 in Helsinki as listed below.

Objective 3, WP3, Robot learning and adaptive interaction

The aims of work package 3 were to allow the Care-O-Bot robot to learn via human-robot interaction collaborations supporting the dual aims of co-learning and re-ablement. The focus of the work was the development of a computational memory model, including the central control core of the robot, to support these aims. This control architecture includes facilities for centralised sensory processing, behaviour scheduling, behaviour creation and planning (see Figure 5 and Figure 6).

These aims were achieved by ensuring that a disciplined and coherent approach to the design of the memory architecture of the robot was observed. To this end three memory components were considered: semantic memory, procedural memory and episodic memory.

Semantic memory was designed to hold not only instantaneous information relating to the robots state and environment but also states which could be labelled with higher levels of contextual information useful to the end user. In fact these higher level semantics would be labelled and created by the users' themselves by 'showing' the robot what they related to.

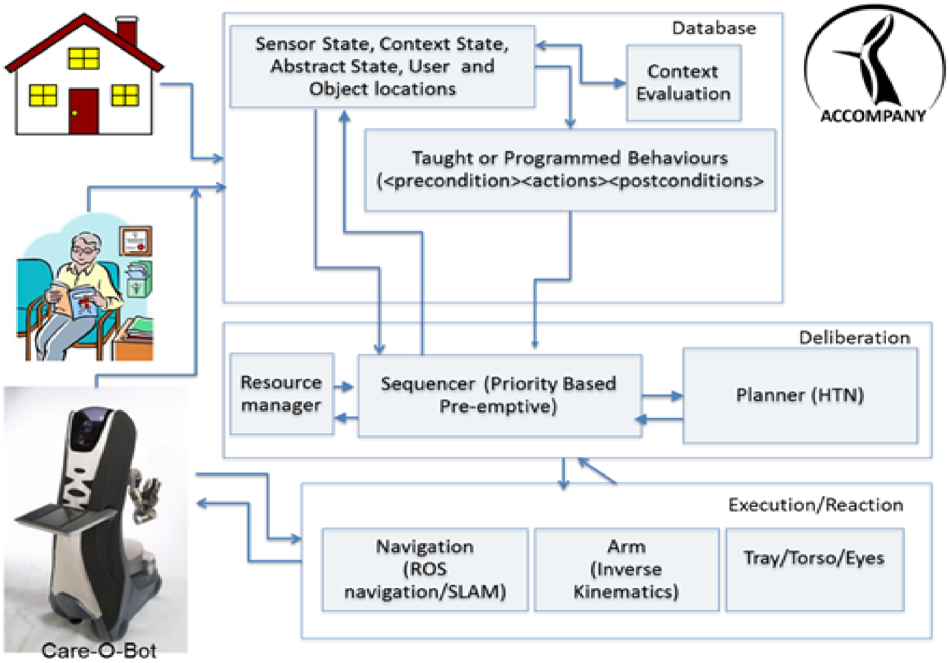


Figure 5. Overall control architecture incorporating smart home, users and robot

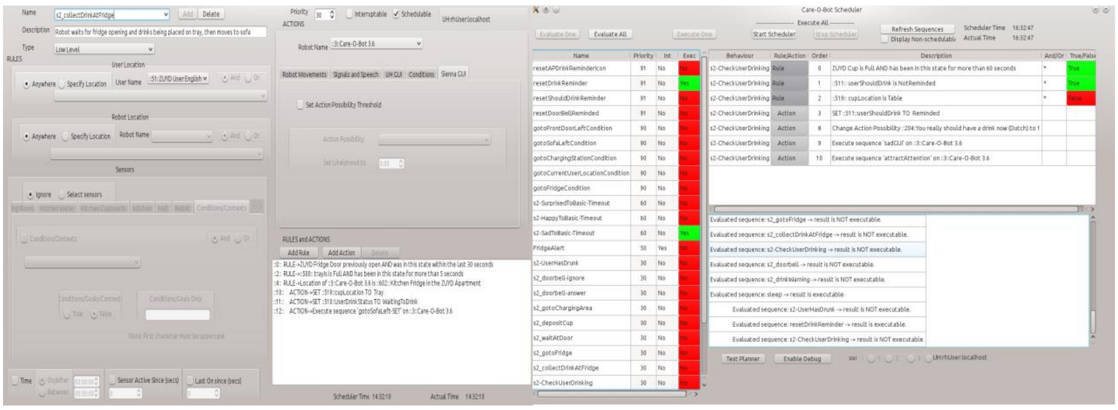


Figure 6. Behaviour creation facility (left screen) and pre-emptive behaviour scheduler (right screen)

Procedural memory was designed to contain all of the behavioural components of the robot. A key factor here was that these behaviours would be created without expert programming. Thus end users could create robot behaviours by effectively 'teaching' the robot what to do and when to do it. The behavioural teaching component exploited common robot behavioural templates to simplify the teaching task for non-experts by generating complex robot programming, scheduling and temporal issues automatically. This approach is, we believe, a key factor that could be exploited in the future to support the aims of co-learning and re-ablement.

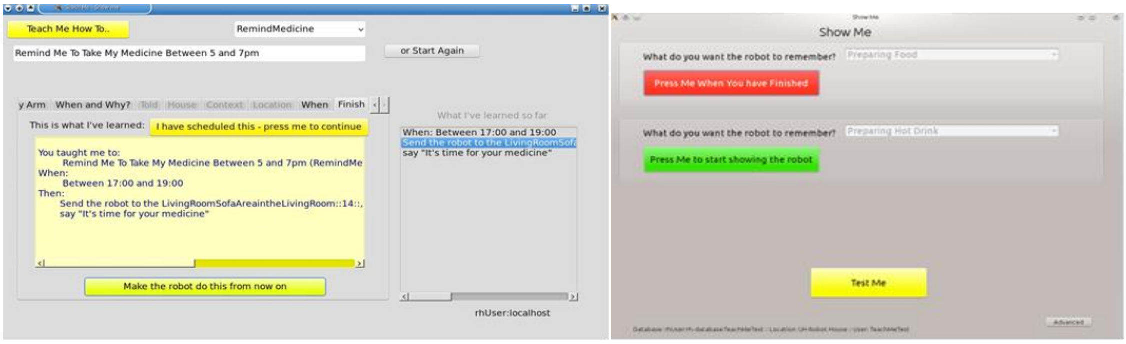


Figure 7. An example of the TeachMe-ShowMe system that allows end users to both teach the robot new behaviours (left screen) and show the robot new higher level semantic activities which it can then detect (right screen) and can be subsequently used in the teaching process.

A novel aspect of the work is that by allowing end users to create higher level semantics, these higher level labels could then be used within the teaching system. This is the key to robot adaptability and personalisation to meet the needs of the user. This adaptability also achieves one of the key objectives of the euRobotics Multiannual Roadmap (MAR) of “adaptation to changing needs”.

Episodic memory was designed as an integrated part of the behavioural execution system. This allowed episodes, captured as text labelled time-stamped images, to be grouped by robot activity.

Equipping a robotic companion with such a visualization tool for episodic memory is an opportunity to have a robot provides memory prosthesis. Such memory visualization can support the user in remembering past events from the human-robot interaction history. Potentially, this ability to explore interaction histories could enable elderly persons as well as third parties (e.g. technicians, carers, family and friends) to monitor, maintain and improve the robot’s abilities and services.

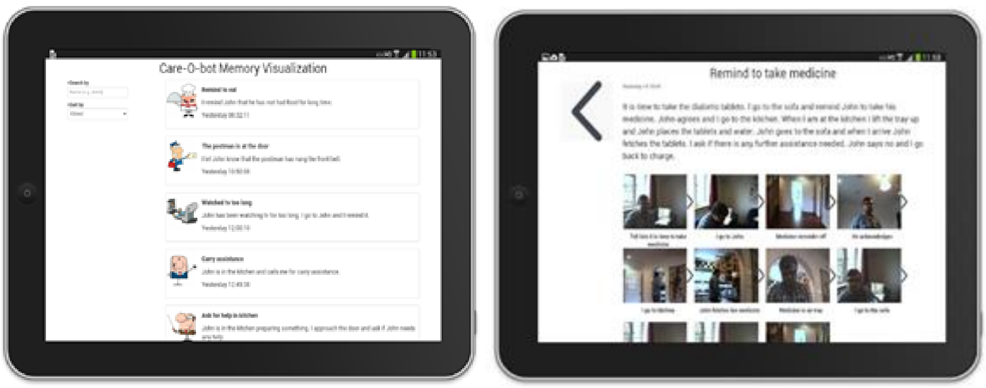


Figure 8. The user interface for the Memory Visualisation System allowing users to drill down through daily interaction activtities with the robot.

The computational memory model described above therefore comprised semantic, procedural and episodic components and was realised in stages throughout the project and evaluated at each stage via real-time, autonomous human-robot interaction scenarios together with detailed formative and longer term summative studies.

Results from these studies indicated that users would accept, be capable of, and be prepared to personalise their robot companions to meet their needs or the needs of someone they were caring for.

This, we believe, is a major advantage and exploitative function of this work whereby responsibility for customisation of the robots behaviours is with the person who needs those functions. This is a first step towards using a robot co-operatively, as both a helper and tool in order to support ongoing and changing needs. It this supports the original project aims of co-learning and re-ablement via robot learning and adaptive interaction.

Objective 3 and its potential impact

Work package 3 has been responsible for the research and development of the computational memory model. All of the work carried out employs standard high level computer languages (C++) and is available via open-source repositories (gitHub).

Making the complex simple

The computational memory model comprises a control, scheduling and planning system integrated with both the Care-o-bot robot and a passive smart home environment. End users are also provided with a robot teaching and activity recognition facility together with a memory visualisation system in one integrated environment.

The novel feature of this approach is that the house resident (or relative/carer) is able to customise and personalise the robots behaviour, not only in response to low level sensory activities in the house, but also to activities at a higher semantic level. This function is called TeachMe-ShowMe and is controlled by the house resident (or relative/carer) themselves. The system has been designed to be robot agnostic.

This customisation feature was produced in order to support the ideas of co-learning (robot and resident working together to achieve the residents' goals) and re-ablement (where the resident finds ways of overcoming physical/mental problems themselves).

Such personalisation and support facilities would be essential in any realistic care environment and therefore it is these particular functions which are most likely for exploitation.

Teach-me-show-me illustrates how very complex tasks that often have very complex programming can be simplified by exploiting commonalities between these tasks. This approach, if exploited by the Interface design community, could be brought to a level which could be commercially exploited and allow non-technical persons to personalise their robot companions.

The integration of robot behaviour, smart home and the personalisation system could be used within future projects involving robot companions for HRI research. Further work to improve the interface, ensure that system is smart home agnostic as well as robot agnostic would be future work. Additional work on activity predication and temporal relationships between user and robot activities would also be improvement candidates for future projects.

Equipping a robotic companion with a memory visualisation tool for episodic memory is excellent opportunities to have a robot provide cognitive prosthetics. Evidently such system could cognitively and socially benefit elderly people with memory impairment (i.e. early stage dementia), as the delivery of an episodic memory visualization tool could enhance day-to-day living, e.g. helping them to remember normal daily routines or keeping their memory active by reviewing past events.

The impact of an episodic memory visualisation system to explore information histories is significant not only for the targeted group (elderly people) but also for informal care givers (who could keep an eye on their relatives or can be informed about risky situations) and professional care givers (who could observe and monitor patients and determine possible harmful situations or habits).

For memory visualisation, there exist exploitation routes not only in health care e.g. aiding memory impairment issues such as dementia, but also helping to keep a visual memory for use by the general public as a way of documenting life. This can be also exploited within the context of smart-homes or without the smart environment and with just the presence of a mobile companion.

Objective 4, WP4, environment and activity monitoring

The main contributions of WP4 are two fold: 1) we have developed a system which applies data fusion methods on robust detection and identification of objects and users. 2) We have developed a system for activity recognition in household chores using multiple sensors.

Data Fusion for robust detection and identification of users

For object recognition, we fuse data from different modalities to improve the quality of available data for object modelling and detection. Concretely, the colour image data of a colour camera is combined with the depth information gained from stereo vision that is improved with the depth data of a time-of-flight sensor. The result is a dense coloured point cloud at a high resolution. This data is applied in the object recognition system that models the shape and texture of objects to facilitate robust re-detection of those objects in real scenes. In order to avoid the modelling of thousands of objects, the object recognition system is accompanied by an object categorization component that predicts the object's class if no model is available in the recognition module.

In person detection, we introduce a unified system that integrates these components in our scenarios. The system is very efficient and suitable for real-time applications. Moreover, the components are complementary to help improving the robustness of the entire system. Commonly used sensors for these tasks include overhead cameras and RGB-D sensors on mobile robots. The overhead cameras are usually fixed at the ceiling, covering most of the areas in the room. The cameras only need to be calibrated once so that the coordinates of the detected person can be transformed easily from the image space to the ground-plane of the room. As the camera is mounted on the ceiling, people in the video are less likely to be occluded by each other. The overhead camera commonly has a wide field of view. Thereby one camera is often sufficient for detecting and tracking people in the whole room. Despite these benefits, it is very difficult for the overhead camera to recognize people's identity. Faces can hardly be seen at many locations. The most prominent parts of people are the clothes, but they may be changed from session to session. Therefore, the overhead camera is suited to locate a person, but it is not suited for people identification.

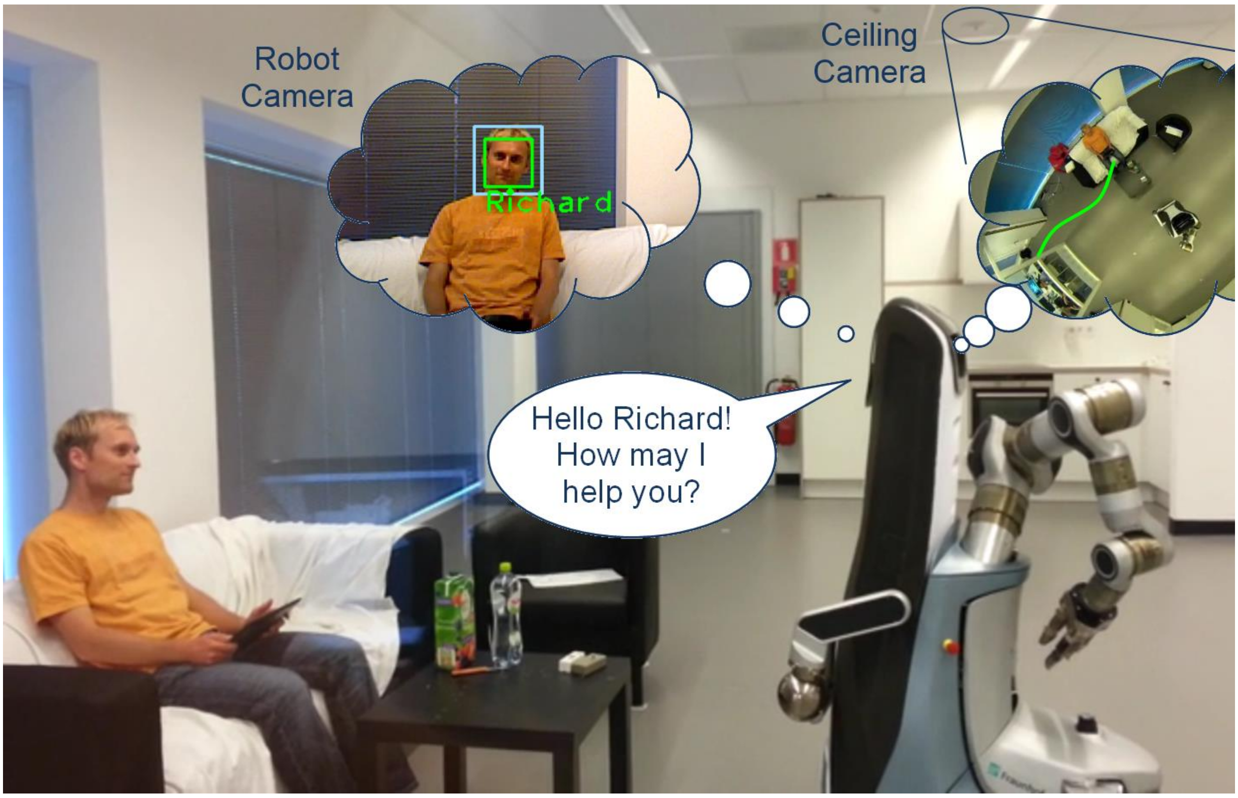


Figure 9. Integrated person identification and tracking system combining robot cameras for identifying and ceiling cameras for tracking a person.

The sensors on the robot, (e.g. Microsoft Kinect etc.) provide a complementary view to the overhead camera. The on-board cameras are commonly mounted at a level that keeps the human face in sight. The RGB-D sensor provides both the color image from a color camera and the depth image from a range camera. By fusion of the depth image and color image, a face can be recognized robustly. However, the RGB-D sensor is limited in both the range and the view angle. When people are too close, the face is outside the field of view; when they are far away, the accuracy and resolution of face data drops quickly. An advantage of the combination of ceiling cameras for tracking and a robot mounted camera for identification is that the robot itself does not need to keep monitoring the persons all the time. Hence, the robot may carry out other tasks, rather than allocating its resources to the task of tracking each person.

Data Fusion For robust Activity Recognition

We developed a novel discriminative model for the recognition of human activities. In order to compare the model with state-of-the-art activity recognition methods, the model was tested on the CAD-120 benchmark data set from Cornell University. We also made our own data set in the ACCOMPANY project with the experimental set-up in Troyes. Experimental results on the CAD-120 dataset indicate that our model outperforms the current state-of-the-art approach by over 5% in both precision and recall, while our model is more efficient in terms of computation.

Based on the recognized sub-level activities, we proposed a two-layered approach that can recognize sub-level activities and high-level activities successively. In the first layer, the low-level activities are recognized based on the RGB-D video. In the second layer, we use the recognized low-level activities as input features for estimating high-level activities. Our model is embedded with a latent node, so that it can capture a richer class of sub-level semantics compared with the traditional approach. Our model is evaluated on a challenging benchmark dataset. We show that the proposed approach outperforms the single-layered approach, suggesting that the hierarchical nature of the model is able to better explain the observed data. The results also show that our model outperforms the state-of-the-art approach in accuracy, precision and recall.

Figure 10. Detection and localization (indicated by bounding box) of textured objects with the

object recognition software.

In order to incorporate confidence of annotation into our activity recognition framework, we proposed the method of soft labeling, which allows annotators to assign multiple, weighted, labels to data segments. This is useful in many situations, e.g. when the labels are uncertain, when a part of the labels are missing, or when multiple annotators assign inconsistent labels. We treat the activity recognition task as a sequential labeling problem. Latent variables are embedded to exploit sub-level semantics for better estimation. We propose a novel method for learning model parameters from soft-labeled data in a max-margin framework. The model is evaluated on a challenging dataset (CAD-120), which is captured by an RGB-D sensor mounted on the robot. To simulate the uncertainty in data annotation, we randomly change the labels for transition segments. The results show significant improvement over the state-of-the-art approach.

For learning, we propose a novel loss function that incorporates the soft labeling in a max-margin learning framework. Unlike the typical zero-one loss, our loss function can give values ranging from zero to one. Compared with the approaches that model uncertainty in labeling, by adding nodes in the graphical model, our method does not increase the computational complexity of the model, as it is independent of the graphical structure. Our source code is available at http://ninghanghu.eu/activity_recognition.html.

Objective 4 and its potential impact

In WP4 of the ACCOMPANY project we have designed, implemented, and evaluated two different systems for modelling the environment of the ACCOMPANY robot. The first system is designed to localize objects and humans in the room and to recognize their identity. The second system is designed to recognize human activities based on robot sensors. The source code of both systems has been made publicly available. The exploitation plan of WP4 focuses on re-using and extending the outcome from ACCOMPANY.

The software for localizing and identifying people in an indoor environment will be re-used by other European projects in our group for similar purposes. For example, the software can be used in the MONARCH (http://www.monarch-fp7.eu/) project where children need to be localized around the robot in hospital scenarios. The hospital scenarios are very similar to the elderly care scenarios since the rooms are usually small and it is necessary to use overhead cameras for localizing and identifying people. Currently there has been many interactions between ACCOMPANY and MONARCH. The system developed by WP4 in ACCOMPANY has been partially re-used in the MONARCH project, and the system is still actively evolving.

The localization software will also be used in the RoboCup project at UvA (https://www.facebook.com/dutchnaoteam). Since Arnoud Visser from the ACCOMPANY project is the team leader of the UvA RoboCup team, we have initialized the cooperation to use the ACCOMPANY software for their robots for localizing and identifying other robots in the field. We plan to apply our overhead cameras to localize Nao, and try to identify opponents and allies. Based on the robot locations, we plan to analyse the role of different robots in playing the robot soccer game.

In collaboration with Amsterdam University of Applied Science HvA, we have collaboration in the field of cameras for health monitoring. We used the localization and tracking software for the recognition of wandering behaviours of the elderly in a nursing home and plan to use the activity recognition software to detect falls. (http://www.digitallifecentre.nl/projecten/balance-it).

Apart from re-using the software, UvA also plans to extend and improve the software in multiple ways. The current activity recognition software only uses RGB-D videos. In our coming work, we would like to fuse different cues, e.g. human locations, human identities and ambient sensors, for robust estimation of human activities. The current system has proved to be able to handle multiple sensors. A new dataset has been created and the system needs to be evaluated based on this data set.

UvA also plans to extend the current framework for recognizing anomalies, in particular the failure of human activities. Older persons often have difficulties in performing daily activities. Detecting anomalies or failures in these activities enables us to assess the functional health of the elderly, thus the robot can provide personalized assistance. This work will carried out in cooperation with the Berkeley Vision and Learning Center. Ninghang Hu is going to be a visiting scholar at the University of California, Berkeley from January 2015, and he will work on extending the current ACCOMPANY system for new tasks.

The activity recognition model that has been developed in ACCOMPANY is very general so it can be extended for other prediction tasks on sequential data. UvA is discussing with people from biology for analysing DNA sequences with our current software.

Person recognition software: Fraunhofer has developed software for the detection of human faces and their identification amongst a set of known people. This component is available as an easy-to-use ROS package to anyone. Fraunhofer will exploit this functionality in 2015 by implementing it into the robots of a manufacturer of autonomous mobile transport robots that are supposed to be applied in hospitals and care homes. Further research might be necessary to increase the recognition robustness against unusual head poses, of the people to identify. The publicly available version has been downloaded by 26 different users so far and gathers 10 contributors for further development. The module is also supposed to be used in two upcoming research projects and one industry project. To the best of our knowledge, this is the most complex and powerful ROS package on person recognition. The person identification has been connected with the ceiling camera based tracking system of UvA in the ACCOMPANY system. The combination provides further useful applications like user tracking, independent of the proximity of the robot or activity recognition. Both functions are important for effective robotic assistance of the elderly and hence might have significant impact on the design of smart home environments.

Object recognition software: The object recognition software enables robots to learn 3d object models of previously unknown textured and un-textured items and to detect and localise them in the environment using an RGB-D camera. FRAUNHOFER will exploit this software by enabling its robots to detect objects in their environment and improve this capability within future research projects regarding robustness, speed and the number of detectable objects. This technology will furthermore be showcased to the public at trade fairs like Vision 2014, to attract attention to Fraunhofer’s efforts in technology development and applications. Recent participation in trade fairs drew several hundred visitors interested in this and related vision technologies.

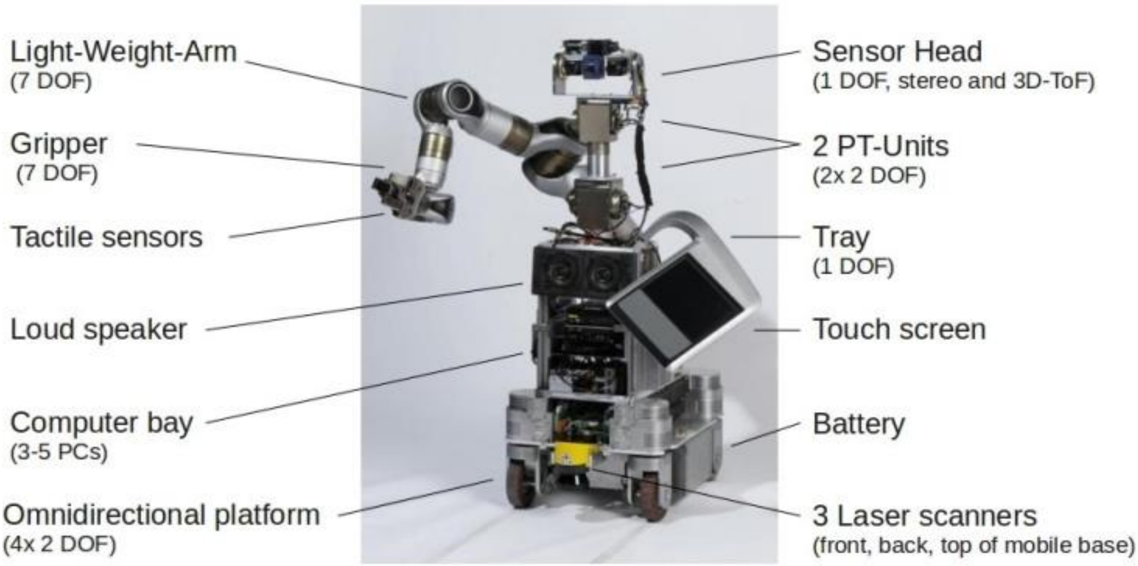
Objective 5, WP5, Integration and showcase

WP 5 - Integration and Showcase was responsible for the coordination and support of integrating all developed and utilized technologies into the ACCOMPANY system demonstrator, for adapting the Care-O-bot robot to the needs of the scenarios, for the technical assistance during the user tests in Heerlen (NL) and Troyes (F), as well as for the overseeing of a final showcase.

Integration framework:

In order to ensure a smooth and efficient integration FRAUNHOFER introduced an integration framework with common guidelines for all partners as follows. At the beginning of the project, the Care-O-bot service robot was introduced to all partners highlighting its hardware and software modules and available capabilities (Figure 11). A common runtime environment based on the Robot Operating System (ROS) was agreed on, which specifies communication protocols and guidelines for developing new capabilities as encapsulated modules. All software has been collected in a common repository on github5 so that previous and current developments were accessible to all partners at any time. Additionally, different development stages, such as the different scenarios or the different implementations of scenario 2 at different testing environments, have been stored in individual development branches to keep them all operational.

FRAUNHOFER coordinated several integration sessions, e.g. at project milestones or during the setup of testing sites, to establish iterative integration cycles of component development and testing within the complete ACCOMPANY system. Besides realizing a working system early in the project this procedure ensured a high robustness of integrated software components. Each project partner was furthermore enabled to test software with the ACCOMPANY system without needing a real robot by using the Care-O-bot simulation environment (Figure 13). Another tool introduced by FRAUNHOFER was a web interface for remote access to the Care-O-bot (Figure 12, see also D5.3). A lot of traveling budget was saved during the user tests by using this interface for remote assistance and debugging. A detailed report on the integration framework is provided in D5.1.



[5] https://github.com/accompany-cob3-6/accompany

Figure 11. The Care-O-Bot hardware

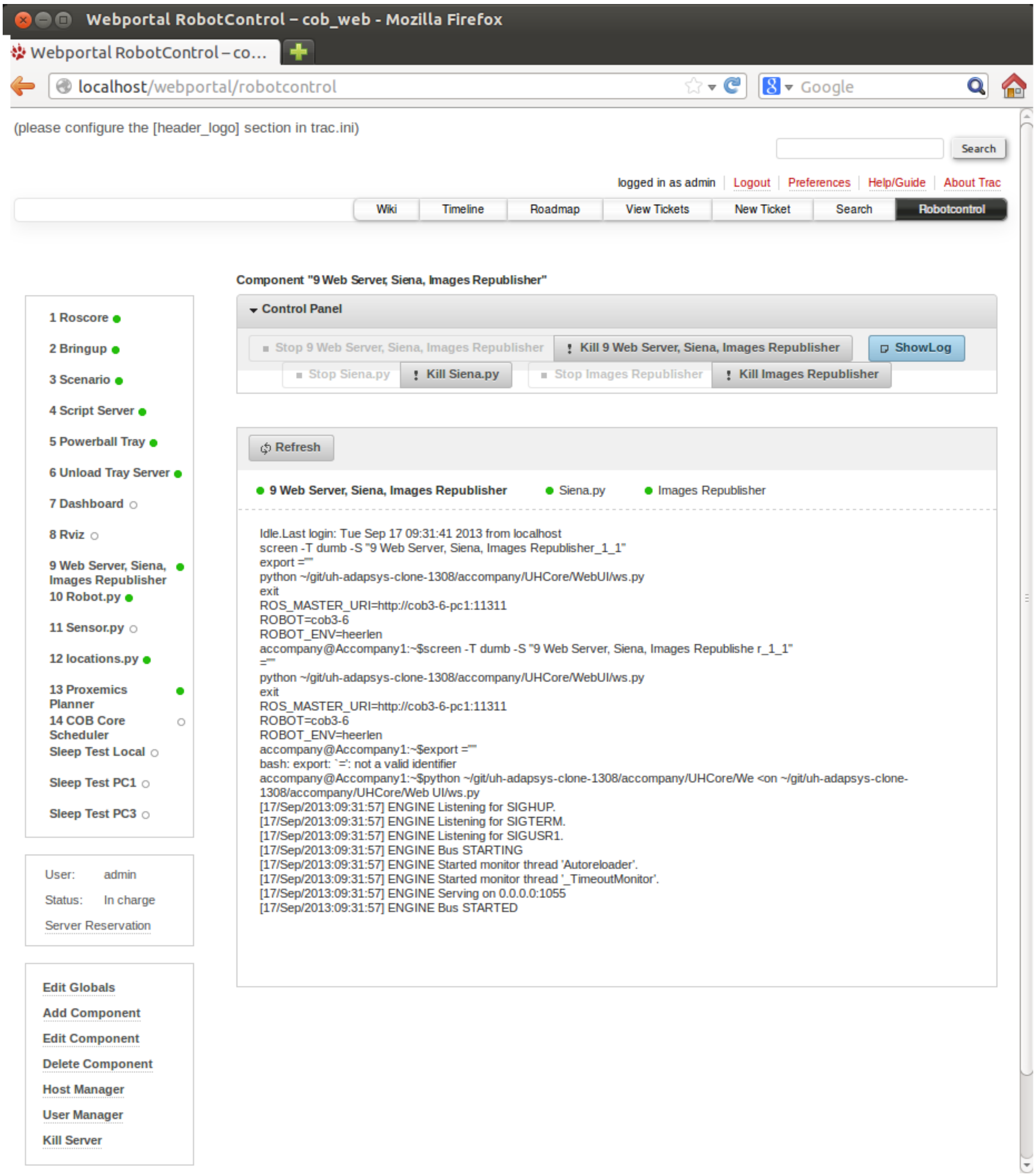


Figure 12. The Webportal software for remote access to the real robot.

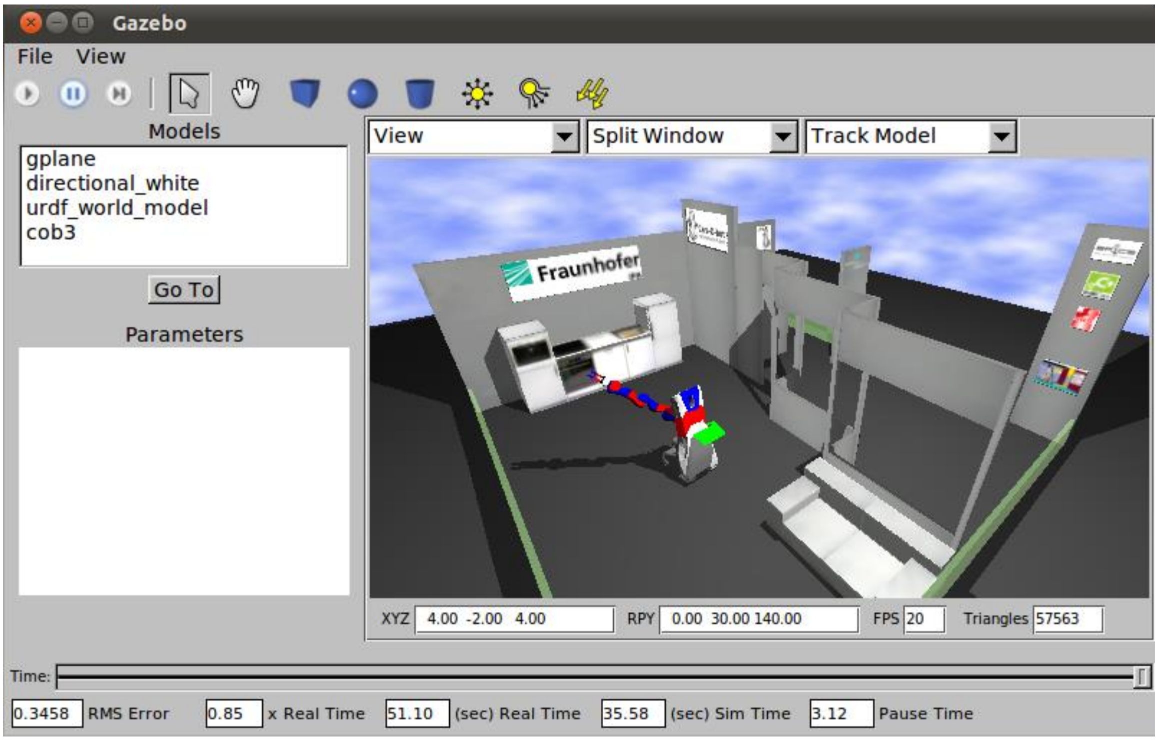


Figure 13. Simulation environment for software testing without the real robot.

Architecture of the accompany system:

Efficient integration necessitates a common agreement on system architecture and modularity. The functional contributions of all partners have been identified early in the project and put together into an architectural diagram (Figure 14). The architecture includes the specification of components and their capabilities and interfaces so that functional gaps or possible redundancies could be determined early. Single functionalities are accessible through the standard ways of communication in ROS: topic broadcasts and client-server requests. The behaviour control system (Procedural Memory, Scheduler), which is accessing the functions of the ACCOMPANY system, is implemented as a reactive, rule based system. The architecture was implemented as envisaged throughout the project together with all desired components and functionalities. The architecture was introduced in D5.1 and continuously updated through D5.2, D5.3, D5.4, and D5.5.

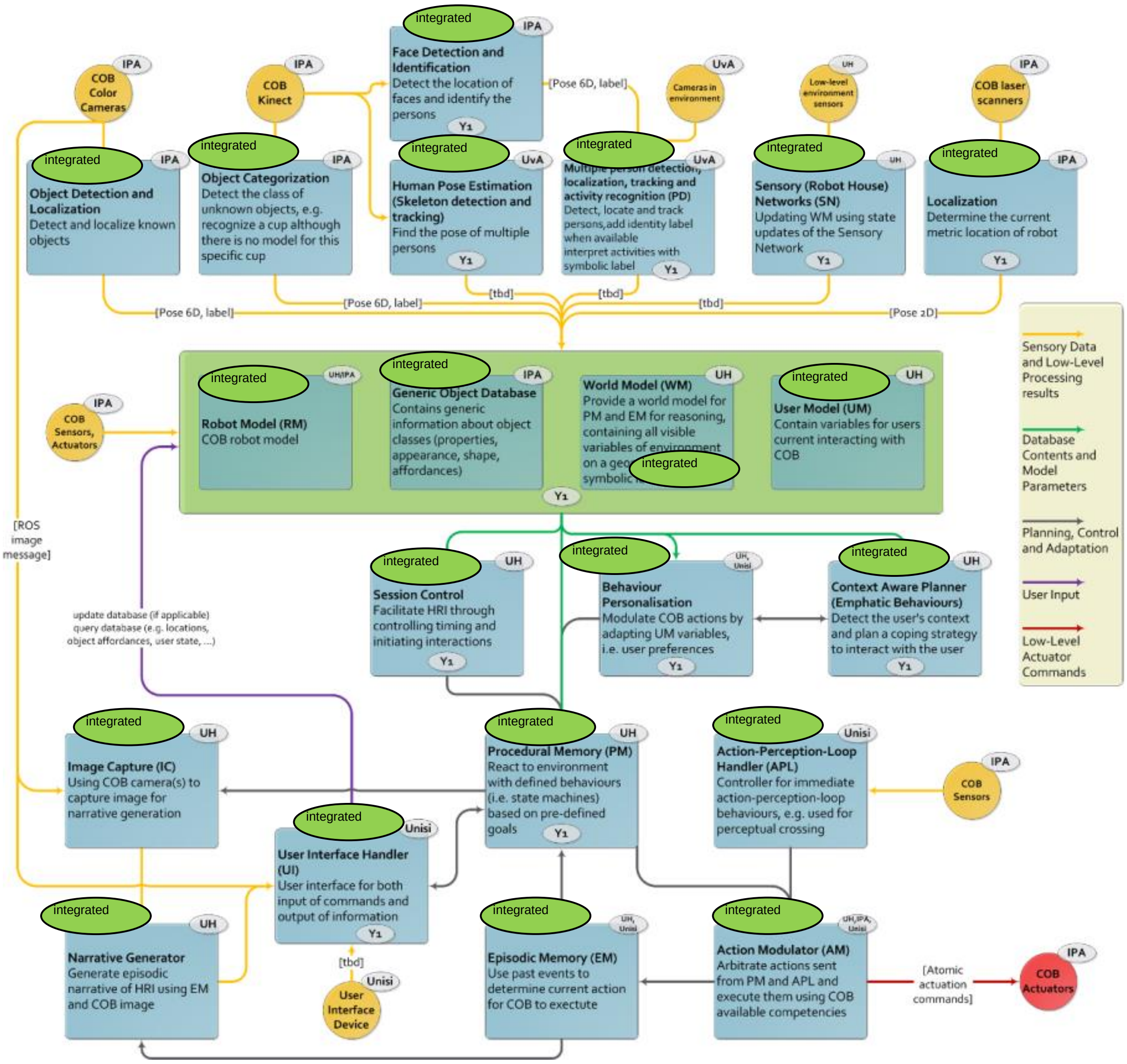


Figure 14. Architecture and integration summary of the ACCOMPANY system.

Figure 15. The new tray kinematics employed for vertically displaying the screen.

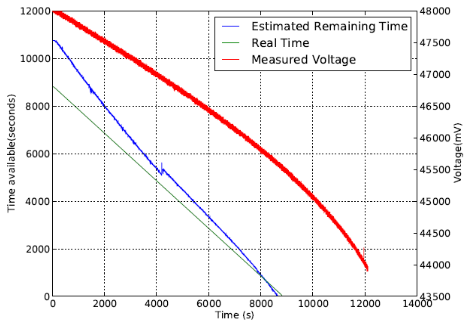


Figure 16. Predictive performance of the battery monitoring tool.

Platform adaptation:

FRAUNHOFER was responsible for the adaptation of the Care-O-bot platform according to the project's needs. First, the original old robot tray (transport and display) with one degree of freedom (1 DOF) was too inflexible, could not adapt to a specific height, and merged transport and user interaction function on one surface (Figure 11). It has been replaced by a new 3 DOF construction which allows for flexible turning and height adjustment of the separated tray or screen sides (Figure 15). In accordance software drivers have been developed and integrated into the Care-O-bot platform. As another adaptation, the flexibility in planning for manipulation tasks with optional obstacle avoidance has been dramatically increased by the integration and configuration of the planning framework MoveIt. Furthermore, a battery monitoring software has been developed which provides runtime estimates on battery power (Figure 16). This tool was very useful for the successful conducting of user tests. All adaptations are explained in D5.2 and D5.3.

Scenarios and final showcase:

WP5 contributed to the definition and implementation of the year 1, year 2 (user tests), and year 3 (final showcase) scenarios. Major work was dedicated to the coordination of iterative integration of functional modules into the ACCOMPANY system. Similarly, hardware of the smart environment, such as the Squeeze Me interaction device (Figure 19), environment sensors, and ceiling mounted cameras, has been integrated into the system (Figure 17-centre). In preparation for the scenarios new robot behaviours and capabilities have been developed, e.g. walking together with the user (Figure 17-left), a Karaoke game (Figure 17-right), or object grasping and unloading (Figure 17 and 20). Moreover, respective robot behaviour rule sets were specified to yield the desired functional scenarios.

FRAUNHOFER coordinated the planning and setup of the ACCOMPANY system and provided technical support during the user tests at the experimentation sites Heerlen (NL) and Troyes (F) (Figure 17). The experiments in Hatfield (UK) were conducted with their own technical staff. Altogether, a successful conducting of all 101 user tests could be accomplished within ACCOMPANY. At the end of the project, FRAUNHOFER setup the ACCOMPANY system at Fraunhofer IPA and coordinated the production of a final showcase video. A similar video documenting the year 2 user evaluation scenario was recorded by HZ in Heerlen. The iterative scenario development is documented in D5.2, D5.3, and D5.4 whereas D5.5 reports on the final showcase and provides a summary on system integration and dependability. The evolution of the scenarios is documented in D1.3, D1.4 and D1.5.

Figure 17 Year 2 scenario in Heerlen (left) and Troyes (center), and the final showcase at Stuttgart

(right).

Extra work was completed by FRAUNHOFER in implementing three perceptual crossing scenarios, defined by Unisi (see D2.2 ,D2.3), into the ACCOMPANY system. All three situations (let's move, walk with me, let's cross paths) have been implemented in two conditions, without and with perceptual crossing (see D5.5), and tested with real users according to UNISI's testing protocol to supplement their evaluation.

As a result of the scenario setups, the consortium has obtained detailed setup instructions, experiences on error fixing, improvements on software reliability through extensive testing, a detailed robustness report on the year 2 scenario at three test sites, videos on the year 2 scenario and the final showcase, as well as new integrated functions, such as person identification and tracking (Figure 21), person following (Figure 17), an innovative input device with robot speed modulation (Figure 19), and finally reactive robot behaviour scheduling and simple behaviour teaching facilities.

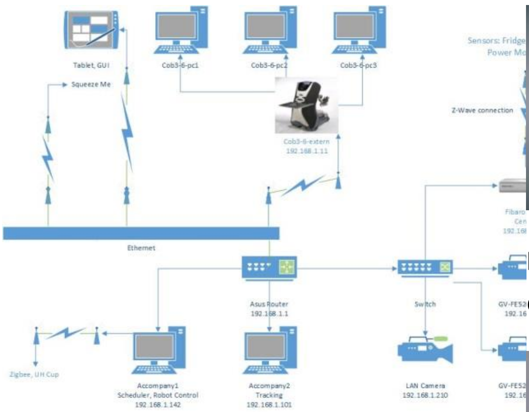


Figure 18 Network map of connected hardware of the ACCOMPANY system.

Figure 19 User interface device.

Figure 20 Grasping objects.

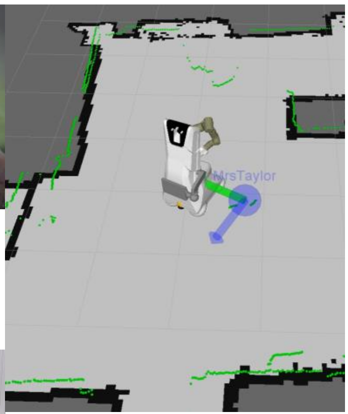


Figure 21 Person recognition, tracking and walking together.

Objective 5 and its potential impact

Novel tray kinematics for Care-O-bot, including software drivers: The old tray with one degree of freedom (1 DOF) has been replaced by a new 3 DOF construction which allows for flexible turning and height adjustment of the tray or screen side. Accordingly software drivers have been developed and integrated into the Care-O-bot platform. FRAUNHOFER has been exploiting and will exploit this development by offering another customization option to customers of Care-O-bot 3. So far, the new tray construction has been ordered with 2 of the 8 existing Care-O-bot 3's.

Robot movements synchronized to the user: FRAUNHOFER has developed algorithms for the synchronized movement of a robot with a user, e.g. for walking together, to provide users a better experience with the robot. This function will be exploited by FRAUNHOFER in 2015 by implementing it into the robots of a manufacturer of autonomous mobile transport robots that are supposed to be applied in hospitals and care homes. Furthermore it will be exploited in at least one upcoming research project.

System integration procedures and software: FRAUNHOFER has extended its knowledge, experience and software pool for rapid development of specialized, modular robot constructions through the ACCOMPANY project. This knowledge and existing software modules have been exploited in 2013 by constructing the Mobina robot which utilizes the localization, navigation and detection functions of the Care-O-bot within a much smaller platform that is supposed to help the elderly quickly in emergencies and has a price below 1000 Euros. The knowledge gained in ACCOMPANY also influenced the construction and design of the follow up Care-O-bot 4 in several aspects, significantly, for example regarding overall stability, sensor placement, flexibility, modularity or size of the robot. The findings that the individual needs of the elderly cannot be matched by one single robot design – functionally and economically – has led to the decision to develop the next generation Care-O-bot with a strong focus on modularity and configurability. The high level of interest from our industrial partners and first orders of the new platform show the importance of this flexible and modular approach to hardware design of (multipurpose) service robots. A spin-off company will emerge on the commercialization of Care-O-bot 4.

Experiences on robot safety design: The extensive user tests with the ACCOMNPANY system revealed a lot of important safety aspects that have been communicated to the ISO TC184/SC2/AG1 Advisory Group, which developed the ISO 13482 standard on Robots and robotic devices - Safety requirements for personal care robots. These examples of practical usage for personal care robots contributed to the contents of the norm. On the other hand, the ACCOMPANY system was thoroughly examined for potential safety hazards by an expert from this group. The developed ISO standard is supposed to have very high impact because this new field of machines did not have any proper applicable safety regulations so far.

Objective 6, WP6, evaluation and ethical issues

Work package 6 has three distinct evaluation activities that ran in parallel during the project. At its core, an important and timely issue of ethics for using ambient assistive technology at home was the main topic of investigation. In parallel, work focused on assessing use acceptance over time and acceptability of a platform like Accompany platform. Finally, the third line of assessment related to evaluation of usage, focusing on results obtained from evaluating the scenarios in three different partner countries, France, the Netherlands and the United Kingdom.

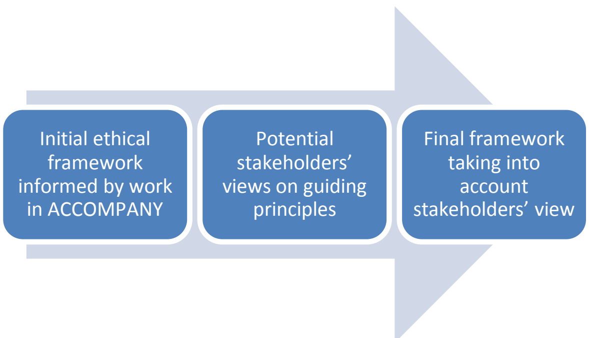


Figure 22: Ethical Integration in ACCOMPANY

Progress in ethical evaluation

An evaluation of the ethical aspects of the design work being achieved in ACCOMPANY was broken into three inter-related tasks as shown in Figure 22.

In D6.2 (*Identification and discussion of relevant ethical norms for the development and use of robots to support the elderly in their own homes*) we discussed values that might be used to guide the development of care-robots for cognitively unimpaired older people who had hitherto lived independently in their own homes, but who, without additional support, would be unable to continue to do so. Six values were suggested.

- autonomy – being able to set goals in life and choose means;
- independence – being able to implement one's goals without the permission, assistance or material resources of others;
- enablement – having or having access to means of realizing goals and choices;
- safety – being able readily to avoid pain or harm;
- privacy – being able to pursue and realize one's goals and implement one's choices unobserved;
- social connectedness – having regular contact with friends and loved ones and safe access to strangers one can choose to meet.

We argued that autonomy should be the organising value for the framework (Sorell & Draper 2014).

We also explored what a care-robot could provide for such an older person that could not be provided by other forms of assistive technology. We concluded that a significant advantage of a care-robot was its potential to be a 'presence' in the life of the older person.

We then designed a qualitative study using focus groups of older people, informal carers and formal carers of older people drawing from the existing ACCOMPANY user panels at HZ, MADoPA and UH. To these we added a further three focus groups of older people drawn from the Birmingham One Thousand Elders. 21 focus groups with a total of 123 participants which were convened to discuss four scenarios using a common topic guide. The scenarios were designed to highlight the potential tensions between the values proposed for the ethical framework. We wanted to understand how potential user groups would resolve such tensions (i.e. whether a hierarchy of values would emerge) and whether new values would be employed that should be added to the framework.

Rich data was gathered. This is best summarised using the mind-maps that were generated in the analysis (see figures 23-25).

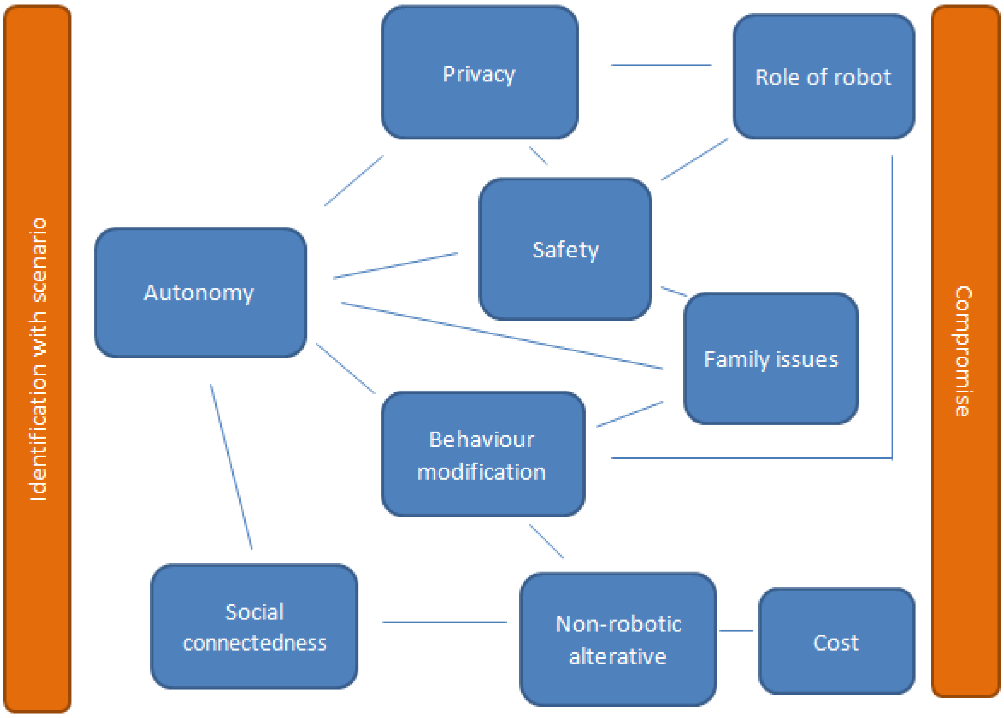


Figure 23:Mind map of themes in the older people focus groups

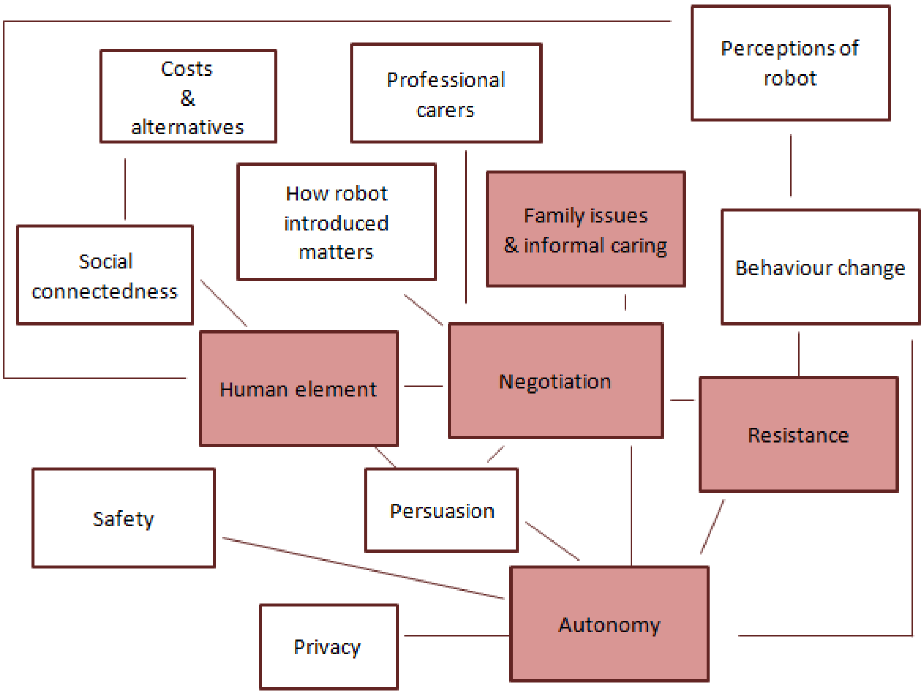


Figure 24: Emerging themes from informal carers groups

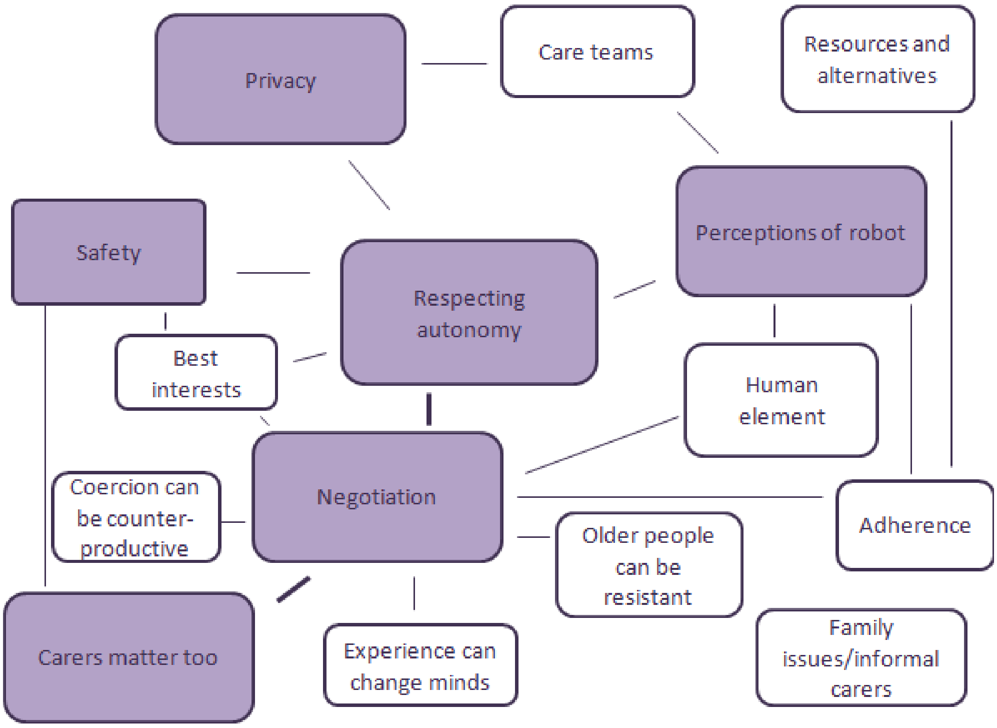


Figure 25: Themes emerging from the formal carers groups.

This data has enabled us to explore: older people's preferences for the values that should govern robotic design (Draper et al 2014a); lessons for designers (Draper et al 2014b); the use of the robot to promote rehabilitation through behaviour change (Draper and Sorell 2014); and ethical issues raised by inserting a robot into the care triad (Jenkins and Draper 2014). Bedaf (HZ) is also using the data to explore the hypothesis that assistive technology may erode independence.

In terms of the values framework, the data largely supported the prominence given to autonomy and highlighted the value of safety. Independence received least attention. Privacy concerns tended to be present in the form of concerns about 'Big Brother' surveillance, but otherwise the norms of (medical) confidentiality tended to be applied. The participants gave a range of responses to the idea of the robot trying to change behaviour in ways that gave value to enablement. This was closely related to social connectedness because the participants, whilst seeing some advantages of robotic care, tended to the view that robotics *should* not replace human contact and *could* not replace aspects of human-human care, specifically the ability to reason with or persuade older people to behave in particular ways that would promote their welfare. Framing the robot and applying role norms was significant in how the participants resolved the ethical tensions. Given the scope of this report, further conclusions from these studies are documented in D6.4 and D6.6.

Potential impact from Ethical Evaluation

A value framework has been argued for in which autonomy is overriding, and can outweigh even safety in some cases. The more dependent an older person is, the more likely safety is expected to equal autonomy in importance or compete with autonomy. In the client group for ACCOMPANY relative independence is assumed. The implication of the value framework for Care-Robot design is that the user should be in charge, other things being equal, where this includes deciding on day to day co-operation with robot prompts, unless a care agreement specifies an agreed and higher level of co-operation. User determination of what is private information is also implied.

The work on the value framework and the empirical testing of the value framework points to the importance of an agreement between a user and a robot-installing authority. The agreement should specify the main purposes and uses of the robot clearly, including conditions for withdrawing the robot in the event of non-cooperation.

Progress in evaluation of user acceptance over time

Work in this area was divided into three subtasks: a) role identification; b) identifying influential factors affecting long-term acceptance; and c) acceptability evaluation for the accompany platform.

A) Identifying robot roles that are relevant to envisaged responsibilities

Progress in this task was made in three separate stages. At first, a literature review on elderly needs and robot roles was carried out to identify robot roles that are appropriate for the responsibilities of Care-O-Bot in ACCOMPANY. This complemented the work of WP1 that was oriented to determining the needs that lead elderly people to give up independence. In addition, an in-depth contextual analysis was carried out with elderly participants that lived independently in Spain. This study aimed to understand important activities, roles and challenges of the daily life of the independent living elderly.

Secondly, a study was carried out that researched the influence of task context and robot roles on perceived social robot personality. The hypothesis here was two-fold, at first, we hypothesized that people's preference for a robot's personality is dependent on the context of the task as well as their own personality traits. Secondly, when the first hypothesis was not met, we expected people to perceive the robot behavior as congruent with the personality associated with the task. Results from the study with 49 participants did not find sufficient evidence for the matching hypothesis, nor evidence for either the similarity-attraction or complementary-attraction rule. In contrast, the data suggests that attraction rules for robot personalities and behaviours depend on the task-context. We expected that people would hold such stereotype expectations of robots in particular jobs and that they would prefer an introverted robot performing introverted tasks while an extrovert robot performing extroverted tasks. However, the trend we found may indicate that for some *task* contexts, the similarity attraction rule holds while for others the matching hypothesis does, and still for others the complementary attraction rule may apply. This suggests that people's preferences for robot's personalities may be much more complex than initially found. Rather than preferring a robot with a personality similar to our own, we may want this for a robot that does a chore we like to do but not for chores we dislike.

Third and finally, a study was performed where elderly and non-elderly participants interacted with a social robot. As part of the interaction, an exercise from the field of positive psychology was carried out with the aid of the robot. The experiment presented two experiment conditions. In one condition, the robot had the role of coach, making participants aware of the positive exercise, whereas in the other condition the robot had the role of companion, leaving participants unaware of the ongoing positive exercise. Our results suggested that robot coaches, displaying explicit care behavior, could be more effective than robot companions in improving the mood of their users, even when the activities performed together are the same.

The findings from the three stages are detailed in D6.1, while providing input for the next subtask.

B) Identifying influential factors affecting long-term acceptance of companion technology

One of the important aspects of the Accompany project was to provide first-hand experience on deploying a companion robot in an elderly person's house, and to report on experiences from this deployment. A preliminary study was conducted to support this task which later on was complemented with a second follow up study. D6.3 details results from the two studies. Study one used technological probes and highlighted people's first responses regarding presence of a physical robot in their living environment. The outcomes indicated that people were more familiar and at ease with the robot mediating with their care-giver, rather than an autonomous robot. This could be explained due to our preference in human-human relationship, compared to human-robot relationship which is more alien and unfamiliar to the participants. A second part of this exploration considered what happens when a robot is placed in a home environment for an extended period of time. A Magabot robot was prepared and adapted to resemble a Care-O-Bot for the purpose of this study. The robot's role was to act as a medium to encourage therapeutic exercise and to provide assistance with this task. As far as we know it is the first study of its kind, where a larger autonomous robot was deployed in someone's home. The outcomes of the study gave the research team a wealth of experience on how to conduct such investigations for the future. For instance, it was important that no researcher was involved on a daily basis. Many studies offer positive results of long-term robot exposure and we felt this was due to researcher's frequent visits. This posed many challenges as the robot needed to operate autonomously without daily visits by the research team. The robot's action capability was therefore limited and carefully scripted for its safe interaction. Even then, we gained interesting insights about how a user's thoughts, feelings and opinions of a robot in the home changed over time. Due to the limits imposed by the nature of such studies, it is difficult to trial such studies with a large number of people (given the required number of robots, support team and also the length of such studies), however, we conducted a similar study with a different platform, the Giraff robot, while also utilizing what was learnt from the first study. For example, in the case of the second study, the robot was operated by a remote operator with a fixed but versatile repository of phrases, while the participant was unaware of this remote operator. This was decided by considering the results from the first study where the participant rated the robot at the lower levels of perceived intelligence. A more natural conversation was thought to impact on robot's perceived intelligence. In both studies, we developed novel investigation methods for long-term acceptance. Namely, we employed the method we term as 'N=1 analysis' where we (instead of using a large sample) follow one subject in detail for an extended period of time. The emphasis on a thorough analysis of a specific case allows insights into the deeper meanings of a participant's thoughts and emotions and how these evolve over time.

One of the main insights gained from the first long-term study refers to the strong view of the robot as a tool that we found in this participant. This might have been at least partly due to the fact that the robot was not adaptive and very responsive or very intelligent. Another strong conclusion derived from that study was the need in long-term studies of minimizing the researcher's involvement throughout the duration of the studies. In addition, we learned that more control should be exerted on the data acquisition.

We made an effort in the second long-term study to offer the participant a highly responsive and adaptive robot. One of the most significant results was the fact that the participant attributed companionship attributes to the robot, that is, he treated the robot not just as a machine but as a friend. This effect, together with the enthusiasm of participating in the study, took place during the first week and degraded progressively during the second week. Finally, we found indications that the task the robot employed for psychological re-enablement had indeed positive effects on the participant.

C) Evaluation of user acceptance

As part of the evaluation of user acceptance, two separate studies were conducted.

C1) User panels on robot acceptance

The first study was a user panel study conducted by the three user centres, HZ, MADoPA and UH. The panels included members of the traid, elderly people, their formal and their informal carers. The focus groups on robot acceptability aimed to assess how ACCOMPANY´s main beneficiaries experienced the Care-O-Bot robot in terms of robot roles and robot acceptance. To this end, two different visions of the robot were shown to the participants in two videos during the focus groups. The first shows the Care-O-Bot interacting with an elderly user according to ACCOMPANY´s scenario. We believed that the role of the robot in this video is that of an assisting device. The second video shows a different robot role, in this case a companion. Thus, our intention was to expose the focus group participants to two different robots, one which seems more reliable and machine-like, and the other more emotional, independent and human-like. We hoped that the exposure to these two opposite views will allow debates on robot roles and robot acceptance.

Elderly people from The Netherlands, France and United Kingdom participated in this study. In The Netherlands, seven focus group sessions were conducted with a total of 34 participants. In UK two interviews and two focus groups sessions were carried out, with a total of 11 participants. In France nine user groups were gathered, resulting in 32 participants. In total, 77 persons participated in this study, with a total of 20 focus group sessions.

Every focus group session was video recorded. Subsequently, the corresponding researchers from each country extracted key points that focused on the subjects for discussion according to the protocol (see above in protocol of focus groups). Additional key points and comments of the participants that the researchers considered also valuable were annotated as well. The key points extracted from each focus group session were grouped and thematically analysed. The full analysis of these findings is featured in D6.5, indicating that in general, the reliable robot which operated as a tool generated a higher acceptance. There was a tendency in expecting controllability of the robot and what it does, in support of making the potential users feel safe. The main advocates of ‘robot as a tool’ were the informal carers whereas the main supporters of the ‘robot as a companion’ were the elderly people themselves. One explanation offered could be that the informal carers were most concerned about the safety of the people under their care, while the elderly seem to assign more value to the possibility of having a companion at home, even if this is a robot.

C2) User acceptance based on acceptability scales

A series of acceptability scales, developed and presented within D6.5, were chosen based on their suitability to reflect on user acceptance. These included trust reflected by the Almere model and source credibility scale (SCS), social presence, self-efficacy, anxiety and enjoyment. These scales were administered during the summative evaluation, when the project scenarios were evaluated in partner sites. In total, 36 questionnaires were completed, consisting of 9 participants at HZ (6 women and 3 men, age 63-94); 19 participants at MADOPA (13 women and 6 men, age 65-95); and 8 participants at UH (5 women and 3 men, age 58-84).

The analysed descriptive statistics of the results are presented in Table 3.

Scale and its range	N	Minimum	Maximum	Mean	Std. Deviation
Social Presence, 1-5	36	1.00	5.00	2.90	.86
Enjoyment, 1-5	36	3.00	5.00	4.02	.59
Trust (Almere), 1-7	36	1.50	5.00	3.63	.74
Source Credibility Scale, 1-7	35	2.25	7.00	5.04	1.30
Self-Efficacy, 1-4	36	2.10	4.00	3.16	.45
Anxiety, 1-4	27	1.50	3.25	1.95	.49

Table 3, Descriptive statistics obtained from analysing acceptability scales

A country by country break down of the results is offered in Table 4.

Country		**N**	**Mean**	**Std. Deviation**
Social Presence	Netherlands	9	3.31	.97
	France	19	2.53	.80
	UK	8	3.31	.48
Enjoyment	Netherlands	9	4.22	.76
	France	19	3.86	.48
	UK	8	4.17	.56
Trust (Almere)	Netherlands	9	4.00	.75
	France	19	3.42	.75
	UK	8	3.69	.59
SCS	Netherlands	8	5.64	.86
	France	19	4.51	1.29
	UK	8	5.72	1.23
Self-Efficacy	Netherlands	9	2.89	.46
	France	19	3.26	.39
	UK	8	3.20	.50
Anxiety	Netherlands	0	.	.
	France	19	2.00	.49
	UK	8	1.84	.48

Table 4: descriptive statistics for the measures, breakdown by country.

As seen in Table 4, most shaded values offer mean observations with a value greater than the average value possible for that scale, for example for social presence, potential values range from 1 to 5 so any observation greater than 2.5 is highlighted.

When observing country-by-country differences, one can observe that studies conducted in France offer generally lower values except anxiety and self-efficacy. A more detailed analysis of these results is provided in D6.5.

Evaluation for usage of Accompany system

The summative evaluation experiments were conducted according to a unified and innovative framework of evaluation which was adapted to the possibilities of recruitment of the end-users in the different countries involved. The purpose of these evaluations were to assess completion of project scenarios, hence giving the project a chance to measure its progress against its objectives. The evaluation protocol and its results are further detailed in a new deliverable, D6.7, detailing different aspects of the evaluation and its results.

An important aspect to note is the planning for this evaluation. The project had access to two COB3 platforms, one sourced by the project, and one contributed by IPA, while needing to conduct three evaluations. Also, at UH, we started with an existing smart home, but the project had to replicate this home in MADoPA and HZ. Finally, evaluation plans had to be made in a way to allow evaluating the most up-to-date scenarios given these constraints. Thus a timetable as shown in Table 5 was agreed at the start of the project.

Project Years.Quarter	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4
Project Scenario	Scenario 1				Scenario 2				Scenario 3			
Project Prototype ready				P1			P2					P3
Integration to get the prototype				I1			I2					I3
Robot 1 location	UH	UH	UH	UH	IPA	UH	UH	UH	UH/IPA	UH	UH	UH
Robot 2 location							IPA	HZ		MADOPA		IPA
WP6 Evaluation					Protocol		Ethics	Summative Evaluation				
Period ends on Project Month	**M3**	**M6**	**M9**	**M12**	**M15**	**M18**	**M21**	**M24**	**M27**	**M30**	**M33**	**M36**

Transport needed

Table 5. Planning of project milestones and evaluation activities

Table 6 summarises the evaluation activities conducted in each of the three partner sites.

	France	**Netherlands**	**United Kingdom**
Location of the experiment	Smart house, Université de Technologie de Troyes	Smart house, Research center Technology in Care, Zorgacademie Parkstad, Henri Dunandstraat, Heerlen.	University of Hertfordshire, robot house

Duration	09/01/2014 14/03/2014	22/07/2013 09/04/2014	17/06/2014 27/06/2014
Participants	34	28	14
Elderly people	18	10	8
Elderly's gender	6 males /12 females	3 males /7 females	3 males /5 females
Informal caregivers	10	7	3
Informal Caregivers gender	2 males / 8 females	1male / 6 females	3 females
Professional caregivers	6	11	3
Professional caregivers' profession	4 : care workers 2 : nursing auxiliary	6 Care TV workers 5 Professional carers at an elderly home	1General Practicioner and 2 Care Assistants
Pro caregivers' gender	6 females	1males /10 females	3 females
Age of participants	Elderly : 65-95 (m73.8)	Elderly : 63-95 (m81)	Elderly : 58-84 (m72,5)
Gender of participant	8 males/ 26 females	5 males / 23 females	3 males /11 females
	16m/60w		
Experiments	Presentation Cycle 1 (6) Cycle 2 Empathy	Cycle 1 Cycle 2	Cycle 1 Cycle 2

6Cycle 1 and 2 include scenarios' 1 & 2 performance with the Care-O-Bot 3, without and with the "Squeeze me" function, the administration of the usage grid, the acceptability scales and the walkthrough grid. The presentation realized in France consists of a meeting dedicated to the presentation, by the participants, of their situations (house, care relationship, entourage, health assets, career, incomes, needs, representations about robotic). The participants also meet the team (engineers, experimenter) and see the robot for the first time.

	Movements recognition		

Table 6. Details of the summative evaluations conducted in the three partner countries

In France, MADoPA was able to recruit a large number of end-users, who formed authentic triads of care (elderly persons and their informal and professional caregivers), and to experiment the Accompany system extensively over three and sometimes four cycles of evaluation.

The results of these summative evaluations in France, the Netherlands and in the UK are consistent. Strongly supported by the extensive evaluation conducted in France by MADoPA, the main findings and impact of the usage evaluation can be summarised as follows:

- **Finding 1a** : **the conception of the system cannot be separated from usage**. **Users re-invent the system's usage and usefulness within a social context**. The ACCOMPANY system may be seen as an answer to certain needs, but these needs correspond to given social situations and different relationships (including or not professional and informal caregivers).

- **Finding 1b**: **the experimentation of the ACCOMPANY system by authentic triads of users** (elderly with their informal and professional carers) **provides an in-depth understanding of the life of the elderly, their needs, their wants, desires and pleasures in life**. It is essential to analyse the usage of the ACCOMPANY system – and any robotic system – according to these two essential dimensions of the relationship of care: usual healthcare support; and support for meaningful and enjoyable activities or relationships.

- **Impact 1:** Consequently, the **ACCOMPANY system, and robotic systems more generally,** designed to enhance the autonomy of the elderly should not be conceived for individual usage but **for collective usage, i.e. for the triad** (elderly person, informal and professional caregivers), or the **couple or the pair** (elderly person and a caregiver) **that actually ensure the autonomy** of the "household", i.e. **healthcare support** for the activities of daily living (problems to be solved, impairments to be compensated) and **meaningful and enjoyable activities and relationships** that underpin the health of the elderly and the autonomy of the "household".

- **Finding 2a: The usage, function and acceptability of the system will depend firstly on the characteristics of the relationship network that ensure the autonomy of the elderly person and secondly on the content and scope of the problems to be solved and the assets to be promoted in these relationship networks**. A set of simple questions about the "household" and its relationship network would appear essential to assess the potential usage, functions and acceptability of a robotic system: who does what in the "household"? How are abilities and functions dispatched? What is the basis of the autonomy of the "household"? Beyond this approach to problem solving in daily life activities, what are the activities or relationships that are meaningful and/or enjoyable for the elderly?

- **Finding 2b:** With regards to the (care) relationships and ways of life of the elderly, the experiments prove that there are **favorable and unfavorable contexts for the system's implementation** (see Table 7). **In a highly homogeneous couple**, where both parties have similar autonomy, similar abilities, similar wishes and similar functions, the main reason for difficulty in the implementation of the robot will be that the system will find only one usage, one function, one utility or no utility at all. The symmetric equilibrium of this type of couple scarcely allows for the delegation of a function, a task, a role or of an ability in their day-to-day lives. Oppositely, where the autonomy of a "household" relies **on a complex and heterogeneous network of relationships**, including different statuses, different functions and different abilities, implementation will be easier because the robot will find several and different usages, and will be used differently by the professional caregiver, the informal caregiver and the elderly person.

	Favorable context	**Unfavorable context**
Care relationship structure	Triad	Couple
Home	Bungalow Owner	Little house with stairs, a lot of furniture Tenant
Class	Upper class	Lower class
Life expectancy	Long life expectancy	Short life expectancy
Situations	Heterogeneous group	Homogeneous group
Location	Suburbs	Countryside
Elderly's health	Chronicle disease, Alzheimer, difficulties to get up and to sit down	Vision or hearing problem

Table 7. Summarizing the favorable and unfavorable context in France :

- **Impact 2.** Consequently, the end user of the system is not a single individual. The end-user is a collective user, a network of relationships with potential problems to be solved and assets to be promoted. This might be seen as important **guidelines for the future development of robotic systems designed for elderly people.** The end user is not a person, an individual, but a "household", a network of relationships, and these relationships will re-invent the usage and usefulness of the system. **This collective end user will define the system usages, its market price and its target market.**

Work package 7, Exploitation and dissemination of the project results

The Project Web-site was developed in year 1 of the project and has been updated frequently as the project progressed. The project web-pages serve as a means for continuous dissemination of information to the public including our project deliverables as well as the many publications the ACCOMPANY team has been involved in over the 3 years. The results of our dissemination effort can be seen in more detail in the final instalment of D7.2 (part c), which describes our dissemination efforts in more detail.

A twitter account was established for the project in Year 2, to compliment the website and was used as a tool to disseminate project external news through tweets.

Members of the consortium presented and provided in a significantly large number of events (over 150) during the three year period. These included workshops as well as invited talks, demonstrations and other public engagement activities. (Table A2).

The project mailing list and WebDav, which was established at the start of the project, was the main form of internal communication and for sharing information amongst our project partners.

Scientific dissemination

For external dissemination two major channels have been used. Research was submitted for publication in scientific journals (considering impact factor and scientific reputation) and peer-reviewed, well-recognised conferences. Participation in workshops, conferences and other forums and events was sought, as appropriate, taking place at a national, European or international level. With these, a total number of 57 (Table A1) publications were achieved while some submissions are still in the review pipeline. The project had a strong influence and presence at ROMAN 2014 in Edinburgh where multiple workshops and presentations featured from the project. In addition the project has been presented at multiple EURobotics forums as well as concertation activities with other FP7 projects such as an initiative by the REACTION consortium where a larger number of ICT for healthcare projects attended and presented their findings.

Public engagement

As well as the project website and twitter account, effort focused aligning our workshops with similar national, European and International initiatives, to increase public engagement. Project partners have used their existing network of contacts to national, European and international print, TV and Internet media and these are noted in report D7.2(C). Some recent highlights include;

- Workshops such as “Assistive Technology in Elderly Care” conducted at Fraunhofer IPA, 2014,pictures below
- TV broadcasts: Quarks&Co. at WDR in Nov. 2013 (a popular German documentary series, Figure) and a week-long children’s news series at BBC in Feb. 2014, as well as coverage on CNN and NBC and http://www.nbc33tv.com/news/meet-mr-robin-grandmas-ro
- YouTube videos “Robot Companion for the Elderly” showing the year 2 user test scenario and “ACCOMPANY - Integrated robot technologies for supporting elderly people in their homes” demonstrating the final showcase,

- Open house events in Heerlen (NL) in 2013 and Troyes (F) in 2014 on robots supporting care,
- Artist event “My New Robot Companion” in Hatfield (UK) with public visitors attending the Robot House during the week
- Technology and robot demonstrations at major international trade fairs (such as AUTOMATICA, Vision).

Figure 26. Care-O-bot participating in the German documentary series “Quarks&Co.”

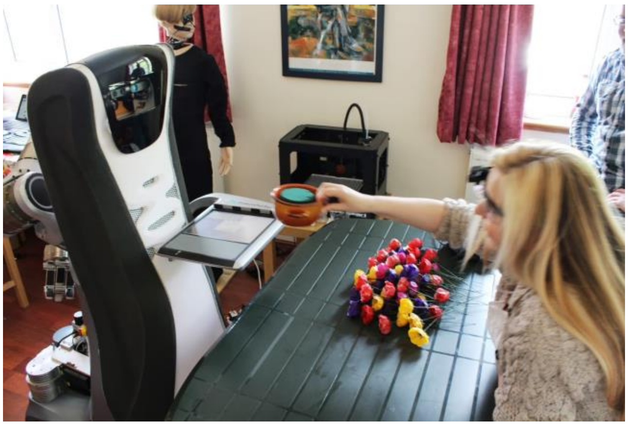


Figure 27. Artists working with the ACCOMPANY system in Hatfield.

Economic model and business case development for home companion robot

The ACCOMPANY system has been evaluated, in order to provide an ACCOMPANY product vision that could be submitted towards a positive exploitation plan. D7.3, the economic evaluation report provides rich material and a scenario that allows us to lead the exploitation plan (D7.4) through a state of the art, reflections on the scenario. This model is based on workshops, focus groups, expert interviews and the usage evaluation report (D6.7), it contains multi-level offers model, identification of the TRL, analysis of the ecosystems, cost-utility analysis, multi-sources funding and an analysis of the economic and demographic data based on the Ageing report 2012 issued by the European Commission, which indicates 30% of Europeans will be 65 or older in 2060.

The evaluation was based on three scenarios identified by the French Ministry of Economy, Finances and the Industry, corresponding to the market segments: robot companion, care-robots and robot-based monitoring system. The evaluation led us to compose an ACCOMPANY product-vision taking the best from the three scenarios, and enabling us to produce a product-vision close to the market.

The main findings highlighted three different added values, a companion robot with a friendly presence; a care service with embedded sensors and variable set of add/remove components such as situation updates, coaching, telepresence, and simplification of service-use, by means of easier to use interfaces; and finally a further to achieve fully autonomous care companion which we currently estimate at TRL2. The deliverable report highlighted the ecosystem surrounding a potential product, along with the view of evolution of needs, due to ageing trends highlighted. It provides a rationale that in the coming decade, systems such as ACCOMPANY and its derivation into care, companion and monitoring, would play a larger role in everyday care and within the ecosystem. This is further supported by an increase in the number of projects in this area, and number of robots and advanced ICT solutions that have emerged due to a large number of elderly and growth in their population, linked to an unprecedented purchasing power.

Project exploitation plan

The project formulated an exploitation plan based on interactions with the industrial advisory board, partner experiences within the project and through interactions at events such as EURobotics forum as well as interactions with other FP7 funded projects, also based on outputs from scientific dissemination of the work, and finally using the economic model aforementioned. In addition considerations are given to the recent development in ISO advisory group on service robotics where multiple project partners are members of (UH and IPA) and a recent standard document ISO 13482:2014 is dedicated to the safety of personal care robots.

These considerations enabled us to formulate project outputs using a two-pronged approach: a) detailing partner plans for exploitation and b) detailing a global project exploitation rooute, further detailed in D7.4.

Partner exploitation plan is summarised in Table 8.

Partner	Exploitable output
UH	A) Making the complex simple, GUI allowing to test and deploy behaviours by non-technical users B) Memory visualisaiton tool, a cognitive prosthetic C) Context aware planner for proxemics system in domestic invironments
HZ	D) The smart environment set up during the project will continue to function during future user evaluations. Also the facility will be used in staff training and education enriching both schools and care education curriculum. E) At scientific level, outputs from publications has already gathered interest and citations. A PhD thesis conveying a strong message on potentials for the care robots is also developed and will remain associated with the project.
IPA	F) At technology exploitation level, person recognition software, object recognition software, robot-user movement synchronisation, novel tray kinematics and user friendly teaching facilities for robot behaviours form part of the exploitation plans. G) At system level, system integration and software development experience, as well experiences gained on robot safe design will be further exploited
UVA	H) Source code for object and user localisation has been made available to public use, while UVA will continue to exploit these results I) Framework for recognising anomalies will be used in detecting failures, i.e. when elderly people get into difficulties performing a task. This has started foundation of collaboration between California Berkley Vision centre and UVA.
UNISI	J) UNISI will exploit the context dependent GUI K) The squeeze me input device will be adapted for standalone operation which opens a wide range of possibilities for market exploitation

	L) Perceptual crossing and the participatory design methodology will be further pursued for scientific exploitation
MADoPA	M) The notion of triads will be used for future research concerning the elderly and ICT interventions at home N) The learning from global evaluation highlighted the complex nature of multi-faced health technology assessment. Scientific dissemination of the protocol and the project results will provide further guide into new research in this area
UB & UW	O) The findings from ethical evaluation will provide the main exploitation route, mainly at scientific and to a degree at policy making levels where technology adaptation and its ethical considerations are widely discussed.
UT	P) The single case study approach, termed here as 'N=1 analysis' will be further used to highlight findings from long-term evaluation of ICT technology at home

Table 8, Individual partner exploitation plans

At the project level, also termed as global exploitation in D7.4, threats to independence identified in WP1 studies are mainly used to list relevant tasks and capabilities where advanced ICT and robotic interventions can influence one's independence.

Suggestions of WP1 on useful robotic assistance are summarized as:

- A robot may provide physical support to take over the execution of those activities, the user cannot perform (robot vacuum cleaner). But user activity may also be supported by the robot. The user and the robot jointly perform the task where the robot provides the functionality the user cannot (for example exoskeletons or smart arm support).
- A robot providing cognitive support could monitor or coordinate activities. Typical example would be a reminder for medication or a fall detection system.
- A robot providing social activity could support and stimulate activities by enhancing the social aspects of an activity. Typical example would be a robot which provides and stimulates communication and activities between people.
- In the re-ablement or rehabilitation option the robot may train the user to perform activities that the user can no longer perform, using a different or alternative way of doing the task. Typical example would be a rehabilitation robot for gait training at home.

Considering the above in line with potential and achievable capabilities of Accompany robot, also considering the economic feasibility, the following three system bundles are considered for short-term exploitation:

ADDED-VALUE 1: a friendly presence simplifying the daily life of the elderly.

ADDED-VALUE 2: an after sales service and-or a central service offering updates, coaching, telemedicine, telepresence, and telecare.

ADDED-VALUE 3: a care-system helping the elderly people to stay at home in an autonomous way, and preventing them to go in a nursing home, helping them to get up and sit down, fetching and carrying things, having medical skills (measure, reminder, alerts).

Long-term exploitation remains focused on research and innovation, partly subject to future funding applications within the H2020, and national and international funding for research in areas of perception, human-robot communication, construction and manufacturing safe robots for physical assistance and finally technological readiness and economic viability of new and emerging approaches.

Interestingly, partner exploitable output aligned with the distinct innovations provided in response to innovation questionnaires, although we were only allowed to identify three distinct innovations for which we have listed the following:

A- Innovation underlying a compound of functionalities such as context-dependent GUI, squeeze me interface, GUI allowing non-technical users to test and deploy behaviours (making the complex simple), memory visualisation and cognitive prosthetic tools, and finally the context aware planner. It is notable that many of these components can also be unilaterally exploited as offered by partners under their individual exploitation plans.

B- Innovation in activity monitoring, where we proposed a novel hierarchical framework for modelling human activities using RGB-D sensor. The learning algorithm is able to deal with uncertain labels, and it is robust to the noise of labels in the training data.

C- Innovation in assessing acceptability of interventions in long-term exposure. Here the innovation is based on a case-study approach which allows us to provide new and novel insights regarding thought processes and emotions of the participants and potential users.

Work package 8: Project Management.

The project had its start date on 1st October 2011. Two additional partners, the University of Twente (UT) and University of Warwick (UoW), joined the consortium from 01 October 2012 bringing the total partners to 9. The role of WP8 was to oversee management tasks for the consortium such as contractual matters, maintaining and setting up decisions structures as well as quality assurance and communication flow. The following tasks were progressed during all 3 years of the project:

Contractual matters

UH as coordinator worked on answering queries related to financial FORMC's, and overseeing the Year1-2 Financial distribution as well as this year (3) submission, in line with Commission requirements.

A deliverable review timetable was planned each period and circulated to partners. Deliverables were circulated for peer review prior to submission to reviewers for quality assurance purposes.

A deliverable template was created and circulated, as were guidelines on project reporting (such as Project reporting templates, final and financial reporting guidance notes). A progress report system was implemented in Year 1 (bi-annually) so partners updates were assessed against the project plan, highlighting any issues and following through on remedial actions.

Two amendments were submitted during period 1-3, the first for the addition of partners and the second in order to submit FORMC via electronic (e-signing) only.

Setup and maintain decision structure and quality assurance measures

UH co-ordinated logistics of 4 quarterly meetings (for example in the current (see Table 9)) in each period with hosting partners, offering administrative support and leadership to project as well as arrangements for the review plan and meetings.

Who	Date	Place	Title
All Partners represented	February, 4th-5th 2014	Twente, The Netherlands	Q3.2 Meeting
All Partners represented	April, 28th 2014	London, United Kingdom	Q3.3 Meeting
All Partners represented	July, 10th 2014	Stuttgart, Germany	Q3.4 Meeting
All Partners represented	September, 22nd - 23rd 2014	Amsterdam, The Netherlands	Q3.5 Meeting

Table 9. List of quarterly meeting during period 3

We coordinated the set-up of an industrial and external advisory panel in Year 2 . We met with the members to discuss future plans and advice on deliverables related to WP7. The members are Christopher Parlitz, Robert Picard and Dick. van der Pijl and they have been helpful in developing the plans for our economic model and advising us on our exploitation plan, D7.3, D7.4.

At each meeting the project management team assisted the hosting partner with preparations and planning. The project management team chaired the agenda for all meetings and followed up with an action note to the consortium. Work packages were also encouraged to have additional (smaller) meetings, a list of 39 which is noted below during the third year of the project. To avoid duplication, meetings reported in earlier project deliverables are not reported in this table.

Partner-Persons	Dates from	Dates to	Place	Meeting title/purpose
All	All year		Webex	Management monthly management catch up first Thursday of every month
HZ	02/10/2013		HZ	Robots in Care day organised by the Expertise centre at HZ (including scenario demonstration) 200 visitors
UH: Joe Saunders	15/10/2013		Brussels	euRobotics Meeting
HZ: Gertjan Gelderblom	13/11/2013			Invited Presentation Blixembosch Robots in Care
IPA: Ulrich Reiser, Richard Bormann	05/11/2013		WebEx	Preparations and logistics for user tests in Troyes
IPA: Ulrich Reiser, Richard Bormann	15/11/2013		WebEx	Preparations and logistics for user tests in Troyes
UNISI and HZ: Iolanda Iacono,Sandra	21/11/2013		Skype Meeting	Input for Focus group 5-Empathy evaluation.

Bedaf				
MADoPA and UTT (Troyes)	22/11/2013		Paris	Organisation of summative evaluation
All	04/12/2013	05/12/2013	Brussels, Belgium	Project Review2
IPA: Richard Bormann, Nadia Hammoudeh Garcia, Tim Fröhlich, Thiago de Freitas Oliveira Araujo, Ulrich Reiser (respective people on demand)	09/12/2013 – 31/01/2014 (daily support) 01/02/2014 – 30/06/2014	(on demand support, approx. every 2nd or 3rd day)	Skype, Team Viewer	Remote Technical Support for User Tests-* Setup and integration support via- - Skype telephone support-- Remote computer control support
IPA: Stefan Schilling, Wenzhe Li	09/12/2013	10/12/2013	Troyes	Robot delivery and setup meeting
IPA: Wenzhe Li	09/12/2013	23/05/2014	Troyes	On-Site Technical Support for User Tests-* System setup and continuous integration,* Scenario Improvement, * Care-O-bot Maintenance, * Support for data recording on activity recognition,* Demonstrations to the public
UNISI:Marco Bongini (on behalf of Ernesto di Iorio)	07/01/2014	10/01/2014	MADOPA, Troyes - Université de Technologie de Troyes	Integration and implementation of the “Squeeze me” for the user test
IPA: Eduard Herkel, Wenzhe Li	20/01/2014	22/01/2014	Troyes	Robot arm repair meeting
IPA: Daniel Hundsdörfer, Wenzhe Li	04/02/2014	05/02/2014	Troyes	Robot arm repair meeting and delivery to manufacturer
MADoPA and UTT (Troyes)	07/02/2014		Paris	Organisation around student placement
UH	13/02/2014		Hatfield	Meeting with BBC TV crew@Robot house
UH: Kerstin Dautenhahn, Farshid Amirabdollahian. HZ: Gertjan	11/03/2014	14/03/2014	Roverto, Italy	European Robotics Forum

Gelderblom				
IPA: Richard Bormann	12/03/2014		Skype Meeting	Preparations for data recording on activity recognition
UB, UW and HZ	17/03/2014		Skype Meeting	Skype meeting UB and UoW on WP6 with HZ Bedaf and Gelderblom
UNISI and HZ- Iolanda Iacono, Sandra Bedaf	24/03/2014		Skype Meeting	Squeeze Me Evaluation-Definition of the protocol./GUI Evaluation-Sharing the results of the Focus Group conducted in HZ.
MADOPA and UH: Farshid Amirabdollahian	24/03/2014		London	WP7 Economic Model meet David Hewson
MADoPA and UH: Farshid Amirabdollahian	04/04/2014	05/04/2014	Paris	WP7 Workshop for Accompany project economic model
UT and UNISI	10/04/2014		Skype	Further collaboration
UVA and IPA: Richard Bormann	16/04/2014		Skype	Preparations for data recording on activity recognition
UB/HZ/UH/UW	21/05/2014	24/05/2014	Skype	plan publications arising out of D6.4-Visit Bedaf to UB
UH: Farshid Amirabdollahian	29/05/2014		Hatfield	Meeting with Raj Sandhu from BK technologies regarding Accompany Exploitation
UH:Farshid Amirabdollahian, Sinead Gorham	03/06/2014		London	Meeting at London School of Economics for Accompany Project economic modelling
UvA and IPA	01/07/2014		Skype	Preparing for the final demo video
UB and UW	18/07/2014		Birmingham	discuss outline for D6.6 and potential publication plans
UB and HZ	18/07/2014		SKYPE	Discussion re. Bedaf et al paper WP6
MADoPA/UH/ HZ/ UT/ UB	20/08/2014		SKYPE	Meeting about the usage evaluation report
UH: Farshid Amirabdollahian	24/08/2014	29/08/2014	Edinburgh	ROMAN 2014
HZ	04/09/2014			EUrob meeting on MAR Huijnen
UB and UW	17/09/2014		SKYPE	Final discussions about section 4 of D6.6
HZ:Sandra Bedaf	18/09/2014		HZ	HZ university Technology Fair (250 students)
UT and HZ	17/10/2014		Heerlen	Making of video for focus groups on robot acceptance
UH	throughout the period		UH	Multiple Skype, email and phone conferences with MADoPA and IPA

				regarding scenario development in implementation

Table 10. List of project meetings during the last period

Project ethical records

The project ethical records are collated and are described below:

Partner	WP	Date	Ethical Approval number	Issuing body	N	Purppose of study/Experiment
UB	6	16/01/13	None provided	IREC University of Birmingham	21	3x focus groups of older people exploring the ethics scenarios as reported in D6.4 & D6.6
UH	1	09-01-2012 to 04-05-2014	1112/46	UH STCA Ethics committee / UH STECDA	20	User Panels as outlined in WP1
UH	6	01-05-2012 to 04-05-2012	1112/161	UH STCA Ethics committee / UH STECDA	150	Formative Studies for the Accompany Project
UH	6	14-01-2014 to 01-09-2014	COM/SF/UH/00015	UH STECDA	15	Summative Study for the Accompany Project
MADOPA	6	29/10/13	DGRI CCITRS MG/CP2013.756	Comite consultatif sur la traitmente de l'information en matiere de recehrche dans le domaine de la sante (CCTIRS)	34	Summative Study for the Accompany Project
HZ	6	27/06/13	13-N-90	Medisch Ethische Toetsingscommissie METC Atrium-Orbis-Zuyd	10	Summative Study for the Accompany Project Approval letter confirms no ethical requirement for the focus groups on WP1 and involvement of informal carers.
UNISI	In Italy, the Ethics Committee express its opinion on any research projects that are related to human subjects (e.g. patients and/or healthy volunteers) only in the clinical research and/or assistance field (as indicated by the Italian Legislative Decree n. 211 of June, 24th 2003). The Ethics Committee in Siena has provided a letter entitled ATTESTAZIONE COMPETENZE CEAVSE as permission to proceed based on above..					

Table 11. Accompany project's ethical records

Communication flow

For internal communications we used Webex to host monthly management board catch-up meetings (this was in addition to our quarterly meetings). The Webex meetings were also coordinated and chaired by UH to update partners on management issues and catch-up on project progress.

In terms of communication with other projects, in Year 1 we did some research on other European projects in the field covering similar themes and we established a connection with them through the REACTION Consortium Clustering Event Ambient Intelligence Advanced Technologies in Support of Healthcare and Assisted Living that took place at the Foundation for Research & Technology - Hellas, in Heraklion, Crete, Greece, on 26-27th September, 2013.During the second year, and third year the project was present at multiple workshops, talks and presentations alongside other FP7 funded projects or European initiatives such as the EURobotics forum on March 2014 in Rovereto, Italy and also heavily featured in RO-MAN2014 conference where CogLaboration and CogWatch EU project joined with demonstrations and presentations. The project officer, Mr Jan Komarek accepted our invitation to attend and present at RO-MAN2014.

Reporting on project effort during its duration

Table 12 presents the project effort throughout the three years. The total effort has an over spend of 151.86 person-months. The additional effort is mainly attributed to the third year of the project. Table 13, Table 14 and Table 15 present the effort per work package, effort over the three periods and per partner respectively

Work packages 2, 6 and 7 have seen increased effort during the period. In particular, WP2 has dedicated more effort to GUI perfections, implementation and testing of the perceptual crossing on the COB platform and perfection of the squeeze me interface. WP6 had a substantial amount of evaluation and analysis at hand, regarding ethics, acceptability and usage evaluation. WP7 in particular had increase effort in support of the economic modelling task. The work in this WP was initially submitted to the coordinator, but failed the quality control and was therefore subject to significant rework, including hours spent by the coordinator on improving deliverable rigour, quality and framework.

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Period	Beneficary	WP1 Person months		WP2 Person months		WP3 Person months		WP4 Person months		WP5 Person months		WP6 Person months		WP7 Person months		WP8 Person months		Total Period	Total YR1-3
		Period	YR1-3	Period	YR1-3	Period	YR1-3	Period	YR1-3	Period	YR1-3	Period	YR1-3	Period	YR1-3	Period	YR1-3		
Period 1	UH	6	10	12	34	17	36.5	0.2	3	6	15	1	15	1	6.5	5	15	**48.2**	**135**
	HZ	12.84	11	0.05	3	0	0	0	4	0	0	0	18	0	5	0.07	2	**12.96**	**43**
	FRAUNHOFER	0	1	0	0	0	4	9	12	14.13	45	0	0	0	2	0.6	2	**23.73**	**66**
	UVA	0.9	2	0	0	0	2	12.31	39	0.514	2	8	33	0.214	2	0.878	2	**22.816**	**82**
	UNISI	2.9	4	10.15	51	3	4	0	0	0	0	0	0	0.7	2	0.5	2	**17.25**	**63**
	MADOPA	7.3	10	0	0	0	0	0	0	0	0	7.7	27	0.5	8	0.5	2	**16**	**47**
	UB	0.2	1	0	0	0	0	0	0	0	0	1.51	10	0.16	0.5	0.17	0.5	**2.04**	**12**
	Total	30.14	39	22.2	88	20	46.5	21.51	58	20.644	62	18.21	103	2.574	26	7.718	25.5	143	448
Period 2	UH	6.34	10	12	34	26	36.5	2.3	3	12	15	4	15	4	6.5	7.2	15	**73.84**	**135**
	HZ	2.1	11	1	3	0	0	2	4	0	0	9.33	18	1	5	0.42	2	**15.85**	**43**
	FRAUNHOFER	0.5	1	0	0	0	4	8	12	43.3	45	0	0	0	2	0.41	2	**52.21**	**66**
	UVA	0.71	2	0	0	0	0	13.2	37	1.31	2	1	11	0.12	1	1.12	2	**17.46**	**55**
	UNISI	1.03	4	22.85	51	0	4	0	0	0	0	0	0	0.5	2	0.53	2	**24.91**	**63**
	MADOPA	3	10	0	0	0	0	0	0	0	0	11.3	27	2.75	8	0.85	2	**17.90**	**47**
	UB	0.38	0.7	0	0	0	0	0	0	0	0	1.74	7	0.04	0.35	0.04	0.35	**2.2**	**8.4**
	UT	0	0	0	0	0	2	0.3	2	0	0	10.8	22	0	1	0	0	**11.1**	**27**
	UW	0	0.3	0	0	0	0	0	0	0	0	1.75	3	0	0.15	0	0.15	**1.75**	**3.6**
	Total	14.06	39	35.85	88	26	46.5	25.8	58	56.61	62	39.92	103	8.41	26	10.57	25.5	217.22	448
Period 3	UH	5	10	10	34	18	36.5	1.5	3	12	15	12	15	6.82	6.5	6.5	15	**71.82**	**135**
	HZ	0.9	11	0.4	3	0	0	1.78	4	0	0	10.92	18	5.97	5	1.53	2	**21.5**	**43**
	FRAUNHOFER	0.5	1	0	0	4	4	3	12	24.62	45	0	0	2	2	2.23	2	**36.35**	**66**
	UVA	0.39	2	0	0	0	0	11.53	37	1.414	2	2	11	0.666	1	0.67	2	**16.67**	**55**
	UNISI	2.2	4	34.3	51	1	4	0	0	0.5	0	2.1	0	3.4	2	1	2	**44.5**	**63**
	MADOPA	3	10	0	0	0	0	0	0	0	0	13.5	27	5.25	8	0.65	2	**22.40**	**47**
	UB	0	0.7	0	0	0	0	0	0	0	0	7.41	7	0	0.35	0	0.35	**7.41**	**8.4**
	UT	0	0	0	0	0.11	2	0.64	2	0	0	14.65	22	0	1	0	0	**15.4**	**27**
	UW	0.3	0.3	0	0	0	0	0	0	0	0	2.99	3	0.15	0.15	0.15	0.15	**3.59**	**3.6**
	Total	12.29	39	44.7	88	23.11	46.5	18.45	58	38.534	62	65.57	103	24.256	26	12.73	25.5	239.64	448
Total Period 1+2+3		**56.49**	**39**	**102.75**	**88**	**69.11**	**46.5**	**65.76**	**58**	**115.788**	**62**	**123.7**	**103**	**35.24**	**26**	**31.018**	**25.5**	**599.856**	**448**

Table 12. Project effort over the three years of its duration

	Project Duration		
Work package	Actual	Contract	Over (-)/ Under(+)
WP1	56.49	39	-17.49
WP2	102.75	88	-14.75
WP3	69.11	46.5	-22.61
WP4	65.76	58	-7.76
WP5	115.79	62	-53.79
WP6	123.70	103	-20.70
WP7	35.24	26	-9.24
WP8	31.02	25.5	-5.52
Total	**599.86**	**448.00**	-151.86

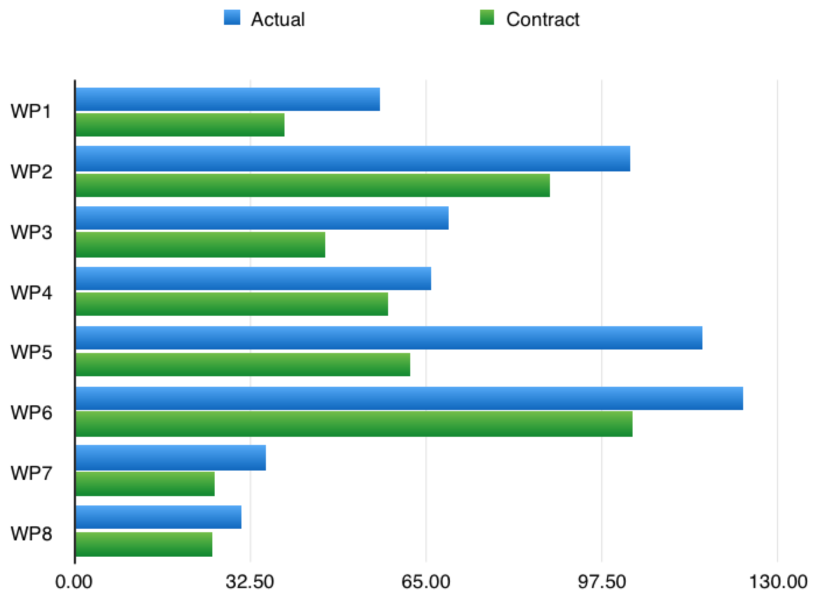

Table 13. Project effort by work package

	Period 1	Period 2	Period 3	Total
WP1	30.14	14.06	12.29	**56.49**
WP2	22.20	35.85	44.70	**102.75**
WP3	20.00	26.00	23.11	**69.11**
WP4	21.51	25.80	18.45	**65.76**
WP5	20.64	56.61	38.53	**115.79**
WP6	18.21	39.92	65.57	**123.70**
WP7	2.57	8.41	24.26	**35.24**
WP8	7.72	10.57	12.73	**31.02**
Total	**143.00**	**217.22**	**239.64**	**599.86**

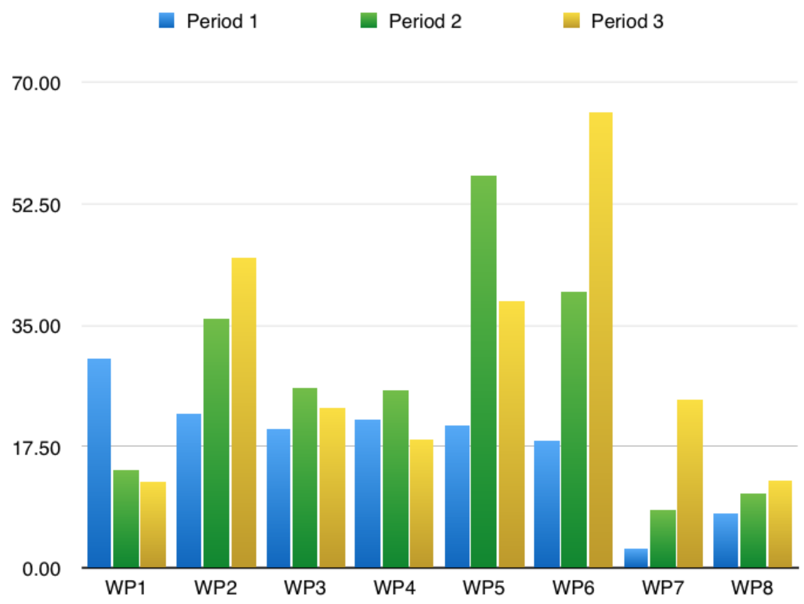

Table 14. Project effort over the three periods and work packages

	Project Duration		Effort to date
Beneficiary	**Actual**	**Contract**	**Over (-)/ Under(+)**
UH	193.86	135.00	-58.86
HZ	50.31	43.00	-7.31
FRAUNHOFER	112.29	66.00	-46.29
UVA	56.95	55.00	-1.95
UNISI	86.66	63.00	-23.66
MADOPA	56.30	47.00	-9.30
UB	11.65	8.40	-3.25
UT	26.50	27.00	0.50
UW	5.34	3.60	-1.74
Total	**599.86**	**448.00**	**-151.86**

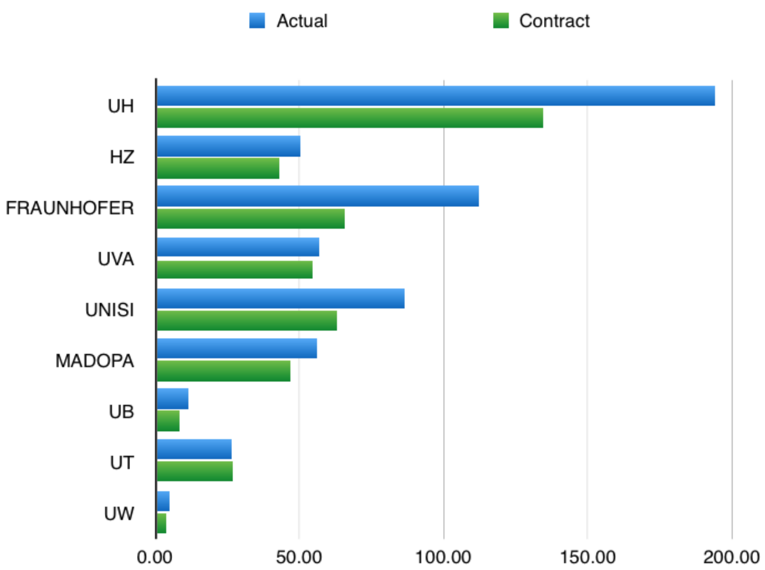

Table 14. Effort by partners versus the contracted effort

Justification for deviations in effort

Explanation of deviation in effort for UH

Additional effort has been attributed to the following work packages:

WP1: User requirement analysis & scenario definition-UH had continued involvement in WP1, as in year 1 and 2 (more PMs were needed for the recruitment of the three user groups which was very difficult for UH in year 2 (as existing contacts dropped out etc.)

WP3: Self-learning & adaptive interaction- more PMs were needed due to the challenges developing a learning and teaching architecture for the care-o-bot3

WP5: Integration & showcase- more PMs were needed since UH had to prepare the robot for summative studies at UH and deal with multiple system repairs, including a broken arm after shipment.

WP7: Exploitation and Dissemination- more effort in year 3, writing up of final results and journal papers to be submitted, plus additional help given towards D7.3, D7.4.

WP8: Project Management required slightly more effort to deal with issues across the consortium over the 3 periods, including unexpected partner additions.

Explanation of deviation in effort for HZ

The following work packages had required additional effort:

WP1: had minor overspending as work on focus groups and reporting required continued attention

WP6: had substantial overspending due to work on the multi-faceted evaluation, but more importantly the ethical evaluation required more work

WP7: had overspending this period, overall more effort was put in dissemination, presentations and public lectures

WP8: had minor overspending compensating for the temporary absence of the local coordinator, overall in line with budget

Explanation of deviation in effort for IPA

WP3: The ostensible overspent at WP3 originates solely from the finalization of this task which has received less attention within the previous project years. The cumulative numbers match perfectly over the three years.

WP5: For tasks T5.3, T5.4, and T5.5 we employed several students, as this task includes a lot of laborious engineering and integration work, e.g. the development of scenario implementations, extensive testing, and the 6 months of full time on-site support with the year 2 user tests at Troyes. Students always have an introductory period with a learning curve, which effectively reduces their actual work equivalent in terms of PMs. The budget is therefore not overspent in the extent of the person months. Altogether 17.9 PM of the additional 36.4 PM in year three were conducted by IPA research staff, 18.5 PM were conducted by students.

Explanation of deviation in effort for UVA

The third year of the project more work was carried out then initially planned in WP4, WP5 and WP6

WP4: took more work than planned because the creation of the data set took longer than expected

WP5: took more time because of the extra integration activities

WP6: took more time because of UvA involvement in the MADoPA experiments

Explanation of deviation in effort for UNISI

WP1: UNISI developed a new Squeeze Me device for HZ University to perform user tests. The device has been installed at HZ premises and UNISI provided remote assistance to ensure the full functioning with the simulation platform.

In addition, UNISI supported the evaluation in HZ providing the Evaluation Protocol.

WP2: the work carried out in WP2 required more effort than planned since the following additional activities have been performed:

- prototyping and development of two Squeeze Me devices fully integrated in the simulation platform and in the Care-O-bot platform.

- three full cycles of design, user evaluation and redesign cycles of the Squeeze Me performed in Siena. These cycles implied also the experimentation of new material and electronics.

- Redesign of the GUI according to an user evaluation cycle performed in Siena.

- Design of three scenarios of perceptional crossing that were implemented in a prototyping platform using Magabot and in the Care-O-bot platform.

WP5: UNISI did not have effort in WP5, however the following activities were performed: a) remote and on-site support to the integration of the GUI, perceptual crossing behaviour and the Squeeze Me in the Care-O-bot platform; b) development of the Karaoke App to implement the Y3 scenario.

WP6: UNISI did not have effort in WP6, however the team contributed to the definition of the Evaluation Protocol for the user test in MADoPA.

WP7: UNISI spent a considerable effort in dissemination in year 3, publishing 1 book, 3 conference papers, submitting 2 journal papers. Moreover UNISI participated to the Maker Faire, 3 invited talks, 4 engagement events, 1 online interview.

Explanation of deviation in effort for MADoPA

WP1: The 5th series of focus group organised from November 2013 to January 2014 in WP1 led to an increase in person months worked.

WP6: 6 months student placement in WP6 to support the summative evaluation led to an increase in person months planned and worked.

WP7: Quality control and assurance returned the economic model for substantial improvements. Additional work for the economic model led to an increase in person months worked.

Explanation of deviation in effort for UB:

WP6: UoB employed Simon Jenkins as an RF for 2 months given the extent of the data collected for D6.4 and to maximise the potential for publications/dissemination. There was therefore a slight increase in person months worked.

Explanation of effort for UT:

UT stayed close to the planned and contracted effort by the end of the three years.

Explanation of deviation in effort for UW:

WP6: The time required for going through the empirical data for the last two WP6 deliverables significantly increased the time spent by Prof. Sorell who was working alone at UW.

Project expenditure and distribution of project funds

The project expenditure versus the contracted EC contributions is given in table 15.

Partner	Name	Requested EU Contribution	Year 1	Year 2	Year 3	Spend to Date	Budget Remaining	Year 1	Year 2	Year 3
		€	€	€	€	€	€	% Spent	% Spent	% Spent
1	UH	1,236,756.00	273,246.00	461,118.00	513,368.00	1,247,732.00	-10,976.00	22.09	37.28	41.51
2	HZ	339,331.00	79,933.00	115,792.00	165,714.00	361,439.00	-22,108.00	23.56	34.12	48.84
3	FRAUNHOFER	612,299.00	156,134.00	240,948.00	220,420.00	617,502.00	-5,203.00	25.50	39.35	36.00
4	UVA	360,860.00	136,622.00	111,224.00	111,757.00	359,603.00	1,257.00	37.86	30.82	30.97
5	UNISI	332,313.00	73,859.00	98,748.00	201,747.00	374,354.00	-42,041.00	22.23	29.72	60.71
6	MADOPA	343,880.00	115,131.00	120,605.00	134,938.00	370,674.00	-26,794.00	33.48	35.07	39.24
7	UB	121,918.00	29,648.00	22,890.00	74,244.00	126,782.00	-4,864.00	24.32	18.77	60.90
8	UT	229,477.00	-	86,501.00	117,978.00	204,479.00	24,998.00		37.69	51.41
9	UW	77,096.00	-	25,302.00	60,670.00	85,972.00	-8,876.00		32.82	78.69
Total ACCOMPANY Budget		3,653,930.00	864,573.00	1,283,128.00	1,600,836.00	3,748,537.00	-94,607.00			

Table 15. Project spending versus requested EC contributions

The table highlights that overall, the project has an overspend of €94,607. Partners are aware that no additional funds from the Commission will be available towards this overspend and each partner will absorb their own shortcomings. These are further illustrated by Figure 28 and Figure 29.

Table 16 highlights the project-transferred funds and the 15% residual held, versus partner spending.

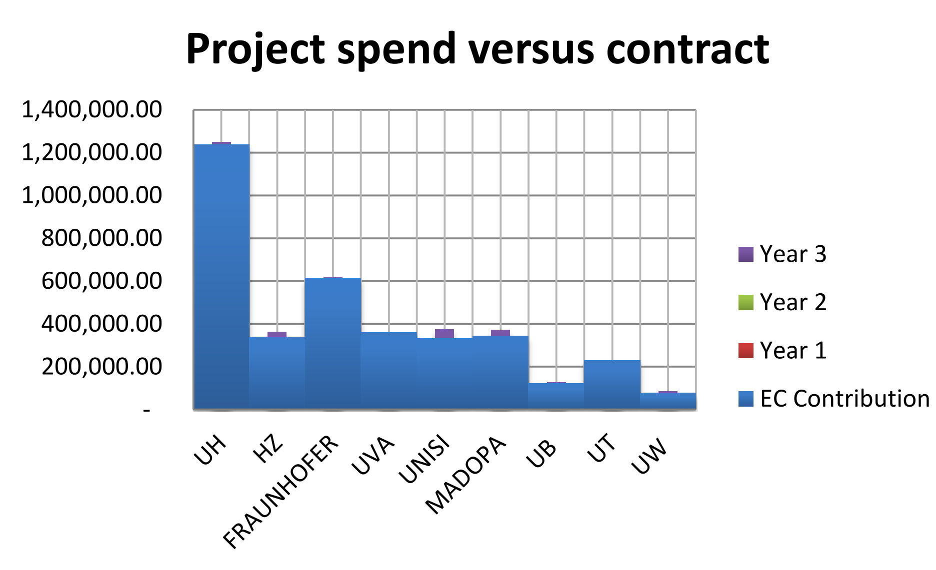

Figure 28. This figure presents the partner spending over project years versus the requested sum from the EC.

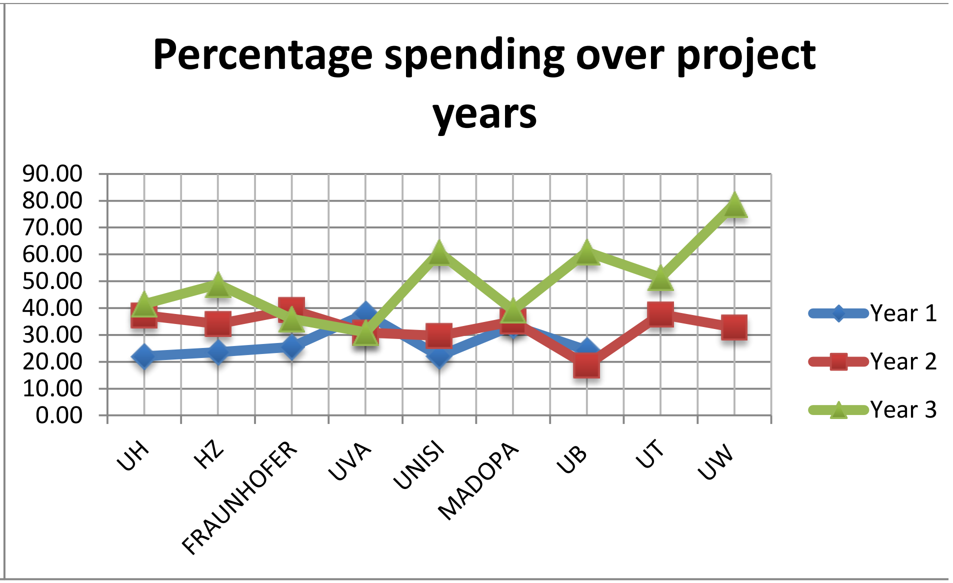

Figure 29. Percentage spending for each partner versus their requested EC sum is presented

Partner	Name	Transferred Funds to Date	Actual Spend to Date	Residual 15%	Partner over/under spending
1	UH	€ 1,051,242.60	€ 1,247,732.00	€ 185,513.40	-€ 10,976.00
2	HZ	€ 288,431.35	€ 361,439.00	€ 50,899.65	-€ 22,108.00
3	FRAUNHOFER	€ 520,454.15	€ 617,502.00	€ 91,844.85	-€ 5,203.00
4	UVA	€ 306,731.00	€ 359,603.00	€ 54,129.00	€ 1,257.00
5	UNISI	€ 282,466.05	€ 374,354.00	€ 49,846.95	-€ 42,041.00
6	MADOPA	€ 292,298.00	€ 370,674.00	€ 51,582.00	-€ 26,794.00
7	UB	€ 104,230.30	€ 126,782.00	€ 13,687.70	-€ 8,864.00
8	UT	€ 195,055.45	€ 204,479.00	€ 34,421.55	€ 24,998.00
9	UW	€ 64,931.60	€ 85,972.00	€ 16,164.40	-€ 4,876.00
Total ACCOMPANY Budget		**€ 3,105,840.49**	**€ 3,748,537.00**	**€ 548,089.51**	**-€ 94,607.00**

Table 16. Project spending versus transferred funds to date and residual spending

List of completed project deliverables

	Deliverables Period 3									
Del. no.	Deliverable name	Version	WP no.	Lead beneficiary	Nature	Dissemination level7	Delivery date from Annex I (proj month)	Actual / Forecast delivery date Dd/mm/yyyy	Status No submitted/ Submitted	Comments
D1.5	Final report on scenarios and system functionality of the ACCOMPANY system	Final	1	HZ	R	PU	M36	17/10/14	Submitted	
D2.3	Conceptual framework for social and emphatic	Final	2	UNISI	P	PU	M36	10/10/14	Submitted	

[7] **PU** = Public

PP = Restricted to other programme participants (including the Commission Services).

RE = Restricted to a group specified by the consortium (including the Commission Services).

CO = Confidential, only for members of the consortium (including the Commission Services).

Make sure that you are using the correct following label when your project has classified deliverables.

EU restricted = Classified with the mention of the classification level restricted "EU Restricted"

EU confidential = Classified with the mention of the classification level confidential " EU Confidential "

EU secret = Classified with the mention of the classification level secret "EU Secret "

	behaviour for robot companion									
D3.4	Final evaluation of ACCOMPANY computational memory architecture	Final	3	UH	R	PU	M36	30/09/2014	Submitted	
D4.5	Evaluation of the activity recognition system	Final	4	UvA	R	PU	M30	28/09/14	Submitted	
D5.4	Documentation for the integration phase 3	Final	5	Fraunhofer	P	CO	M30	01/05/14	Submitted	
D5.5	Report on showcase activities	Final	5	Fraunhofer	R	PU	M36	10/11/14	Submitted	
D6.3	Acceptability of a home companion robot	Final	6	UT	R	PU	M24	28/08/2014	Re-submitted	
D6.4	Report on data analysis aspect of ethics evaluation	Final	6	UB	R	PU	M33	15/05/2014	Submitted	
D6.5	User acceptance over time	Final 1.0	6	6	R	PU	M33	31/08/2014	Submitted	
D6.6	A tentative proposal for an ethical framework	Final	6	UB	R	PU	M36	19/09/2014	Submitted	
D6.7	Usage Evaluation Report	Final	6	MADoPA	R	CO	n/a	18/08/14	Submitted	
D7.2	Dissemination report	Final	7	UH	R	PU	M36	18/11/14	Submitted	
D7.3	Economic model for home companion robot for independent elderly	Final	7	MADoPA	R	PU	M30	18/08/14	Submitted	
D7.4	Technology exploitation plan	Final	7	Fraunhofer	R	CO	M36	20/10/14	Submitted	
D8.1	Periodic technical, management and cost reports	Final	8	UH	R	PU	M38	24/11/14	Submitted	

	Deliverables Period 2									
Del. no.	Deliverable name	Version	WP no.	Lead beneficiary	Nature	Dissemination level8	Delivery date from Annex I (proj month)	Actual / Forecast delivery date Dd/mm/yyyy	Status No submitted/ Submitted	Comments
D1.4	Phase two scenarios	Final	1	2	R	PU	M24	Oct 1 2013	Submitted	
D2.2	Low-fidelity prototypes and mock-ups for perceptual crossing	Final	2	5	P	PU	M24	Oct 14 2013	Submitted	
D3.3	First Design and technical Implementation of Computational Memory Architecture	Final	3	1	R	PU	M24	Oct 3, 2013	Submitted	
D4.4	Data fusion and activity recognition in household chores	Final	4	4	R	PP	M24	Sept30, 2013	Submitted	
D5.3	Documentation of integration phase 2	Final	5	3	P	CO	M24	Oct 31 2013	Prototype delivered, Report submitted	
D 6.1	Robot roles, personality and interaction behaviors	Final	6	6	R	PU	M12	Nov 6 2013	Submitted	
D 6.3	Acceptability of a home companion robot	Draft	6	6	R	PU	M24	Nov 15 13	Submitted in draft	

D7.2	Dissemination report	Final	7	1	R	PU	M24	Nov 30 13	Submitted	
D8.2	Periodic Report	Final	8	1	R	PU	M24	Nov 30 13	Submitted	

	Deliverables Period 1									
Del. no.	Deliverable name	Version	WP no.	Lead beneficiary	Nature	Dissemination level9	Delivery date from Annex I (proj month)	Actual / Forecast delivery date Dd/mm/ yyyy	Status No submitted/ Submitted	Comments
D7.1	Web-site set-up	1.2	7	UH	R	PU	3	13 March 2012	Submitted	
D1.1	Status of elderly care in Europe and the potential for service robotics	1.3	1	HZ	R	PU	4	23 March 2012	Submitted	
D1.2	Report on user and system requirements and first outline of system functionality	1.2	1	HZ	R	PU	6	31 March 2012	Submitted	
D3.1	Report on memory model requirements and specification		3	UH	R	CO	6	31 March 2012	Submitted	
D4.1	Relevant literature and contextual analysis as well as		4	UvA	R	CO	6	29 March 2012	Submitted	

9

	initial test bed									
D5.1	Specification of the adaptation requirements for the existing integration framework		5	FHG	R	CO	6	13 April 2012	Submitted	
D1.3	Phase one scenarios and report on system functionality		1	HZ	R	PU	12	30 Sep 2012	Submitted	
D2.1	Graphical user interface prototype: design, development	Final version	2	UNISI	P	CO	12	31 Aug 2012	Submitted	
D2.4a	Implementation and integration of context-aware planner	.6	2	UH	P	PU	12	31 Oct 2012	Submitted	
D3.2	Initial design and implementation of the memory visualisation and narrative generation	.2	3	UH	R	PU	12	31 Oct 2012	Submitted	
D4.2	Data fusion for robust detection and identification objects and users		4	UvA	R	PU	12	10 Sep 2012	Submitted	
D4.3	Data fusion and activity recognition in household chores-preliminary report		4	UvA	R	PP	12	31 Oct 2012	Submitted	
D5.2	Documentation for the integration phase 1		5	FHG	P	CO	12	31 Oct 2012	Submitted draft	
D6.1	Robot Roles Personality and	1.0	6	MADoPA	R	RE (PU)	12	30 Oct 2012	Submitted	This deliverable has been submitted. However, because

	interaction behaviours									the PhD student started 6 months later than planned due to problems in the hiring process. The deliverable does not include multiple iterations of studies into personality and roles for the robot. This is carried over to continue research into robot roles and personalities in the next task of 6.2 long-term research.
D6.2	Identification and discussion of relevant ethical norms for the development and use of robots	1.0	6	MADoPA	R	PU	12	12	Submitted	
D7.2(a)	Dissemination report	1.2	7	UH	R	PU	12		Submitted	
D8.1 (a)	Periodic report	1.2	8	UH	R	PU	12		Submitted	

List of completed project milestones

Milestones Table

Milestone no.	Milestone name	Work package no	Lead beneficiary	Delivery date from Annex I dd/mm/yyyy	Achieved Yes/No	Actual / Forecast achievement date dd/mm/yyyy	Comments
MS1	User and Technical Requirement analysis	WP1, WP2, WP3, WP4, WP5	HZ	31/03/2012	YES	31/07/2012	The final decision on hardware requirements was delayed by the late specification of user requirements
MS2	Phase 1 tasks completed	WP3, WP4, WP5, WP6, WP7	Fraunhofer	30/09/2012	YES	31/01/2013	MS2 was delayed due to delayed specification of the scenarios
MS3	Phase 2 tasks completed	WP3, WP4, WP5, WP6, WP7	Fraunhofer	30/09/2012	YES	30/09/2013	N/A
MS4	Phase 3 tasks completed	WP3, WP4, WP5	Fraunhofer	31/03/2014	Yes	31/03/2014	N/A
MS5	Evaluation of the project scenarios	WP3, WP5, WP6, WP7	MADoPA	30/09/2014	Yes	30/09/2014	N/A

Section A

A1: List of Scientific (peer-reviewed) publications

TEMPLATE A1: LIST OF SCIENTIFIC (PEER REVIEWED) PUBLICATIONS, YR1-YR3 JOURNAL PUBLICATIONS ARE HIGHLIGHTED IN RED										
UH	Title	Main author	Title of the periodical or the series	Number, date or frequency	Publisher	Place of publication	Year of publication	Relevant pages	Permanent identifiers[10] (if available)	Is/Will open access[11] provided to this publication?
1	*A User Friendly Robot Architecture for Re-ablement and Co-learning in A Sensorised Home*	Joe Saunders	*Assistive Technology Research Series*	*Volume 33: Assistive Technology: From Research to Practice*	*AAATE (Assoc. Advancement Assisted Tech. Europe)*		*2013*	*49-58*	DOI:*10.3233/978-1-61499-304-9-49*	Yes
2	*Temporal Issues In Teaching Robot Behaviours in a Knowledge-Based Sensorised Home*	Joe Saunders	*Proceedings of the 2nd International Workshop on Adaptive Robotic Ecologies*		*Fourth International Joint Conference on Ambient*	*Dublin, Ireland.*	*2013*		DOI:10.1007/978-3-319-04406-4_11	Yes

[10] A permanent identifier should be a persistent link to the published version full text if open access or abstract if article is pay per view) or to the final manuscript accepted for publication (link to article in repository).

[11] Open Access is defined as free of charge access for anyone via Internet. Please answer "yes" if the open access to the publication is already established and also if the embargo period for open access is not yet over but you intend to establish open access afterwards.

					Intelligence					
3	*Hey! There is someone at your door. A hearing robot using visual communication signals of hearing dogs to communicate intent*	Kheng Lee Koay	*IEEE Symposium on Artificial Life*		*IEEE*		*2013*	*90-97*	DOI:*10.1109/ALIFE.2013.6602436*	Yes
4	*Episodic memory visualization in robot companions providing a memory prosthesis for elderly*	W.C.Ho	*Assistive Technology Research Series*	*Volume 33: Assistive Technology: From Research to Practice*	*AAATE (Assoc. Advancement Assisted Tech. Europe)*		*2013*	*120-125*	DOI:10.3233/978-1-61499-304-9-120	Yes
5	*What can a robot do for you? Evaluating the needs of the elderly in the UK*	Hagen Lehmann	*Proc. of the Sixth International Conference on Advances in Computer-Human Interactions*		*IARIA*		*2013*		ISBN: 978-1-61208-250-9	Yes
6	*Resource-Efficient Methods for Feasibility Studies of Scenarios for Long-Term HRI Studies*	Nate Derbinsky	*Proc. of the Sixth International Conference on Advances in Computer-Human Interactions*		*IARIA*		*2013*	95-100	ISBN: 978-1-61208-250-9	Yes
6	*Knowledge-driven User Activity Recognition for a Smart House.*	Ismael Duque	*Proc. of the Sixth International Conference on Advances in Computer-Human*		*IARIA*		*2013*	141-146	ISBN: 978-1-61208-250-9	Yes

	Development and Validation of a Generic and Low-Cost, Resource-Efficient System		*Interactions*							
7	*Companion Robots for Elderly People: Using Theatre to Investigate Potential Users' Views*	Michael L. Walters	*Proc. Symposium on Robot and Human Interactive Communication*		*IEEE*		*2013*	691 - 696	DOI:10.1109/ROMAN.2013.6628393	Yes
8	*Exploring Robot Etiquette: Refining a HRI home companion scenario based on feedback from two artists who lived with robots in the UH Robot house*	Kheng Lee Koay	*Proc. International Conference on Social Robotics*		*Springer*		*2013*	290-300	DOI:10.1007/978-3-319-02675-6_29	Yes
9	*Accompany: Acceptable robotiCs COMPanions for AgeiNg Years – Multidimensional Aspects of Human-System Interactions"*	Farshid Amirabdollahian	*Proceedings the IEEE 6th International Conference on Human System Interaction 2013*	*2013*	*IEEE Explore Digital Library*	*Sopot (conference Location)*	*2013*	*pp. 570 – 577*	ISBN: 978-1-4673-5635-0	No
10	*Sharing Spaces, Sharing Lives – The Impact of Robot Mobility on User Perception of a Home Companion Robot*	Dag Sverre Syrdal	*Proc. International Conference on Social Robotics*		*Springer*		*2013*	321-330	DOI:10.1007/978-3-319-02675-6_32	Yes

11	*Artists as HRI Pioneers: A Creative Approach to Developing Novel Interactions for Living with Robot*	Hagen Lehmann	*Proc. International Conference on Social Robotics*		*Springer*		*2013*	402-411	10.1007/978-3-319-02675-6_40	Yes
12	*Assistive technology design and development for acceptable robotics companions for ageing years*	Farshid Amirabdollahian	*Paladyn Journal*	*Volume 4, Issue 2 (Dec 2013)*	*Paladyn, Journal of Behavioral Robotics*		*2013*	*pp. 94–112*	ISSN (Print) 2081-4836, DOI: 10.2478/pjbr-2013-0007,	Yes
13	*A Template Based User-Teaching System for an Assistive Robot*	Joe Saunders	*Proc. of Symposium on New Frontiers in HRI*		*SSAISB*		*2014*		http://doc.gold.ac.uk/aisb50/AISB50-S19/AISB50-S19-Saunders-paper.pdf	Yes
14	*"The fridge door is open"-Temporal Verification of a Robotic Assistant's Behaviours*	Clare Dixon	*Proceedings of IEEE-TAROS*		*IEEE*		*2014*		DOI:10.1007/978-3-319-10401-0_9	Yes
15	*Views from within a narrative: Evaluating long-term human-robot interaction in a naturalistic environment using open-ended scenarios*	Dag Sverre Syrdal	*Cognitive Computation*		*IEEE*		*2014 (In press)*		DOI:10.1007/s12559-014-9284-x	Yes
16	*Long-term Human-Robot Interaction using Task– and*	Dag Sverre Syrdal	*The Information Society*		*Taylor & Francis*		*In press*			*Yes*

	Scenario–based Prototyping									
17	*Development of the Sociability of Non-Anthropomorphic Robot Home Companions*	Joan Saez-Pons	*4th IEEE International Conference on Development and Learning and on Epigenetic Robotics(ICDL-EpiRob 2014)*		*IEEE*		*2014*		Not yet available	
UB/UW										
18	*Ethical Dimensions of Human-Robot Interactions in the Care of Older People: Insights from 21 Focus Groups Convened in UK, France and the Netherlands*	Heather Draper	*ICSR. LNCS (LNAI)*	*vol. 8755*	*Springer,*	*Heidelberg*	*2014*	pp. 138–147	Not yet available	Yes
19	*Robot carers, ethics and older people.*	Tom Sorell and Heather Draper	*Ethics and Information Technology*	*2014; 16: 183-195*	*Springer*	*Heidelberg*	*2014*	pp. 183-195	DOI:http://link.springer.com/article/10.1007/s10676-014-9344-7	Yes
20	*Using robots to modify the demanding or impolite behavior of older people.*	Heather Draper and Tom Sorell	*ICSR. LNCS (LNAI)*	*vol. 8755*	*Springer*	*Heidelberg*	*2014*	pp. 126–135	Not yet available	Yes
22	*What asking potential users about ethical values adds to our understanding of an ethical framework for social robots for*	Heather Draper	*AISB50-S17*	*AISB*		*London*	*2014*	n/a	http://doc.gold.ac.uk/aisb50/AISB50-S17/AISB50-S17-Draper-Paper.pdf	Yes

	older people.									
23	*Robots and the division of healthcare responsibilities in the homes of older people.*	Simon Jenkins and Heather Draper	*ICSR. LNCS (LNAI)*	*vol. 8755*	*Springer*	*Heidelberg*	*2014*	pp. 177-186	Not yet available	Yes
UT										
24	*Improving psychological wellbeing with robots (In review)*	Jorge Gallego-Perez	*HRI2015*	*March 2-5, 2015*			*2015*			Yes
25	*Robots for the psychological wellbeing of the elderly*	Jorge Gallego-Perez	*HRI2014, Workshop - Socially Assistive Robots for the Aging Population: Are We Trapped in Stereotypes?*	*March 3, 2014*			*2014*		http://workshops.acin. tuwien.ac.at/HRI2014_Elderly/ FinalSubmissions/HRI_6.pdf	Yes
MADOPA										
26	*Development of a multidimensional evaluation method for the use of a robotic companion as a function of a care relationship*	David Hewson Herve Michel	*Conference 9th world conference of Gerontechnology*	*June 20 2014*		*Taiwan*	*2014*			
27	*Comparison of the results of 2 methods of assessment of the users needs implemented in France, the example of the Accompany system*	Herve Michel	*Conference Forum des Living Lab santé et autonomie*	June 5 2014		Paris,	*2014*			

FRAUNHOFER										
28	*Multi-user identification and efficient user approaching by fusing robot and ambient sensors*	Ninghang Hu and Richard Bormann	*IEEE International Conference on Robotics and Automation*		*IEEE*	Piscataway, NJ	*2014*	*pp. 5299 - 5306*	DOI: 10.1109/ICRA.2014.6907638	Yes
29	*Person recognition for service robotics applications*	Richard Bormann	*IEEE-RAS International Conference on Humanoid Robots*		*IEEE*	Piscataway, NJ	*2013*			Yes
30	*Efficient object categorization with the surface-approximation polynomials descriptor*	Richard Bormann	*Spatial Cognition VIII, Lecture Notes in Computer Science*	vol. 7463	*Springer*		*2012*	*pp. 34 - 53*	DOI: 10.1007/978-3-642-32732-2_3	No
31	*Adding Rotational Robustness to the Surface-Approximation Polynomials Descriptor*	Richard Bormann	*IEEE-RAS International Conference on Humanoid Robots*		*IEEE*	New York, NY	*2012*	*pp. 409 - 416*	DOI: 10.1109/HUMANOIDS.2012.6651552	Yes
32	*A toolchain for deploying component-based applications on complex service robots*	Ulrich Reiser	*ICRA 2013, 8th Workshop on Software Development and Integration in Robotics (SDIR-VIII)*				*2013*		http://robotics.unibg.it/tcsoft/sdir2013/slides/raiser.pdf	No
33	*Accompany: Acceptable robotiCs COMPanions for AgeiNG years - multidimensional aspects of human-system interactions*	Farshid Amirabdollahian	*International Conference on Human System Interactions*		*IEEE*	New York, NY	*2013*	*pp. 570 - 577*	DOI: 10.1109/HSI.2013.6577882	No

UVA										
34	*Learning to Recognize Human Activities from Soft Labeled Data*	Ninghang Hu, Zhongyu Lou, Gwenn Englebienne, Ben Kröse	Robotics: Science and Systems	July 2014	Robotics: Science and Systems Conference	UC Berk eley	2014			Yes
35	*A Two-layered Approach to Recognize High-level Human Activities*	Ninghang Hu, Gwenn Englebienne, Ben Kröse	IEEE International Symposium on Robot and Human Interactive Communication	Aug 2014	IEEE	Edinb urg	2014		DOI:10.1109/ROMAN.2014.6926260	Yes
36	*Learning Latent Structure for Activity Recognition*	Ninghang Hu, Gwenn Englebienne, Zhongyu Lou, Ben Kröse	IEEE International Conference on Robotics and Automation	June 2014	IEEE	Hong Kong	2014		DOI:10.1109/ICRA.2014.6906983	Yes
37	*Posture Recognition with a Top-view Camera*	Ninghang Hu, Gwenn Englebienne, Ben Kröse	IEEE International Conference on Intelligent Robots and Systems (IROS), 2013	November 2013	IEEE	Tokyo	2013		DOI:10.1109/IROS.2013.6696657	Yes
38	*Bayesian Fusion of Ceiling Mounted Camera and Laser Range Finder on a Mobile Robot for People Detection*	Ninghang Hu, Gwenn Englebienne, Ben Kröse	Lecture Notes in Computer Science, Human Behavior Understanding	July 2012	Springer	Portugal	2012		DOI:10.1007/978-3-642-34014-7_4	Yes

	and Localization									
UNISI										
39	*Exploring empathy in interaction: Scenarios of respectful robotics.*	Patrizia Marti	*GeroPsych: The Journal of Gerontopsychology and Geriatric Psychiatry*	*Vol 26(2), Jun 2013*	*GeroPsych: The Journal of Gerontopsychology and Geriatric Psychiatry*		*2013*	*pp. 101-112*	*DOI:http://dx.doi.org/10.1024/1662-9647/a000086*	No
40	*Robot e Società, Editoriale*	Patrizia Marti	*Rivista Italiana di Ergonomia*	*n. 9, 2014*	*Rivista Italiana di Ergonomia*		*2013*	*pp. 5-9*		No
41	*La relazione empatica con i robot*	Patrizia Marti	*Rivista Italiana di Ergonomia*	*n. 9, 2014*	*Rivista Italiana di Ergonomia*		*2013*	*pp. 65-75*		No
42	*Expressive touch and materials in continuous-sustained interaction design*	Patrizia Marti	*TOCHI*				*Submitted*			
43	*Sensible Interfacing: Action-Possibility Driven System Design*	Jelle Stienstra	*International Journal of Design*				*Submitted*			
Books										
44	*"The Subtle Body"*	Patrizia Marti	*Eindhoven University of Technology*		*Eindhoven University of Technology*		*In press Oct 2014*		ISBN: 978-90-386-3714-3.	
45	*Squeeze me: gently please*	Jelle Stienstra	*NordiCHI '12 Proceedings of the 7th Nordic Conference on Human-Computer Interaction:*	*2012*	*ACM Digital Library*	*New York, NY,*	*2012*	*Pages 746-750*	ISBN: 978-1-4503-1482-4 DOI: 10.1145/2399016.2	No

			Making Sense Through Design			*USA*			399131	
46	*Shaping Empathy Through Perspective Taking*	Patrizia Marti	*RO-MAN, 2013 IEEE*	*2013*	*IEEE Xplore Digital Library*	*Gyeongju (conference Location)*	*2013*	*pp. 751 – 756*	ISSN : 1944-9445 DOI: 10.1109/ROMAN.2013.6628403	No
47	*Dreamy eyes: exploring dynamic expression in human-system interaction*	Jelle Stienstra	*CHI EA '13 CHI '13 Extended Abstracts on Human Factors in Computing Systems*	*2013*	*ACM Digital Library*	*New York, NY, USA*	*2013*	*pp. 595-600*	ISBN: 978-1-4503-1952-2 DOI: 10.1145/2468356.2468461	No
48	*Engaging through her eyes : embodying the perspective of a robot companion*	Patrizia Marti	*Conference Paper : Proceedings of the 18th International Symposium on Artificial Life and Robotics (AROB 2013)*	*2013*	*http://www.tue.nl/en/publication/ep/p/d/ep-uid/280940/*		*2013*			
49	*Exploring Movement Qualities in a Reciprocal Engagement*	Patrizia Marti	*Proceedings of the fourth joint IEEE International Conference on Development and Learning and on Epigenetic Robotics, ICDL 2014, At Genova, Italy*	*2014*	*IEEE Explore Digital Library*	*Italy (conference Location)*	*2014*	*pp.117-122*		No
50	*Expression-rich communication through a squeezable device*	Patrizia Marti	*Proceedings of the IEEE International Conference on Biomedical Robotics and Biomechatronics, (Bio-Rob), Sao Paulo, Brazil, 2014 Aug 12-15*	*2014*	*IEEE Explore Digital Library*	*San Paulo (conference Location)*	*2014*	*pp. 536-541*	DOI:978-1-4799-3127-9/6/14	Yes
51	*Engaging Older*	Iacono Iolanda	*Proceedings of the 8th Nordic*	*2014*	*ACM Digital*	*New*	*2014*			

	People With Participatory Design		*Conference on Human-Computer Interaction (NordiCHI), 2014 Oct 26-30, Helsinki, Finland.*		*Library*	*York, NY, USA*				
HZ										
52	*Which activities threaten independent living of elderly when becoming problematic; Inspiration for meaningful service robot functionality*	Sandra Bedaf	Disability and Rehabilitation: Assistive Technology.	Nov. 2014, Vol. 9, No. 6			*2014* (Epub 2013 Oct 1.*)*	445-52	DOI:10.3109/17483107.2013.840861	Yes
53	*Overview and categorization of robots supporting independent living of elderly people: what activities do they support and how far have they developed*	Sandra Bedaf	Assistive Technology	Accepted					DOI:http://www.tandfonline.com/doi/abs/10.1080/10400435.2014.978916#.VG6Z0IusXos	
54	*What should a care robot be able to do? Evaluating problematic activities threatening the*	Sandra Bedaf	*ICORR 2013*	2013 Jun	IEEE Int Conf Rehabil Robot.	*Seattle USA*			DOI:10.1109/ICORR.2013.6650458.	Yes

	independence of elderly persons.									
55	*Differentiation in service robot goals based on user ability.*	Sandra Bedaf	*AAATE 3013*		*IOS press*		*2013*		DOI: 10.3233/978-1-61499-304-9-149	Yes
56	*Functionality of service robotics for Aging-in-Place: What to build?*	Sandra Bedaf	*Gerontechnology*	*11(2): 361*	*Gerontechnology (ISSN/EISSN 1569-1101 1569-111X) is the official journal of the International Society for Gerontechnology*		*2012*	*pp. 361-*	DOI:http://dx.doi.org/10.4017/gt.2012.11.02.555.00	Yes
57	*Nieuwe technologie in de ouderenzorg: hoe ouderen en onderzoekers samen producten ontwikkelen die aansluiten op de behoefte van de gebruikers.*	Joan Vermeulen	Tijdschr Gerontol Geriatr	43(4)			*2012*	213-215.		Yes

A2: List of project events and activities

Partner	Type of Activity	Main Leader	Title	Date From	Place	Type of Audience	Size of Audience	Countries Addressed
UH	demonstration	UH	Naidex South Exhibition - Independent living exhibition	20/10/2011	ExCel London Exhibition and Convention Centre, London	patients, health professionals and industry	2000+	UK
UH	presentation	UH	Kheng Lee Koay was invited to give lecture at the 2nd International Symposium on Biofied Buildings. Title of the presentation "Designing robot companions as home assistants"	23/02/2012	Keio University, Japan	Scientific Community and Industry	100	Japan
UH	presentation	UH	Kerstin Dautenhahn was invited as seminar speaker at University of Sheffield, title of the presentation "Interaction Studies with Robot Home Companions"	29/02/2012	Sheffield, UK	Scientific Community (higher education, Research)	35	UK
UNISI	Press/engagement events	UNISI	Interviews to Patrizia Marti on a web tv Oggi Scienza TV	22/03/2012	Online	Other	743 views	Online
UNISI	Press/engagement events	UNISI	Meeting at "Pio Albergo Trivulzio"	02/04/2012	Milano	Other	30	Italy
MADOPA	Seminar	MADOPA (H Michel)	Seminar on the evaluation protocols of homecare services using technological devices : participation of UH, UvA, University of Twente, Fraunhofer	04/04/2012	Paris, MGEN, Mutualité Générale Education Nationale	National and international health decision, policy makers and academic community	70	International

UW	Invited talk	UW	Telecare vs Robotics in Assistive Technology	01/05/2012	Centre for Cognitive Science, University of Sussex, UK	Scientific Community (higher education, Research)	10	UK
IPA	exhibition	FHG	AUTOMATICA Fair	22/05/2012	Munich, Germany	Industry	several hundred	international
UW	presentation	UW	Sussex Cognitive Science Dep.	01/06/2012	Brighton, UK	Scientific	10	UK
UvA	demostration: poster	UvA	symposium "Vision and Robotics" -ACCOMPANY project presentation	05/06/2012	Eindhoven	Professionals	100	Netherlands
MADOPA	Seminar	MADOPA (H Michel)	Seminar on the results of the evaluation of homecare services using technological devices.	19/06/2012	Paris,MACIF Mutualité	National and international health decision, policy makers and academic community	70	international
UB	Conference	UB	Feminist Approaches to Bioethics 9th Ccongress	25/06/2012	Rotterdam, the Netherlands	Scientific Community (higher education, Research)	15-20	International
UB	Conference	UB	International association of Bioethics 11th Congress	28/06/2012	Rotterdam, Netherlands	Scientific Community (higher education, Research)	20	International,
UH	presentation	UH	Farshid Amirabdollahian was invitd to talk at Hamlyn Symposium, (www.hamlyn-robotics.org), to around 15 participants.	30/06/2012	Hamlyn Symposium, UK	General Public	15	UK

UvA	Conference	UvA	Human Behavior Understanding (HBU '12)	01/07/2012	Algarve, Portugal	Scientific Community	500-1000	Portugal
MADOPA	Conference	MADOPA (C Gutierrez Ruiz)	Université d'été de la performance en santé« Comment faire le lien ? L'intégration du réseau relationnel des personnes âgées dans un protocole d'évaluation : l'expérience ACCOMPANY »	30/08/2012	Nantes, France	Scientific Community (higher education, Research)	100	France
HZ	Conference	HZ	Robotmatch event	11/09/2012	Utrecht	Professionals and public	50	Netherlands
IPA	Conference	FHG	Spatial Cognition VIII, Lecture Notes in Computer Science	02/09/2012	Seebruck, Germany	Scientific Community	40	international
UH	presentation	UH	Kerstin Dautenhahn was invited as seminar speaker at University of Plymouth, title of the presentation "Social Robots as Assistive Tools"	14/09/2012	Plymouth, UK	Scientific Community (higher education, Research)	20	UK
HZ	Conference	HZ	AAL Forum 2012	25/09/2012	Eindhoven	Scientific	35	International
UNISI	Press/engagement events	UNISI	Researchers' Night 2012	28/09/2012	Siena	Other	100	Italy
UB/UW	Invited talk	UB/UW	Coglaboration & CogWatch	11/10/2012	Birmingham, UK	Scientific Community (higher education, Research)	12	UK
UH	Workshop	UH	Kerstin Dautenhahn invited speaker at the IROS 2012 workshop on "Cognitive neuroscience robotics", as part of IROS 2012. Title of presentation "Interaction with Robot Companions – Psychological and Neuro-Biological Factors".http://www.iros2012.org/site/	12/10/2012	Villamoura, Portugal	Scientific Community (higher education, Research)	40	Portugal/ international
UNISI	Conference	UNISI	NordiChi 2012-7th Nordic Conference on Human-Computer Interaction: Making Sense Through Design	15/10/2012	Copenhagen	Scientific Community	150-200	international

UH	presentation	UH	Farshid Amirabdollahian presented Accompany project at Ransacker's event. Audience size, around 15	18/10/2012	Europe House, London, UK	General Public	15	UK
UH	presentation	UH	Kheng Lee Koay was invited to give lecture at the IC Robotics Megabyte Talks	01/11/2012	Imperial College	Students	60+	UK
IPA	exhibition	FHG	VISION Fair	06/11/2012	Stuttgart, Germany	Industry	several hundred	international
UH	Other: Keynote/ presentation	UH	Kerstin Dautenhahn keynote speaker at the 5th York Doctoral Symposium on Computer Science, title of talk: Social Robots as Assistants. http://www.cs.york.ac.uk/yds/?page_id=49	08/11/2012	York, UK	Scientific Community (higher education, Research)	50	UK
UH	presentation	UH	Farshid Amirabdollahian was invited to University of Carlos III, Madrid where Accompany project was presented to about 13 participants during a research seminar on assistive and rehabiliatation robotics.	12/11/2012	Madrid	Scientific Community (higher education, Research)	13	Spain
UH	presentation	UH	Kerstin Dautenhahn invited speaker at the Liverpool Symposium on Legal, Ethical and Social Autonomous Systems- Forsight Centre, University of Liverpool. The title of presentation was "Problems with Social Robotics? Challenges!" http://cgi.csc.liv.ac.uk/~michael/ethical2012_web.html	14/11/2012	Liverpool, UK	Scientific Community (higher education, Research)	30	UK
UH	presentation	UH	Accompany project was presented to around 15 participants at University of Sheffield. Farshid Amirabdollahian used the opportunity to discuss ethics and Accompany objectives.	20/11/2012	Sheffield, UK	Scientific Community (higher education, Research)	15	UK

UH	presentation	UH	Farshid Amirabdollahian was invited to talk at University of Bedfordshire. The talk featured Accompany project and continued with discussions about SRS and Accompany project.	27/11/2012	Bedfordshire,UK	Scientific Community (higher education, Research)	12	UK
UH	demonstration	UH	Roboville Festival	01/12/2012	The Science Museum, London	General Public	2000	UK
IPA	Conference	FHG	IEEE-RAS International Conference on Humanoid Robots	01/12/2012	Osaka, Japan	Scientific Community	30	international
HZ	Conference	HZ	In voor zorg congres 3.0	26/12/2012	Eindhoven	Care professionals	35	NL
UNISI	Invited Talk	Patrizia Marti	From Perceptual interaction to extended cognition	21/01/2013	Compiegne, at the UTC	Scientific Community	50	international
UNISI	Conference	UNISI	18th International Symposium on Artificial Life and Robotics - AROB 2013	30/01/2013	Daejeon	Scientific Community	100	international
HZ	newspaper article	HZ	Dagblad de Limburger (regional newspaper)	04/02/2013		General public	newspaper	NL
UH	presentation	UH	Kerstin Dautenhahn speaker at Bentley Wood High School, part of the Speakers for Schools programme, title of talk "Robots Interacting with People".	11/02/2013	UK	Other: School	40	UK
UNISI	Press/engagement events	UNISI	Interviews to Patrizia Marti on a local news paper La NAZIONE	17/02/2013			160000	Italy
UH	Conference	UH	ACHI 2013 (Advances in Human Computer Interaction), 2 Papers	25/02/2013	Nice, France	Scientific Community (higher education, Research)	20	France
HZ	invited lecture	Gelderblom	Alliade Care Innovation event	21/03/2013	Leeuwarden	care professionals	45	NL

UW	presentation	UW	UK Robot Ethics Conference	25/03/2013	Sheffield, UK	Scientific	25	UK
UvA	Public lecture	UvA	'Robots & hersenen: wie is slimmer?' lecture about the relations between AI and Neursciences. http://www.spui25.nl/programma/item/04.04.13---robots--hersenen-wie-is-slimmer.html	04/04/2013	Amsterdam	General Public	100	Netherlands
UH	Other: Plenary: BILETA2013, Autonomous Systems	UH	What regulatory and governance frameworks do we need to balance innovation and human values in the age of autonomous systems?	10/04/2013	Liverpool, UK	Legal community	60	UK
UH	Conference	UH	IEEE Symposium on Artificial Life, 2013	16/04/2013	Singapore	Scientific Community (higher education, Research)	20	Singapore(but made up of academics from a variety of countries)
UNISI	Conference	UNISI	CHI 2013 Conference on Human Factors in Computing Systems	27/04/2013	Paris	Scientific Community	3442	international
UH	exhibition	UH	My New Robot Companion (artist event)	01/05/2013	Hatfield ,UK	Civil Society, Scientific Community (higher education, Research)	40	UK
UB	Workshop/poster	UB	University of Birmingham, College of Medical and Dental Sciences	02/05/2013	Birmingham, UK	Scientific Community (higher education, Research)	40	UK

UH	presentation	UH	Kerstin Dautenhahn invited speaker at Technical University of Chemnitz, talk entitled "Challenges in Human-Robot Interaction", followed by a workshop/discussion round with PhD students of the CrossWorlds - DFG-Graduiertenkolleg at TU Chemnitz	03/05/2013	Germany	Scientific Community (higher education, Research)	40	Germany
IPA	Conference	FHG	ICRA 2013, 8th Workshop on Software Development and Integration in Robotics (SDIR-VIII)	06/05/2013	Karlsruhe, Germany	Scientific Community	30	international
IPA	presentation	FHG	ROSCon 2013-"Hi Richard – Personalize your Robot with the cob_people_perception Stack"	12/05/2013	Stuttgart, Germany	Scientific Community, Industry	30	international
UH	Other: Open House Public engagement event	UH	Open house as part of the Artist's Residential event at the robot house.	17/05/2013	UH Robot House, Hatfield, UK	Creative	50	UK
UvA	Presentation	UvA	EMGO+ Annual Meeting 2013, RAI Amsterdam-The digital life & ambient robotics: How can IT and robotics be used in our daily lives?-	28/05/2013	Amsterdam	Scientific community	100	Netherlands
UH	presentation	UH	Kerstin Dautenhahn lecturer at Summer School on Social Signal Processing, on behalf of SSPNet, the European Network of Excellence on SSP. http://www.dcs.gla.ac.uk/~vincia/sspschool/index.html	03/06/2013	Vietri Sul, Mare, Italy	Scientific Community (higher education, Research)	40	Italy
HZ	invited lecture	Gelderblom	Future care program, Euregional project	03/06/2013	Heerlen	care professionals	60	NL, BE, DE

UH	Conference	UH	HSI 2013 (International Conference on Human System Interaction) .	06/06/2013	Gdansk, Poland	Scientific Community (higher education, Research)	120	Poland
UH	Keynote	UH	Kerstin Dautenhahn invited Keynote Speaker at COST Event - The Future Concept and Reality of Social Robotics: Challenges, Perception and Applications Role of Social Robotics in Current and Future Society, International Press Centre, Brussels (BE).Title of talk "Social robotics and real world applications – an interdisciplinary perspective"http://www.cost.eu/events/socialrobotics	10/06/2013	Brussels	Scientific Community (higher education, Research)	80	International
HZ	Conference	HZ	ICORR 201313th International Conference on Rehabilitation Robotics (ICORR),	24/06/2013	Seattle, June 24-26, 2013.	Robot scientists	40	International
UvA and HZ and UH		UvA and HZ and UH	'International Summer School on Social Human-Robot Interaction' Christ's College	26/08/2013	Cambridge, United Kingdom	Scientific Community	60	Europe
UNISI	Conference	UNISI	RO-MAN2013 22nd IEEE International Symposium on Robot and Human Interactive Communication	26/08/2013	Gyeongju	Scientific Community	300	international
UH	Conference	UH	RO-MAN 2013 (IEEE International Symposium on Robot and Human Interactive Communication) Towards a user-centered approach to assistive and service robotic technology for elderly care	26/08/2013	Gyeongju, South Korea	Scientific Community (higher education, Research)	60	South Korea
UNISI	Invited Talk	Iolanda Iacono /Michele Tittarelli	Robots that care	02/09/2013	London, at Campus Party	Scientific Community,	10000 visitors	international

HZ	Conference	HZ	AAATE 2013, Association for the Advancement of Assistive Technology in Europe	19/09/2013	Villamoura, Portugal	Scientific Community (higher education, Research)	50	Portugal
UH	Conference	UH	AAATE 2013, Association for the Advancement of Assistive Technology in Europe	19/09/2013	Villamoura, Portugal	Scientific Community (higher education, Research)	50	Portugal
UH	presentation	UH	Farshid Amirabdollahian was invitd to talk at the REACTION Consortium Clustering Event Ambient Intelligence Advanced Technologies in Support of Healthcare and Assisted Living that took place at the Foundation for Research & Technology.The aim of the clustering event was to bring together European projects for demonstrations, presentations of innovative solutions, and discussions of potential synergies and cooperation	26/09/2013	Hellas, in Heraklion, Crete, Greece,	Civil Society, Scientific Community, Policy Makers	50	Europe
IPA/HZ	exhibition	IPA/HZ	Robots Supporting Care- organised by the Expertise centre at HZ (including scenario demonstration)	02/10/2013	Heerlen, Netherlands	Industry, Policy makers, Scientific Community	200	The Netherlands
HZ	Conference	HZ	Symposium "Robots For Care	02/10/2013	Heerlen	Educational and care professionals	200	NL
HZ	TV	HZ	Regional television item on care robotics- http://www.l1.nl/video/zorgrobots-2-okt-2013	02/10/2013	Online	General Public	TV	NL
HZ	Radio Item	HZ	Regional radio item on Robots supporting Care symposium-http://www.l1.nl/audio/zorgrobots-heerlen-verslaggever-peter-beeker-2-okt-2013	02/10/2013	Online	General Publlic	numerous	NL

UH	Other: Debate	UH	Ideal World Season – Are we having an out of body experience?, Invited panel member for public discussion event. (debate)	04/10/2013	Watford, UK	Civil Society &Arts Media Experts	50	UK
IPA	Conference	FHG	IEEE-RAS International Conference on Humanoid Robots	17/10/2013	Atlanta, USA	Scientific Community	30	international
UH	Workshop	UH	KT-EQUAL workshop on Showcasing research to promote active ageing: from Rehabilitation robots to Assistive technologies and beyond	19/10/2013	Hatfield UK	Civil Society, Scientific Community	25	UK
IPA	presentation	FHG	RSS 2013- Workshop on Common Platforms in Robotic Manipulation "Care-O-bot 3: towards Real World Experiments in consumer domain",	24/10/2013	Berlin, Germany	Scientific Community	30	international
UH	Workshop: ICSR 2013, Invited Speaker for Workshop 2: Embodied Communication of Goals and Intentions	UH	Lecture on Interaction with socially interactive robot companions, focusing on interaction modalities and social norms in domestic environment	27/10/2013	Bristol, UK	Scientfic community	40	UK
UH	Plenary: ICSR 2013 (International Conference on Social Robotics), Plenary Panel Discussion	UH	Part of Panel discussing issues related to Robotic Home Companion and to discuss the question "Companionship"	27/10/2013	Bristol, UK	Scientfic community	130	UK
UH	Conference	UH	ICSR 2013 (International Conference on Social Robotics), 3 papers	27/10/2013	Bristol, UK	Scientific Community (higher education, Research)	130	UK
UH	presentation	UH	ACCOMPANY Caring for the future 2013, http://accordgroup.org.uk/filemanager/resources//Technology.pdf	29/10/2013	Birmingham, UK	Civil Society	250	UK
UvA	Conference	UvA	IEEE International Conference on Intelligent Robots and Systems (IROS), 2013	01/11/2013	Tokyo, Japan	Scientific Community	500-1000	JAPAN

IPA	TV clip	FHG	Quarks&Co. (popular German documentary series)	12/11/2013	WDR (German TV channel)	Civil Society	above 1 million	Germany
HZ	presentation	HZ	Invited Presentation Blixembosch Robots in Care: G Gelderblom	13/11/2013	The Netherlands	Industry	20	The Netherlands
UNISI	Press/engagement events	UNISI	European Robotics Week UNISI organised a Public Talk entitled “Robot and elderly: what is the possible future?”	26/11/2013	Siena, Location Residential Home Care: “Villa I Lecci	Other	70	Italy
UH	Conference	UH	ARE Adaptive Robotic Ecologies 2013	03/12/2013	Dublin, Ireland	Scientific Community (higher education, Research)	8	Ireland
UNISI	Press/engagement events	UNISI	Meeting at UNISI with the Residential Home Care of Chiusdino, Siena	15/12/2013	Siena, Italy	Other	10	Italy
HZ	Article	Bedaf	Nederlands tijdschrift voor Geneeskunst (Dutch journal for curative medicine)- http://www.ntvg.nl/artikelen/nieuws/universele-hulprobot-voor-ouderen-nog-ver-weg/volledig	17/12/2013	The Netherlands	medical professionals	numerous	NL
UH/HZ	presentation	UH/HZ	European RoboticsForum	11/03/2014	Roverto, Italy		300+	Italy/international
UNISI	Invited talk	Patrizia Marti	World Social Work Day -Design that cares	18/03/2014	Siena, University of Siena	Scientific Community	120	Italy
HZ	invited lecture	Gelderblom	Radboud University, Donders Institute	25/03/2014	Nijmegen	Psychologists	50	NL
UH	Conference	UH	AISB50	01/04/2014	London, UK	Scientific Community (higher education, Research)	25	UK

UB/UW	Conference	UB/UW	AISB50	01/04/2014	London, UK	Scientific Community (higher education, Research)	30	Various European, North America, Australia
UT	Tv show	UT	Pauw en Witteman	04/04/2014	The Netherlands	General Public	numerous	The Netherlands
IPA	workshop	FHG	Assistive Technology in Elderly Care (Technische Assistenzsysteme in der Pflege)	10/04/2014	Stuttgart, Germany	Industry, Policy Makers, Scientific Community	50	Germany
UvA	Other: Public debate	UvA	"Robosapiens" Debate on Intelligent Systems	24/05/2014	Amsterdam	General Public	100	Netherlands
IPA	exhibition	MADoPA	Porte Ouverte	26/05/2014	Troyes, France	Civil Society	20	France
HZ	Invited lecture	Gelderblom	lecture series RWTH Aachen Machinenbau Institut	28/05/2014	Aachen DE	Engineers, Scientists	40	DE
UT	Other: Festival	UT	Design Festival	29/05/2014	Berlin		50	Germany
UvA	Conference	UvA	IEEE International Conference on Robotics and Automation (2 papers)	01/06/2014	Hong Kong	Scientific Community	500-1000	CHINA
IPA	exhibition (fair)	FHG	AUTOMATICA	03/06/2014	Munich, Germany	Industry	several hundred	international
IPA/UVA	Conference	UvA and FHG	IEEE International Conference on Robotics and Automation	04/06/2014	Hong Kong, China	Scientific Community	30	international
UNISI	Press/engagement events	UNISI	Meeting at Residential Home Care “Villa Petronilla”	04/06/2014	Siena	Other	10	Italy
MADOPA	Conference	MADOPA (H Michel)	Forum des Living Lab santé et autonomie, Comparison of the results of 2 methods of assessment of the users needs implemented in France, the example of the Accompany system	05/06/2014	Paris, Hopital Broca	French experts, academic and Health decision makers	50	France

UNISI	Invited Talk	Patrizia Marti	5th National Conference on Alzheimer's Day Care Centres	06/06/2014	Pistoia, Italy	Scientific Community	150	Italy
HZ	presentation	HZ	Regional robotics day, presentation dissemination	19/06/2014	The Netherlands	Scientific Community		The Netherlands
MADOPA	Conference	MADOPA (D Hewson, H Michel)	9th world conference of Gerontechnology, Development of a multidimensional evaluation method for the use of a robotic companion as a function of a care relationship	20/06/2014	Taiwan	Scientific Community (higher education, Research)		international
HZ	presentation	HZ	Visit National commission on future care provision in the Netherlands, Presentation	20/06/2014	The Netherlands		3	The Netherlands
HZ	presentation	HZ	Summercourse Saudi Arabian Nursing Students . Presentation	23/06/2014	The Netherlands		15	The Netherlands
UT	Conference	UT	European Conference on Positive Psychology	01/07/2014	Amsterdam, The Netherlands	Students, entrepreneurs, researchers	20-30	International
UvA	Conference	UvA	Robotics: Science and Systems	01/07/2014	UC Berkely	Scientific Community	500-1000	USA
MADOPA	Other: General assembly (of MADoPA)	H Michel	Results from usage and economic evaluation of the Accompany system	03/07/2014	Paris, Féderation Nationale Mutualité Française	Health and care decision makers	40	France
UT	National Science/ Press event	UT	NWO Bessensap	15/07/2014	The Netherlands	Scientific Community	50	The Netherlands
UT	Other: Festival	UT	Design Festival	25/07/2014	The Netherlands	Other	50	The Netherlands
UNISI	Press/engagement events	UNISI	Meeting at UNISI with AFAM ,Associazione Familiari Alzheimer Marche	28/07/2014	Siena	Other	10	Italy

UvA	Conference	UvA	IEEE International Symposium on Robot and Human Interactive Communication	01/08/2014	Edinburgh, Scotland	Scientific Community	500-1000	UK
HZ	Magazine interview	HZ	Gelderblom interview in Ergotherapy Magazine (National Occuational Therapy magazine	01/08/2014		Occupational Therapists	numerous	NL
UNISI	Conference	UNISI	BIO-ROB2014 (IEEE International Conference on Biomedical Robotics and Biomechatronics)	12/08/2014	San Paulo, Brazil	Scientific Community	150-200	international
UH	Conference	UH	TAROS 2014 15th Towards Autonomous Robotic Systems	01/09/2014	Birmingham, UK	Scientific Community (higher education, Research)	100	UK
UT	Other: Festival	UT	Advice to Raad Leefomgeving en Infrastructuur (advisory body to the Dutch government, www.rli.nl)	05/09/2014	The Netherlands			The Netherlands
HZ	Conference	HZ	Health Technology Conference 2014	09/09/2014	Den Bosch	Industry and policy	60	NL
HZ	Exhibition	HZ	HZ University Care Technology Fair	10/09/2014	Heerlen	Students	250	NL
UNISI	Invited talk	Iolanda Iacono	Workshop at "Responsibility Project"-Title of the presentation "Social Robots for supporting autonomy and well-being of elderly people	12/09/2014	Siena, Italy	Scientific Community	30 people	Italy
UT	Workshop	UT	FROG EU project	25/09/2014	The Netherlands	Scientific Community	10	The Netherlands
UT	Seminar	UT	New Friends	25/09/2014	Almere, The Netherlands	Students, entrepreneurs, researchers	20-30	International
UvA	Radio Interview	UvA	de Kennis van Nu' interview on job-threatening robots- national radio NPO Radio 5- http://www.npowetenschap.nl/programmas/de-kennis-van-nu/Radio-5/2014/september/30-09-2014-dementie.html	30/09/2014	Hilversum	General Public	>1000	Netherlands

HZ	Public debate	HZ	Gelderblom in Expert panel TU Eindhoven (national science week)	30/09/2014	Eindhoven	general public	50	NL
UB/UW	Conference	UB/UW	European Association of Centres of Medical Ethics	02/10/2014	Lille, France	Scientific Community (higher education, Research)	10	Various European, North America, Australia
HZ	Web press	HZ	Gelderblom in Expert interview Masterclass Open University (national science week)- http://www.youtube.com/watch?v=EovqtDFwlFQ	02/10/2014	Online	General public	350 views	NL
HZ	Public debate	de Witte	U meet event Maastricht University (national science week)	02/10/2014	Maastricht	General Public	400	NL
UNISI	Press/engagement events	UNISI	Maker Faire	03/10/2014	Rome	Scientific Community Industry, Civil Society, Policy makers, Medias,	90000 visitors	Europe
UNISI	Press/engagement events	UNISI	Interviews to Iolanda Iacono to be published online on Medicina e Informazione, Video Approfondimenti con gli Specialisti (www.medicinaeinformazione.com).	05/10/2014	Roma	Scientific Community	online	Italy
UNISI	Conference	UNISI	ICDL-EPIROB2014 (The Fourth Joint IEEE International Conference on. Development and Learning and on Epigenetic Robotics)	13/10/2014	Genova, Italy	Scientific Community	150	Europe
UH	Conference	UH	ICDL-EPIROB2014 (The Fourth Joint IEEE International Conference on. Development and Learning and on Epigenetic Robotics)	13/10/2014	Genova, Italy	Scientific Community (higher education, Research)	150	International

UB/UW	Invited talks	UB/UW	Centre for Biomedical Ethics, Yong Loo Lin School of Medicine, National University of Singapore	20/10/2014	Singapore	Scientific Community (higher education, Research)	6	Singapore(but made up of academics from a variety of countries)
UNISI	Invited talk	UNISI	Inaugural Lecture of Patrizia Marti at Eindhoven University of Technology	24/10/2014	Eindhoven	Scientific Community, other	70	The Netherlands
UW	presentation	UW	Monash philosophy dept; Biomedical Ethics Centre	24/10/2014	Melbourne Aus.	Scientific	15	Aus.
UB/UW	Conference	UB/UW	6th International Conference on Social Robots	27/10/2014	Sydney, Australia	Scientific Community (higher education, Research)	150	International
UB	Inivited talk	UB	Macquarie Research Centre for Agency, Values and Ethics, Macquarie University	27/10/2014	Sydney, Australia	Scientific Community (higher education, Research)	20	Australian
UNISI	Conference	UNISI	NordiCHI2014 (The 8th Nordic Conference on Human-Computer Interaction), Helsinki, Finland	28/10/2014	Helsinki, Finland	Scientific Community	150/200	International
IPA	exhibition (fair)	FHG	VISION	04/11/2014	Stuttgart, Germany	Industry	several hundred	International
HZ	Magazine interview	Gelderblom	FMT Gezondheidszorg	14-02 2014		Care professioals, Policy	Magazine	NL
IPA	video	HZ	Robot Companion for the Elderly	ongoing since 5 December 2013	YouTube (Fraunhofer channel) and accompanyproject.eu	all	1800 (at 15.10.2014)	international

IPA	video	FHG	tectv - robots	ongoing since May 2014	tectv (internet TV channel of largest German Engineers association VDI)	Civil Society	500	Germany
IPA	video	FHG	ACCOMPANY - Integrated robot technologies for supporting elderly people in their homes (final showcase)	ongoing since October 2014	YouTube and accompanyproject .eu	Other: General Public	2000 expected	international
HZ	TV	HZ	Online Video LED regional economic development- http://www.youtube.com/watch?v=K30Q8Z3cDh8	yr 2013	Online	Other: General Public	350	NL
UH	Web /press piece	UH	European Year Of Active Ageing: http://www.age-platform.eu/best-practices/128-employment/1484-accompany	yr.2013	Online	Other: General Public	www	www
UvA	website	UvA	Website of the activity recognition system. Make the software publicly accesible.Learning Latent Activity Structure with Soft Labeled Data	yr: 2014	Online	Scientific Community	www	international
UH	Other: Symposium, Futurist Invited Speaker and panel member.	UH	Future of robots in society and being part of the panel for general discussion on the future of digital technologies. Michael Walters invited speaker and panel member.	yr:2013	Watford, UK	General Public and Experts	200	UK mainly
UH	Other: Art Show-Two days public engagement event	UH	Turin Art Show – Robot event in conjunction with the Code Breakers legacy event	yr:2013	Bletchley Park, UK	General public	1000	UK
UH	Other: UH Professional Staff engagement event	UH	Professional Staff Conference	yr:2014	UH	Professional Staff from UH	40	UK
UH	TV: Public Dissemination	UH	BBC Newsround filming a short documentary of robot research in the Robot House	yr:2014	UH Robot House	Other:General Public	Many millions	UK

UH	Other: Engagement with business (Ocado)	UH	Visiting UH and the Robot House for possible future collaboration	yr:2014	UH	Industry	2	UK
UH	Press: engagement events	UH	My Robot Companion – An Afternoon with HARR1	yr:2014	Brighton, UK	Civil Society Mixed audience mainly elderly persons	40	UK

Section B

B1. List of patents, trademarks and registered designs

The project has not had any registered patents and trademarks emerging from the three years of research and technological developments undertaken.

B2. Exploitable foreground

A complete list of exploitable foreground is provided in D7.4 and also is detailed under WP7 progress report earlier above, however the template tables provided are filled for completeness.

Type of Exploitable Foreground12	Description of exploitable foreground	Confidential Click on YES/NO	Foreseen embargo date dd/mm/yyyy	Exploitable product(s) or measure(s)	Sector(s) of application13	Timetable, commercial or any other use	Patents or other IPR exploitation (licences)	Owner & Other Beneficiary(s) involved
General advancement of knowledge	*Person recognition software* *(extendable by person tracking with overhead cameras)*	*no*		*Feature for better human technology interaction, e.g. with robots, computers, phones*	*M72 - Scientific research and development,* *Q86.1 - Hospital activities,* *Q87 - Residential care activities*	*2013* *2015*	*publicly available through LGPL license*	*FRAUNHOFER (owner of person recognition software),* *UvA (owner of optional person tracking extension with overhead cameras)*

[19] A drop down list allows choosing the type of foreground: General advancement of knowledge, Commercial exploitation of R&D results, Exploitation of R&D results via standards, exploitation of results through EU policies, exploitation of results through (social) innovation.

[13] A drop down list allows choosing the type sector (NACE nomenclature) : http://ec.europa.eu/competition/mergers/cases/index/nace_all.html

						2015		
General advancement of knowledge	*Object recognition software*	*no*		*Technology for learning object models and detecting them in arbitrary scenes*	*M72 - Scientific research and development*	*2014*		*FRAUNHOFER (owner)*
Commercial exploitation of R&D results	*Novel tray kinematics for Care-O-bot, including software drivers*	*no*		*New Care-O-bot 3 platforms can be sold with more flexible tray kinematics*	*M72 - Scientific research and development*	*2014*		*FRAUNHOFER (owner)*
General advancement of knowledge	*Robot movements synchronized to the user*	*no*		*Feature for better human robot interaction*	*M72 - Scientific research and development,* *Q86.1 - Hospital activities,* *Q87 - Residential care activities*	*2013* *2015* *2015*		*FRAUNHOFER (owner)*
General advancement of knowledge	*System integration procedures and software*	*no*		*Knowledge, experiences and software for rapid development of*	*Q87 - Residential care activities,* *M72 - Scientific research and*	*2013*		*FRAUNHOFER (owner)*

				specialized, modular robot constructions	*development*	*2014-2015*		
Exploitation of R&D results via standards	*Experiences on robot safety design*	*no*		*Communication to ISO TC184/SC2/AG1 Advisory Group which developed the ISO 13482 standard on Robots and robotic devices - Safety requirements for personal care robots*	*M72 - Scientific research and development,* *Q87 - Residential care activities,* *Q86.1 - Hospital activities*	*2012-2014*		*FRAUNHOFER (owner)* *UH*
General advancement of knowledge	*User friendly teaching facilities for robot behaviour adaptation*	*no*		*Extend scope of this system to further simplify human robot interaction and learning*	*M72 - Scientific research and development*	*2015*		*UH (owner)* *FRAUNHOFER*
Partner UT								
Methodology	*N=1 Analysis of independent living elderly people*	*no*			*All*			

Research platform	*Plan to implement aspects of tablet concept in telepresence robot research*	*no*			*All*			

Report on societal implications

Replies to the following questions will assist the Commission to obtain statistics and indicators on societal and socio-economic issues addressed by projects. The questions are arranged in a number of key themes. As well as producing certain statistics, the replies will also help identify those projects that have shown a real engagement with wider societal issues, and thereby identify interesting approaches to these issues and best practices. The replies for individual projects will not be made public.

A General Information *(completed automatically when **Grant Agreement number** is entered.*

Grant Agreement Number:	287624
Title of Project:	ACCOMPANY
Name and Title of Coordinator:	DR FARSHID AMIRABDOLLAHIAN

B Ethics

1. Did your project undergo an Ethics Review (and/or Screening)? • If Yes: have you described the progress of compliance with the relevant Ethics Review/Screening Requirements in the frame of the periodic/final project reports? Special Reminder: the progress of compliance with the Ethics Review/Screening Requirements should be described in the Period/Final Project Reports under the Section 3.2.2 *'Work Progress and Achievements'* Project ethical records are offered in this report on page 47	***Yes*** ***Yes***
2. Please indicate whether your project involved any of the following issues (tick box) :	***YES***
RESEARCH ON HUMANS	
• Did the project involve children?	No
• Did the project involve patients?	No
• Did the project involve persons not able to give consent?	No
• Did the project involve adult healthy volunteers?	**Yes**
• Did the project involve Human genetic material?	No
• Did the project involve Human biological samples?	No
• Did the project involve Human data collection?	No
RESEARCH ON HUMAN EMBRYO/FOETUS	
• Did the project involve Human Embryos?	No
• Did the project involve Human Foetal Tissue / Cells?	No
• Did the project involve Human Embryonic Stem Cells (hESCs)?	No
• Did the project on human Embryonic Stem Cells involve cells in culture?	No
• Did the project on human Embryonic Stem Cells involve the derivation of cells from Embryos?	No
PRIVACY	
• Did the project involve processing of genetic information or personal data (eg. health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)?	No
• Did the project involve tracking the location or observation of people?	No
RESEARCH ON ANIMALS	
• Did the project involve research on animals?	No
• Were those animals transgenic small laboratory animals?	No
• Were those animals transgenic farm animals?	No
• Were those animals cloned farm animals?	No

• Were those animals non-human primates?	No
RESEARCH INVOLVING DEVELOPING COUNTRIES	
• Did the project involve the use of local resources (genetic, animal, plant etc)?	No
• Was the project of benefit to local community (**capacity building**, access to healthcare, education etc)?	**Yes**
DUAL USE	
• Research having direct military use	No
• Research having the potential for terrorist abuse	No

C Workforce Statistics

3. Workforce statistics for the project: Please indicate in the table below the number of people who worked on the project (on a headcount basis).

Type of Position	Number of Women	Number of Men
Scientific Coordinator		1
Work package leaders	2	6
Experienced researchers (i.e. PhD holders)	7	13
PhD Students	1	17
Other	6	17

4. How many additional researchers (in companies and universities) were recruited specifically for this project?	**12**
Of which, indicate the number of men:	**11**

D Gender Aspects

5.	**Did you carry out specific Gender Equality Actions under the project?**	○√ ○	**Yes** No

6. Which of the following actions did you carry out and how effective were they?

		Not at all effective → Very effective
☒	Design and implement an equal opportunity policy	○ ⊖ ○ ○ ○
☒	Set targets to achieve a gender balance in the workforce	○ ⊖ ○ ○ ○
❑	Organise conferences and workshops on gender	○ ○ ○ ○ ○
❑	Actions to improve work-life balance	○ ○ ○ ○ ○
☒	Other:	Flexible work presence

7. Was there a gender dimension associated with the research content – i.e. wherever people were the focus of the research as, for example, consumers, users, patients or in trials, was the issue of gender considered and addressed?

⊖ Yes- please specify

Yes-We sought gender balance in our focus groups. The only gender specific issue to emerge related to attitudes to daughter-in-law. The gender dimension was analysed in the usage of the Accompany system by the end-user

○ No

E Synergies with Science Education

8. Did your project involve working with students and/or school pupils (e.g. open days, participation in science festivals and events, prizes/competitions or joint projects)?

⊖ Yes- please specify

UB/Draper worked with a BMedSc student – additional focus groups were added and the student helped with data collection and wrote up dissertation on basis of result. UH/Dautenhahn speaker at Bentley Wood High School, part of the Speakers for Schools programme, title of talk "Robots Interacting with People".HZ/Gelderblom hosted Care technology Fair , Care robots exhibition w/students. UT/Evers hosted open days UVA /Krose hosted RoboCup demos. IPA had bachelor/master thesis and student workers within Accompany, as well as live presentation to a visiting group of school pupils

○ No

9. Did the project generate any science education material (e.g. kits, websites, explanatory booklets, DVDs)?

⊖ Yes- please specify

Yes at UT used Robot as platform for students' assignments and at IPA videos were produced and uploaded to YouTube and website

○ No

F Interdisciplinarity

10. Which disciplines (see list below) are involved in your project?

⊖ Main discipline[14]: **1.1, 2.2,6.3, 5.4**

[14] Insert number from list below (Frascati Manual).

○	Associated discipline[14]: **3.3**	○	Associated discipline[14]:

G Engaging with Civil society and policy makers

11a Did your project engage with societal actors beyond the research community? *(if 'No', go to Question 14)*	⊖ ○	Yes No

11b If yes, did you engage with citizens (citizens' panels / juries) or organised civil society (NGOs, patients' groups etc.)?

- ○ No
- ⊖ Yes- in determining what research should be performed
- ⊖ Yes - in implementing the research
- ⊖ Yes, in communicating /disseminating / using the results of the project

11c In doing so, did your project involve actors whose role is mainly to organise the dialogue with citizens and organised civil society (e.g. professional mediator; communication company, science museums)? At UH, resident artists with expertise in creating a dialogue with people we involved in a residency which provided such a dialogue.	⊖ ○	Yes No

12. Did you engage with government / public bodies or policy makers (including international organisations)

- ○ No
- ⊖ Yes- in framing the research agenda
- ⊖ Yes - in implementing the research agenda
- ⊖ Yes, in communicating /disseminating / using the results of the project

13a Will the project generate outputs (expertise or scientific advice) which could be used by policy makers?

- ⊖ Yes – as a **primary** objective (please indicate areas below- multiple answers possible)
- ⊖ Yes – as a **secondary** objective (please indicate areas below - multiple answer possible)
- ○ No

13b If Yes, in which fields?

Agriculture Audiovisual and Media Budget Competition Consumers Culture Customs Development Economic and Monetary Affairs Education, Training, Youth Employment and Social Affairs		Energy Enlargement Enterprise Environment External Relations External Trade Fisheries and Maritime Affairs Food Safety Foreign and Security Policy Fraud Humanitarian aid		Human rights Information Society Institutional affairs Internal Market Justice, freedom and security Public Health Regional Policy Research and Innovation Space Taxation Transport	

13c If Yes, at which level? ⊖ Local / regional levels ○ National level ○ European level ○ International level	
H Use and dissemination	
14. How many Articles were published/accepted for publication in peer-reviewed journals?	**10**
To how many of these is open access[15] provided?	**10**
How many of these are published in open access journals?	**10**
How many of these are published in open repositories?	**0**
To how many of these is open access not provided?	**0**
Please check all applicable reasons for not providing open access:	
❑ publisher's licensing agreement would not permit publishing in a repository ❑ no suitable repository available ❑ no suitable open access journal available ❑ no funds available to publish in an open access journal ❑ lack of time and resources ❑ lack of information on open access ❑ other[16]: ……………	**n/a**

15. How many new patent applications ('priority filings') have been made? *("Technologically unique": multiple applications for the same invention in different jurisdictions should be counted as just one application of grant).*		**0**
16. Indicate how many of the following Intellectual Property Rights were applied for (give number in each box).	Trademark	**0**
	Registered design	**0**
	Other	**0**
17. How many spin-off companies were created / are planned as a direct result of the project?		**1**
Indicate the approximate number of additional jobs in these companies:		**4**

18. Please indicate whether your project has a potential impact on employment, in comparison with the situation before your project:

❑ Increase in employment, or	❑ In small & medium-sized enterprises
❑ Safeguard employment, or	❑ In large companies
❑ Decrease in employment,	❑ None of the above / not relevant to the project
☒ Difficult to estimate / not possible to quantify	

[15] Open Access is defined as free of charge access for anyone via Internet.
[16] For instance: classification for security project.

19. For your project partnership please estimate the employment effect resulting directly from your participation in Full Time Equivalent (*FTE = one person working fulltime for a year*) jobs:	*Indicate figure:*
Difficult to estimate / not possible to quantify	☒

I Media and Communication to the general public

20. As part of the project, were any of the beneficiaries professionals in communication or media relations?

⊖ Yes ○ No

21. As part of the project, have any beneficiaries received professional media / communication training / advice to improve communication with the general public?

⊖ Yes ○ No

22 Which of the following have been used to communicate information about your project to the general public, or have resulted from your project?

☒	Press Release	☒	Coverage in specialist press
☐	Media briefing	☒	Coverage in general (non-specialist) press
☒	TV coverage / report	☒	Coverage in national press
☒	Radio coverage / report	☒	Coverage in international press
☒	Brochures /posters / flyers	☒	Website for the general public / internet
☒	DVD /Film /Multimedia	☒	Event targeting general public (festival, conference, exhibition, science café)

23 In which languages are the information products for the general public produced?

☐	Language of the coordinator	☒	English
☒	Other language(s) (some French, Italian and Dutch)		

***Question F-10*:** Classification of Scientific Disciplines according to the Frascati Manual 2002 (Proposed Standard Practice for Surveys on Research and Experimental Development, OECD 2002):

FIELDS OF SCIENCE AND TECHNOLOGY

1. NATURAL SCIENCES

1.1 **Mathematics and computer sciences** [mathematics and other allied fields: computer sciences and other allied subjects (software development only; hardware development should be classified in the engineering fields)]

1.2 Physical sciences (astronomy and space sciences, physics and other allied subjects)

1.3 Chemical sciences (chemistry, other allied subjects)

1.4 Earth and related environmental sciences (geology, geophysics, mineralogy, physical geography and other geosciences, meteorology and other atmospheric sciences including climatic research, oceanography, vulcanology, palaeoecology, other allied sciences)

1.5 Biological sciences (biology, botany, bacteriology, microbiology, zoology, entomology, genetics, biochemistry, biophysics, other allied sciences, excluding clinical and veterinary sciences)

2 **ENGINEERING AND TECHNOLOGY**

2.1 Civil engineering (architecture engineering, building science and engineering, construction engineering, municipal and structural engineering and other allied subjects)

2.2 Electrical engineering, electronics [electrical engineering, electronics, communication engineering and systems, computer engineering (hardware only) and other allied subjects]

2.3. Other engineering sciences (such as chemical, aeronautical and space, mechanical, metallurgical and materials engineering, and their specialised subdivisions; forest products; applied sciences such as geodesy, industrial chemistry, etc.; the science and technology of food production; specialised technologies of interdisciplinary fields, e.g. systems analysis, metallurgy, mining, textile technology and other applied subjects)

3. MEDICAL SCIENCES

3.1 Basic medicine (anatomy, cytology, physiology, genetics, pharmacy, pharmacology, toxicology, immunology and immunohaematology, clinical chemistry, clinical microbiology, pathology)

3.2 Clinical medicine (anaesthesiology, paediatrics, obstetrics and gynaecology, internal medicine, surgery, dentistry, neurology, psychiatry, radiology, therapeutics, otorhinolaryngology, ophthalmology)

3.3 Health sciences (public health services, social medicine, hygiene, nursing, epidemiology)

4. AGRICULTURAL SCIENCES

4.1 Agriculture, forestry, fisheries and allied sciences (agronomy, animal husbandry, fisheries, forestry, horticulture, other allied subjects)

4.2 Veterinary medicine

5. SOCIAL SCIENCES

5.1 Psychology

5.2 Economics

5.3 Educational sciences (education and training and other allied subjects)

5.4 Other social sciences [anthropology (social and cultural) and ethnology, demography, geography (human, economic and social), town and country planning, management, law, linguistics, political sciences, sociology, organisation and methods, miscellaneous social sciences and interdisciplinary , methodological and historical S1T activities relating to subjects in this group. Physical anthropology, physical geography and psychophysiology should normally be classified with the natural sciences].

6. HUMANITIES

6.1 History (history, prehistory and history, together with auxiliary historical disciplines such as archaeology, numismatics, palaeography, genealogy, etc.)

6.2 Languages and literature (ancient and modern)

6.3 Other humanities [philosophy (including the history of science and technology) arts, history of art, art criticism, painting, sculpture, musicology, dramatic art excluding artistic "research" of any kind, religion, theology, other fields and subjects pertaining to the humanities, methodological, historical and other S1T activities relating to the subjects in this group]

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