



## Enabling Social Interaction through Embodiment

---

ExCITE addresses the challenge of promoting robotic telepresence to alleviate social isolation and allow regular visits to the elderly. The project is built around the Giraff robot and aims at allowing caregivers and relatives with no prior computer experience to virtually enter a home and conduct a natural, secure visit just as if they were physically there. ExCITE is evaluating user requirements for social interaction embodied through robotic telepresence. A rigorous evaluation procedure is deployed in situ, on a Pan European scale and with a longitudinal perspective. The existing robot prototype is deployed to the targeted end-users, and is refined by tightly coupling the users and designers in the development cycles of the prototype throughout the project. ExCITE involves partners in three partner countries: Italy, Spain and Sweden. Key project ideas are (a) user centered product refinement, (b) user tests outside labs, in real contexts of use (c) use on a time period long enough to allow habituation and possible rejection to appear, (d) analysis of cultural and societal differences over European countries.

Participant organization name	Organization type	Country
Örebro University	Academic	Sweden
Giraff Technologies AB	SME	Sweden
Consiglio Nazionale delle Ricerche - ISTC	Academic	Italy
RatioConsulta SpA	SME	Italy
University of Malaga	Academic	Spain
Örebro City Council	End-User	Sweden

## Introduction

The new generation of senior citizens is expected to be an active and productive part of society long after today's age of retirement. They will have diverse activities for instance being present in the workforce on a part time basis, being members of organizations or health facilities, and traveling internationally or to multiple residences within Europe. The social spheres of the seniors are expected to be equally diverse, encompassing others who share similar interests, former colleagues, and family members who may or may not be living in the same city. Indeed a clear paradigm shift is expected in the social habits of an elderly population from a model where the closest contacts were those within close physical proximity to a model that reflects a mobilized and globalised European society.

Even though Europeans will still have the ambition to maintain the same level of social interaction throughout their lives, the onset of the age related conditions for the vast majority is inevitable, and thus the decrease in both physical and mental health can impair mobility and contribute to a feeling of isolation, loneliness and depression. However, for a generation with basic or moderate exposure to Internet and mobile phones, ICT will have the potential to play a significant role in maintaining contact with others. Yet, for this to be possible, it is critical that such technologies meet the requirements for successful interaction between individuals and fulfill both the needs of elderly for achieving suitable social interaction as well as the needs of the kin to be able to maintain contact.

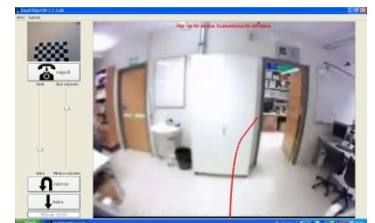
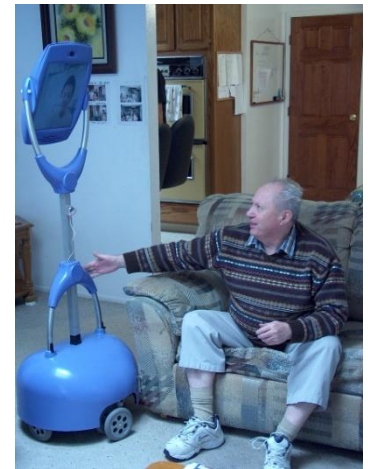
Telepresence has long been advocated as a means to enable virtual face-to-face communications for people located at different places. A newer variant of telepresence that has recently emerged proposes to integrate ICT technologies onto robotic platforms and enable actuation in remote locations. So far, robotic telepresence has made a debut in the deployment of robotic systems in dangerous or unreachable environments. However, a number of systems are starting to emerge that advocate the use of robotic telepresence in a domestic or office environment. The use of such systems for the aging society as a tool to enhance social interaction for the elderly is still relatively novel. However, used as a device to increase social interaction, *robotic telepresence* could be particularly suited to an elderly audience for a number of

reasons. Firstly, the elderly interacts with the robot in a natural and intuitive manner as little additional learning is required for the elderly. Secondly, the client connecting to the robot from a remote location gains a greater level of control as it allows the client to move in the environment, which is currently not possible in desktop applications. Despite this potential, the number of existing system which advocate better social interaction have indeed only been subjected to either little or no end user validation with an elderly audience.

*The **main objective** of ExCITE is to evaluate user requirements for social interaction embodied through robotic telepresence. This evaluation is performed in situ, on a PanEuropean scale and with a longitudinal perspective. An existing prototype is deployed to the targeted end users, and is refined by tightly coupling the users and designers in the development cycles of the prototype throughout the project.*

The importance of user evaluation should not be underestimated, nor should the science of eliciting user requirements. In fact, the end users' perspectives can only be truly understood if evaluation is performed in situ, on a reasonable scale and with a longitudinal perspective. The longitudinal aspect of the user based evaluation allows a better understanding of important parameters such as user acceptance, added value of social interaction, integration in a domestic environment, technical viability and scalability. A large scale study, outside the isolation of a laboratory setting, allows better correlation of the above parameters to important social factors such as gender, culture and lifestyle.

To perform the user based evaluations, a prototype is deployed to the targeted end users. The prototype is called **Giraff** and consists of a screen and web camera mounted on a simple robotic base that can be teleoperated. The figure shows a visit with the Giraff. The camera and screen is a pantilt unit which enables a greater and controllable field of view. The elegance of Giraff is its simplicity and thus its affordability with a current estimated price tag of 4000 euros and a possibility to reduce the price to 2000 euros in the near future when going from prototype to commercial product. The prototype exists and several units have been built. The current version of the Giraff contains a mobility subsystem and a remote interface for teleoperation. The figure shows the interface from the point of view of the person that makes a visit. The red line is the direction selected for Giraff given via mouse. The line becomes green and the Giraff moves when the left mouse button is held down. The Giraff stops when the button is released. The Giraff is placed in the resident of the elderly and the requirements of the system are assessed from the point of view of the elderly interacting with the device when embodied by a family member, spouse or healthcare professional and from the point of view of the person connecting to the device (client side). The key to the evaluation process is the cyclic evaluation approach where user input is taken into account to make iterative changes to the prototype throughout the course of the project. At the end of the three year user studies, the results obtained from ExCITE will:



- (1) Create an affordable product that is effective in promoting healthy aging and social well being that is thoroughly validated by the users.
- (2) Allow researchers in clinical and academic fields to advance their understanding of acceptable forms for social interaction in the ageing process.

## What we have achieved so far

The project started on July 2010 and has just passed the first year mark. Central to the project is the long term evaluation of Giraff that is achieved via the test sites. In the first phase of the project, we focused on providing the basic infrastructure to start the test sites. In particular, the Giraff company has built the robots for the other countries and offered technical support for the setup phase. They have also completed the first version of the Sentry database administration that is used for managing the Giraffs and their users.

A web portal (<http://www.excite-project.eu>), user videos and manuals have been created. Questionnaires for evaluating Giraff and its functionalities, different aspects of the interaction with the users as well as the potential impact of Giraff on its users have been prepared and the output of the user evaluation has been the basis of numerous technical, functional and

aesthetic improvements of Giraff. In the following, we first present the test sites; we then outline the evaluation procedure we have performed and the technical recommendations and improvements done in the first year. Then the important aspect of dissemination is considered and finally the next steps of the project are outlined.

## The test sites

Central to the ExCITE project is the notion of test sites where the Giraff is deployed and used in a resident's home or elderly complex. These test sites (totalling 12 over three years) are crucial to maintaining a cyclic evaluations as it is the feedback from real test runs that drives a needs-driven development of the Giraff platform. After each cycle of evaluation, the Giraff becomes closer to market and evolves into a more attractive product for an elderly demographic. Secondly, the test sites are also the most convincing argument to demonstrate to organizations and elderly individuals the usability, utility, use worthiness (worth to use over longer periods of time) and not least the robustness of the product.

**The first test site in Sweden** was the home of an elderly couple in Örebro (see figure). The wife received assistance from professional home help and her home was equipped with an alarm service. The Giraff was used by her city council, Örebro City Council, and alarm central company (Tunstall AB) to contact the couple. A total of 32 persons that could be contacting the couple via Giraff received a short course on how to use the Giraff. They also filled questionnaires after the trials to collect their first impressions of the Giraff. The test site was started in November 2010 and unfortunately the wife passed away in January 2011 which interrupted the evaluation prematurely. A replacement test site was established in April 2011, a rehabilitation center in Örebro (see figure). People in need of rehabilitation after e.g. strokes visit the rehabilitation center regularly (1-2 times per week). Now, an occupational therapist connects to the Giraff and interacts with the elderly. The photo shows one such a visit. Interaction takes place during coffee breaks as well as during actual training. A questionnaire based on the Almere model is used to evaluate the elderly's perception of the Giraff at the rehabilitation center.



**The second test site in Sweden** is in an elderly residential home in Töre (North of Sweden). Deployment will occur in September 2011. The Giraff is scheduled to remain at the test site for a year. Currently, two elderly residents have expressed their wish to use the Giraff to interact with relatives. Users at the second test site will be asked to regularly respond to questionnaires studying long-term effects according to the project's evaluation plan.



**The first Spanish test site** is the private home of a widow woman around 65 years old living with one of her sons, but spending a lot of time alone. She tries to be occupied but she is lacking of personal relations: she only meets the relatives from time to time. All of the communication with them are made through phone calls given she is not a technological user, and thus, does not use computers, nor is familiarized with videoconference, although ADSL connection is present in the site. The main need of this person is to be connected to some of their relatives in a more personal manner than a mere phone call.

**The second Spanish test site** is managed by a professional team of a health center in Estepona (Málaga), within the public Health Andalusian Service ("Distrito Sanitario Costa del Sol - Servicio Andaluz de Salud". The user, selected by the team is a widow man of 80 years old who lives alone at home. He is self-sufficient but needs on-site attention, by means of interviews, in order to check the evolution of their mental abilities, as well as routine medical attention, like revising the medication, monitoring the blood pressure, temperature, blood sugar level, etc. Since this Health Center is at a very touristic area in the Costa del Sol, other potential users of Giraff at this test site may include foreign residents in Spain with relatives living in other European countries. Thus, apart from the local assistance carried out by nurses or caregivers, an additional benefit to evaluate is how Giraff can improve or facilitate social and family relationships.

**The first Italian test site** was the private home of a woman with a reduced mobility capability, who lives with a caregiver and spends much of her time at home receiving weekly visits from her only daughter who lives in the same city. The woman has two other sons who live far away and Giraff could offer the possibility of increasing the frequency of contact with them. In this first case, we experienced many problems with Internet connection at the old woman apartment that

prevented a robust use of the robot. These initial problems discouraged the old woman and contributed to reduce her interest toward the experimentation. Therefore an alternative plan was needed and CNR contacted another possible user of Giraff who agreed to participate in the study. This man lives alone in an apartment and the persons who will be contacting the man through Giraff are an operator from a Charity organization and his son. We have planned a more operative meeting with him and his son and a representative of Comunità di Sant'Egidio on September in order to finalize this collaboration and assess the feasibility of this experimentation, which should be starting in October 2011.

**The second Italian test** is a rehabilitation center in Rome. The aim is to validate the use of Giraff as a tool for rehabilitation of Mild Cognitive Impaired patients. The robot is under test at the center since the beginning of 2011. In collaboration with the center a protocol has been set up to first assess the emotional response of a sample of elderly people with mild cognitive impairment in terms of stress and anxiety to the Giraff physical presence. Aim of the study is to understand how patients with special needs feel about their interactions with the robot. Preliminary results show a positive assessment of Giraff on behalf of frail elderly. Specifically, the robot seems not to have a negative effect on the interaction with the therapist during a cognitive exercise (additional information in the evaluation section). In parallel with this specific activity we had different contacts, demonstrations and tutorials for people interested in the project and possibly in the experimentation (nurses, responsible of charity organizations and so on). During these meetings we both disseminated the project's objectives and gathered some useful feedback for the robot's improvement.

Interestingly already after the first year, differences could be noticed in the three countries regarding setting test sites. Most difficulties, both technical and of acceptance have been encountered in Italy, while Sweden has shown better Internet coverage and more willingness to try new technology both by primary and secondary users. The situation in Spain is similar to Sweden with moderate difficulties in setting the test sites. The setting of the first set of test sites has been a learning experience in all the three countries and with the first set of test sites now in place we have acquired the necessary competence to double the number of test sites in the next two years.

## Evaluation

The main objective of the User Evaluation within ExCITE is to gather and analyse continuous data from the user experience with Giraff in a systematic and reliable fashion. The activities of the first year of the project have been dedicated to find users groups representative of different realities (e.g. healthcare professional, healthy and not healthy elderly, nurses, relatives, friends, etc.) in the three countries involved in the project. Test sites for each country have been selected and the chosen test sites have been used to start gathering qualitative and quantitative data on the interaction between Giraff and the users (both the *end users*, i.e. the elder at home and the *client*, i.e. the family members or caregivers visiting the elderly). The collection of relevant user data is following a twofold approach:

- (a) **Collection of immediate feedback of users** (both end users and client) on Giraff connected to different aspects of the interaction mainly related to the user's opinions, judgments and expectation on Giraff and the interaction with it and in general at investigating the variables related to the user-system interaction.
- (b) **Study of long-term impact** of Giraff on some relevant factors (more related to the functionalities of Giraff and its impact in everyday life) like perceived loneliness, satisfaction of social support, caregiver workload etc.

The first type of evaluation provides immediate feedback that can be for used for quick improvement of the technology and to eventually add functionalities to the system. The second type is the very original contribution of this project since a long-term evaluation for this type of technology is usually neglected.

## Opinions, expectations and suggestions of Giraff users

The objective of this evaluation is to study the user's opinions on different aspect of Giraff. Examples of aspects under study are: *ease of use, social presence, spatial presence, quality of communication, emotional response, physical aspect, acceptance and relevant factors for the acceptance and intention to use the system, etc.*

The procedure used often entailed a practical session with the interested users (both end users and clients).

After the practical session different alternative methods were used to gather feedback on the above mentioned metrics: focus groups, interview, and questionnaires. The best suited method has been chosen according to the time availability, the number of participants and the specific situation presented in each evaluation session. The following table lists the



questionnaires developed, with a short description of the aspects investigated and the reference to the specific evaluation session during which they have been used. In addition, the table lists a number of evaluation sessions that we have conducted till now involving different users from different countries to obtain useful feedback on the Giraff and its applicability. Other sessions are already planned in the next months in order to increase the participants and also to obtain a balanced sample of subjects with respect to age, sex, and expertise with technology and study any possible differences of results depending on these variables. All the questionnaires have been shared in the intranet of the project and the results of the evaluations have been delivered to the Giraff AB partner to allow improvements.

<b>QUESTIONNAIRES FOR IMMEDIATE USER FEEDBACK</b>			
<b>Questionnaire Name</b>	<b>Description</b>	<b>Evaluation Session</b>	<b>Participants</b>
Q1_Aspect_Usability_Communication (in Italian)	Around 60 questions investigating mainly the physical aspects, easy of use, quality of communication – plus a socio-demographic form	July 19 <sup>th</sup> 2011 CNR-ASL (Data analysis is ongoing)	Around 20 participants (nurses)
Q2_Expectation_Desired_Functionalities (in Italian)	Around 12 questions aimed at understanding the nurses expectations on the Giraff functionalities and possible applicative uses	July 19 <sup>th</sup> 2011 CNR-ASL (Data analysis is ongoing)	Around 20 participants (nurses)
Focus Group at Comunità di Sant'Egidio	A 2 hours focus group on the potential of Giraff as an additional means for the operator of Comunità di Sant'Egidio to assist people	April 27 <sup>th</sup> 2011 CNR- Comunità di Sant'Egidio. Feedback form the operator reported in Report: CNR Report Training at the Comunita' di Sant'Egidio (April 2011)	Around 10 operators of Comunità di Sant'Egidio
Ease of use and sense of presence at 1 <sup>st</sup> Giraff drive	Tutorial sessions with alarm operators and health care staff connected to the first Swedish test site	Several different days in Sep, Oct 2010 at Örebro University Analysis reported in HCI International paper and HRI workshop paper. Further analysis submitted to special issue of Int J of Social Robotics	21 alarm operators from alarm company and 11 health care professionals from Örebro municipality.
Ease of use and sense of presence at 1 <sup>st</sup> Giraff drive	Tutorial Session and Usability test with 4 students and 1 professor of the high School - ITIS Archimede of Catania (Istituto Tecnico Industriale - Electronics)	On September 16 <sup>th</sup> a tutorial on Giraff has been given to 5 people with expertise in Electronics. General feedback as been also gathered through an interview at the end of the usability session. The Q1 questionnaire has also been administrated	4 students (high school) and 1 teacher in Electronics from a high school
Caregiver attitude	A total of five video-evaluations using the “Hello-Pat”-movie with students and teachers at School of Health and Medical Science, Örebro University. Several different	April and May 2010 at School of Health and Medical Science, Örebro University. An analysis presented at Medicine and Technology days 2010 and a longer article being submitted for	In total 150 participants (22 nursing teachers, 13 health subjects teachers, 79 nursing students, 25

	questionnaires depending on type of caregiver used	journal publication.	occupational therapy students and 11 audiology students)
--	--	----------------------	--

The figures show a session with nurses. Most of the results from this evaluation activity have been shared among the partners and used by the technological partners to start improving the robotic platform. Specifically, suggestions and feedback on the technical problems, usability problems have been considered for new releases of the Giraff software and changes of Giraff hardware. These studies have also given an indication of the acceptance of Giraff by caregivers and health professional. Our initial focus on this group of users is due to the results of evaluations done before the start of the project showing a great acceptance of the elderly group of Giraff, but a less acceptance of health professionals and caregivers that show a general concern that technology can substitute them and decrease personal contact. This has been confirmed by the above evaluations. While this concern may not always apply to a system like the Giraff per se, it is very important that it is addressed when presenting Giraff to potential users. We intend also to investigate further what would make Giraff most acceptable in term of type of use, appearance, and support for organizations and professionals.



### *Studying Long Term Impact of Giraff*

One of the original features of the EXCITE project consists of realizing long-term experiments involving elderly using Giraff in their normal environment both to communicate with other persons and to receive assistance services. In this perspective, the project entails the instantiation of several case studies in three countries and the creation of special questionnaires to be administered to the elderly (end users) and to the family members, friends and caregivers (clients). Designing the evaluation with different types of users and situations entails an effort to prepare materials and adjust the procedure according to the specific case. For this evaluation we distinguish among situations in which the elderly interacts with a health care institution (formal care giver), a family member caring for the elderly (informal caregiver), and a family member or friend that interacts solely for social purposes. The three situations have been distinguished because the type of questions for both the client and the end user depends upon the type of interaction for which Giraff is used. To exemplify the types of variables we monitor, the next table lists a set of questionnaires used for the case in which the elderly interact with a health care institution.

QUESTIONNAIRES FOR LONG TERM IMPACT (END USER SIDE)		
Questionnaire Name	Description	Month
<b>Q1: Consent Form</b>	A consent form through which the end user accept to participate in the study and is informed	<b>Month 0</b>
<b>Q2: Socio-Demographics Data</b>	A questionnaires used to gather initial info on the end users, like gender, age, education, expertise with technology and so on	<b>Month 0</b>
<b>Q3: Loneliness: UCLA</b>	UCLA Loneliness Scale is the most commonly used self-report loneliness instrument. It was developed to assess subjective feelings of loneliness or social isolation.	<b>At regular intervals</b>
<b>Q4: Quality of Life: SF12</b>	This survey asks for end users views about their health. This information will help keep track of how they feel and how well they are able to complete their usual activities	<b>At regular intervals</b>
<b>Q5: MSPSS: Multidimensional Scale of Perceived Social Support</b>	This scale measures the perceived social support	<b>At regular intervals</b>

<b>Q6: Depression: Geriatric Depression Scale</b>	The Geriatric Depression Scale is one of the most widely used scale for assessing depressive symptoms in the elderly	<b>At regular intervals</b>
<b>Q7: Health Service Satisfaction Inventory</b>	This questionnaire aims to assess the level of satisfaction of Health services	<b>At regular intervals</b>
<b>Q8: Attitude_Acceptance</b>	This questionnaire has been developed on purpose to study the users' attitude toward Giraff and their opinion on factors like aspect, usability and in general opinion on the physical dimensions.	<b>At regular intervals</b>
<b>Q9: PIADS</b>	This is used to study the Psycho-Socio impact of Giraff in everyday life	<b>At regular intervals</b>

Similarly, for the client side a set of questionnaires has been chosen to assess relevant variables like the workload and the potential effect of Giraff on the workload, the impact of Giraff in the daily work, opinions and attitudes toward Giraff.

This part of the evaluation has been the most difficult one due to the very ambitious goal of convincing people to use Giraff for a long period of time. The design of the evaluation is almost completed. We are refining and finalizing the choice and the timing of some of the questionnaires to cover all the cases, both from the client and from the end user side. We are also finding the validated version in each language: Italian, Spanish and Swedish or translating them in the desired language when it is not available.

Overall, this first year of work has been particularly useful both to gather initial feedback to feed to the technology developers and to test the evaluation procedure for more ambitious investigations. The initial questionnaires are in use in the test sites and we expect initial results during this autumn (2011).

### *Assessing the tolerance of Giraff on behalf of frail elderly*

A specific effort has been required for the Italian test case at Don Gnocchi where a novel use of Giraff is considered. The intention is to use Giraff as a means for cognitive rehabilitation of frail elderly. A preliminary study was necessary, to measure the tolerability of the Giraff presence on behalf of frail older people. The aim of the study is to demonstrate that the users' response to the Giraff presence is positive by showing that the "physiological stress" will not increase during the interaction. Assessing the reaction of old patients contributes to a higher level of awareness of potential problems in the patient-robot interaction that need to be taken into account in view of the overall and long-term use of Giraff as a means to provide rehabilitation treatments and foster social participation of frail elderly people.

**The participants** selected for the study are a group of frail older people. Frailty is considered as a clinical syndrome highly prevalent in old age and is judged to be a disability. More specifically, for the purpose of our study we decided to consider a pre-dementia syndrome which is known as Mild Cognitive Impairment (MCI). MCI represents the transition state between normal aging and dementia with the general assumption that people who are evolving towards dementia go through a phase of mild cognitive impairment characterized by cognitive dysfunction of a single cognitive area, namely memory, as core symptoms of Alzheimer dementia. Cognitive impairment without dementia is a common problem in the elderly persons that has negative impact on the performance of everyday activities and for this reason these persons can be considered an interesting target for the telepresence robotic solutions. The sample of our experiment consists of a control group of 5 old volunteers without any cognitive impairments and a treatment group of 5 elderly with diagnosis of Mild Cognitive Impairment (MCI). Both groups have been recruited at the rehabilitation center (Don Carlo Gnocchi Foundation).

Participants and family member are initially briefed on the objective of the study. They are then asked to read and sign an informed consent form. Socio-demographic data are also gathered together with information on participant's ability and familiarity with the use of technology. The experimental procedure is articulated into six main sessions in which participants interact both physically with the human experimenter in the same room and with the experimenter by means of Giraff.

**Physiological measures are monitored** during all sessions and specifically in three different moments: at rest, during the sessions (20/25 min.) and at the end of each session. In addition the S-anxiety scale of Spielberg's state-trait anxiety inventory (STAI) is used to measure the intensity of anxiety with respect to the experienced situation (at the end of session 1 - 3 - 5). A questionnaire focused on subjective interaction experience with Giraff and its impact on patient satisfaction is filled out at the end of the sessions.

With the support of medical personnel and volunteers of the Don C. Gnocchi Foundation we have completed a pre-testing assessment of both instruments and procedures. The study also received the approval of their Ethical Committee. We recruited both the treatment group (5 older people with mild cognitive impairment diagnosis) and the control group (5 older people without any cognitive impairment). We completed all the evaluation sessions for 4 of the patients with mild cognitive impairment and 2 of the control group.

## Dissemination

Dissemination is essential in a project such as ExCITE to increase awareness and to support test sites selection and maintenance. In the following table, we outline the main presentations and dissemination activities done in the project.

<b>IMPACT AND AWARENESS ACTIVITIES</b>			
<b>Partner responsible (Where)</b>	<b>Activity</b>	<b>Date</b>	<b>Indicative coverage</b>
UMA, ORU (Spain)	Presentation at the AALIANCE conference	11-12/03/10	User, researchers industry
ORU (Sweden)	Press release	6/9/10	General public
ORU, Giraff AB (Denmark)	Presentation at the AAL Forum	15-17/09/10	User, researchers industry
ORU (International)	Project website ready	30/10/10	User, researchers industry general public
CNR, ORU (Italy)	Presentation at the AAL Italian Forum	6-8/10/10	User, researchers industry
ORU (Sweden)	Exhibition at Research Night	24/9/2010	General public
CNR (Italy)	Presentation at Italian Workshop on Aging Society	3/12/2010	Researchers, industry
Giraff AB (Sweden)	Swedish Handicap Institute presentation on ExCITE project	17/11/10	User, researchers
Giraff (Sweden)	Robotdalen Day presentation of ExCITE and Giraff, Örebro	7/09/10	Researchers, industry
CNR (Italy)	Presentation and tutorial at Comunità di Sant' Egidio	27/04/11	Researchers, charity organization
CNR (Italy)	Presentation and tutorial at ASL/Roma A	19/07/11	Researcher/ nurses
ORU, Giraff AB, Oru Mun (Sweden)	Exhibitor at Tunstall marketing days	30-31/3/11	Organizations
ORU (Sweden)	Presentation at HCI International, Orlando, Florida, USA	13/7/11	Research
ORU, Giraff AB, OCC (Sweden)	Ängen (large complex for elderly) Opening	26/05/2011	Users, Community
CNR (Italy)	Presentation of ExCITE Meeting CNR- MIUR (Ministero Istruzione Università e Ricerca)	16/09/2011	Reseachers, Representative from MIUR
Events Organization:			
Another interesting joint activity between the project members has been a workshop proposal to the HRI conference 2011 (the main International yearly meeting on Human Robot Interaction). A joint			



initiative ORU-CNR produced a workshop proposal on “Social Robotic Telepresence” that was accepted with very good reviews. The official web site for the workshop is:

<http://www.aass.oru.se/~ali/hri2011ws/>

The workshop was successfully held in Spring 2011 with large participation and has been an important vehicle for disseminating ExcITE results.

We have submitted a proposal of a second edition of this workshop to HRI 2012. With this activity, we aim at creating a stable forum around this topic involving interested people from different contexts.

Publications: Eight publications have so far resulted from the project (see [www.excite-project.eu](http://www.excite-project.eu))

One additional effort within the project is the production of supporting material that better facilitate the spread of information and the dialogue with interested potential users. Here is a clear need to dedicate specific attention to introductory material given the need to interact with people not used to technology. The issue of copying with the digital divide is essential in our project and will remain a constant in the further developments.

At present we have worked at two levels:

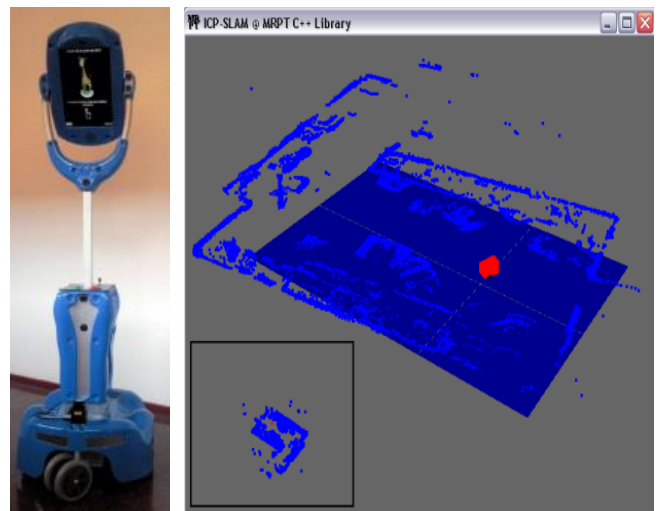
- Demonstration movies:  [Hello Pat - English](#) and  [Hej Aina - Swedish](#).
- Introductory material and manuals and explanatory movies:
  - English:  [Written manual to get Going with Giraff](#);  [Short tutorial](#);  [Install the Giraff Pilot](#);  [Giraff User's Guide](#).
  - Italian:  [User manual for Giraff and Giraff client](#);  [Introduction to Giraff Functionalities](#); Swedish:  [Written manual Giraff](#);  [Movie manual Giraff](#);
  - Spanish:  [How to Use Giraff](#),  [User's Guide Giraff](#)

## Recommendations and technical developments

An important part of the project is the improvement of the Giraff platform in order to make it easier to use, more reliable and robust. Technical improvements of the actual platform and the pilot software have been implemented following recommendations of the users. Many changes have been implemented in the first year to overcome the technical difficulties encountered in long term tests and to respond to explicit comments from the users. An example of the former is the introduction of a database management system for users called Sentry. Sentry allows care organizations to manage Giraffs and users within their own domain and enables the creation of Giraff identities, permissions between users and Giraffs and assigning of a callout user for each Giraff. This not only facilitates the working of the test site during the course of ExcITE, but is a long term improvement that is part of the Giraff solution. The Sentry was further a response to raised concern among elderly and caregivers, namely the need to be able to decide who is to have access to the Giraff and under what premises.

Another example of an improvement due to explicit user requests is the ability to initiate a call. A new remote control was implemented that allows the elderly to call a pre-selected client user (call out user) but also to respond or deny a call. The new remote is now under testing and will be further improved according to the feedback of the users. The physical appearance of the Giraff has also changed over time following user input. The latest version of the Giraff is shown above and previous versions are shown in the previous figures.

One partner in the project is dedicated to more complex changes to the platform has focused on improvement in the mobility of Giraff by including new sensors, like a laser scanner. The analysis of the requirements for a semi-autonomous



navigation using Giraff has been completed, and initial software architecture for semi-autonomous navigation of Giraff has been described. Furthermore, the map building task which aims to obtain a 2-dimensional representation of the user's apartment is partly finished (see figure above). Remaining is software for producing a schematic map easier to use within the Giraff interface. The problem of recovering the Internet connection when the Giraff gets into areas with a poor Wi-Fi signal intensity has also been analyzed.

## Commercialization

ExCITE has already contributed significantly to commercialization simply by creating public awareness of the Giraff solution at an EU level. The feedback process has also advanced the Giraff considerably toward a commercially viable product and service. For example, activities as mundane as examining the damage to a Giraff in shipment provide valuable information that cannot be obtained in a pure development environment. The ability to make mistakes in a more controlled, "friendly" environment is a rare and coveted asset to a startup commercial effort.

Perhaps most importantly, focus on the requirements of disparate user groups (elderly, formal and informal caregivers, care organizations) – a unique and difficult challenge for commercialization – has helped lay the foundation for a marketing plan. For example, we have learned that Giraff benefits as perceived by elderly (e.g. social contact) are quite different and sometimes even in conflict with benefits as perceived by care organizations (e.g. reducing care costs). Based on this feedback the Giraff team is now developing the key messages to each user group, as well as integrating them into a cohesive overall "value proposition." Indeed, starting with the 2011 AAL Forum in Lecce, Giraff will begin communicating these messages to municipalities, social care organizations and the general public. From this same foundation of user feedback the Giraff team is also now building a new web site that will become its main voice to the social care world.

From a commercialization perspective, the main goal of the project over the next year is to initiate the first proactive marketing efforts for Giraff. These efforts will focus on the municipality, specifically on the social care organization. Starting with a value proposition based on "quality of life" the marketing plan will – hand in hand with the municipality – reach out to their professional caregivers, their elderly clients and the associated family and friends. We also predict that this effort will dramatically reshape current thinking on how the Giraff should be sold. It is possible that the Giraff will ultimately not be a single product, but rather a comprehensive service for social connection, integrating hardware, software, a "crowd sourced" knowledge base and online user forums that bridge the gap between Giraff as an interesting technology and Giraff as a valuable solution for home care.

## The next two years

In the first year the ground work has been laid for the cyclic evaluation and the first round of the cycle was completed. The next two years will delimit the ExCITE project from other initiatives for prototype evaluation in that we will study in particular (1) the longitudinal effects of deploying the Giraff to the test sites and (2) the scalability of running in parallel a large number of test sites across Europe with a prototype that is still relatively in its early developmental phase. Many of the technical difficulties which arise from practical implementation of new technologies have been addressed in the first cycle. The following two years allow for a more in depth study on many of the issues central to ambient assisted living, such as how to engage the organizations in order to encourage the uptake of this solution and how the use of the new technologies change over time and affect parameters such as loneliness and social isolation. We expect that the results obtained from the cyclic evaluations with Giraff will be able to in part generalize to new technologies and offer insights on the process of deploying new technologies for independent living in the European market.

The work done in ExCITE has already led to further project developments. Namely, an FP7 project that leverages from the Giraff platform has reached the contractual phase in negotiation and is due to start January 1<sup>st</sup> 2012. This project, aptly named Giraff+, further enhances the possibility to provide at home care and social interaction by combining pervasive sensor networking with a Giraff unit. More specifically, sensors distributed throughout the home measure different parameters of the person at home and the environment to determine an activity profile of the home's inhabitant. This profile is communicated to the health care professional when he/she visits using the Giraff platform. Inspired by the ExCITE methodology, Giraff+ has adopted the notion of test sites and cyclic evaluation and will also have long term test sites for one year.