Abstract—SocialRobot is a collaborative European project, which focuses on providing a practical and interactive solution to improve the quality of life of elderly people. Having this in mind, a state of the art robotic mobile platform has been integrated with virtual social care technology to meet the elderly individual needs and requirements, following a human centered approach. In this short paper, we make an overview of SocialRobot, the developed architecture and the human-robot interactive scenarios being prepared and tested in the framework of the project for dissemination and exploitation purposes.

I. INTRODUCTION

Several demographic studies report that Europe’s population is ageing, as the average life expectancy over the years increase [1]. Consequently, the elderly care market is growing, which in turn reveals a huge and unexplored potential. The SocialRobot Project [2] aims to provide an answer to this demographic change challenge, through knowledge transfer and the creation of strategic synergies between the participating academia and industry partners. Therefore, an integrated Social Robotics system is being developed (cf. Fig. 1) to address key issues for improved independent living and quality of life of the elderly people.

The solution involves a practice-oriented elderly care mobile robot platform targeted to people with light physical or cognitive disabilities who can find pleasure and relief in getting help or stimulation to carry out their daily routine. The platform provides personalized services based on user information, their preferences and routines [3], tackling initially the area of preventive care at an early stage of the ageing process. This is possible by integrating state of the art, standardized and interoperable robotic technologies and ICT-based care and wellness services, and benefiting from a virtual social care community network – SoCoNet.

In the remaining of this paper, an overall description of the SocialRobot framework is provided, and a test scenario is presented. Lastly, conclusions are drawn upon the current state of the project.

II. FRAMEWORK OVERVIEW

In this project, a modular service robot architecture, following a user-driven philosophy, has been proposed. The social community model proposed encourages and supports communication, assistance and self-management of the elderly, promoting seamless connection and interaction to different people from all ages at any time, where the robot will act as a form of an intermediate agent between the elderly and the social care community.

A Social Care Community Network (SoCoNet) was implemented so as to provide a secure web-based virtual collaborative social community network that enables the effective administration and coordination of the user profiles and virtual care teams (VCTs) around the elderly person. SoCoNet has been designed and maintained regardless of the robotic platform used, and it provides methods for retrieving and storing the required data for service provision. This way, it ensures a unique personalized profile of disabilities and abilities, special needs and preferences, stored in a secure database, thus promoting personalized care provision. Furthermore, SoCoNet supports intelligent management techniques, which dynamically adapt the content included in the database throughout the elderly ageing process. These are statistical analysis techniques applied on the elderly daily monitoring information that enables the system to update preferences, priorities, routines and so on.

Services are actively provided by an appealing and affordable mobile robot platform [4], whose design considers the issues of size, shape, color and acoustic. The platform is a two wheels robotic base, with a structure body and robotic head with several integrated sensors such as an RGB-D sensor (Asus Xtion) and a laser range finder. This enables

Fig. 1. Concept: An integrated Social Robotics system for “Ageing Well”.

SocialRobot: Towards a Personalized Elderly Care Mobile Robot

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to fulfill the goal of promoting the maximum interaction between the elderly, family, friends, and carers supported by the robotic platform and the SoCoNet (cf. Fig. 2). On the technical side, the robot is fully integrated in the Robot Operating System (ROS), being capable of performing behavior analysis to adapt social relationships and contexts of the elderly people as they age, as well as mapping and navigating indoors in unstructured environments [5] to provide affective and empathetic user-robotic interaction, taking into account the capabilities of and acceptance by elderly users. For more details on the intrinsic architecture underlying the SocialRobot system, please refer to [6].

III. USE-CASE TEST SCENARIO

After extensive testing of the different modules of the system, as well as their integration using ROS, a validation stage is currently underway. Since end-user involvement has been a priority even since the beginning (e.g. in the requirement specification stage), in this section a test scenario is described. This represents an exploitation activity scheduled to occur in the upcoming project review meeting. Involvement of the elderly in the age of 65 to 83 in the system design and prototype testing have shown positive end user acceptance related to the increase of motivation and reduction of hesitations in carrying out their daily routine with the support and company of the SocialRobot.

It is noteworthy that the system should provide ICT-based personalized services such as reminders and assistance, recognition of abnormal behavior and alerting, suggestions and guidance of daily activities, making use of innovative face recognition and vocal analysis. Having this in mind, the following scenario is envisioned:

1) Robot goes to a specific room (navigation).
2) Robot approaches a person (person tracking).
3) Robot recognizes person (face recognition).
4) Robot checks for medicine in a window of time (SoCoNet: check medicine).
5) Robot checks for activity in a window of time (SoCoNet: check activity).
6) Robot inquires the person (speak).
7) Robot extracts emotion from response (emotion recognition).
8) Robot suggests activity according to the emotional state (SoCoNet: suggest activity).
9) Robot resumes its previous task (navigation).

The presentation of this preliminary scenario aims to attract both research and industrial stakeholders and promote know-how transfer in the project’s technology and results at a European and an international level, so as to define a market penetration strategy.

IV. CONCLUSIONS

In this work, an overview of the SocialRobot framework and a use-case test scenario has been presented. The ongoing project places emphasis in supporting the elderly to maintain their self-esteem in managing the daily routine, by addressing their security, privacy, safety and autonomy. The system not only considers the elderly as an active collaborative agent able to make personal choices, but also adapts the care model to his/her lifestyle, personalized needs and capabilities changes over the ageing process. Furthermore, it provides a platform that supports carers, both family members and therapists, in their daily tasks.

Innovation emerges from the human-robot interaction perspective (e.g. emotion and face recognition, and empathetic interaction); the software perspective (e.g. adaptation to the related context of daily routine occurrences as elderly age, and behavior modeling); the robotic perspective (e.g. robot design, and navigation in unstructured environments); and the social care model perspective (e.g. an elderly practice-oriented model integrating new types of social interaction, robotic monitoring and wellness services).

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