

Virtual Coaching Activities for Rehabilitation in Elderly

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D5.1 Definition of coaching services

Extended summary

This project vCare has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769807.



Work package 5 - *Coaching services* focuses on the definition and implementation of the coaching services. The coaching services are the key contribution of vCare towards ICT supported rehabilitation in home environments after the release of an event-induced stationary rehabilitation in a clinic for one of the following indications: Heart failure, stroke, Parkinson's disease or ischaemic heart disease.

Coaching services within vCare are **clinical pathway-related software modules** providing content and dedicated support for the patient aiming for a quicker recovery, a healthier lifestyle and a reduction of the re-hospitalization rate.

This document is one of the core deliverables describing how the care pathway will be digitally implemented in a personalized, user-friendly and empathic way. It provides a definition of the vCare coaching services which will **be integrated and/or developed** within the project. In the first case, the services are to be considered as background technology from former projects.

The overall aims of this deliverable are

- Definition of virtual coaching in general and state-of-the-art
- Definition of clinical pathway related to virtual coaching in the vCare project
- Mapping of the functional requirements to services from a functional and technical perspective
- Providing a list of coaching services to be developed
- Identification of limitations of existing service modules provided by former projects

Due to the interdisciplinary nature of the project, a common deep understanding of the purpose, benefit, and requirements of the coaching services have to be found within this iterative process and this deliverable is seen as the first milestone.

The identified coaching services are **divided into coaching services, supporting services and data services**. While coaching services are related to a pathway and include reminders, motivational messages, e-learning, digitalized physical and cognitive therapies and questionnaires, supporting services are dedicated for private use and provide e.g. a private agenda service and weather information using the same avatar-based UI with the goal of maximising the user experience. Data services are running in the background and collect data like vital parameters and activity tracking data. A more detailed description of the services is given in the tables below.

Table 1: List of coaching services

#	Name	Description	Pathological needs fulfilled
CS 1	Physical training	Providing motor exercises giving feedback using a depth camera. Additionally, motivational elements help the user staying engaged (rewards, positive feedback etc.)	Physical therapy
CS 2	Health status	The user is given an overview of his personal health status as well as of the progress of the rehabilitation treatment	Monitoring vital signs
CS 3	Cognitive training	The cognitive training service will provide gamified cognitive exercises to the patient. Different levels of difficulty and types of exercises will be provided as well as motivational elements through rewards.	Cognitive training
CS 4	E-Learning	Providing general information about health and a healthy lifestyle aiming to increase the patient's health literacy	Risk factor modification
CS 5	Rehabilitation coach	The rehabilitation coach assists the patient with his therapy and tries to motivate and support him to reach his personal goals.	Emotional and social rehabilitation, risk factor modification, occupational therapy
CS 6	Intelligent notifications / scheduler	Information of the user about pathway relevant actions using a context-aware intelligent notification service. The notification can be provided via multiple modalities (UI, avatar, speakers, light etc..)	Pharmacological intervention, occupational therapy
CS 7	Medical questionnaires	Based on validated and standardized questionnaires, data related to the health status of the patient shall be collected to support the monitoring of health status progression as well as the diagnosis of co-morbidities	Pain, Emotional and social rehabilitation,
CS 8	User feeling	The avatar asks the user about his or her subjective health status (physically and	Emotional and social rehabilitation

		mentally). This is defined in the personalized pathway.	
CS 9	Speech and swallowing therapy	vCare shall provide digital support for therapy of dysphonia, dysarthria, oropharyngeal dysphagia via serious games.	Speech and swallowing therapy

Table 2: List of supporting services

#	Name	Description
SS-1	Weather	Provides weather information for a given location and given time.
SS 2	Agenda	Provides information to remind the patient about non-pathway related events, e.g. family events etc. Even though the agenda is integrated into the UI, this service forms the backend holding and providing the data.
SS 3	Standby	Puts the VC in a standby/passive mode to not disturb the patient

Table 3: List of data services

#	Name	Description
DS 1	Location of the patient in the house and home activity/inactivity monitoring	Detection of the location of the end-user on room level and measurement of time where the user spends most of the time at home. This service will also detect the user leaves the house.
DS 2	Body position detection	Detection of the current body pose of the patient and relies on the use of a wearable sensor (accelerometer, e.g. integrated into a smartwatch). The data analysis will be performed off-device.
DS 3	Object use detection	Detection if certain objects are used. This will be realized by mounting accelerometers or NFC tags on objects, like the cane.
DS 4	Fall detection	Detection of falls using a wearable device (Sense4Care)
DS 5	Monitoring of vital parameters	Collecting vital parameters using personal health devices (blood pressure monitor, balance board, weight scale, glycosometer,...

DS 6	Monitoring of physical activity level	The monitoring of physical activity will include used energy, number of steps, pace etc.
DS 7	Detection of activities of daily living	Collection of the user's behaviour at home, e.g. time at the bed, time watching TV, the time consumed for lunch etc. This services also detects deviation from expected behaviours
DS 8	Social monitoring	This service will detect if there are visitors at home and will record the patient going out. This service is on top of DS-1 using the same sensor data.
DS 9	Detection of emotional state	The emotional state of the user will be estimated based on voice and facial expressions when communicating with the virtual coach
DS 10	Detection of sleep quality	The sleep quality will be measured and monitored via appropriate sensors.