

## **Virtual Coaching Activities for Rehabilitation in Elderly**

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### **D1.1 Healthy and behavioural models for virtual coaching Extended summary**

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The **vCare** project starts from the assumption that rehabilitation provides an ideal setting for the adoption of a Virtual Coach. Rehabilitation at home, supported by virtual coaches, can improve a patient's transition from clinic to home.

This report investigates healthy, behavioural and well-being models. It devises a single framework of virtual coaching for human behaviour and behavioural change.

The report's contribution is to provide a common model of action for a potential virtual coach for all the rehabilitation pathways covered in the **vCare** project.

The **vCare** methodological approach was developed in the project's first work package (WP1). The approach consists of two phases:

Clinical Concept (the design the overall user framework)

Piloting (testing and validation of the **vCare** solution).

The Clinical Concept is composed of three tasks:

Task 1.1: Healthy, Behavioural & Well-Being models

Task 1.2: Narratives for virtual coaching

Task 1.3: Knowledge representation requirements.

This report is the outcome of the first task of the **vCare** project. It provides an input to Task 1.2. The report can be usefully read in conjunction with deliverables D1.2 and D1.3.

## BACKGROUND

Rehabilitation pathways are specific to each pathology: they offer standardised descriptions of rehabilitation processes. **vCare** adapts the concept of rehabilitation pathways as a basis for describing a personalised rehabilitation programme in a multidisciplinary setting.

**As a first step:** The structured care pathways were analysed starting from clinical experience in a real-world setting. The focus of the analysis concentrated on the pathways' impact on well-being during everyday behaviour.

**As a second step:** The relevant literature was reviewed in a systematic manner to find out how virtual coaches had previously been used in clinical applications, and to what extent the approaches taken were supported by evidence. An analysis was also undertaken of the consortium background knowledge, emerging from the former European projects in which partners of **vCare** consortium had been involved. This effort was made in order to enlist all the possible technological solutions and services available to support the **vCare** project.

## DESIGN OF A MODEL

Based on these two in-depth analyses, a **vCare** model was designed to support the virtual coaching. Ideas were gathered from the **vCare** clinical focus group.

The group defined two main domains on which the virtual coach should be based. These two domains are represented by horizontal and vertical axes on a diagram (see *Figure* for a detailed illustration). For the horizontal axis, a domain related to social interaction was designed, which ranges from the "personal sphere" to a "social domain" (interaction with the other). To define the vertical axis, two correlated variables were selected that are related to the use of the technologies: the "intrusiveness" and the "interaction". These choices were inspired by the need to put the user in the centre of the **vCare** model.

To delineate appropriate application areas for the virtual coach, three main areas were defined that are based on three models of living (see the horizontal axis):

- the **Healthy** model, aimed to support rehabilitation of the patient (*the blue bar in Figure*).
- the **Behavioural** model, targeted to support the risk reduction, the adherence to the care plane, and the lifestyle of the patient (*the orange bar in Figure*).
- the **Well-Being** model, directed to promote an active life (*the green bar in Figure*).

These three separate models became part of a single, unique model for **vCare**, called a comprehensive model. Overlap between the three models is an essential part of the **vCare** model.

Three additional levels were defined, in which the potential interaction/intrusiveness of the virtual coach increases (see the vertical axis). They are:

- At the **lowest level** of interaction, the virtual coach should work like a reminder device, with light feedback offered to the patients.
- At the **medium level**, the future device should be more participative, implementing verbal messages, and supporting the rehabilitation programme.
- At the **highest level**, the virtual coach involves emotional and motivational aspects.

The proposed comprehensive model takes into account the four main objectives of the **vCare** project. These are to improve the quality of life, reduce risk factors, encourage adherence to care plans, and promote health.

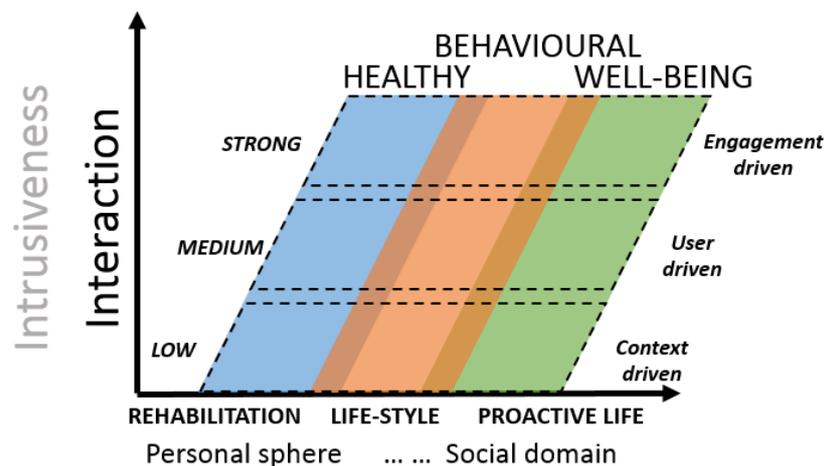


Figure: Proposed vCare model for the virtual coaching service

## USE OF THE MODEL

This **vCare** report provides a first step in developing and validating a new information and communication technology (ICT)-based virtual coaching system that can empower and motivate people during the rehabilitation process. The ambition of the proposed model of virtual coaching, in the **vCare** setting, is to unite four different aspects of virtual coaching in a comprehensive way: the technical, medical, social, and research aspects. The model integrates semantic technologies (reasoning, machine learning, behavioural models, and predictive analytics), together with well-elaborated coaching services, and clinical pathway services. As a result, the model advances significantly the current state-of-the-art in virtual coaching.