# An Ontology-based Recommender System to Promote Physical Activity In The Pre-Frail Elderly

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## Introduction

Frailty is a prevalent condition in which the older adult is at an increased risk of developing disabilities and adverse events such as dementia, falls, hospitalization and mortality. Physical activity has been shown to be a preventative factor for frailty and its progression [1].

The focus of this research is to keep seniors physically active by designing an intelligent system that recommends exercises tailored to the individual's health status, goals and preferences. The recommender engine will be integrated in CoCo [2], a web-based platform that allows elderly to perform physical exercises assigned by healthcare professionals at the home setting.

## Method

In the design of the recommender system, an ontology-based approach is taken as relevant data can arise from heterogeneous sources ranging from multiple software systems to different sensors such as activity trackers.

### Recommendation Steps

To provide the most clinically relevant exercise while respecting the elderly's goals and preferences, the following steps are taken:

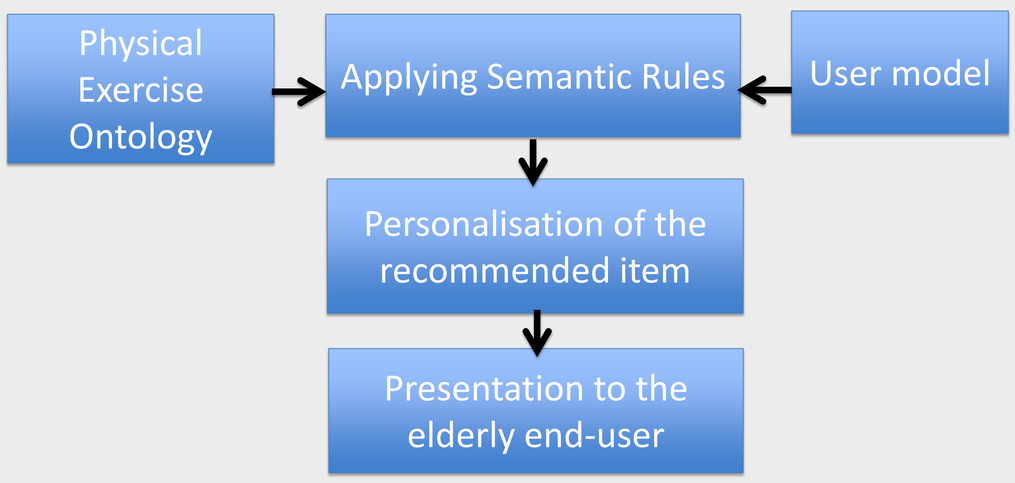


*Figure 1. Recommendation Procedure Steps*

### Ontology Construction

A workshop with a group of physiotherapists was organized during which the participants explained their approaches towards prescribing exercises to the older adults.

The qualitative analysis was performed in the Atlas.ti software in which 253 terms were identified to be of significance.

The preliminary ontology was constructed using the Web Ontology Language (OWL) and with the help of researchers active in the field of Telemedicine and human movement.

## Results

The Physical Exercise Ontology will function as the Knowledge base against which semantic rules will be executed.

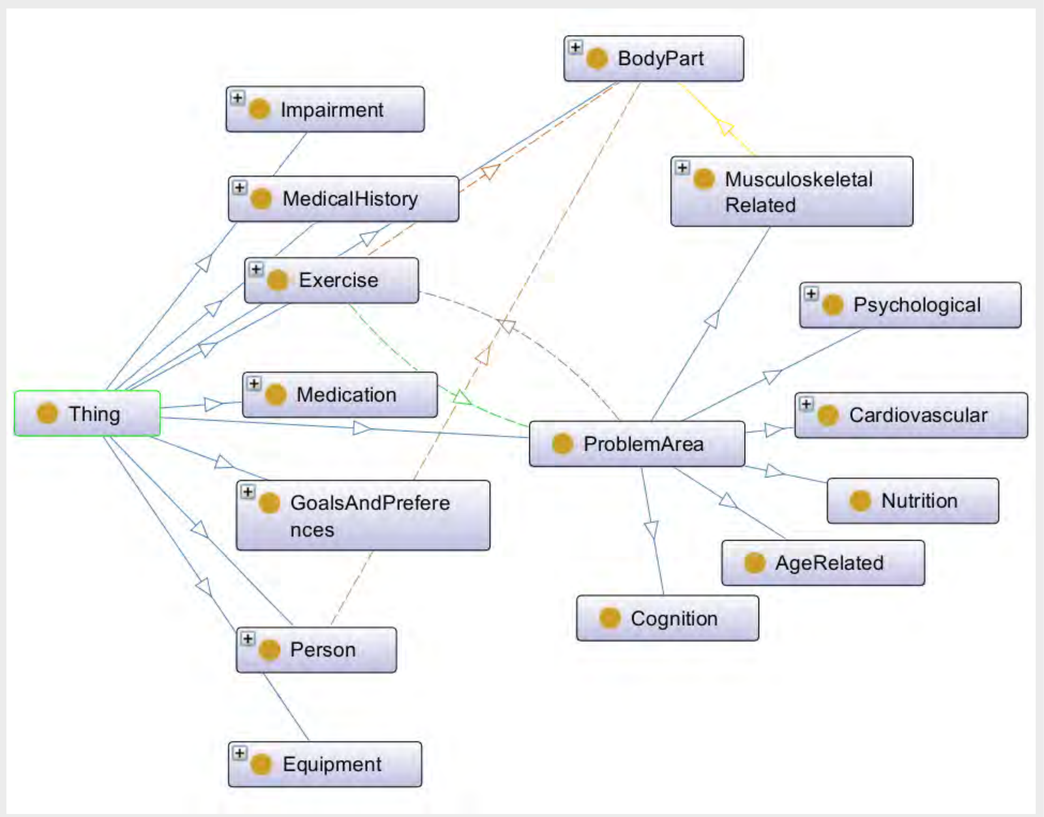


*Figure 2. The Physical Exercise Ontology constructed in the Protégé Software*

## Ongoing and Future Work

The Physical Exercise Ontology will be further refined by follow-up focus groups with physiotherapists.

The recommender system will be implemented in an iterative process taking into account more user information as data becomes available.

The system will be first evaluated with the domain experts e.g., physiotherapist. At the later stages, the effectiveness of the envisaged system will be validated with a group of older adults (65+) in terms of health improvements and adherence to the exercises.

## References

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[2] Tabak, Monique. "Telemedicine for patients with COPD: new treatment approaches to improve daily activity behaviour. " University of Twente, (2014).

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