City4Age frailty and MCI risk model

Deliverable ID	D2.1
Version	1.0
Contractual delivery date	31/03/2016
This version delivery date	30/03/2016
Status[1]	Final
Dissemination level[2]	PU
Leading partner	MMED
Contributors	UNIPV

---

[1] ToC (v# = 0.0), Draft (v# < 1.0), Final (v# = 1.0), Improvement (v# > 1.0)

[2] PU: Public, CO: Confidential, only for members of the consortium (including the Commission Services)

Executive summary

Deliverable *D2.1 City4Age frailty and MCI risk model* presents an initial attempt at outlining how risks of MCI and frailty onset can be assessed in the frame of the City4Age project.

The work is based on an extensive review of current geriatrics knowledge, and it aims to propose relevant measurement Instruments that are:

- valid and reliable
- able to predict the onset of critical health conditions in individuals (MCI and frailty respectively)
- linked to behavioural traits that can measured by sensors and other datasets available in the city environment.

For each Instrument, an introduction, relevant literature references and a comprehensive description of its structure (to identify which parts may be of interest to City4Age) are provided.

Overall, 8 Instruments for MCI and 11 instruments for frailty have been proposed, for a total of 226 Items.

The primary objective of this effort – at the current stage of the project – is to enable City4Age pilot Partners to model the risk detection needs of their respective testbed scenarios, by connecting them with Instruments and/or Items that have proven predictive value.

This, in turn, allows to base the pilots' data collection strategy (e.g. sensing equipment, feature extraction, etc.) and behaviour reconstruction requirements (e.g. activity to be monitored) on a sound and reliable foundation.

The quality of the modelling will then be assessed during the testbed experiments.

Several interesting insights are already discernible in this first version of this document, as for instance:

- the importance of the Instrumental Activities of Daily Living, which (a) are significant for both MCI and frailty prediction, (b) are directly described in behavioural terms, and (c) have been demonstrated to be more sensitive to initial signs of frailty and MCI, when compared with basic ADLs
- the importance of gait, a behavioural characteristic that can potentially be extracted from motions measures taken through the smartphone, which is crucial for early detection of frailty and that has also been demonstrated, by some authors, to be linked to MCI risks

It has not escaped the attention of the City4Age Consortium that potentially new indicators can be devised "from scratch" by directly linking sensor data streams to ground truth regarding the onset of frailty and MCI, without the "intermediation" of existing, recognized indicators. Although this direction cannot be easily pursued in City4Age, as it would require time and resources beyond those available to the project, the approach proposed in this document will still provide relevant insights to researchers (including Consortium Partners) that will be willing to take on this challenge in the future.

Next versions of this deliverable, due at months M21 and M27 respectively, will add extra content, in particular thanks to new information that will be available after the analysis of testbed experiments:

- assessment of the model Indicators' and Items' quality when used as a basis for unobtrusive sensing in different urban contexts
- relationship with the findings of other initiatives, in particular the *European Innovation Partnerships* on *Active and Healthy Ageing*, and on *Smart Cities and Communities*
- guidelines and recommendations directed to Social Services, for the application of the City4Age risk detection model to specific needs of addressed elderly populations