D2.1 Digital mobility database of existing real-world and laboratory data and algorithms [confidential]

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Summary

The aim of WP2 is that of providing a fully validated set of algorithms for the estimate of digital mobility outcomes (DMOs) starting from data collected with one sensor located on the pelvis or lower limb. The first stage of the planned development and validation process entails the implementation and optimisation of concurrent existing algorithms and their comparative assessment on existing datasets. This will allow to pre-select a number of valid solutions to be then fully validated on new data collected from all population of interests during the actual technical validation study.

This deliverable reports on the work done to enable this first step of the validation process, which entailed three main critical steps:

- Identification of existing digital movement datasets, suitable for the purpose of a technical validation;

- the generation of a database of standardized datasets with laboratory and real-world data;

- the identification and implementation of existing algorithms for the evaluation of digital mobility outcomes.

We initially identified 52 existing datasets from 13 partners. Among the 52 datasets, we selected 8 of them, which had specific characteristics that would made them suitable for the validation of algorithms extracting the digital mobility outcomes of interest for the Mobilise-D project. We found a profound lack of harmonization between datasets recorded by different partners, including differences in data collection techniques, data formatting and also in terms of type of chosen gold standards. Therefore, we designed and implemented the following tools: a) a standardization procedure for the provision of harmonized data for algorithm validation; b) software code needed to enable automatic implementation of the standardization when possible; 3) the definition of a set of metrics to account for different quality of gold standards.

As a result, eight fully standardized datasets, containing sensor data from laboratory and free-living settings, together with gold standards, are now available and readily accessible by all Mobilise-D partners through the E-Science Central platform.

The existing algorithms have also been identified and implemented and will now be evaluated on these standardized datasets. These include algorithms for the quantification of walking speed and other DMOs, including gait sequence and stride detection, turning detection, and secondary mobility outcomes such as pace, rhythm, variability, and complexity.