



# Deliverable D24.8

*Product development accomplishment*

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## Glossary of Terms

**ECHORD++:** European Clearing House for Open Robotics Development Plus Plus (E++ for short)

## **1 Product overview**

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ASSESSTRONIC is a powerful tool designed to assist health professionals during CGA process.

It is a modular solution that allows to perform cognitive tests, or physical tests or both, depending on the costumers' needs. In terms of hardware, it requires just a tablet PC running Android OS for cognitive assessment and for managing patients' data and results. For the physical assessment an additional hardware is required, consisting on a compact box embedding a 3D camera used to perceive the patients' body movements and to send the collected data to a remote server, which is used for data analysis and storage.

### **1.1 Benefit of using ASSESSTRONIC system**

The use of the system for CGA process brings several benefits for health professionals and patients

- + Parallelization of the test and time saving for health professionals
- + Ability to manage autonomously the execution of some tests with unbiased test results (less susceptible to the human subjectivity)
- + Ability to interact in a natural way (voice + touch screen)
- + Ability to display information and results in a user-friendly way
- + Ability to record both results and raw data for post processing analysis and later comparison
- + Cost reduction
- + Easy tracking of the patients' performances
- + Decreasing of anxiety experienced by patients during the interviews performed with health professionals

### **1.2 System components**

Depending on the configuration bought, the system can be used for cognitive tests, physical tests or both.

### **1.3 Cognitive tests components**

To perform the cognitive tests only a tablet PC running Android OS with Internet connection is required. The user needs a licence to use the ASSESSTRONIC application which allows doctors, patients and relative to perform different cognitive tests, display the tests results, create and modify patients' profile and so on.

### **1.4 Physical tests components**

To perform physical tests the user requires a tablet PC running Android OS and the ASSESSTRONIC box, which embeds a 3D camera used to observe the patients'

movements during the physical tests. Both the tablet PC and the box have to be connected to Internet. The licence to use the ASSESSTRONIC application is needed.

## **1.5 Server**

Both the tablet PC and the ASSESSTRONIC box communicate with a remote server used both as database to store raw and processed data (videos, audio tracks, tests results etc.) and as processor to perform the analysis of the collected data.

## **2 Hardware achievements**

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The main approach of ASSESSTRONIC since the beginning of the project has been to keep the product as simple as possible with 2 principal goals: acceptability by the end-users (the system has to be reliable and easy to use) and affordability (low cost and low maintenance required). With these aims in mind, the system has been designed around an element which is very low cost and used in everyday life: a tablet PC. The additional module used for the physical-based tests is a box that embeds in an elegant and functional design few pieces of hardware which allow the perception of patients' body's movement in a quite direct and hassle-free way.

In this section of the document only the box is described because in terms of hardware it constitutes the only component tailored for the product, and so the only achievement in this sense.

### **2.1 The ASSESSTRONIC box**

The ASSESSTRONIC box is a compact and portable device used for performing physical-based tests. It embeds a 3D camera which is used to observe the patients' movements during the physical tests, a battery pack to power the camera, a ON/OFF switch and several port to connect with the camera from outside the box (HDMI, USB and micro USB). Several designs have been realised and tested. The final design is shown in Figure 1. The frame is 3D printed in PLA. The box dimensions have been accurately chosen in order to minimize the encumbrance and to maximize the perception performance simply placing the box on the floor (no need to use external additional supports to lift up the box).



Figure 1 ASSESSTRONIC box

### 3 Software achievements

In this section the software designed and developed to use the product is described.

#### 3.1 Architecture

In Figure 2 the architecture of the system is illustrated. The 3 main elements (tablet PC, box and server) communicate with each other through the net. In the case of cognitive-based tests the box is not used, so in this configuration the data exchange happens only between the tablet PC and the server.

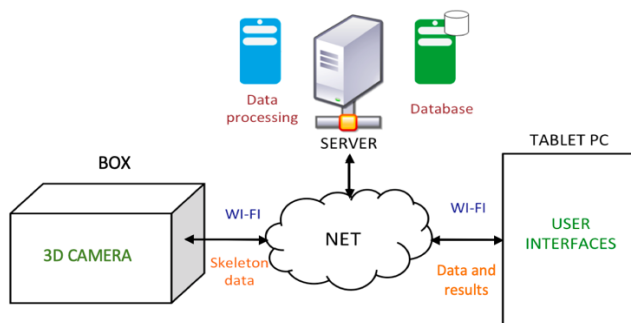


Figure 2 Overview of the ASSESSTRONIC system architecture

This architecture is fully implemented and functioning in the actual prototype.

### 3.2 The app

The application on the Tablet PC can be run in 3 different modes:

- + Patient mode, to present the survey forms to be performed by the patients (Barthel and Get Up & Go tests) and see the results obtained by the patient only
- + Relative mode, to present the survey form to be performed by the relatives (Barthel and Zarit tests) and see the results obtained by the relative only
- + Physician mode, to perform manually the tests, to consult and modify the tests results and manage the patients' data (including adding and updating new patients in the database)

It is available in English, Spanish, French and Italian and it offers the option of easily enabling and disabling the voice recognition. The vocal interaction works properly with the different languages if the language set for the tablet PC is the same language selected for the ASSESSTRONIC app.

Trough the app, the medical staff can add a new patient in the database and update the data of already existing patients, schedule consultations with the sequence of tests the patients and relatives should perform, run the tests, display and modify the tests results.

The patients and the relatives can use the app to perform the tests, to display the results of the tests they performed (but they cannot modify them).

All the functionalities described above are fully implemented in the system. However, some details need to be improved yet. For instance, the results page has to be improved in order to filter the results to display following different criteria (e.g. the type of the test, a specific date and so on). Also, the page to schedule consultations needs some improvements. As we discussed with the medical staff the doctors should be able to schedule more than one consultation and to modify the consultations that are already planned. We planned to work on these achievements in the next few months after the project end.

### 3.3 The Get Up and Go analysis

The software developed for the Get Up and Go test consists on a program to collect the patients' skeleton movements and send the data to the server and a program to analyse the collected data and compute the results. This software is able to calculate data related to the gate such as steps number, frequency and length, total duration of the tests and of the single phases (getting up, moving forward and back for 3 m, sitting back) and combines all these parameters to give a global score (from 1 to 5) as final result.

This software is of course an important achievement but we intend to keep working on training it with patients' data in order to improve its accuracy.

### **3.4 The database**

As management system for the ASSESSTRONIC database we choose PostgreSQL, which is free, open-source and easy to use. The database is fully implemented and functioning. The only modification required is an additional field to differentiate patients from different hospitals (so far this information is not stored). The communication between the database, the app and the box happens through WebAPI messages and it is fully developed.

*Figure 1: An image illustrating your work*

### **3.5 Sub-headline 2**

Please note:

- + Instead of bullet points we use the plus sign
- + Like this
- + plus
- + and so on...

Looks good, doesn't it?

### **3.6 Sub-headline 3**

Example: To ensure high-level service quality an e-mail ticket system was installed which is able to guarantee a timely response to every incoming e-mail. For specific request different mail queues have been defined e.g. one for RIFs in general, one for each single RIF, one for general request, etc. Like this, incoming questions can be answered more e