EVOTION

Big data supporting public hearing health policies

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I. DESCRIPTION

Hearing Loss (HL) is a highly prevalent chronic disease (the 5th cause of disability world-wide), which increases the risk of cognitive decline, mental illness, and depression, and furthermore leads to social isolation, unemployment/early retirement, loss of income and work discrimination.

To enable successful holistic management of HL, appropriate public health policies for HL prevention, early diagnosis, long-term treatment and rehabilitation are required. In addition, HL management would benefit from detection and prevention of cognitive decline; protection from noise; and initiatives for socioeconomic inclusion of HL patients. However, the evidence for forming such policies and enabling true holistic HL management is lacking. Specifically, holistic HL management policies require access to and analysis of heterogeneous data sources.

In EVOTION, such big data from five different clinical organizations are available and continuous acquisition of real-time data produced by sensors, mobile-phones, and hearing aids used by HL patients will support their continuous update.

In order to utilize these data in forming holistic HL management policies, EVOTION is developing an integrated IT platform supporting: 1) the acquisition and analysis of heterogeneous big data related to HL; 2) policy decision making, i.e. selection of effective interventions related to the holistic management of HL based on the outcomes of 1) and the formulation of related public health policies; and 3) specification and continuous monitoring of the effects of such policies in a sustainable manner.

II. PARTICIPANT ENTITIES

EVOTION is a consortium composed of thirteen partner institutions representing universities, hospitals, research organizations, governments, and companies across seven EU member countries (i.e. UK, Denmark, Poland, Greece, Bulgaria, Croatia, and Italy) and one associate country (Switzerland). Thus, the consortium has a multidisciplinary nature with competencies from academic, clinical, industry, and health policy making communities. The EVOTION partners are:

- Oticon A/S, Denmark (Company, Project Coordinator)
- University College London, United Kingdom (University & Hospital, Scientific Coordinator)
- Institute of Communication and Computer Systems, Nat. Tech. Uni. Athens, Greece (University)
- The City University of London, United Kingdom (University, Technical Coordinator)
- National and Kapodistrian University of Athens, Greece (University & Hospital)
- Nofer Institute of Occupational Medicine, Poland (Research Organization)
- Guy's and St. Thomas NHS Foundation Trust, United Kingdom (University & Hospital)
- Athens Technology Center, Greece (Company)
- Institute of Public Health for the Osijek-Barayna County, Croatia (Research Organization)
- Pazardzhik Regional Administration, Bulgaria (Government)
- University degli Studio di Milano, Italy (University)
- Athens Medical Centre, Greece (Hospital)
- EMPELOR GmbH, Switzerland (Company).

III. PROJECT GOALS

In the first 18 months, EVOTION has specified platform requirements; designed the IT architecture; reviewed and ensured data privacy and security; implemented platform components according to the architecture specifications; and developed a novel specification language for the formulation of public health policy decision models (PHPDMs). The platform can:

- acquire and store data from EVOTION hearing aids; associated wearable biosensors; and ongoing activity of the EVOTION mobile-phone app
- acquire and store retrospective and current patient data from existing clinical repositories
- perform analytics using big data methods, and
- produce simulations to support decision-making.

A unified protocol for managing over 1200 patients across the clinical sites in Greece, the UK and Denmark has been developed together with the implementation of the EVOTION platform.
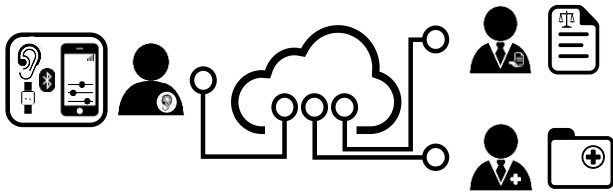
Figure 1. EVOTION platform (the cloud) with three connected stakeholders: Patients (left), Policy Makers (upper right), and Clinicians (lower right).

The EVOTION platform, with relevant stakeholders, is illustrated in Figure 1: EVOTION platform. Today, connections between all stakeholders and the platform are enabled while the platform is powered. So far, clinical validation and the formulation and modelling of public health policies with the EVOTION data have been completed.

IV. FUNDING AGENCY

V. PUBLICATIONS

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