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The DAPHNE Project

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Abstract

This paper summarizes the DAPHNE Project presented at the ICTH 2016. The DAPHNE (Data-as-a-Service Platform for Healthy lifestyle and preventive medicine) Project is supported by the European Community's FP7 research programme with the objective of providing personalized ICT services to support healthier lifestyles for patients with obesity and related chronic diseases. The DAPHNE Project has developed wearable sensors to monitor health behavior, with data aggregated and transmitted to a cloud-based platform where it can be accessed by health care professionals to provide off-site monitoring and clinical care.

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1. Introduction

The prevalence of overweight and obesity across Europe is high: more than 50% of the total European adult population are overweight (BMI>25) and in several Member States more than 20% of adults are obese (BMI>30)[1]. Overweight and obesity contribute to mortality and the burden of major chronic diseases, such as cardiovascular

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diseases (coronary heart disease, hypertension, and stroke), various types of cancer (endometrial, cervical, ovarian, prostate, breast, colon, rectal, kidney, liver and gall bladder), type 2 diabetes, osteoarthritis, reproductive disorders, sexual dysfunction, complications in pregnancy, as well as psychological and social problems[2].

Data from several studies suggest that childhood obesity has also increased steadily in Europe over the past three decades. In Europe, almost 20% of children are overweight or obese, with some of the highest prevalence levels observed in southern European countries[3].

The drivers of obesity include low levels of physical activity, high levels of sedentary behavior and unhealthy dietary intake, and these factors offer potential opportunities for prevention[4]. The production of healthy lifestyles and prevention of obesity will lead to a reduction of costs to the European health care system, increased productivity in the labour force and improved household incomes for the individual and their families[5].

The DAPHNE project (www.daphne-fp7.eu) was developed in response to the call for proposals on the use of ICT in health services to support personalized health, active ageing and independent living. The objective of the DAPHNE project is to develop a state-of-the-art ICT platform for reducing sedentariness and improving dietary habits, based on 'data-as-a-service' and providing the necessary organizational, security and business models for the exploitation of the DAPHNE project results.

The three-year development project runs 2013 through 2016 and, at the time of the ICTH 2016 symposium, the project can report on the development of personalized sensors, models and services, and the pilot-testing of the system in clinical environments with adult and adolescent patients.

2. The DAPHNE model

The DAPHNE platform is designed to deliver personalized guidance services for lifestyle management to the individual citizen or patient by means of (i) advanced sensors and mobile phones to acquire and store data on lifestyle aspects, behavior and surrounding environment, (ii) individual models to monitor their health and fitness status, (iii) intelligent data processing for the recognition of behavioural trends and (iv) specific services for personalized guidance on healthy lifestyle and disease prevention.

The intention is to ensure the DAPHNE platform will be open to hardware and software developers, providing data for different personalised health services, both at the citizen and service provider side. At the same time, data generated by end-users will be available in an anonymous and secure way for other stakeholders, like health insurance companies, public/private health companies, research, etc. which will be able to use it for orientation in their business. The paradigm Data-as-a-Service, as an evolution of Software-as-a-Service, will be used for data publication and consumption, taking into account relevant security and anonymity aspects, and enabling new business ecosystems and models that will be fully exploited before and after the finalization of the project.

Data are being made available in a Data-as-a-Service platform, taking into account security issues, enabling integrated data exchange for key stakeholders to empower a high-performance population health management ecosystem. These data will be available for different types of consumption:

a) Individual´s input data for clinical use, meant for personal guidance and coaching, that can assist the doctors in their work and help in the patient co-production of health.

b) A global big data source, for different stakeholders that could use global market data for clinical research or for orientation in their businesses.

Figure 1 (below) shows the overall conceptual model, indicating the collection of information on body movement and body position, dietary intake, and physiological activity from the individual, the integration of this data using intelligent systems and algorithms to provide estimates of health-related behaviors, the transmission of this to cloud-based platforms where it can be made available to health professionals, and where it can be anonymized in order to