METABO

Controlling Chronic Diseases related to Metabolic Disorders

The mission of METABO is to contribute to the improvement of diabetes management by providing patients and medical doctors with a technological platform to help them share and gather information that will allow them to enhance patients' self-management and improve medical therapies and diagnose.

Objectives of the Project

Problem or Context: Diabetes Mellitus is a chronic metabolic disturbance characterized by increased blood glucose concentrations and decreased insulin secretion and/or action. Today, diabetes has no cure. However, the long term control of blood glucose levels and other metabolic parameters has been shown to significantly decrease the risk of developing chronic complications.

Although this risk can be greatly reduced by restoring normal or near-normal blood glucose levels, the intensive use of glucose lowering medications (especially insulin) aiming to optimal metabolic control leads to a significant increase in episodes of hypoglycemia.

Project: METABO addresses the need of health care practitioners:

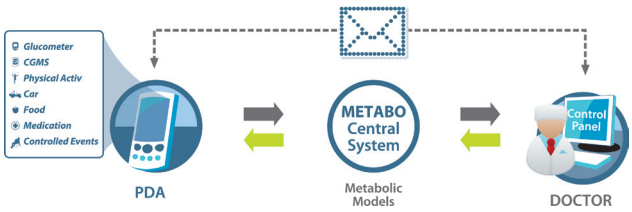
- to develop **and implement more effective and adaptive monitoring and modelling processes of metabolic diseases** for clinical research purposes, as well as improving care provision
- to **design, develop, implement and validate an integrated system and technology interoperable platform** for the effective monitoring of metabolic parameters of diabetic patients
- to **generate predictive personalized models** and their application in care processes of diabetes.

Project Description

The aim of METABO is to set up a comprehensive platform, running both in clinical settings and in every-day life environments, for continuous and multi-parametric monitoring of the metabolic status in patients with diabetes and associated metabolic disorders.

The parameters monitored, in addition to "traditional" clinical and biomedical parameters, include subcutaneous glucose concentration, dietary habits, physical activity and energy expenditure. Environmental parameters will be monitored in order to control hazardous situations, like a patient driving a car, when the loss of consciousness due to a hypoglycaemia can have dramatic consequences.

"METABO closes the loop between the Patients, the Clinical Professionals and the health organization."



The data produced by METABO will be integrated with the clinical data and the history of the patient and will be used in two major interrelated contexts of care:

- **Setting up a dynamic model of the metabolic behaviour** of the individual to predict the influence and relative impact of specific treatments and of single parameters on glucose level
- **Building personalized care plans integrated in the current clinical processes** linking the different actors in primary and secondary care and improving the active role of the Patient.

CASE STUDY / PRACTICAL EXAMPLE / SCENARIO

Ana is a 59 years old engineer, independent, living alone. She goes to the office every day and works in her computer and in the lab for the experiments she carries out. She has been a Type 2 diabetic for 6 years.

After using the METABO system she learnt that exercise affects her during a couple of days and she manages her insulin doses accordingly. Sometimes it is hard because changing one aspect of her treatment, whereas it is food, insulin doses, activity or schedules, will affect her for a couple of weeks more or less until she adapts to those changes, but METABO was crucial for her to understand that the only key to succeed and be healthy was in her hands and was her self management.

When she needs to travel long distances by car she uses a METABO-compliant car in order to have a constant hypoglycaemia monitoring while driving.

The complexity of diabetes pathophysiology and the relatively high number of environmental factors influencing daily metabolic profile do not allow to clearly define a "single" diabetic patient and, in turn, a "single" scope for the METABO system.

As a result of the work carried out in conjunction with the clinical partners in the consortium, medical professionals expert who have been consulted in several workshops and with the input provided by several interviews with patients, METABO has defined a **situation /problem-oriented vision of the disease,** in order to focus its features and try to address those issues that most of diabetic patients and physicians have to deal with.

This approach responds to the identified needs of real clinical environments in the different health care systems and to a study of the current market needs and trends for health technology.

Expected Results & Impacts

From a clinical and scientific point of view METABO contributes to increase the understanding of the cause-effect relationships between clinical parameters, lifestyle habits and pharmacological treatments on metabolic control of the disease. METABO intends to have an impact improving the current clinical processes of management of chronic diseases, such as diabetes.

From a social point of view METABO aims to implement the paradigm of integrated patient-centred care empowering patients to directly control and manage their disease, shifting the "locus-of-control" from a physician-driven situation to a patient-managed self monitoring and care perspective.

From a business perspective:

- METABO **middleware solution** is a potentially interesting product for producers of medical devices and sensors, who could offer additional monitoring facilities to customers.
- The METABO platform **integrates models and a care pathway generator** as a tool to allow a continuous patient and disease management in hospitals and medical networks.
- **The modular architecture of METABO platform** enables an easy and low-cost adaptation to other medical domains, so offering a market opportunity for IT providers active in the healthcare sector.

January 2008 - June 2011
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- National Technical University of Athens (Image, Video and Multimedia Systems Lab -ICCS/NTUA, Greece)
- S.A.T.E. Systems and Advanced Technologies Engineering S.r.l. (Italy).

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Diabetes, Decision Support Systems, Modelling, Personalised health, Clinical Pathways