## PUBLISHABLE SUMMARY

POCEMON Objectives and Vision

POCEMON stands for a large-scale integrated R&D project aiming at the development of a mobile monitoring and diagnostic platform for detecting a large number of Autoimmune Diseases. In an Autoimmune Disease, a person's immune system attacks organs in his or her own body. Diagnosing such conditions is highly demanding and so far possible only in specialized central laboratories.

The purpose of this project is to combine new hardware and software in the form of so-called "pocket-sized labs" (i.e. labs that can be fitted onto a microchip) linked remotely to a central computer with appropriate diagnostic software. In the future, this could make it possible for practice-based doctors also to offer their patients top-quality diagnostic services. Simple blood or saliva samples will be analysed by mobile devices (comparable with the well-known handheld-PCs or mobile phones). During the subsequent diagnostic process, the doctor will be assisted by computer-supported linking of the analysis results from the microchip with extensive data from relevant databases.

The vision of the POCEMON project states that the project will provide to the primary healthcare community a portable diagnostic platform capable to early-diagnose the predisposition of an individual to critical autoimmune disorders.
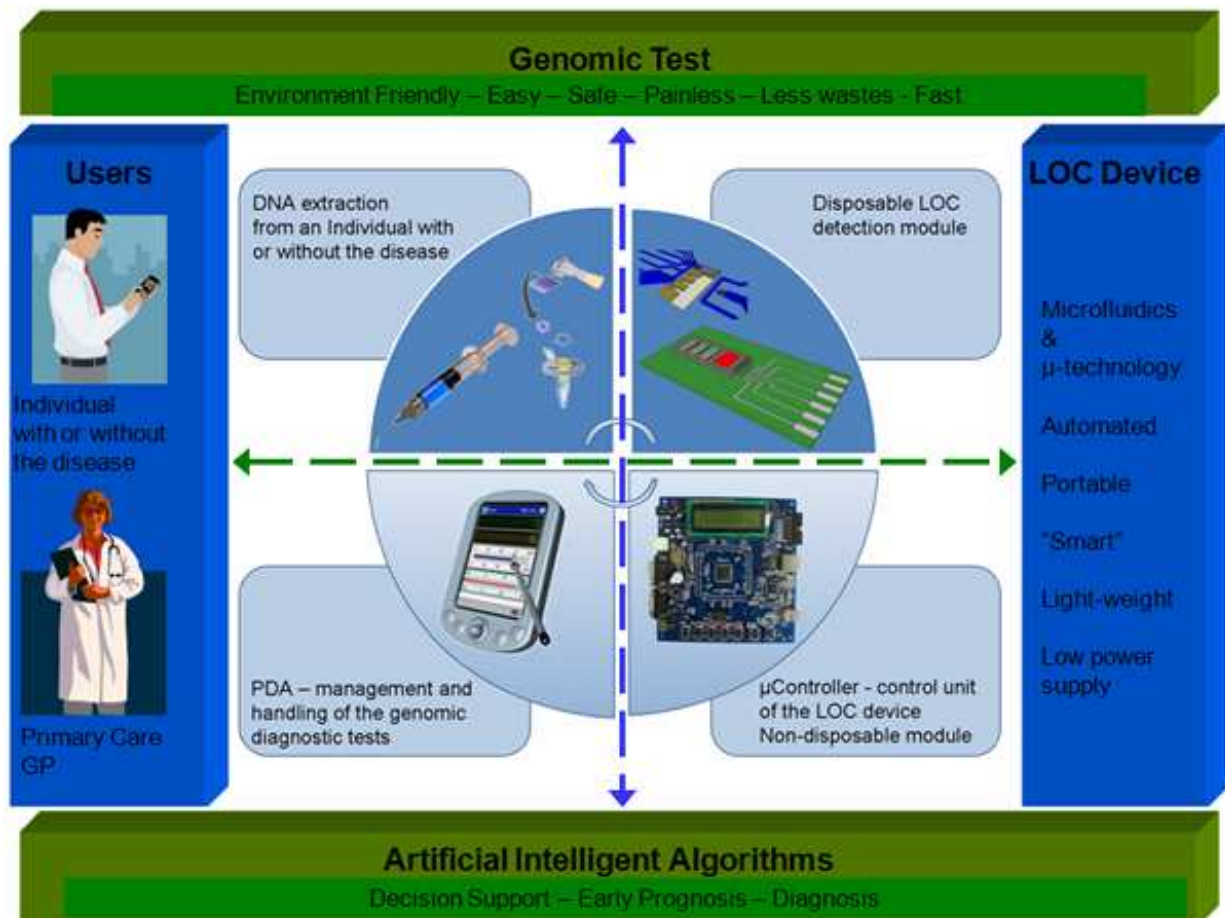
The development and realization of a portable diagnostic platform with applications to the primary care community suggests that in the forthcoming years a wide range of autonomous micro-devices will be able to diagnose complex diseases using the genetic profile of an

individual. Behind the technological advancement and scientific effort it is defined the innovative concept of a "smart" micro-device capable to lead a new generation of diagnostics applied at any point-of-care.

POCEMON Objectives
- Development of a diagnostic Lab-On-Chip platform based on a genomic HLA-typing microarrays
- Development of new LOC micro-technologies for analysis of microarrays with probes of HLA oligonucleotides
- Development of a Desktop Diagnostic System and Data Management Server with an HLA typing database
- Facilitation of efficient diagnosis at the primary healthcare level across Europe (now available only at hospitals and medical centres)
- Making new ICTs easily accessible to the EU primary care community

Expected Results and Impact
By supplying PCPs with a diagnostics support platform, POCEMON exerts a profound impact on primary healthcare diagnostics for Autoimmune Diseases:
- Numerous advantages over prevailing diagnostic techniques: Higher quality of care, shorter and less complex diagnostic procedures and painful medical examinations, more technology-oriented healthcare, cost reductions in hospitals and large-scale screening for Autoimmune Disorders are the result.
- Efficient patient management: Genetic testing combined with selective information about the patient's phenotype may provide healthcare professionals with further indicators of the likelihood of disease. Beyond identifying susceptibility to RA or MS, POCEMON helps to predict the likely course and severity of the disease
- and treatment: Additional information regarding a patient's pharmacogenetic susceptibility to successful treatment with selected therapies (or risk of adverse reaction) would be a valuable asset to RA/MS healthcare specialists. Existing protocols for RA and MS diagnosis fail to predict the potential of therapeutic intervention response and possible adverse reactions to drug therapy in patients.
- Predominant clinical pathways: Adaptation of the current clinical pathways to the envisaged scenario by incorporating the POCEMON device, indicates the reduced time scale required for the patients to complete the patient pathway and reach the most suitable, safe and effective treatment for that patient.
- The prediction of a patient's predisposition to RA or MS, incorporating environmental as well as phenotypic factors, and providing decision support in developing a pharmacogenetics-based patient treatment plan may be of extensive benefit to patients and healthcare commissioners alike.

POCEMON First Year Achievements
The collection of samples for both Multiple Sclerosis and Rheumatoid Artritis has progressed and the analysis is ongoing allowing the Consortium to approach the design of predictive algorithms for the two diseases in the next few months.

The evaluation of the state of the art of LOC devices and of the key-points for the realisation of high performance devices has been completed. Namely, issues related to the general architecture of the LOC, to the requirements for the LOC electronics, to the realisation and performances of cantilever detectors and to the bio-chemical aspects related to the immobilization of ssDNA probes on micromachined structures. On the basis of these preliminary studies, a general architecture for the LOC has been selected, as well as a technological approach to the realisation of cantilever detectors and microfluidic structures. The technological

process for the realisation of microcantilever detectors has been defined also by means of technological tests performed in order to optimise the most critical technological steps.

Modelling and preliminary design of LOC modules (microcantilevers and microfluidics) have been performed, as well as the fabrication of first test devices for the detector module, finalised to the optimisation of the mechanical performances (e.g., stress sensitivity) of cantilever-based sensors with very low thickness (340nm-thick Si beams). Preliminary tests on their suitability for the application to LOC systems have also been performed. Preliminary characterisation of realised structure has been performed. Even as far as the implementation of software and algorithms are concerned, the work has lead to preliminary results that will be further refined and the functionality of the algorithms for the HLA genomic microarrays analysis will be delivered early in 2009.

On the Market Analysis and Exploitation side, he market analysis and definition of the business approach for the POCEMON system has progressed and the Market Investigation is to be completed at the beginning of 2009. Several papers have been presented and the Project Concept and vision has been communicated participating at fairs, workshop and dissemination events.

Project Consortium
Partners with different background and the required skills make up the Pocemon Consorium. Organizations have appropriate skills and resources in all different research and development domains required by the project.

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