

Smart Integrated Biodiagnostic Systems for Healthcare

The SmartHEALTH Integrated Project will develop and deliver the next generation of smart diagnostic systems fully integrated into healthcare systems in Europe. Driven by key applications in cancer diagnostics, SmartHEALTH will enable enhanced medical diagnosis leading to earlier and more precise results and thus contributing to an increased quality of life.

Objectives of the Project

In addressing the high economic burden of the healthcare sector, prevention, early diagnosis and informed therapeutics are indispensable. Tests must be highly accurate and well integrated into medical management to avoid unnecessary treatment and stress to users.

SmartHEALTH will address these complex issues by developing highly intelligent diagnostic technologies that are fully integrated into healthcare systems, optimising their impact in management and work practice. Driven by key targeted applications in cancer diagnostics (breast,

SmartHEALTH technology will deliver better and improved solutions for diagnostics

cervical and colorectal), the project will deliver prototype systems with the aim of moving instrumentation from the laboratory, through to portable devices localised at the “point of care”.

SmartHEALTH technology providing new solutions for cancer monitoring

Cancers are not ‘cured’ but ‘managed’. One of the major areas of progress with cancers, for example, breast cancer, is the benefit of long term therapies for reducing growth rates. This approach requires regular monitoring such that the efficacy of maintenance therapy is rapidly noted and different therapy can be initiated as required. This necessitates regular testing for cancer load. People wish to avoid hospital yet want results interpreted expertly and communicated rapidly. They want tests that do not miss problems yet avoid unnecessary worry. SmartHEALTH aims to develop such integrated cancer monitoring diagnostic devices, eventually useable in localized and more available settings.

SmartHEALTH will facilitate improved healthcare service and delivery in Europe

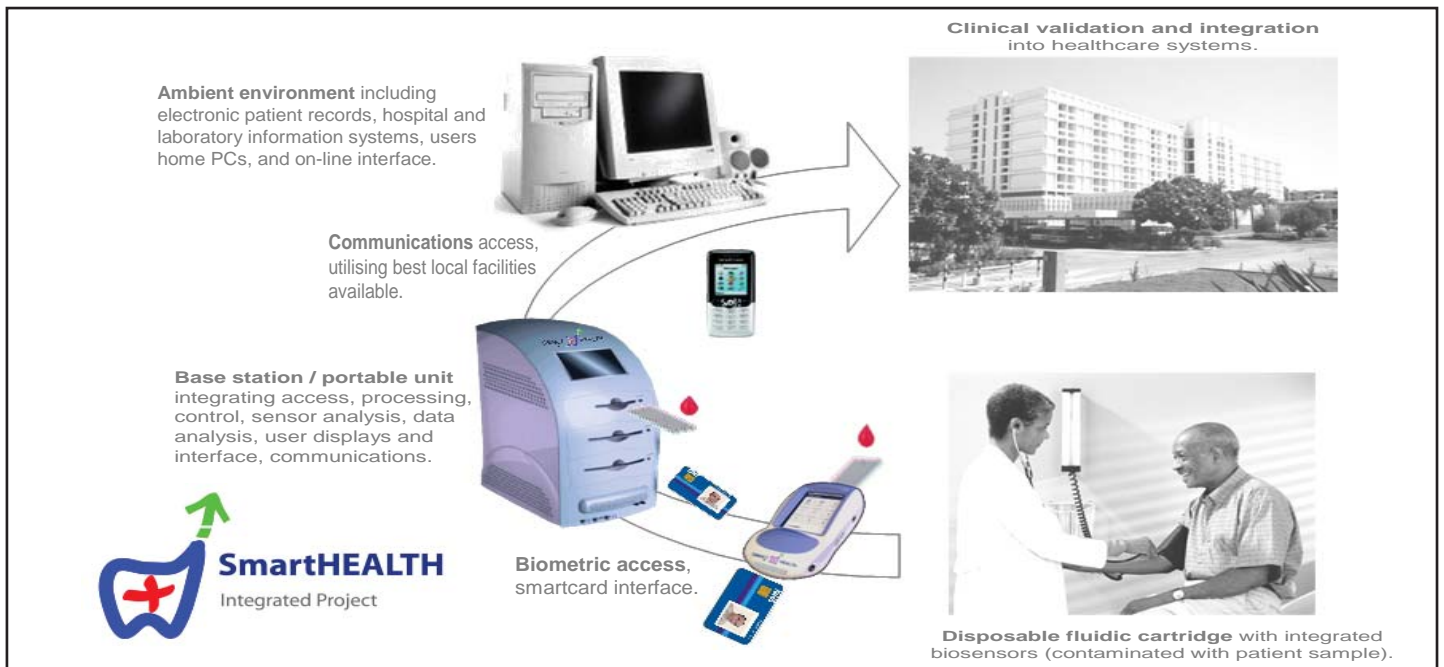
Project Description

Driven by clinical applications and MNT & IST technology, SmartHEALTH will develop an open integrated architecture for new biodiagnostic systems to support European companies exploiting bioassays or new application concepts. The initial system has a disposable fluidic cartridge with a desktop base-station linking to the ambient e-Health environment. This concept will be miniaturized and cost engineered into a portable and more available product. It will perform multi-analyte sensing and interpretation, for nucleic acids and proteins and will handle multiple biological sample types. Results will be interpreted and presented using bio-information analysis. Systems will be healthcare “user identity-” and “ambient environment-” aware, respecting confidentiality and information access rights. The IP will enable enhanced medical diagnosis, leading to earlier and more precise results contributing to an increased quality of life as well as increasing the competitiveness of the European IVD sector. Clinical areas for SmartHEALTH application are in Cancer Diagnostics - breast cancer recurrence monitoring, cervical cancer case finding, and colorectal cancer diagnostics, theranostics and prognostics. Each application includes clinical validation and commercial exploitation partners.



SmartHEALTH objectives include

- Introduce new SmartHEALTH sensor systems into future healthcare services to improve and better existing services.
- Demonstrate the role of Ambient Intelligent (AmI) medical devices and online services for pervasive healthcare provision.
- Demonstrate clinical validation of systems for targeted applications in breast, cervical and colorectal cancer.
- Demonstrate the economic benefits and means of healthcare provision for the targeted clinical applications.
- Develop new manufacturing technologies for realisation of unique sensor solutions integrating fluidics, transducers and biological assays.



Expected Results and Impacts

The European Community has made health and well-being one of its top priorities, not least in view of EU enlargement. Three lines of action have been suggested: 1) Improving information for the development of public health; 2) Creating an EU surveillance, early warning and rapid reaction capability; 3) Health promotion and disease prevention, screening and testing of target populations. SmartHEALTH impacts all these areas.

The economic impact of the results of SmartHEALTH are potentially very considerable with proposed technologies that will facilitate improved healthcare provision, from improved centralised screening systems, through to fast and flexible point of care systems. Expenditure for diagnosis generally represents less than 1% of total healthcare expenditure, thus increased testing cannot significantly increase healthcare costs but can significantly contribute to the quality of health care as it:

- Allows earlier and more appropriate and therefore less costly treatment.
- Helps to rule out expensive treatments.
- Reduces costs of treatment of complications.
- Potentially shortens the length of hospital stay by making therapies more effective and therefore more cost-effective.

The SmartHEALTH Consortium

University of Newcastle upon Tyne (UK), MiniFAB (Aust) Pty Ltd (Australia), microfluidic ChipShop GmbH (Germany), Institut für Mikrotechnik Mainz GmbH (Germany), Zarlink (UK), Fraunhofer Institut für Biomedizinische Technik (Germany), Netherlands Organisation for Applied Scientific Research TNO (Netherlands), Ikerlan (Spain), Fundación Gaiker (Spain), IMEC (Belgium), Universitat Rovira i Virgili (Spain), Wicht Technologie Consulting (Germany), NEXUS (France), Dublin City University (Ireland), Centre Suisse d'Electronique et de Microtechnique SA (Switzerland), Università degli Studi di Trento (Italy), Norchip (Norway), TATAA Biocentre (Sweden), iXscient Ltd (UK), CanAg Diagnostics (Sweden), Olivetti I-Jet (Italy), Forschungszentrum Karlsruhe GmbH (Germany), Telecom Italia S.p.A. (Italy), Charité – Universitätsmedizin Campus Buch (Germany), Frauenklinik der FSU Jena (Germany), Fundación Vasca de Innovacion e Investigación Sanitarias (Spain), St. Georges Hospital Medical School (UK).

Timetable: December 2005 to November 2009
 Total cost: €21.8M, EC funding: €12.3M
 Instrument: IP
 Project Identifier: FP6-2004-IST-NMP-2-016817
 Key words: biomedical sensors, nano technologies, microsystems, diagnostic systems, point of care, eHealth networks



SmartHEALTH

Smart Integrated Biodiagnostic Systems for Healthcare. Project co-ordinator: The University of Newcastle upon Tyne (UK)

Co-ordinator: Professor Calum McNeil

Tel: +44 191 222 8259 Fax: +44 191 222 6227 E-mail: calum.mcneil@ncl.ac.uk Website: www.smarthealthip.com