

**Hermes Partnership workshop on “towards ICT-supported health”  
March, 2011**

**Abstracts of speaker contributions:**

**Abstract:**

**J. Felix Hampe: “Re-adjusting the Focus: Priority on Prevention to Avoid Health Care”**

By taking a closer look at potential changes in the German population pyramid over the next decades we question today's tendency to put most emphasis on the aging population. Is it accurate to identify this predicted change as the dominant problem with respect to the next generations? Based on statistics on juvenile disease development in most western countries, in particular obesity data from the US, we argue that new ways of raising awareness about healthy living and early childhood education will be in highest demand. We acknowledge there are various initiatives already under way in these areas but they have had limited impact so far. We regard these areas as a major opportunity to advance new personalised mobile services and health support solutions, leading us to the notion of “empowerment of the patient”. We provide some examples and early experiences from the field of secondary prevention programs and outline some project ideas to transfer this vision to reality. We then open the discussion and encourage the audience to participate in envisioning such services and support solutions hopefully leading to trans-sector projects.

**Abstract:**

**Hermie J. Hermens: “Present experiences and future perspectives of Telerehabilitation”**

The rapidly growing number of people with chronic disorders in our western society puts such a pressure on our healthcare system that innovative approaches are required to make our health care more effective and more efficient. Conceptually, substantial gains can be obtained by moving treatment outside the intramural care systems and increase self management of the people with chronic illness. The use of technology seems obvious, especially the combination of ICT with Biomedical Engineering to enable remote monitoring and remotely supervised treatment/training (RMT). This will enable individually tailored training anywhere and anytime with an intensity not feasible in an intramural setting.

These services will become important for patients (safety, more in control, convenience), health care insurances (efficiency, cost reduction) and healthcare service providers (more effective care).

But, RMT systems are complex distributed Information and Communication Technology (ICT) systems, integrating ambulant sensing to measure relevant biosignals and subject's context information, secure data transport and storage, appropriate decisions support systems to assist in both technical and clinical decision making but also feedback on information to both patients and care providers. RMT systems can only be realized by a close multidisciplinary collaboration.

During the past years, considerable progress has been made with the technical development of the building blocks. In parallel, experience has been gained with respect to the challenges involved when using RMT systems in a clinical environment. Examples are: activity monitoring in low back pain (Awareness), an ambulant myofeedback treatment in subjects with neck shoulder and lower back pain (New, Myotel) and post rehabilitation home training (HelloDoc, Clear).

Until now, a main focus has been on the technical realization of the building blocks and small scale demonstrations. The challenge for the upcoming years is especially in the area of facilitating large scale implementations of these services, so the health care community will be convinced of the additional value of these systems and real implementation in daily health care can start.

**Abstract:**

**Wouter Serdijn: "Moving diagnostic, monitoring and therapeutic wireless medical devices into the homes and into the body"**

In order to improve health, well-being and quality of life and to reduce healthcare costs, diagnostic, monitoring and therapeutic medical devices will need to move from specialized centers into the home and interact with patients and other devices in an intelligent and unobtrusive manner.

In this presentation I will discuss the need for reliable supercutaneous (wearable), subcutaneous (implantable) and transcutaneous (through-the-skin) wireless communication networks along with a discussion of the state-of-art and future wireless communication standards, on-chip antennas, energy harvesting and radio-frequency signal processing capabilities of nanoscale electronics.

**Abstract:**

**Jean Benoit Pierrot: "NACCESS proposal: *nanoscale smart communication components and systems*"**

At the occasion of CALL 7 of the EC ICT program a consortium of Hermes Partners submitted an proposal on "nano scale smart communication components". Aim of this presentation is to highlight the research challenges in this proposal, in particular focusing on:

- introduction to general application scenarios, requirements w.r.t. powering, sensing/actuation and communications
- description of the NACCESS approach
- technology challenges and possible solutions
- focusing of the general approach to health applications
- outlook and future steps towards autonomous nanoscale systems in health application scenarios.

Abstract of the NACCESS proposal:

"Current trends for applications in wireless communications require miniaturization of devices. Future wireless sensor and actuator networks with devices down to nanometre scale will be used for applications like e.g. smart personal environments, unobtrusive telemedicine systems, environmental monitoring and monitoring of material properties. Benefits arising from nanoscale wireless nodes are numerous, how to implement them is yet less obvious. A relevant topic for future smart systems with nanoscale components is the reliable powering of the miniaturized nodes requiring some form of energy harvesting for a proper operation of systems. *NANOScale smart Communication components and Systems* (NACCESS) provides a general system design for wireless sensor and actuator networks with nanoscale components. The approach followed in NACCESS is to provide acoustic and/or electromagnetic waves from a radiating device to a nanoscale component in a certain target area where the waves are converted into power. This harvesting resembles the form of schemes in microwave tagging where readers are used to read information from tags scattering back the waves impinging from a reader. The approach makes it possible to extend schemes known to work properly in the tagging context to nanoscale devices in an evolutionary way. The wireless power supply allows for a reduced size of the devices under well defined conditions on power availability. NACCESS combines the energy harvesting with an efficient design of the protocols for wireless communication among the nodes and/or an external wireless access where the objective is to provide a functionality of the overall system for sensing or actuating purposes in the target area. A validation platform will be set up to demonstrate the basics of the overall approach. The steps to be taken need both fundamental research in the field of efficient ways for harvesting the received energy and the ways of implementing the resulting schemes and systems.

Keywords: autonomous nanoscale wireless sensor and actuator networks, energy harvesting, power efficient networked smart systems."

**Abstract:**

**Piet verhoeve: "Practical experiences & challenges to bring technology to e-care markets"**

With the rise of broadband and ICT, a technological vision towards eHealth technology has been formulated and developed towards several concepts & operational demonstrators. Although the benefit of such solutions are big and seem obvious at first sight, the uptake of the technologies is lagging behind. The presentation will give practical examples that illustrate a number of the thresholds that have been identified to be blocking the market introduction for some Belgian cases. The second part of the presentation will focus on the current trends in healthcare and translate them into practical use cases which can help creating successful scenarios for future oriented solutions.

**Abstract:**

**Paul Mitcheson: "Energy harvesting in e-health applications"**

Energy harvesting devices are now commercially available for some applications in chemical process monitoring and the monitoring of some structures. However, whilst some research devices exist for harvesting energy from the human body, these are not yet commercial or practical and do not currently achieve high enough power densities to be miniaturized to an extent where they can be ignored by the user.

This talk will review the state of the art in energy harvesting from the body, including solar, thermal and

kinetic approaches. Power densities of existing devices will be compared and the potential for improvements in power density as technology improves will also be considered.

**Abstract:**

**Łukasz Januszkiewicz “Status of e-health and tele-health in Poland”**

The e-health and tele-health are considered to be an effective way of increasing the efficiency and accessibility of healthcare system. This domain requires a complex, interdisciplinary approach that uses the telecommunication and computer expertise as well as medical experience. The presentation will cover recent e-health activities that have been developed in Poland. In addition some concept of potential new projects in this area which are being conceptualized in Technical University of Lodz will be presented.