

## PROJECT PROFILE

# CAT408

### How sensor-based systems will keep health-care costs in check and improve services and quality of life [NexGen]

**The Next Generation of Body Monitoring (NexGen) project addresses key issues related to health and health-care. It uses sensor-based technologies to ease the ever-increasing burden of treating a sick and ageing population, while reducing the cost of health-care services and improving the quality of life of recipients of these services.**

Unsurprisingly, the European Commission selected eHealth as one of six promising lead markets to address the problems of ageing. What is urgently needed is to achieve two additional years of healthy, active life, on average, by 2020 to be able to bear increased pension and health-care costs. And in a population with over 60% showing the first signs of metabolic syndrome, the need to adjust to a healthier lifestyle is urgent.

Mobile health-care systems, based on a multitude of different networked sensors (which enable ubiquitous body monitoring), are considered an important response to chronic diseases, especially multimorbidity (the presence of two or more chronic medical conditions in an individual). Furthermore, they will improve the quality of medical services and raise the independence of elderly people. New mass markets will undoubtedly emerge and nano-electronic based components will be available to secure these mobile medical electronic solutions at reasonable costs.

However, economic risk, market fragmentation and limitations of current micro- and nano-electronic technologies, together with missing components (such as sensors and energy harvesters, standardised protocols, security blocks, integration technologies for biocompatible and implantable solutions), limit the benefits of eHealth today and hinder a swift and successful commercial launch. What can be done to mitigate some of these barriers and obstacles?

#### **Integrated mobile health monitoring and implantable sensors**

NexGen will develop sensor-based systems for variable mobile health-care applications. Based on the Philips Digital Health Platform, these systems will deal with the two hemispheres of clinical and home health, together with fitness devices in practical use by an ageing population suffering from metabolic syndrome. In this context, reference architectures will be defined in order to develop devices needed to complete mobile medical systems and enable clinical assessment, including medical approval by co-operating with health-care providers and hospitals. Here, NexGen focuses on the

development of an integrated approach to mobile health monitoring and implantable sensor systems.

The goal of NexGen is to pave the way for interconnected, ubiquitous body-monitoring systems, where a set of different sensor elements interact in a collaborative way. The Philips Digital Health Platform communicates using Internet of Things (IoT) and a secured 'cloud' (a network of servers). Thanks to this communication, the two hemispheres will be linked as subjects under observation pass from good to ill health in their journey through life; and the relationship between patients' monitoring measurements is put to best use in making lifestyle choices, such as diet, hygiene and medication.

In order to achieve this goal, generic technology blocks/platforms will be developed (where possible). NexGen's sensor systems will comprise (typically high-volume scenarios):

- An implanted device for glucose monitoring;
- A non-invasive multi-parameter on-body monitor, which can be deployed in the health (especially multimorbidity) and wellness/fitness domains.

Currently available systems for the measurement of the hydration level use indirect measurement methods and laboratory devices which are bulky and non-wearable. The system NexGen proposes will use a direct, continuous measurement of the whole body's hydration. Here, non-invasive, contactless sensing (using a new concept of  $\mu$ -wave sensor to measure hydration and/or impedimetric/capacitive skin measurements) is deployed.

The multipurpose applicability of these technologies will be demonstrated in two different use cases. Based on these sensor-systems demonstrators, the functionality of mobile health-care systems will be verified; micro-electronic technologies and components provided; and new business models assessed.

Key NexGen activities will span across a variety of research fields. These include system architecture, modelling, design and package co-design, energy management and technology development, together

## PROJECT CONTRIBUTES TO

- ✓ Communication
- ✓ Health and ageing society
- ✓ Digital lifestyle
- ✓ Sensors and actuators

## PARTNERS

Infineon Technologies AG  
 Siemens AG  
 Senetics health care group GmbH & Co. KG  
 Infineon Technologies Dresden GmbH  
 B Braun Melsungen AG  
 eesy-innovation  
 NXP Semiconductors Netherlands BV  
 Philips  
 Evalan BV  
 Maastricht Instruments BV  
 NXP Semiconductors Belgium NV  
 Quad Industries  
 SIOEN Industries NV  
 Stichting IMEC Nederland  
 IHP GmbH  
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## COUNTRIES INVOLVED

-  Germany
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## PROJECT LEADER

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## KEY PROJECT DATES

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with, manufacturability, algorithms for automated evaluation of provided data, bio-compatibility and reliability. Expected project results include a significant reduction in the size of the sensor nodes, as well as, in cost and power consumption.

## Handling risk and other challenges

NexGen has to deal with the disruptive nature of technology and concepts, with accompanying risks and barriers. On the other hand, this project also offers high market potential and opportunities to significantly improve the quality of life of patients and the quality of health-care, and to decrease the mortality and morbidity caused by diabetes. One way of mitigating such risks and other challenges is to ensure experts over the whole value chain – including medical experts and experts in medical approvals – are part of the project consortium. Furthermore, the project management team will carefully manage risk during the project, through appropriate risk mitigation and contingency planning.

## Catering to a sick and ageing society

The demographic change poses a challenge to Europe as a whole, as it addresses changes in lifestyle and how chronic diseases related to metabolic syndrome – such as diabetes, cardiovascular disease (CVD) and chronic kidney disease (CKD) – are handled clinically. OECD statistics on health from 2012 show that Europe will be one of the first regions to encounter the effects of an ageing society. It is expected to trigger a rise in the cost of health-care: from 7.2% of GDP in 2010, to 8.5% in 2060.

Essential to the balance of the burden of health are the costs that society has to bear in providing health-related services. Across Europe, with very different health expectations, systems and population profiles, the individual investment and effort will be key to dealing with health-care costs related to ageing.

## Strengthening Europe's competitiveness and markets

Research activities will be performed along strong and broad value-chains, leveraging research results for new business cases. Hence industrial competitiveness, based on knowledge gained from European research, will be strengthened and new innovative products in the business of mobile health-care created. NexGen is set to significantly strengthen European competitiveness in this market segment, by providing sets of components and technologies ready for medical approval. NexGen-based systems will be high-performance and will have broad functionality, thanks to their planned integration level. Furthermore, project achievements will also help European industry develop a large number of different applications, and to reduce time-to-market. That will strengthen European industry and ease its entry into the health-care market, which is expected to grow to US\$10.8 billion in 2018.

And parallel to these developments, another market segment for smart healthcare systems – like blood pressure monitors; blood glucose monitors; weighing scales; home pulse oximeters; and body-fat analysers – is also growing: it increased from US\$1.9 billion in 2014 to US\$ 2.4 billion in 2017, reflecting a compound annual growth rate (CAGR) of 12%.

