

## PROJECT PROFILE

16004



Remote care and diagnostic tools offer patients better, longer and autonomous 'active life' at a much lower price  
[SERENE-IoT: **Secured &EneRgy EfficienT hEalth-care solutions using IoT technologies**]

With a growing ageing population (in which many could experience multiple chronic diseases), governments and health authorities in the European Union are rightly concerned with rising health-care costs. Remote health-care offers a way of alleviating this problem and the SERENE-IoT project supports this approach through quality remote-care and diagnostic tools based on advanced, smart health-care, and the internet of things.

Medical progress in last decades have significantly fallen mortality rates and have staidly improved our global health and this transformation is impacting seriously our health and social care systems. Some 30% of the population in the European Union (EU) will be over 65 by 2030; two out of three people of retirement age will have at least two chronic illnesses. Currently, 70% of health-care are on chronic illnesses and 41% on hospital care; and health-care costs in the EU represent 9% of GDP and are expected to reach 10.5% in 2060. Fortunately, the convergence of the health-care and the high-tech mass-market ecosystems is coming to a point where things and people are increasingly connected, as with the internet of things (IoT), and where health-care is partly divided between hospital and home. Impacting our health models, the Internet of Medical Things (IoMT) is born. Unsurprisingly, the economic and social impact due to chronic diseases in Europe will make this move mandatory in order to keep medical and social services sustainable and improve patients' quality of life.

### Remote health-care and diagnosis through the internet of things

SERENE\_IoT will focus on benefiting the patient with an improved quality of life and better access to health-care in general, as well as reducing health-care costs. It will achieve this by addressing the specific needs of patients being handled remotely by professional caregivers through the development, by European companies and research institutions, of smart e-health IoT devices and an advanced architectures.

The core values of this project are:

- High quality of health-care services;
- High level of trust (security, safety, privacy, robustness);
- Efficient execution of required tasks;
- Interoperable and compatible information technology (IT) systems;
- Reduced costs compared to current traditional care.

Major project outcomes and deliverables will be three Clinical Prototypes that will validate benefits derived

from remote-care scenarios. In line with the so-called medical innovation cycle (up to 'clinical prototype' level), SERENE-IoT will develop three medical devices to meet the following medical challenges:

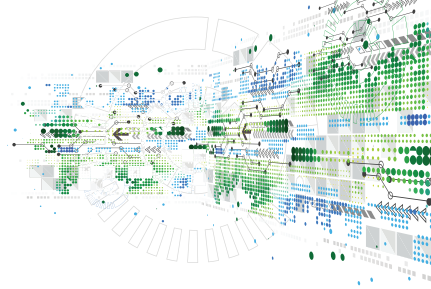
1. Providing homebased health-care services remotely: by developing the first low-power medical IoT module validated with two class IIx medical devices;
2. Early detection of Methicillin-resistant bacteria: by developing the first low-power mobile detector for MRSA (antibiotic-resistant bacteria);
3. Fall prevention: by developing a fully wireless insole for fall detection and risk monitoring.

These medical devices will be validated in real clinical environments under mono-centric and multi-centric clinical conditions. Importantly, the three demonstrators will be used to provide the necessary validation of advanced concepts needed by European industry for the development and manufacture of products and services in the area of remote medical-care.

Importantly, SERENE-IoT will contribute to the evaluation of a secure, end-to-end, IoT system platform in 'real-life' scenarios (including the use of the proposed health-care data structure), while demonstrating the resulting benefits. Certification and industrialisation phases will follow the SERENE-IoT project.

### The right mix means a balanced and holistic approach

The SERENE-IoT consortium – from France, Germany and Spain – provides a balanced and holistic approach to this project, thanks to the mix of project partners (large firms, SMEs and academia) which covers the health IoT ecosystem – from integrated device manufacturer (IDM) and original equipment manufacturer (OEM), to end-user service-provider. And the involvement of industrial supply-chain and health-care providers ensures the right devices and services are developed. In addition, the consortium, specifically the academics, will be involved in promoting standards, sharing technical material and raising awareness of the achieved results through international journals,



## KEY APPLICATION AREAS

-  Health & Well-Being
-  Energy
-  Digital Industry
-  Digital Life




## ESSENTIAL CAPABILITIES

-  Systems and Components Architecture, Design & Integration
-  Connectivity & Interoperability
-  Safety, Security & Reliability
-  Computing & Storage
-  ECS Process Technology, Equipment, Materials & Manufacturing

## PARTNERS

CHU Grenoble / CEA LETI/LIST / Flavia IT / Fraunhofer / Fresenius Kabi / Grenoble INP - LCIS / LMU Klinik / Maatel / Medtronic / Idemia / Orange Labs / Seidor / SensingTex / SGS-TÜV Saar / Spring Techno / STMicroelectronics / UAB / XFAB

## COUNTRIES INVOLVED

-  France
-  Germany
-  Spain

## PROJECT LEADER

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## KEY PROJECT DATES

01 June 2017 - 30 November 2020

publications, as well as conferences and exhibitions.

Thanks to SERENE-IoT, project partners – who are also stakeholders from across the healthcare value-chain – will validate new advanced IoT-based technical concepts, and subsequently create new market opportunities in the European health-care industry, paving the way for the deployment of such connected devices in the EU.

The health-care industry is expected to evolve towards a more competitive and efficient marketplace as a result of new flourishing business models based on remote health-care and diagnostics. Now, while the process to reach this goal will further evolve, it could also be slow, nonlinear and include parallel initiatives. That is why supply-chain members need to contribute to a common, acceptable solution, and why such a consortium – which covers the complete supply-chain and works in a collaborative way – was formed initially.

## Benefiting health and health-care stakeholders

Techniques developed in this project could synergistically improve energy efficiency, as well as, safety and security, of IoT systems. SERENE-IoT will also impact all stakeholders in the very complex health and health-care ecosystem. The health-care market has a particularly high number of stakeholders with complex 'interactions', which vary according to country, culture and local laws. IoT systems will collect, process and make available several types of information: not only medical data related to a patient (caregiver's concern), but also device-related information, such as device status and location (manufacturer's concern) and medical consumables (purchasing department's concern) and the like. Importantly, the introduction of IoT technologies in the medical field could also open up new application areas. However, exploiting this data properly will require reorganising the market value-chain in order to provide new and innovative services.

## Healthy IoT and health-care markets

Several IoT surveys forecast up to 50 billion connected objects in 2020, with an exchange of more than 50 trillion gigabits of data (according to IDC). This is what is termed the third wave of the internet, which

is expected to have a tremendous impact at different levels. At the technological/scientific level, drivers will be new scientific developments (like 'big data') through multiple, connected smart objects with safety, privacy, security and power constraints. At the societal level, our daily lives will be improved by such innovations as smart health, smart cars and smart energy. And on the industrial/economic level, there will be a continual creation of new business opportunities for established companies, SMEs and start-ups in multiple innovation domains.

According to the 'Yole Development' report issued in September 2017, analysts estimate that there are today more than 45 million IoMT devices and more than 235 million in 2020. Based on this report, two major medical devices can benefit from the connectivity: the existing medical devices moving to connected medical devices and the new connected medical devices created on purpose. This market is distributed in the 4 following segments: implanted patients, professional monitoring, self-quantified patients, lack of autonomy patient assistance.

The global Connected medical devices market represents \$9.6B revenues in 2017 and will grow to reach more than \$23.7B in 2022. Thanks to IoT technology the patient become a genuine actor of his own care and of his social environment, and thus shaking up our current social representation of a dependent person.

The clinical prototypes produced by SERENE-IoT illustrate perfectly the picture depicted in Yole report. Adding connectivity on already existing medical devices and developing medical devices on purpose thanks to connectivity, the clinical prototypes address the three segments having the best perspectives in the IoMT market:

- Professional monitoring segment with CAGR: 21.4%
- Self-quantified segment: 18.7%
- Assistance segment: 15.5%

Finally, a June 2015 report from McKinsey Global Institute, estimates that 89% of the potential annual economic-impact of health-care IoT applications in 2025 will be in advanced economies, versus 11% in developing ones; and Europe will be one of the first to deploy these new technologies.

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