

# CareWare

Enhancing quality of life through wearable solutions

## EXECUTIVE SUMMARY

The ITEA project CareWare has generated innovative value-driven concepts in the form of durable versatile sensors that are mass producible, easy to integrate into production processes and deliver accurate information. These unobtrusive wearable business solutions can monitor and improve performance and care in sports and health domains respectively.

## PROJECT ORIGINS

Healthy living has become a crucial domain in a modern era dominated by scarce human resources and rising costs in caring for a growing and ageing population. Monitoring has thereby become an essential part of the solution. The issue that the CareWare project looked to address was how to incorporate digital service innovations to enable productivity enhancement by the optimal use of real-world assets such as novel textile integrated, wearable sensor solutions and novel mobile communication and platform solutions.

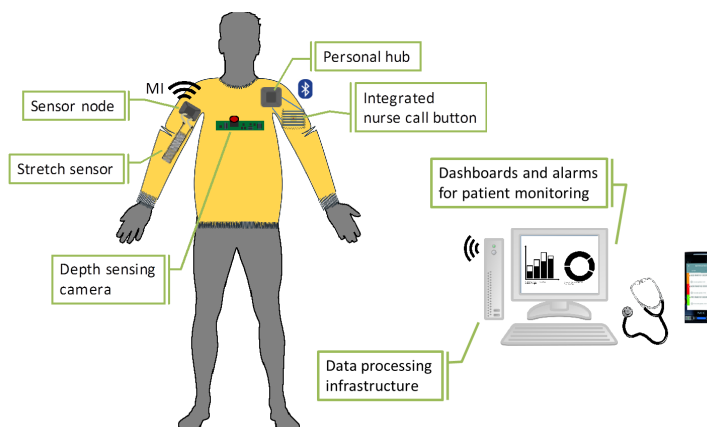
Wearing 'intelligent' clothes and following personalised guidance will enhance the health, quality of life, safety and efficiency of the user. Sensors and actuators integrated in clothing or for use in wearable cyber-physical systems and ready-to-use platforms will provide personal health information. By making health monitoring as easy as checking your watch, and combining the monitoring with care and/or coaching services in a compelling way, not only will the user benefit but also the user's social environment and society at large.

## TECHNOLOGY APPLIED

The CareWare project developed an open and common architecture reference model that allows the introduction of new combinations and integration of sensor technologies in textiles, a reference model and open building blocks. The result is the development of a wide variety of cooperative novel services, systems and

appliances, time simulation and operational co-control of different subsystems, new sensor integrations within the existing platform solutions, and support of novel methodologies to build IOT-based service innovations in the market.

The common high-level architecture designed within the project is suitable for the integration of (existing) sensor data technologies and real-time data processing. It allows appropriate methods and techniques to be employed for analysing data from wearable sensors, such as a smartwatch app for simulating a personal hub or the visualisation of data from sensors on an Android application. Good collaboration between the CareWare partners resulted in improved confectioning techniques for electronic textiles and the development of new materials and methods as well as technical product designs.



CareWare: electronic wearable sports and health solutions

Three demonstrations revealed the impact of the technology in practice. A patient monitoring system in Belgium comprised patient and device registration that included a nurse garment with push button, a patient garment with stretch sensors, a body-worn camera showing hand gestures and a nurse dashboard and alerting system. In France, an Aidé et Moi (AEM) scenario was demonstrated with a monitoring system for the elderly at home. This employed a Software as a Service coordination tool around the care of elderly people for the professional, the family and the elderly person himself. This demonstrator featured the SmartBAN (Smart Body Area Network), an ETSI standard to which the CareWare project has made ongoing contributions. The third use case was a sports pilot scenario in Lithuania that focused on physical fitness (functional state) evaluation, health promotion through physical

activity for healthy persons, planning and control of the training process for professional sportsmen and women, safe patient exercising and motivation to exercise.

## MAKING THE DIFFERENCE

CareWare successfully demonstrated the combination of textile-embedded sensing and body area networking with cloud applications as well as the integration of printed sensors in textiles, connected to dedicated electronic sensor front-ends and communication. CareWare has contributed to the development of technology for smart textiles and while additional work and developments are necessary to bring these solutions to maturity, several of the technologies developed in CareWare have been exploited. For instance, the highly durable conductive yarn that incorporates electronic modules manufactured by Alsico. Another example is a textile with printed electronic tracks produced by Centexbel. It is washable to 30°C, stretchable, bendable, allows freedom of design and is suitable for multiple applications in EMI shielding, signal transfer of electronics on textiles and powering electronics on textiles.

The methodology and architecture for collecting and processing data for wearable intelligence is being exploited by Sirris, for example through advisory services to support companies in building intelligent wearable products and in dedicated knowledge transfer activities to industry. Eolane has used the results to boost sales of Picogateway LoRa products and NXP has developed a new IC sensor (NTAG SmartSensor NHS3153), an integrated sensor and radio on single node. Similarly, Televic has integrated a nurse call button as a personal hub in clothing as a gateway for transferring measurements of sensors. The CareWare budget also enabled IMT to kick-start two start-ups, Emiota and Boudoir de Marie, the latter to produce customised clothes for elderly people aimed at helping them accept technical products and systems.

The health, quality of life, safety and efficiency of the user will be enhanced simply by wearing 'intelligent' clothes and following personalised guidance. The resulting savings from lower costs of care and more efficient working hours will be considerable and provide more significant opportunities for the companies that use CareWare results.

## MAJOR PROJECT OUTCOMES

### Dissemination

- FUTEX: Marcq en Baroeul 18 & 19 January 2017
- Fashion Tech Days Uptex Roubaix 19 & 20 January 2017
- European Congress on Innovations in Textiles for Healthcare, 20 April 2017
- cEDM workshop: merging of Textile and Electronics @ Televic, 9 June 2017
- Smart textiles Salon 18 October 2017
- DIF: Amsterdam 10 & 11 May 2017

### Exploitation (so far)

New products:

- NxH2281 BAN radio
- Integrated 3D camera with gesture recognition
- Gateway between BLE and LAN
- ECG registering shirts
- Textile integrated push button
- Gateway between BAN and BLE
- Gateway between BLE and LoRa

New systems:

- Activity recognition integrated in CW backend
- LoRa gateway deployment

### Standardisation

- Demonstration during ETSI SmartBAN/SmartM2M joint meeting (Sophia-Antipolis, 9 November 2017)
- CareWare contributions to SmartBAN ETSI standards

ITEA is a transnational and industry-driven R&D&I programme in the domain of software innovation. ITEA is a EUREKA Cluster programme, enabling a global and knowledgeable community of large industry, SMEs, start-ups, academia and customer organisations, to collaborate in funded projects that turn innovative ideas into new businesses, jobs, economic growth and benefits for society.

## Partners

### Belgium

Alsico High Tech  
Centexbel  
Esperity  
NXP Semiconductors  
Sirris  
SoftKinetic  
Televic

### France

Eolane  
Institut Mines-Télécom  
Santech

### Lithuania

Audimas  
Kaunas University of Technology  
Lithuanian Sports University  
Optitecha

## Project start

January 2015

## Project end

January 2018

## Project leader

Jean-Jacques Busson, Eolane

## Project email

[careware\\_coordinator@eolane.com](mailto:careware_coordinator@eolane.com)

## Project website

<http://www.careware-itea.eu/>