



# ITEA international customer & end-user workshop on Smart Health

## Results

On 21-22 June we organised our 2<sup>nd</sup> international customer workshop. This year's topic was Smart Health. The aim was to receive from the different stakeholders in the value chains their concerns about desired functionalities or any difficulties they encounter in delivering efficiently in their daily environment. These results are an opportunity for the ITEA community to create ITEA R&D projects dedicated to solving actual end-user concerns or challenges. We have observed that projects involving user demands from the outset are usually more successful in demonstrating an impact on the market, which remains the first priority for ITEA. This report shares the output of this workshop with the ITEA community at large.

The participants represented a wide range of stakeholders in the smart health value chain:

- **Hospitals** (Charité Berlin, Amsterdam Medical Center, Schüchtermann-Schiller'sche Kliniken, University Health Network from Toronto, Medical Hospital Göztepe, Canceropole Toulouse)
- **Insurance companies** (Axa)
- **Home care** (Madopa France, Eczacıbasi Home Care, Robert Bosch Foundation)
- **Cities** (Istanbul, Arnsberg)
- **Market elements** (Canadian Institute of Health Research, Chinese Bosch representative)
- **Industrials** (Airbus, Barco, Bosch, Bull/Atos, Elekta, Materna, Philips)
- **Innovative SMEs** (Sopheon, Evalan, Medvision360, Prologue, Santech, SRDC)

We focused the discussions on two topics:

- Collaborative care & new acquisition devices
- Autonomy & participative care

It became immediately evident that this division was a bit superficial for many reasons:

- There appears to be great demand to cover the full workflow from the first moment when the patient gets to the hospital to many months later when he is back at home and needs to be monitored
- The prevalence of chronic diseases that require some hospital visits and continuous monitoring at home
- The hospital organisations with some iconic hospitals gathering all the most advanced technologies and local hospitals well adapted to personal support close to the home or at home

Nevertheless, we used these two topics to organise our discussions.

The key challenges gathered during these two brainstorming sessions are presented in the next two paragraphs.

## 1. Collaborative Care and new acquisition devices

Some strong messages appear during our workshop:

- **Workflow management requirements.** It covers many kinds of workflow in different environments and at different stages
- The sense of being **overwhelmed by data**, which requires big data analysis, simulation and cooperative visualisation
- **Interoperability** of data access management systems taking into account data ownership and security
- **Patients, the elderly, are people: we need to take good care of the soft people aspects in Smart Healthcare**

### 1.1. Patient workflow

The hospital organisations are based on iconic hospitals gathering all the most advanced technologies to serve the patients and enabling local hospitals to be closer to the patient. This generates a phenomenon of **overtriage**. It requires a clear workflow and associated data exchange to determine which hospital is best suited to treating the patient. The present reality is that a lot of patients are pushed toward the iconic hospitals by default, which generates an overload in these hospitals, while it would have been better for the patient to be referred to a local hospital. The extra cost per patient is estimated at €6K. While the urgency management is exemplary, the monitoring of some chronic diseases causes similar problems, especially in terms of transport, which results in a huge cost for society.

The hospitals are calling for the definition of **patient workflow from the first contact with the hospital to when he is at home** and maintaining some relationship with the doctors. It means that they want to cross the artificial border between the workflow in the hospital and the workflow at home. It covers macro workflow (long-term treatment) and micro workflow (medical treatment). It includes geolocalisation of the patient, the devices, the doctors and nurses when they are in the hospital.

The pressure of chronic diseases is extending the role of the hospital from acute care to providing community care. **The patient has to do more**: he has to be able to provide input to enable the health system to learn but without this being a burdensome task; active coaching to improve acceptance. The challenge is to ensure upscaling to millions of patients. The cost of the monitoring process must reduce the pressure on the health professional and overall costs while taking into account the patient's social and psychological circumstances.

Hospitals are under such pressure in terms of activity, number of patients and level of cost that they need to move from an urgency management process to a **care 'production process'**. Taking into account that the hospital manages a few key moments which are the human face-to-face contacts between the patient and the nurse / doctor, such moments (20% of the time) need to be protected. The optimisation of the rest of the process (80%) is an opportunity to protect these moments as it is always these times which are cut under pressure. Lean processes need to be checked.

Remote **patient monitoring** is becoming key to the earlier release of the patients with patient monitoring at home. We can imagine some health data measurement kiosk in the city to facilitate usage. We are speaking about social networks for healthcare to connect the healthcare stakeholders.

These workflows act cooperatively. For the special case of chronic diseases like cancer. They have **multidisciplinary conferences** where the different actors are sharing their understanding of the patient's situation and co-decide the next protocol to propose to the patient. These conferences require:

- An efficient collaborative data browser
- Data registration and superposition tools
- Generalised cooperative visualisation tool
- Patient profile and risk analysis automatic tools; the final decision remains in the doctor's hands

Besides the workflow itself, there is a key demand for data access between the silos (services, hospitals, liberals ...) to allow easy access to all relevant data "owned" by other organisations. This data access will also have to deal with the privacy rules (cf privacy paragraph below)

## 1.2. Big data and algorithms

**The quantity of data is exploding** because of:

- The number of new acquisition devices generating images, video and even 3D
- The longitudinal monitoring

This data explosion is such that the doctors are no longer able to mentally organise all the available data. It requires big data analysis to allow simple browsing of registered data.

In the special case of intensive care too many sensors and data generate alarm fatigue.

A side effect is the requirement of anonymous databanks to design and test all these algorithms.

Demand for **training** and education (virtual rooms, MOOCs, ..) is greater.

## 2. Autonomy and participative care

### 2.1. Back to the user

**The first step is to ask the user!**

**Isolation** is the great danger.

A key demand is usability – the simplicity of usage, gamification, no training to start usage, no stigmatisation.

Users must cover the different stakeholders (patient, family, nurses, doctors, ...).

Reimbursement in Europe tends to be based on treatment or prevention rather than the results.

Actual impact must be demonstrated in terms of cost reduction and care enhancement.

**The patient's home is the setting of chronic conditions** – not the hospital! The focus needs to be on primary care.

Health care services in the primary care sector need to be bundled to:

- create synergies and reduce redundancies
- **ease cooperation and communication among multi-professional teams** that deliver real integrated care to accompany the patient along their journey.

A challenge is to find solution to **engage people**.

At home health devices are in coopetition with native iOS/Android features (calendars, health kit,...), posing the challenge of the quality of the acquired data.

Seniors are less concerned with their health status (until they become ill):

- They do not like to be reminded about their health risks
- They are worried about being monitored (privacy)

Smart homes with non-intrusive sensors are still:

- Expensive
- Complex to install

and big data value creation requests time.

Families feel guilty but need to be given an incentive to participate; they need a nudge.

Social recommendation is becoming the preferred solution (algorithm-bashing).

The system is unsustainable if spending continues as now: **we have to reduce the need for personnel, reduce the pressure on the professional**. A net increase in the workforce is not feasible. We must multiply by ten the patient/professional ratio when patients are at home.

**Self-care and informal care-giver are the new key!** Challenge on user side: where technology replaces the human, that technology needs to be trustworthy.

**The data need to be automatically interpreted and transformed to a higher semantic level. It must be actionable by the patient. It must be interoperable at the higher semantic level.**

## 2.2. Privacy and security

**Privacy and Security are key issues for all projects** The identification of privacy and responsibility are sensitive issues. In some countries like Germany, this is particularly the case.

**Can we implement single patient consent for each access (and how can we do it)?**

Cloud services are not working if you split them per country: how to comply with the laws?  
(counter example: USA, Patriot Act)

**The more ill you are, the less you care about privacy. Privacy is negotiable for better personalised services.**

**Evaluation of the system from an independent institution:** secondary use of data for scientific questions; **how to generate statistical data in a trusted way.**

## 2.3. Architecture

It does not have to be geographical (set of people who want to “play with me”)

Show on a regional level that it works (city is different from rural area)

**Low-margin high-volume** is different from high-margin low-volume (up to now typical for med-tech).

**Open cloud infrastructure / open source. Not for free, but creating an eco-systems** (docking for SME).

## 2.4. Multi scale

**Geriatrics is holistic** and not specialised: Quality of life issue.

**Commitment of all to work around the same patient:** who owns the therapy? And after the commitment we need help.

Interoperability challenge.

**Personalised care / medicine will move into personalised health and lifestyle.**

## 2.5. City policy

Cities are important health actors and will have to solve multiple challenges:

- City centre revitalisation
- Prevent congestion in hospitals and healthcare facilities
- Decrease the cost of scaling up health
- Generate statistical data for research
- Attractive housing conditions for elderly people
- Mobility and accessibility
- Improvements in the local healthcare system – connecting the stakeholders

**Health is cure not only when I am ill.**

**Connection with the community**, social life, volunteering, prevention: **can we offer a platform?**

**Can we evaluate the how well they are doing?** Can we give the participants something back?

**Canada: Pay for value and quality instead of processes**

## 2.6. Business model

- **How can the deployment start on a different scale than just small numbers?**
- **Who is going to share the risk?** “Crowd-funding” for some technological innovations
- **Business model doesn’t have to be within the hospital, it could be the city, the insurance,...**
- **Cover the complete value chain, different in different countries, including the insurance companies**

## 3. Project ideas

Many ideas for ITEA R&D projects arose during the discussions. In this paragraph we list these ideas with a short explanation of the content and some key players interested in promoting the idea. These ideas will be inputs for the ITEA Project Outline Preparation Days, taking place on 13-14 September in Paris. Of course, these inputs will be discussed in detail, possibly combined, refined or – conceivable as well – not pursued further during this two-day brokerage event. Feel free to contact the referenced players if you are interested in discussing the topic.

- **Methodologies for design and validation of quality-assured, data-driven medical systems** (Barco, Elekta, AMC)
  - Modelling system components
  - Automatic performance assessment
  - Proposing design specifications
  - Needs-specific use cases
- **Data access management system** (Schuchtermann Kliniken, Sopheon, ATOS, Philips)
  - Access to data: which applications, persons can have access to which data, policies
  - How to deal with data ownership and security
  - European directive 2016/679 (personal privacy) mandatory from May 2018
  - Interoperability of systems
- **Interoperability** (Elekta, all)
  - More standards needed, compare telecom industry, priority areas could be patient data, image data, treatment data
  - DICOM is the standard for exchange of image data
- **Heterogeneous and high-performance data analytics** (AMC, ATOS, Sopheon, Philips)
  - Wealth of data that needs to be connected
  - Analysis of data from different sources
  - Optimisation of decision support
  - Example: alarm fatigue
- **High-scale collaborative workflows (“healthcare for the millions”)** (Sopheon, AMC, ATOS, Barco, Philips, Airbus)

How to deal with workflows covering thousands of people in parallel

Portfolio management: prioritisation and resource management

Optimise quality/quantity of alarm and decision support

Learn from other industries: e.g. automotive, aeronautics

- **Semantic interoperability** (Jean-Marc Verlinden, Medvision360)

Data from different acquisition devices must be interoperable at the same semantic level and must reach a user actionable semantic level

- **Lobbying of unified privacy policy in Europe** (Medur Sridharan, Bull)

Privacy is a key stumbling block to the deployment of health solution

The national level is no longer economically sufficient to deploy an industrial system; it requires at least a European dimension

The challenge is to gather the key actors to push towards a unique European privacy policy (design of the solution, lobbying, regulation proposal)

- **Cloud-based, open big data platform to free up service design** (Franz-Josef Stewing, Materna)

Innovation is open to everybody, especially SMEs

They require an available open-cloud infrastructure to innovate on service design

- **Trusted environment/Privacy to generate statistical data banks for extracting meaningful information**

There is a need to generate data banks for design and testing

These data banks must be anonymous not to be blocked by privacy regulation

- **System to know when I have to go to the doctor** (Leon Derks, Evalan)

We observe a lot of situations where a patient visits the doctor too late or when he comes when it is not useful

These discrepancies are decreasing the efficiency of our health system

It is useful to generate a kind of expert system to help the patient to classify his requirements

- **Local stakeholder cooperation platform** (Pierre-Yves Simonot, Santech, Philips ?)

The local care is still very individual

There is a demand to reorganise it to strengthen the collaboration between the professionals and the patient

- **Cost and revenue mutualisation to create shared business model** (Alexandre Duclos, Madopa)

Many business models are not sustainable by themselves

If we are able to synchronise different business models, we can generate a sustainable mutualised business models that are of interest to all the stakeholders