

DESCRIPTION OF THE OPERATIONAL ENVIRONMENT

- SOUTH OSTROBOTHNIA

South Ostrobothnia is situated in the province of Western Finland. The region is made up of 17 municipalities. South Ostrobothnia has around 190 000 inhabitants and the regional center is Seinäjoki, with over 60 000 inhabitants. The region is well known for its entrepreneurship and the exceptionally large number of small and medium size enterprises and strong agriculture sector. Strong economic clusters include food, metal- and technology industry and wood industry. Unemployment rate is lower than the average for the country (on average 7,3% in year 2018 for South Ostrobothnia, currently 6,5%). Region is sparsely populated and most of the municipalities are struggling with decreasing population. Ageing population is one of the biggest challenges in the region. Region of South Ostrobothnia does not have its own university in such. The RDI operations of Seinäjoki University of Applied Sciences are consistent with the nature of a University of Applied Sciences Institution in conducting research that can be applied to and serves the region. For the same reasons the RDI activities of the University of Applied Sciences are strongly connected to teaching, among other things through different integration platforms and through undertaking thesis work co-operation with the companies of the region. Furthermore, from a regional perspective the RDI operations of Seinäjoki University of Applied Sciences emphasise international co-operation. In addition to European co-operation other important co-operation areas have been Japan, Vietnam and Mexico. Content-wise the focus of the RDI operations of Seinäjoki University of Applied Sciences have been congruent with the focus areas of the University Consortium.

The University Consortium of Seinäjoki is another supporting leg of the South Ostrobothnian higher education community, which comprises of the operations in South Ostrobothnia of five member universities. Included are, Tampere, Helsinki and Vaasa universities, Tampere University of Technology and University of the Arts: Sibelius Academy. Research and development work are at the centre of the operations of the University Consortium of Seinäjoki. The volume and quality of scientific research in South Ostrobothnia has been raised by the unique system work of South Ostrobothnia university network (Epanet). Besides strengthening the functional research and development community in South Ostrobothnia, Epanet also has the goal of intensifying and expanding research work. Broad based, but focused research and development work is undertaken under the leadership of research directors and managers. Having operated for over 10 years already, the Epanet network has a central role in the organisation and implementation of the active research groups of the province. The goals of the research projects, which are planned as five-year periods, are interdisciplinary and are finding new approaches.

The third supporting leg of the South Ostrobothnian higher education community is the University Association of South Ostrobothnia (EPKY), which has the goal of promoting higher education policy co-operation and higher educational development work in the province. The University Association produces university level training services in its summer university, and strengthens research by planning Epanet network research projects, obtaining funding for them and by following and supporting their implementation.

There are substantial health technology skills in the province. In the past the South Ostrobothnia Health Technology Development Centre (EPTEK) has amongst other things developed, together with local authorities, companies and Seinäjoki University of Applied Sciences, technological solutions associated with support for living at home. Today EPTEK is part of Seinäjoki University of Applied Sciences. These technologies help in the solution to the pressure of caring for an aging population. Another strong area has been developing video and teleconferencing connections, which amongst other things has enabled the training of specialist doctors in South Ostrobothnia. Remote connections can also improve the quality and availability of health care services in more distant communities. Furthermore, the combination of fiber networks and health technology open new application possibilities.

South Ostrobothnia health care district (SOHCD) has been financing as well as implementing several projects in eHealth, both national and international level. Currently situation of using telecare systems are increasing a lot. In Finland there are several projects related to this, for example two of the largest regions in Finland are now acquiring patient record modular systems which increases the possibilities of eHealth. Also, SOHCD is currently looking for new solutions. AI is one the most interesting topics. Although there is a high number of companies in the region, there is lack of companies working in healthcare technology.

- **WEST TRANSDANUBIAN REGION**

The West Transdanubian region is located on the Western part of Hungary, bordered by the Austria, Slovakia, Slovenia and Croatia. It includes the counties Győr-Moson-Sopron, Vas and Zala. The population is 989.343 which is 10% of the whole Hungarian population.



The territory of the region is 11 183 km² that includes 12 % of the territory of Hungary but the population density of the region is highly heterogenous, densely populated urban areas and remoted rural areas with decreasing and aging population. The volume index of GDP per capita in Purchasing Power Standards (PPS) is 21.900 EUR (Eurostat, 1st December 2019.), it means the 2nd place in the Hungarian regions but it is just 70,6% of the EU28. The economy structure is divided as Industry and Service sector give 48-48% and the agriculture take only 4% of the GDP. The R&D Spending per GDP in Hungary is 0,72 % (Eurostat, 2018) which is cc. half of the EU28 (1,37%). 5% of the R&D spendings comes from our region and the value is devided among the counties: 66% Győr-Moson-Sopron county, 25% Vas county and 9% Zala county. This distribution shows that there is a big gap within the region and the Northern part of the region is overrepresented due to the automotive sector (Audi in Győr). The number of R&D sites is 260 R&D sites in the region where 3587 researchers worked in 2018.

According to a report of the National Office for Research Development and Innovation, most EU innovation fundings in Hungary went to health projects in Hungary between 2015 and 2017. In Hungary most of the support, 35% of the projects, was in the **Health Society and Wellbeing** area, ie health, medical and therapeutic projects.

In the West Transdanubian region there is a traditional health industry primarily in spas thanks to the regional natural resources, the area is reach in thermal waters. However, this sector focuses primarily on treatments and medical cosmetics there are only a few initiatives in the field of e-health - these are mostly central developments.

The increasingly growing problems in health care (long waiting times, work-overload, underfinancing, health condition of the aging population, lack of comprehensive approach, etc) are common across Europe and the increasing cost of health care makes it almost unsustainable for most countries. These problems led to get more and more

importance of the e-solutions in health industry also in case of Hungary as well as in our region.

The **organizations** which are related to health are divided into 3 group: R&D institutions, Universities and Companies (62% of the researchers works for companies, 59% of these for large companies with employees over 250).

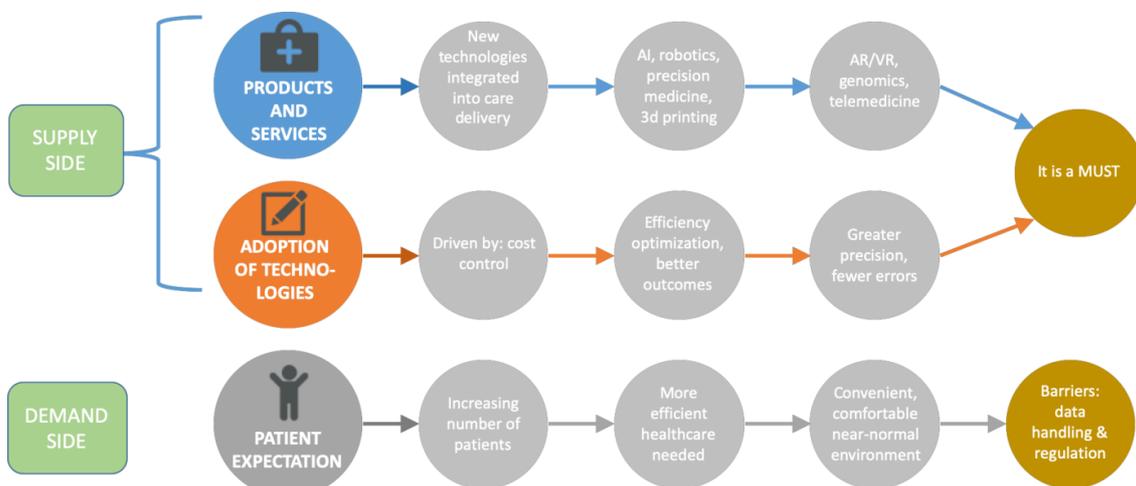
In the first 4 research areas at the companies there are Electrical, electronic and computer sciences (1), IT (2), Medical sciences (3), Pharmaceutical industry (4) and the Medical engineering sciences (10) represents health industry.

Beside these actors the public sector is took part in some case of local initiatives e.g. Municipality of Szombathely was developed an application for the city which has also a "Health section".

The **main challenges and/or barriers** in the region related to e-Health especially at companies are too high innovation costs, difficulties to obtain national innovation grants, lack of skilled labour, lack of own resources for innovation, too strong market competition, uncertain market demand for innovation ideas, lack of market funding (credit, privat equity), lack of cooperative partners.

Beside this there is a huge need for changes in the environment and mindset with the involvement of the entire ecosystem. It is important that staff, through their automated and coordinated processes, are increasingly able to place greater emphasis on patient care and reduce operating costs. Therefore, instead of treating disease, the focus is on health management and patient satisfaction, which also results in the release of medical abilities, skills and reduces administrative burdens, increasing the accuracy of care and minimizing the patient's recovery time.

Demand and supply side of a smart solution in healthcare



The e-health industry has no or little experience and competence in applying or exploiting IT-possibilities. Even medical professionals may not be prepared or fully prepared for using e-health, telemedicine, AI, etc. Yet AI-solutions are being used in health industry, and there are very good examples but in most cases it is still in embryonic phase, or isolated use is typical within the hospital, so the mature, value-based health care model is still missing.

To sum up, we face the task in healthcare understanding and applying 21st-century technologies with a 20th-century mindset in 19th institutions.

- **BRETAGNE**



Bretagne is one of the 13 French regions. It counts 3.3 million inhabitants (France 67 million). There are 2 University hospitals in Bretagne (Rennes and Brest), 1 regional cancer centre and 220 care institutions. Interestingly, one of the French bigger rehabilitation centres, called “Kerpape”, is located in Bretagne (cf Good practice below “Rehab-Lab”).

In France, the organisation of healthcare is centralized at the national level (managed by the Ministry of Health). The French social security system is a compulsory insurance, financed by contributions on people’s revenues; it’s been historically managed by representatives of employers and employees, in coordination with the government.

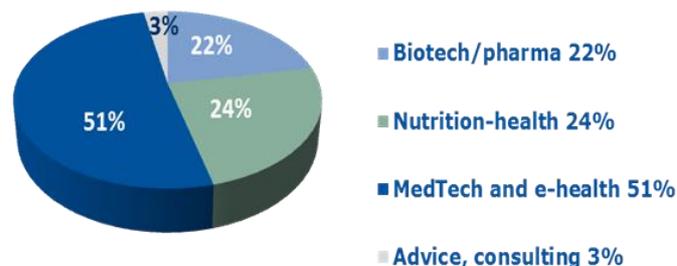
The ARS, Regional Health Agency, is the representative of the Ministry of Health in the region. The GCS e-santé is the operational body of the ARS as regards implementation of e-health in Bretagne. ARS and GCS e-santé are in charge of the implementation of the national strategy “Ma santé 2022” and particularly of the health digitalisation roadmap at the regional level.

Specifically, the GCS e-santé deploys digital services for health professionals, such as GWALENN (see good practices below).

The ARS launched two calls for projects in 2013 and 2017 to develop telemedicine¹. In 2017, 17 projects were funded. Some of them are described below as good practices. The ARS also launched a call for experimentations² in 2018, for the delivery of healthcare, which may relate to e-health and also become a good practice in the INTENCIVE project. It should be noted that health is not a compulsory competence of regional authorities in France. Each regional authority may decide to have a health policy. In Bretagne, the regional council implements strategies and actions dealing with facilitating access to community/proximity health services – including e-health services, notably as regards prevention and promotion of health for the youth and for the elderly... In addition, the ARS, the regional authority and other local governments may sign “local health contracts” on specific territories to implement health actions together (cf Good practice “telemedicine in the Ponant Islands”).

However, health is a strategic sector of the Bretagne regional authority economic policy (economic development is the main competence of French regional authorities). As a matter of fact, the health sector has been defined as a strategic sector both within the regional strategy for economic development (SRDEII³), and within the regional smart specialisation strategy (RIS⁴).

In Bretagne there are 2305 companies operating in the health sector (half of them in e-health and medical technologies).



The dynamic of e-health company creation is very strong in Bretagne (see city of Rennes, capital of Bretagne, below).

¹ Telemedicine consultations can be reimbursed by the social security since September 2018 (patient partly reimbursed + lump sum for health professionals for equipment).

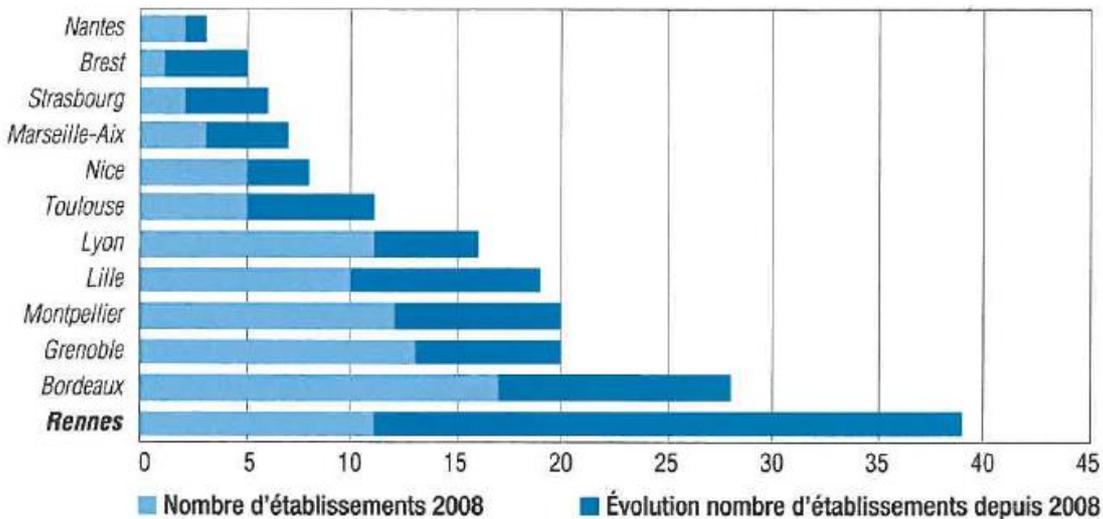
² In 2018, the ARS Bretagne launched a call for experimentation supported by two instruments (one called “innovation and organisation” and another one related to the article 51 of the 2018 Law for the funding of the social security, which enables funding for innovative healthcare schemes).

³ Schéma Régional de Développement Economique, d’Innovation et d’Internationalisation

⁴ Regional Innovation Smart Specialisation Strategy

⁵ ID2Santé study 2018

Number of e-health companies in French main cities (Paris excluded): evolution 2008-20146.



The main areas of regional e-health and medical technology companies are diagnostic and interventional medical imaging, medical devices, orthopaedics, computer-assisted medicine and surgery, telemedicine, connected health devices, big data analysis and assisted living.

As regards research and innovation related to e-health and medical technologies, key organisations are ID2Santé (the regional innovation centre dedicated to the health sector) ⁷, the competitiveness cluster “Images & Réseaux” dedicated to digital technologies and the Technology Research Institute B<>COM (with expertise in artificial intelligence as well as augmented/virtual reality applied to health). Outstanding research teams include the LTSI (Image and Signal Processing Lab) and the LATIM (Laboratory of Medical Information Processing), both expert in data analysis and artificial intelligence. Biomedical data management is actually an area of expertise. The University hospitals of Western France, members of the so called HUGO network, manage a clinical and biomedical data warehouse called e-Hop gathering and organizing all the biomedical data of patients available in the hospitals (data from medication, genomics, imaging, unstructured data from clinical reports, etc.). For research and innovation purposes, the whole chain is being considered: collection and consolidation of data, anonymization, annotation, data sharing, management of quality of data, etc. in line with data protection and cybersecurity requirements (expertise in Bretagne is concentrated in the “Pôle d’Excellence Cyber 8”).

⁶ Audiar study December 2015, L’écosystème santé bien-être rennais.

⁷ ID2Santé merged into the new organisation Biotech Santé Bretagne in January 2020.

⁸ <https://www.pole-excellence-cyber.org/>

The e-Hop project leader, Prof. Marc Cuggia, researcher at the LTSI, is an internationally known expert. In 2018, Prof. Marc Cuggia has been involved in the national initiative to design the national HealthDataHub (mentioned above), in line with the national strategy for Artificial Intelligence, designed by the French government.

Expertise also exists in Rennes in technical and semantic interoperability through IHE (Integrating the Healthcare Enterprise) and the Gazelle platform (see good practice below), developed by INRIA 9 and the Kereval company. This initiative is recognized at the international level. Each year, IHE Europe organizes a European “connectathon” which provides a unique opportunity for vendors to test the interoperability of their products in a structured environment together with peer vendors 10.

Let’s also highlight research projects such as Followknee (development of connected knee prostheses), Digi-NewB (AI-based decision support system for early detection of sepsis in neonatal intensive care units), and the HIT tproject (Handicap Innovation Territory) which aims at developing an inclusive city through new solutions linked to digital technologies and new organisational and business models.

The main challenges related to the expansion of e-health are the lack of dedicated funding sources for large digital infrastructures and digital equipment at local/regional level for e-Health research, innovation and care; in some territories, the lack of high-throuput internet connection; the lack of budget to facilitate evolution in human resources (education and training needed for new technologies and for the management of change); the lack of validated business models for new healthcare interventions (in line with reimbursement policies).

- **GOZO**

Gozo is the second largest island of the Maltese Archipelago with a population of approximately 30,000. We have the challenge of an ageing population in Gozo, with the youngsters going to live in Malta and the elderly opting to retire in Gozo to enjoy the more relaxed life and countryside in Gozo. This brings about the challenges of having people with dementia.

We have one university which is situated in Malta, the University of Malta. In the last years, this university opened a campus in Gozo where few courses are being offered there. Research in the University of Malta with regards to digital health is being conducted through the Faculty of ICT, in conjunction with several health professionals.

⁹ National research institute for digital sciences

¹⁰ The 2019 Connectathon took place in Rennes (2018 in The Hague and 2020 in Brussels)

The Government in Malta is focusing on Artificial Intelligence even in the health sector. In October 2019, it launched 'A Strategy and Vision for Artificial Intelligence in Malta 2030', part of which focus on the health sector. It aims to allocate a substantial amount of funds towards the support of using digital technology in healthcare.

Main challenges in eHealth include:

- Creating a common definition of eHealth
- Convincing citizens and health professionals of the reliability and large benefits of digital health technology usage.
- Educating citizens on how to assess the reliability of digital health technology
- Creating a mechanism whereby research on digital health technology can be validated

• CANTABRIA

Cantabria is a relatively small region in the north of Spain with around 0.6M inhabitants and common healthcare public system under a Regional Healthcare Ministry that coordinates 3 hospitals and regional primary care services. Several e-health initiatives have been piloted mostly locally (with some exceptions) based on the needings and resources of the different health centers.



Some examples have been reported as good e-health practices but obviously there are many others that include clinical and management initiatives developed by the ICT experts of each center.

In the last few years, a progressive centralization of the Healthcare system ICT resources that converged in the recent creation of a General Directorate of Digital Transformation

at the Ministry of Health has promoted the identification of this locally developed tools, its sharing at regional level, it is improving and also the development of new ones.

It should be highlighted that the cantabrian healthcare system has a big hospital, the University Hospital Marques the Valdecilla (HUMV) (800 beds, 400M€ budget, 45 medical specialities, more than 10.000 employees, around 30.000 admissions and 600.000 consultations per year) as a epicenter. TUniversity Hospital Marques the Valdecilla is also reference for some neighbour Spanish communities in for some specific diseases, and transplantation.

In the framework of the FEDER Operational Program of Cantabria (2014-2020) we find that it is focused on answering to economic, environmental and social challenges identified in Cantabria, like demographic aging, aligned with national strategies. Among the socio-economic challenges associated with technology are the following objectives:

- Research and innovation
- Strengthen the field of ICT in public administration
- Reduce social inequalities by improving access to social and health services

One of the outstanding strategies for achieving the objectives is the capacity to invest in social and health infrastructures that contribute to national, regional and local development. Thus, reducing health inequalities, and promoting social inclusion through improved access to social, cultural and recreational services and the transition from institutional services to local services.

In Cantabria, e-health projects are developed in many cases thanks to public-private partnerships. Normally, these projects provide solutions to hospital needs related to the early diagnosis of cognitive impairment, sleep, cardiology, psychiatry or physical activity. Among the main barriers that identify Cantabrian organizations that work on ehealth issues is the difficulty finded in the interaction with clinical professionals. However, much progress has been made in the multidisciplinary and coordinated work of all stakeholders.