



- Wound treatment virtually (p.4)
- Distance care for diabetes patients (p.5)
- Searching for the ideal infrastructure for telemedicine (p.6)
- Benefits of FTTH in eHealth (p.7)
- Developing fibre networks in the Czech Republic (p.8)



## Fibre enabling more stable and qualified eHealth solutions



Connected for Health is a unique development project, in which some of the newest IT technology is tested in three Nordic countries by utilizing the open access fibre optic networks.

Without suitable infrastructure even the fanciest solutions in eHealth would

be useless. In this project, the importance of fast internet connections and building more fibre is emphasized as a condition enabling more stable and qualified eHealth solutions.

The Regional Council of South Ostrobothnia wants to be a forerunner of the digital revolution, together with the rest of the altogether 13 partners of the consortium. Most of practical piloting and research work is done by our other Finnish, Swedish, Danish and Czech partners.

The coordination of the pilots is in the trustworthy hands of EPTEK, South Ostrobothnia Health Technology Development Centre, whereas a well-known research institute Acreo Swedish ICT is in charge of research and analysis in the project.

The initiative for the Connected for Health project was joint development with the Regional Council of South Ostrobothnia, MEPs Anneli Jäätteenmäki, and Riikka Pakarinen (former Manner). Currently Jäätteenmäki holds the position of the

Vice President of the European Parliament. South Ostrobothnia had a strong interest to involve many of its stakeholder organizations to this development work.

Since the Regional Council also already had several years of experience as a partner in international projects, the decision to lead the consortium was ready to be made. For example, the Regional Council together with other South Ostrobothnian partners is actively involved as a member in an international network called eHealth for Regions, which supports transnational cooperation on health in the Baltic Sea region.

The funding for the Connected for Health project comes directly from the European Commission budget. The project adds value to the Commission priorities, especially by contributing to the Digital Agenda. The project is coordinated by the DG Connect.

We strongly believe that this project provides valuable information for a European-wide audience, such as decision-makers and professionals working in the fields of health and social care, as well as within the ICT sector. The ageing population in Europe needs innovative eHealth solutions so that our continent can provide good quality of life also in the future.

*Marjatta Eräsoja*

Director of International Affairs and Culture  
The Regional Council of South Ostrobothnia



# Connected for Health -project



## Project background and objectives

The aim of the Connected for Health -project is to test health technology applications and develop remote services to the social welfare and health sector. The goal of the project is to collect information on how do fast communication networks create possibilities for patients' home care as well as bring cost savings. To find the solution, four pilot projects will take place – two of them in Finland, one in Sweden and one in Denmark.

### The Regional Council as a Lead Partner

The Regional Council of South Ostrobothnia, as the major planning and development authority in the region, is happy to lead the project.

– It is natural for us to coordinate the cooperation, connect different actors to work together and foster FTTH and eHealth development, the project manager **Elina Koivisto** says. It is a great worth that the project is funded from the additional Commission's budget, and the partners will deliver recommendations on the wider use of FTTH in eHealth to the European Union.

### Partners

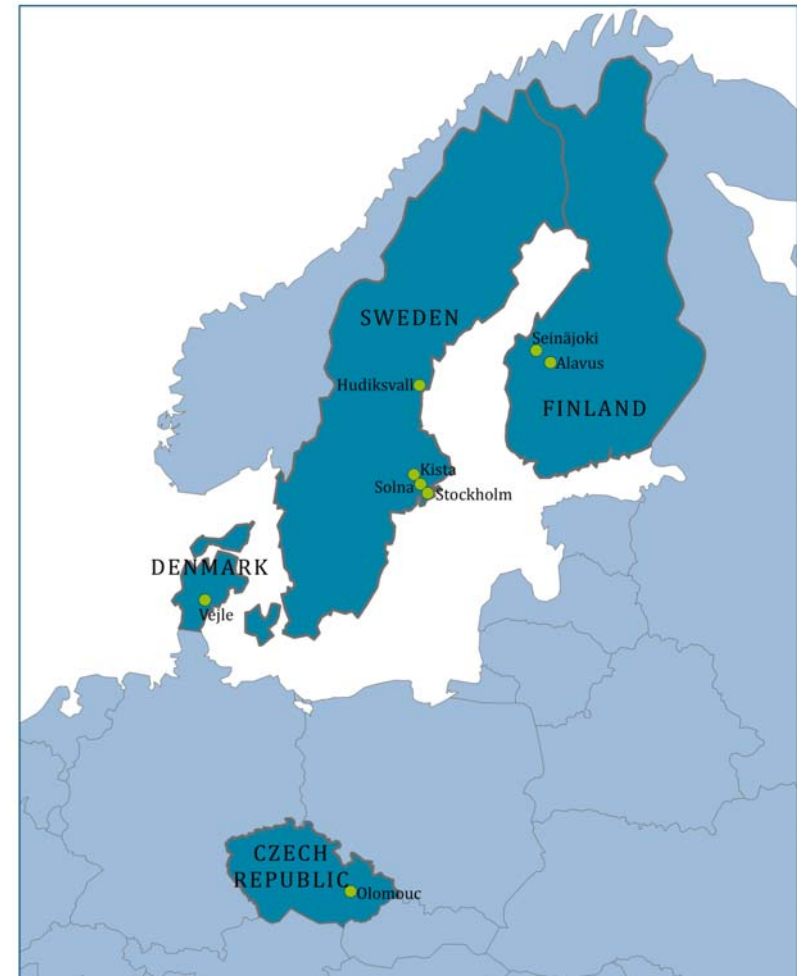
For the successful implementation of the pilot activities, a strong consortium of public health and social care providers, academic institutions and FTTH network experts has been built with participants from the Czech Republic, Denmark, Finland and Sweden. All the partners listed can be found from [http://epliiitto.fi/project\\_partners](http://epliiitto.fi/project_partners)

### At a glance

- Duration: 5.6.2015 – 4.6.2016
- Lead Partner: Regional Council of South Ostrobothnia
- Partnering countries: Finland, Sweden, Denmark, Czech Republic
- Funding programme: Additional funding from the Commission
- Coordinator at the European Commission: Directorate General for Communications Networks, Content & Technology (DG CONNECT), Digital Society, Trust & Security (Directorate H), Health & Well-Being (Unit H.1).
- Total budget: 1.7M€
- [http://epliiitto.fi/connectedfor-health\\_en](http://epliiitto.fi/connectedfor-health_en)
- <http://ec.europa.eu/digital-agenda/ehealth>



For more information,  
please see page 8!



## Pilot 1: eHealth project based on FTTH in Hudiksvall

### Crister Mattsson

The main objective of the project is to identify, test and evaluate new and existing systems and services for providing accessible home health care over open FTTH networks. To achieve these aims, the project has implemented a pilot covering municipal eHealth services in Hudiksvall.

The pilot includes tests of a social alarm infrastructure as well as a video call service. The report covers the technical setup of the pilot, the pilot process as well as giving insights into the results.

Hudiksvall has FTTH networks which work on a complete open access principle. The network provider allows all service providers to offer any of their services to the customers free of charge. Digital home care services can be delivered over an open network based on FTTH.

The pilot builds on the FTTH network run by the municipality of Hudiksvall. The network operates according to an open access model, open at the active layer (Active Layer Open Network). The pilot goes one step further and investigates openness at the digital service level by providing an open-interface platform, over which service from different providers, using different hardware, are tested.

Innovative societal services require high transmission speeds (bandwidth) but also high reliability. Fibre to the Home (FTTH) networks rely on a future-proof infrastructure, which is delivering higher speeds, higher robustness and longer transmission distance. The table below compares the fundamental physical properties of fibre with other infrastructure types, such as copper and wireless. As can be seen, technologies using fibre can easily deliver several orders of magnitude higher bandwidth,

transmission distance and hence latency (lower number of hops for the signal).

As such, FTTH can enable advanced services with the necessary quality and reliability. One area that is set to benefit largely from this is eHealth, which often relies on e.g. high-definition video, strict reliability and security requirements. While some of these services can be delivered over copper and wireless infrastructure, practical experience shows that theoretically good enough connections often turn out not to be reliable, as nurses and home care personnel from the Connected for Health have reported in several occasions.

Several earlier projects have shown that FTTH-based digital services deliver benefits both in terms of improved life quality and monetary savings for social care. Now the Connected for Health project is analyzing these effects for health care.

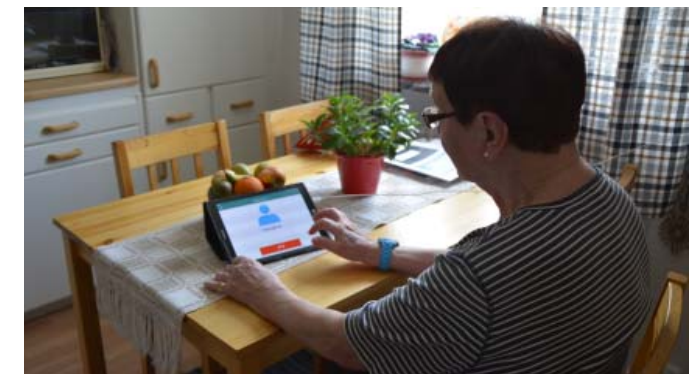
The Swedish pilot has been carried out mainly among home care patients and personnel of the municipality of Hudiksvall situated in the Gävleborg County, on the coast of central - Northern Sweden. There have also been participants among home care personnel and patients from the neighbouring municipality of Bollnäs in the pilot.

The driving force for the deployment of digital services in the Hudiksvall municipality is to be able to provide an improved experience of home services, an overall quality of life and enhanced social life for the home care users through high-quality communication services. In addition, increased cost-efficiency is an important driver – meaning that more elderly can be given home care for the same total cost.

Hence the pilot has two objectives. On one hand, a number of services that are of interest for the municipality are going to be tested and evaluated. On the other hand, collaboration with service providers will test and evaluate the business model. The aim of the pilot is to come up with a sustainable model. After the end of the project, activities will continue on a commercial basis.

The services that were selected for the pilot activities are a video communication service, digital alarm, and night supervision. The pilot will also deploy an open digital social care alarm platform that will integrate the services in the pilot.

Within the Connected for Health project the municipality in cooperation with Acreo, Alleato and the network provider, has been able to create a welfare broadband enabling the municipality to give homecare clients free access to our eHealth services. This has been achieved in a secure way where the data traffic from the health care services has priority and which does not allow the clients to use the connection for other Internet activities.



*Patient testing piloting solutions in Hudiksvall.  
Picture: Madeleine Hedin*

## Pilot 2: Special treatment for wounds from a distance - how is that possible?

### Annika Pollari and Elina Manninen

Since summer 2015 the home care of the city of Alavus and health care services of the Kuusiokunnat area have been piloting monitoring and treating of wound patients with the help of a video call service. The pilot is part of the Connected for Health project.

Sometimes, during an ordinary visit at a patient's home, the home care nurses would need expertise on treating wounds. Usually the patients would need to physically visit the specialized wound nurse who has her reception at the health care centre.

In the pilot the wound nurse's expertise has been brought to the patient's home with the help of tablets and a video call service. The nurses at the patient's home use a tablet to connect with a wound nurse at the health care centre.

With the help of the video, the wound nurse can estimate the wound, and give further guidance for the nurses. In case the wound requires more special treatment, the patient can still be asked to visit the wound nurse in person.

- The video connection with the wound nurse has eased a lot the everyday life of the patients involved. Now they do not need to leave their homes for every control visit. Everything can be handled on the sofa, explains **Sari Haveri**, home care director.

The wound nurse **Sari Salama** is very satisfied with the new technology.

- The control visit which has normally taken one hour can now be carried out in 15 minutes. I can take in a lot more patients per day, Salama says.

The personnel experience the distant eHealth services as very promising, and in their opinion, the video service is technically easy to use. The use of the services will continue even after the lifetime of the Connected for Health project.

- During the project, we have been able to get to know better the other professionals in this field. The collaboration has improved significantly, says a nurse in the home care **Elina Leikkari**.



*The video connection is almost the same thing as having the patient physically at the reception. The video works as my eyes and the nurses in the home care work as my hands, if needed, the wound nurse Sari Salama describes.*

*Picture: Annika Pollari*

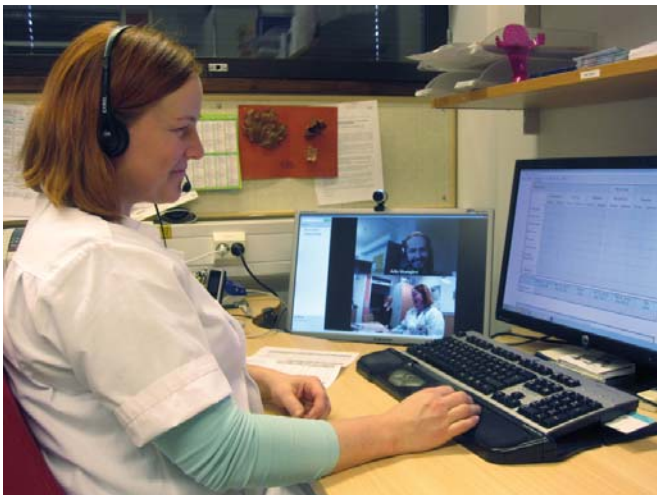
- The Alavus pilot took place in the city of Alavus, South Ostrobothnia, Finland
- The pilot was realized during July 2015 - February 2016
- The Alavus pilot activities are divided into 3 categories:
  - 1) Testing daytime distance monitoring solutions in home care setting,
  - 2) Testing night time distance monitoring solutions in home care setting, and
  - 3) Testing distance consultation with primary health centre and electronic recordings
- The pilot involves actively 15 home care nurses, 2 wound nurses, and 20 home care customers

# Pilot 3: Virtual appointments in diabetes treatment

## Minna Luhtanen

In South Ostrobothnia Health Care District, Connected for Health pilot activities have taken place since September 2015. The main part of the pilot focused on testing a new distance care model for diabetes patients. The model replaces a part of regular hospital appointments by virtual ones. Patients were also encouraged to do health related self-monitoring and to increase the use of electronic health care service portal in communication with health care professionals.

The piloting was carried out between health care professionals from the internal medicine department of Seinäjoki Central Hospital and 20 patients from the Kuusi-



Picture: Minna Luhtanen

okunnat region. Technical support and coordination of the pilot was provided by South Ostrobothnia Health Technology Development Center (Eptek) and related research activities were carried out by Seinäjoki University of Applied Sciences (SeAMK).

During the pilot, diabetes patients participated in diabetes nurse's appointments virtually from home or work. Appointments were arranged through a video communication solution called Vidyo. Each patient's regular appointment schedule was followed.

Patients were working age individuals with long distance to the hospital. Appointments with the diabetes nurse normally required them to take several hours off from work and travel approximately 60-70 km back and forth. With virtual appointments they were able to save both time and money. Patients also felt good about having the information online, thus available everywhere. Some concerns were expressed about the safety of their data but they mainly felt confident about the national Electronic Patient Data Repository.

With majority of patients, the distance care model worked well and self-monitoring was done even better than usually. An interesting aspect noticed by the nurse was that the patients seemed to be more casual during the virtual appointments. On the other hand, some patients were also more careless about cancelling the virtual appointments in comparison to regular ones. Information came at times late or didn't come at all.

Overall, both patients and professionals felt positively about the pilot test. Most patients are keen on continuing with virtual appointments also in the future. Once the method is properly established, patients can be offered a choice between the two systems. The distance care model suits especially those who are ready to take more responsibility on their own care and health monitoring. In exchange, patient receives time savings, as virtual appointments replace hospital visits.

- The pilot took place in South Ostrobothnia Health Care District between Seinäjoki Central Hospital and patients from Kuusiokunnat region.
- Pilot involved 20 diabetes patients and 1 diabetes nurse. Several other professionals were also involved in the activities.
- The pilot was carried out during 09/2015 – 02/2016
- Pilot activities were divided into 2 categories: 1) Testing the electronic health care service portal and 2) Distance consultation
- In addition to the diabetes pilot, distance consultation was tested also between secondary health care and home care.

## Pilot 4: Testing and specifying an infrastructure or ecosystem for telemedicine

**Anna-Britt Krog**

### The results from the pilot

The purpose of the pilot carried out in the Region of Southern Denmark is to test and specify an infrastructure/ecosystem for telemedicine, thus investigating how to support implementation and upscaling of telemedicine. The pilot includes interviews with both patients and health care personnel.

The results from this pilot study point in different directions. In most cases there are no significant differences between users using FTTH or other connection types such as mobile broadband. On the other hand some patients experienced difficulties, most likely because some technologies require a certain quality of network connection to function properly.

The interviews showed that the patients generally felt safe and empowered using the technology. The need for support has been very limited, even though the pilot includes users that are not familiar with communication technologies.

### Current trends in eHealth in Denmark

The ambition is to create a citizens-centred health system that aims to create coherence in relation to detection, prevention, treatment, care and rehabilitation.

Key trends are:

- Development of eHealth solutions that support patients in self-management using home monitoring and virtual consultations. There is among other carried out trials including pregnant diabetics.
- Development of eHealth solutions that support collaboration and data exchange across sectors, and

connect data from multiple systems and devices. An example of this is the Shared Care platform developed by the Region of Southern Denmark.

- Patients using social media to connect and interact with peers facing similar conditions.
- Furthermore the Danish government has decided on an ambitious plan for a nationwide implementation for telemedicine for patients with COPD. The implementation is planned to be completed by 2019.

### Facts of the pilot

- Number of interviews including patients, health care personnel, and managers: 17
- Total number of patients interviewed: 7
- Total number of health care personnel interviewed: 6
- Total number of managers interviewed: 4
- Partners included in the pilot: Esbjerg Municipality (testing data and video), Vejen Municipality (testing video) and Odense University Hospital (testing video) – each of the partners is testing the eHealth service including different kind of patients.



*Pictures: Esbjerg municipality*

# FTTH in eHealth – benefits and possibilities

Marco Forzati and Crister Mattsson

Innovative societal services require high transmission speeds (bandwidth) but also high reliability. Fibre to the Home (FTTH) networks rely on a future-proof infrastructure, which is delivering higher speeds, higher robustness and longer transmission distance. The table below compares the fundamental physical properties of fibre with other infrastructure types, such as copper and wireless. As can be seen, technologies using fibre can easily deliver several orders of magnitude higher bandwidth, transmission distance and hence latency (lower number of hops for the signal).

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Several earlier projects have shown that FTTH-based digital services deliver benefits both in terms of improved life quality and monetary savings for social care. Now the Connected for Health project is analyzing these effects for health care.

The massive deployment of FTTH networks currently taking place can provide the precondition for the scaling of e-health solutions and is therefore the foundation for their successful development.

Infrastructure	Current commercial technology (now)		Fundamental properties of physical medium (future)		
	Top technology	Data rate (down/up)	Shared medium in 1 <sup>st</sup> mile?	Available bandwidth	Basic transmission reach
<i>wired</i>					
Fibre p2p	GbE	1/1 Gb/s	No	50 000.00 GHz	80 km
Fibre p2mp (PON)	GPON	up to 2.5/1.2 Gb/s	Yes	50 000.00 GHz	20 – 45 km (32 – 8 users)
Coaxial cable	DOCSIS 3	up to 300/50 Mb/s	Yes	1.00 GHz	0.5 – 3.0 km (high – low speed)
Twisted pair	VDSL2	up to 60/10 Mb/s	No	0.05 GHz	0.2 – 1.5 km (high – low speed)
<i>wireless</i>					
Terrestrial wireless	LTE	up to 60/10 Mb/s	Yes	0.10 GHz	several km
Satellite	Ka-band systems	up to 20/8 Mb/s	Yes	10.00 GHz	--

Source: Acreo Swedish ICT

## The opening seminar in Stockholm, Sweden

Connected for Health -project opening seminar in Stockholm, Sweden 11.6.2015 brought together the key stakeholders in eHealth and home health care, to share experiences, discuss challenges and present the solutions that the project will implement and evaluate. The title of the seminar was “FTTH and e-health: experiences, challenges, solutions”.

Speakers of the seminar represented the Connected for Health researchers, policy makers and business people, as well as guests from high-profile actors in Sweden, among others, TeliaSone-  
ra and the Swedish Agency for Participation. The panel discussion was concentrated on how to ensure that eHealth and home care solutions are a win-win solution for all stakeholders.



Picture: Jie Li



## Status of FTTH in the Czech Republic and its relation to the health care

**Zdeněk Gütter, National eHealth Centre (Palacky University Olomouc, Czech Republic)**

Participation of the Czech partner in project Connected for Health (CfH) has its background in strategy called "Digital Czech v. 2.0. Roadmap to Digital Economy", as well as in anticipated future healthcare reforms.

Conversion of broadband strategy into innovative high speed services for the Czech public does not go so fast though operators are busy with new FTTH constructions.

Optical access networks are currently (2016) build by a number of operators in the CR, mostly in locations with larger population of customers. Arrangement for open access to FTTH is still not yet a priority for many investors. FTTH in the CR offers typically only TV and internet access.

Larger expansion of FTTH in countryside would be enabled by effective utilization of dedicated EU broadband subsidy (approx. 510 mil Euro). The progress has, however, been hindered by long negotiation of comments to "National plan of Next Generation Networks (NGN) Development" by stakeholders in the CR, which has postponed final approval of the Plan.

In healthcare, there are 2 top level concepts that have close relation to use of ICT, namely National Strategy Health

2020 and National Strategy for eHealth, which is planned to be completed by June 2016 and should in coordinated way open up healthcare to ICT including telemedicine.

At present, ICT use is mostly targeted to management of the sector, registries and data processing. Advanced services using video communication and supporting diagnoses, treatment and education of patients are still not available.

Wide spectrum of broadband eHealth services reviewed and piloted in CfH project therefore forms extraordinary opportunity to get the feel with innovative exploitation of FTTH for health and social care.

Piloted CfH services are enhancing homecare of seniors, accelerate interventions in acute cases, exchange data and maintain contacts between healthcare provider and patients. Such services can support chronically ill patients and in the future may relieve impact of declining availability of care in rural areas of the CR.

Project CfH will contribute by concrete recommendations related to broadband build in public interest and mediate experience from Nordic countries.



## Connected for Health

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## Partnership meeting in Odense, Denmark

The Connected for Health -project second partnership meeting was held in Odense, Denmark 19.-20.10.2015, when the project was almost half way. The main focus of the meeting was placed on the running piloting actions, and the process on how to evaluate the pilots and collect recommendations on how to use FTTH in eHealth.

It was discussed that the information change between municipalities and home care is a problem. In Finland hospital district manages the municipalities' health care, and the social workers cannot see health care workers information. In Sweden the legislation is old and doesn't communicate with the digitalization. It was decided that at the recommendations report, partners could highlight that the regulation is not following digital development.

On the second day of the meeting, on the 20th of October, the project arranged a "Putting Health & Care Tech Development on speed?"- seminar, as one of the events of the international Week of Health and Innovation 2015 -festival.

*Pictures: Morten Sand Valkær*





Connected for Health

# CONFERENCE Fibre enabling eHealth

27.4.2016 in Brussels  
9 am - 1 pm

Permanent Representation of Sweden to the  
European Union,  
Square de Meeûs 30, Brussels

“Fibre enabling eHealth” -conference is a final conference of the Connected for Health -project.

Topics at the seminar include digitalization in health care and ageing, possibilities of fibre to the eHealth and piloting actions tested in the Nordics recently related to these matters.

Key note speakers at the conference are:

- Anneli Jäätteenmäki, Vice-President of the European Parliament
- Sara Johansson, Health Council, Permanent Representation of Sweden to the European Union
- Dr. Nancy Pascall, Policy Coordinator, DG Connect
- Representatives from Finland, Sweden, and Denmark to present eHealth piloting action

Come and hear about latest trends and eHealth solutions in open access fibre networks, recently tested in the Nordics.

Co-funded by  
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