![Celtic-Plus Smart Connected World logo]

## E3

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**Partners:**

Calboquer S.L., Spain

eHoiva Palveluverkko Oy, Finland

Galaksiya Bilisim Teknolojileri, Turkey

Idi Eikon, Spain

Institut Mines Télécom, France

Poznań Supercomputing and Networking Center, Poland

SeniorSome, Finland

SoSoft, Turkey

Université de Lorraine (UL: CRAN & TELECOM Nancy)

Vestel Electronics, Turkey

**ViLynx Spain S.L.U., Spain**

Vitec, France

**Co–ordinator:**

Oscar Chabrera Villarreal

ViLynx Spain S.L.U.

E-Mail: oscar@vilynx.com

**Project Websites**

www.celticnext.eu/project-e3

www.hipermed.eu

# E-health services Everywhere and for Everybody

**E3 allow everybody's** (both rural & urban areas, both Patients & Professionals) **access to e-health services everywhere** (provide low cost high quality video conference & e-health services reusing in-home infrastructures). More than 30 thousand viewers from 91 countries attended the 4th European Laryngological Live Surgery Broadcast session http://els.livesurgery.net/archive2018.php last 28th November 2018.

## Main focus

E3 designed and implemented an End-to-end platform able to allow everybody access to e-health services everywhere that has been tested and validated in **15 healthcare implementations** by doctors and patients.

These 15 healthcare implementations have been aggregated in 3 main categories:

On the Professional-to-Professional imple-

mentations E3 has evolved from a fix line connection symmetric videoconferencing to a Mobile based WebRTC solution reducing the minimum bandwidth connection needed from 3Mbps to just 1Mbps. The impact is that low bandwidth connected areas will be able to use E3 Videoconferencing services to get access to the same e-health services main populated cities have.

On the Professional-to-Patient and Inter-Patient implementations, E3 allows patients to access medical services from home using their own Mobile phone, Smart TV's or STB (Set-Top-Boxes) reducing deployment costs and allowing everybody to have e-health services everywhere.

E3 is able to summarize and index the visual information allowing Professionals to have a quick summary of the recorded sessions as well as to navigate and discover information inside a video thanks to video indexing. Also speech-to-text tech-

nologies have been developed easing doctor's access to patients information.

## Approach

E3 has evolved from SIP (HIPEMED) to WebRTC allowing a system complexity reduction and improving customer connection allowing asymmetric connection and mobile ones. In parallel the project has worked on compression techniques allowing reducing video minimum bandwidth requirements for medical decisions from 3 to 1 Mbps. This allows professionals to connect on the move, and not just from their offices, providing e-health services everywhere.

We have integrated E3 services and wearables in both mobile Apps and STB-HDTV allowing to provide medical services and monitoring at home, reusing patients existing equipment in order to ease in patient's home deployment of medical services.

## Achieved results

E3 project is a cross domain SME driven project (8 SME's, 1 Industry and 3 Research Universities) that has proven that international cooperation as encouraged by EUREKA and Celtic-Plus is a must, not only to join the necessary expertise to master the project but also to ease cross partner and cross-country exploitation of the project results, or even helping other partners with the developed solutions exploitation.

E3 international cooperation has allowed to get the inputs from the medical system of 5 different countries (Spain, Finland, France,

Poland and Turkey) easing to tune the solutions to match the e-health sector needs in a broader scope, as well as the fact that collaboration with external self-funded potential final users (6 SME's and 4 hospitals & Medical Institutions) has proven to be the right approach for going to market faster, as solutions are tailored to final user's needs.

HEVC (High Efficiency Video Coding) proposed medical test video sequences have been ACCEPTED for the MPEG video test set (at the 119th MPEG meeting at Torino, Italy) for the development of Video Coding Standards. Doctors and professors have validated the superiority of HEVC compared to AVC/H.264 encoding standard for medical video compression in subjective tests.

E3 project has been awarded "eVIA INNOVA Bronze Award" last 4th November 2015. eVIA is the Spanish Technological Platform for both e-health and independent and active life (Plataforma de Tecnologías para la Salud y la Vida Activa e Independiente)

Cross Domain project with 3 Medical Congress:

♦ Nancy (France) on 29th Sept to 1st Oct 2015 f**irst 3D Telesurgery transmission of both ENT** /Ears, Nos and Throat) **& Heart Surgery**,

♦ Nancy (France), Espoo (Finland) & Poznan (Poland), 14th June 2016 **first Simultaneous 2D & 3D Robotic & Endoscopic Surgeries** during the MTR (Midterm Review) of the E3 project in Espoo-Finland,

♦ Nancy (France), 27th June 2018, 2D endoscopic surgery and 2D robotic simulation during a telemedicine workshop

First course on brain anatomy coupled to an awake live surgery (May 26, 2017) in Nancy, France, which allowed 250 students simultaneously attending vs 3-5 possibly present in an operating room, allowing future surgeons to get access to better training and live experience.

Video compression thresholds based on subjective tests realized in living lab PROMETEE (TELECOM Nancy, Université de Lorraine): acceptability of video compression by doctors with respect to the medical usages

Dr Gallet (ENT Surgeon, Nancy University Hospital) indicates that "The E3 project was used to organize an International Course between France and Canada: the E3 solution was stable, user-friendly, with a remarkable audio and video quality, despite low speed networks" he also points out that "We used the E3 solution to carry out surgical coaching during live surgeries: this tool opens new perspectives in surgical education»

## Impact

**Thousands of doctors and medical students can access simultaneously to an operating room experience** (over 30 thousand from 91 countries in the 4th European Laryngological Live Surgery Broadcast session) **improving productivity.**

Integrated approach for ehealth services created **a backbone for further ehealth applications to be included easily** which in turn lowers cost and time for new app development and increases quality by reusing existing resources.

**Resource sharing** has allowed to manage increasing traffic volumes due to a better utilization of the communication infrastructure.

**Accessing patient's recent and historical vital information in time** to take action immediately if required increases the **reliability of ehealth services** and lowers the ehealth costs

**Lower services costs** have allowed to launch to market new products from equipment manufacturers as well as new eHealth applications.

The HEVC acceptance of E3 proposed medical test video sequences for the MPEG video test set for the development of Video Coding Standards will improve medical video imaging.

## About Celtic-Plus

Celtic-Plus is an industry-driven European research initiative to define, perform and finance through public and private funding common research projects in the area of telecommunications, new media, future Internet, and applications & services focusing on a new „Smart Connected World" paradigm. Celtic-Plus is a EUREKA ICT cluster and belongs to the intergovernmental EUREKA network. Celtic-Plus is open to any type of company covering the Celtic-Plus research areas, large industry as well as small companies

or universities and research organisations. Even companies outside the EUREKA countries may get some possibilities to join a Celtic-Plus project under certain conditions.

## Celtic Office

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