# HIPERMED: High PERformance telemedicine platform

## E3: Ehealth services Everywhere and for Everybody

## CELTICplus Success Stories

Madrid 16th March 2016

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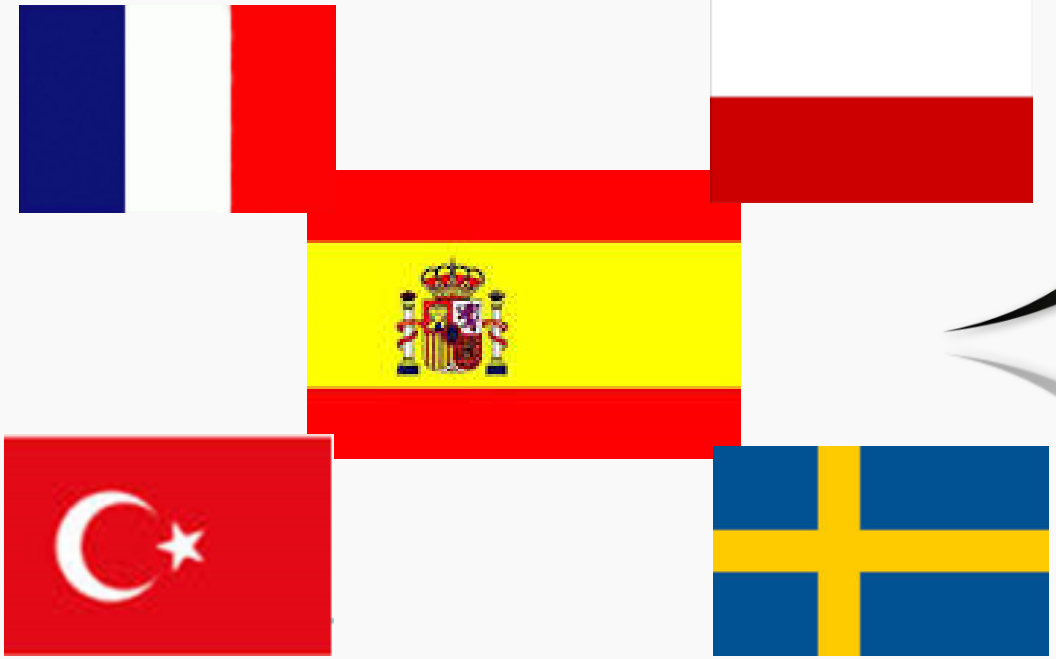
# HIPERMED

HIgh
PERformance
teleMEDicine
Platform
CP7-007

E3 PROJECT
e-health solutions



# Project overview

- Exploits and extends the results form the HDVIPER Celtic Project

- Designed and implemented an **OPEN HIgh PERformance teleMEDicine platform** based on a unified Service Oriented Architecture (SOA), providing media and control services over IP
- **Validated in 5 Healthcare Scenarios by patients, doctors and professors**
- **Currently under exploitation**

# HIPERMED Project Awards

- **CELTICplus Award** Silver 2014
- **EUREKA ADDED VALUE Award** Winner 2014
- **EUREKA INNOVATION Award** Winner 2014

# External Final Users Validation

HIPERMED

E3 PROJECT e-health solutions

HACETTEPE ÜNİVERSİTESİ

TÜRK TELE KOM

MAGICBOX INTERACTIVE

phemium

vilynx

i2HEALTH Sant Pau

asmedit® orientación asistencial permanente

PROMETEE LE LIVING LAB DE LA MÉDECINE NUMÉRIQUE

CHU NANCY www.chu-nancy.fr

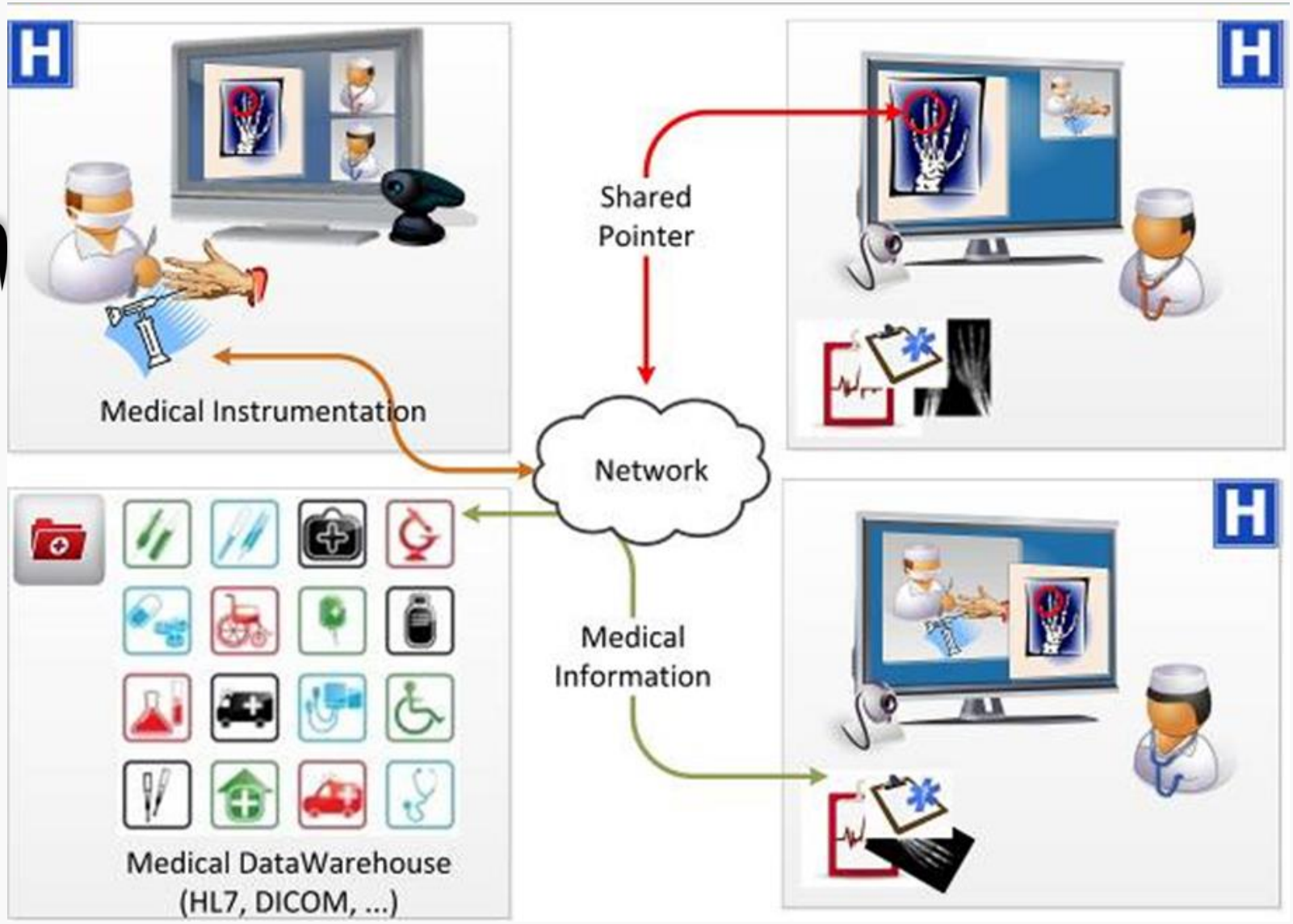
POZNAN UNIVERSITY OF MEDICAL SCIENCES POLAND

HOSPITAL DE LA SANTA CREU I SANT PAU UNIVERSITAT AUTÒNOMA DE BARCELONA

CLÍNIC BARCELONA Hospital Universitari

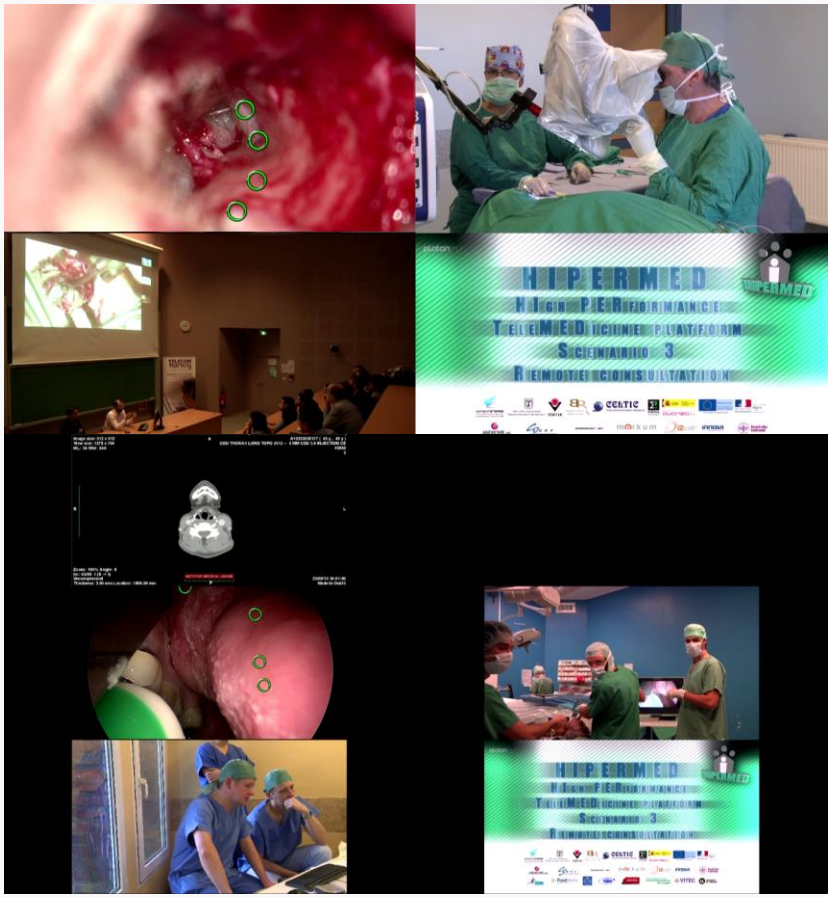
ECOLE DE CHIRURGIE NANCY FACULTÉ DE MÉDECINE

# In a Nutsell


Medical Instrumentation
Shared Pointer
Network
Medical Information
Medical DataWarehouse
(HL7, DICOM, ...)

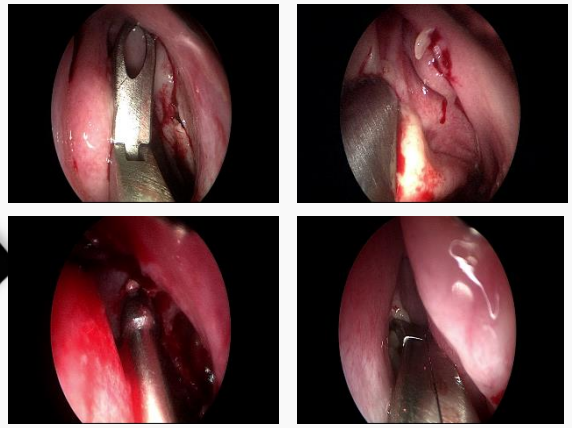
# E-health solutions for doctors: Remote Consultation

- Remote Lecture
- Planned Consultation
- Emergency Consultation
- **First ever Surgery**

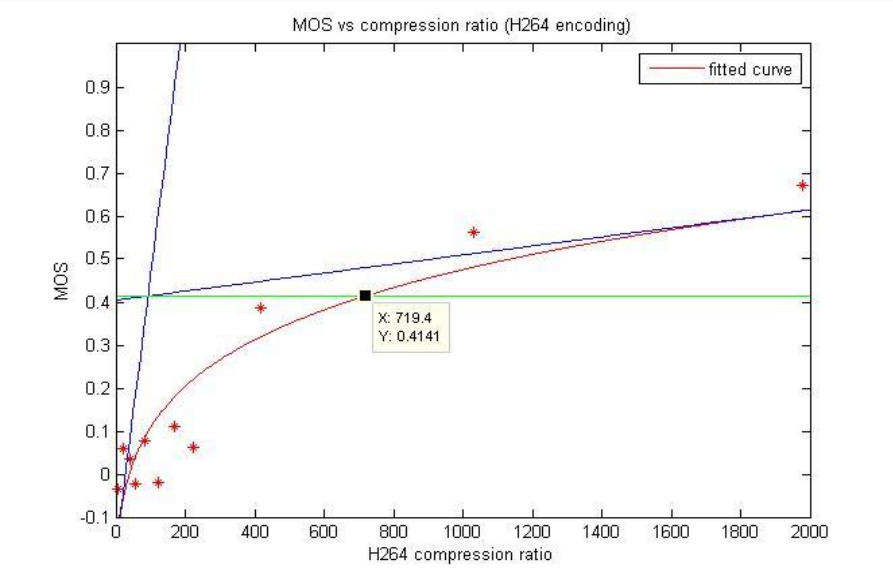



Hipermed clearly appears **relevant, efficient and effective** for professional usages. Under deployment in Sweden, France, Poland and Spain

# Video quality assessment: compression threshold

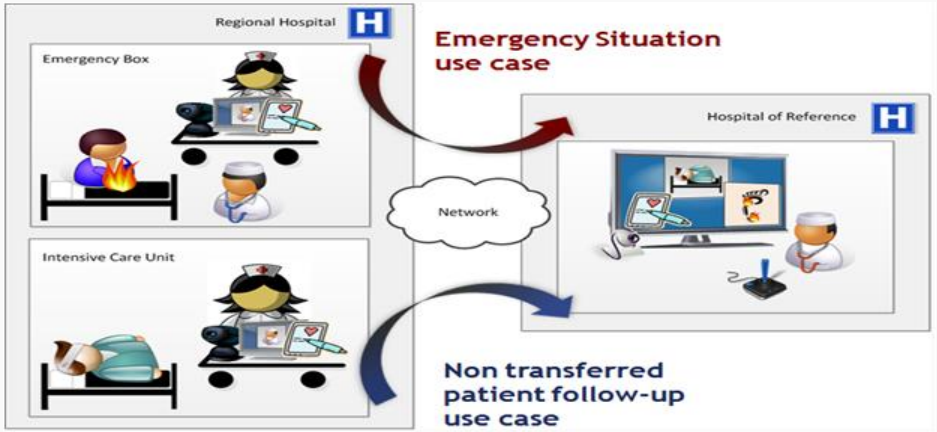


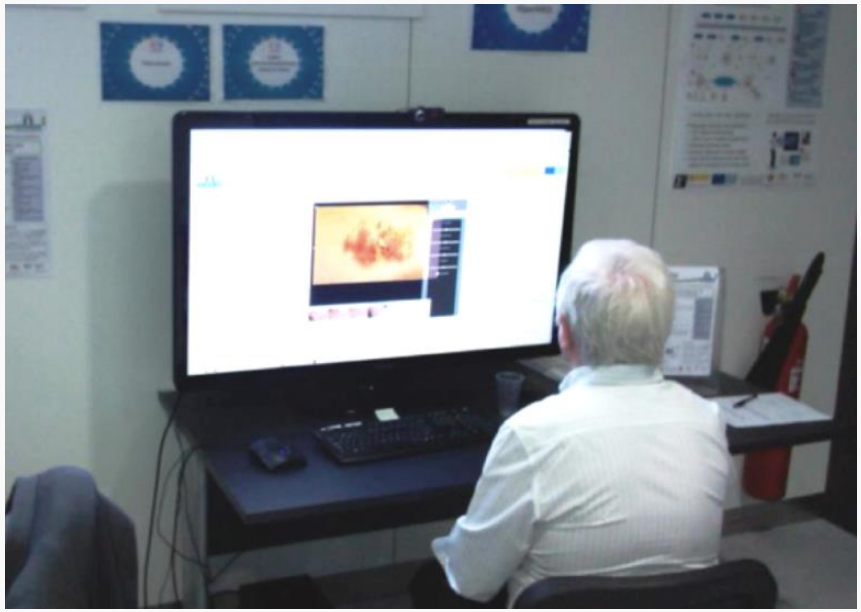
- ✓ ITU-BT.500-13 protocol for the **assessment of picture and video quality** - **double-stimulus continuous quality-scale** (DSCQS)
- ✓ **4 original ENT video test sequences** at **3Gbits/s** (full HD resolution (1920x1080 – 60 Frames/s))
- ✓ **14 observers** with different ENT experiences in medical curriculum (intern, extern, resident, doctor, professor)
- ✓ **10 AVC/H.264 compression ratios**
- ✓ Comparison between **MOS** and **objective metrics**




Thanks to **expertise in compression** and in **quality assessment** we keep safe the quality of ENT videos for medical usages **down to about 3Mbps**

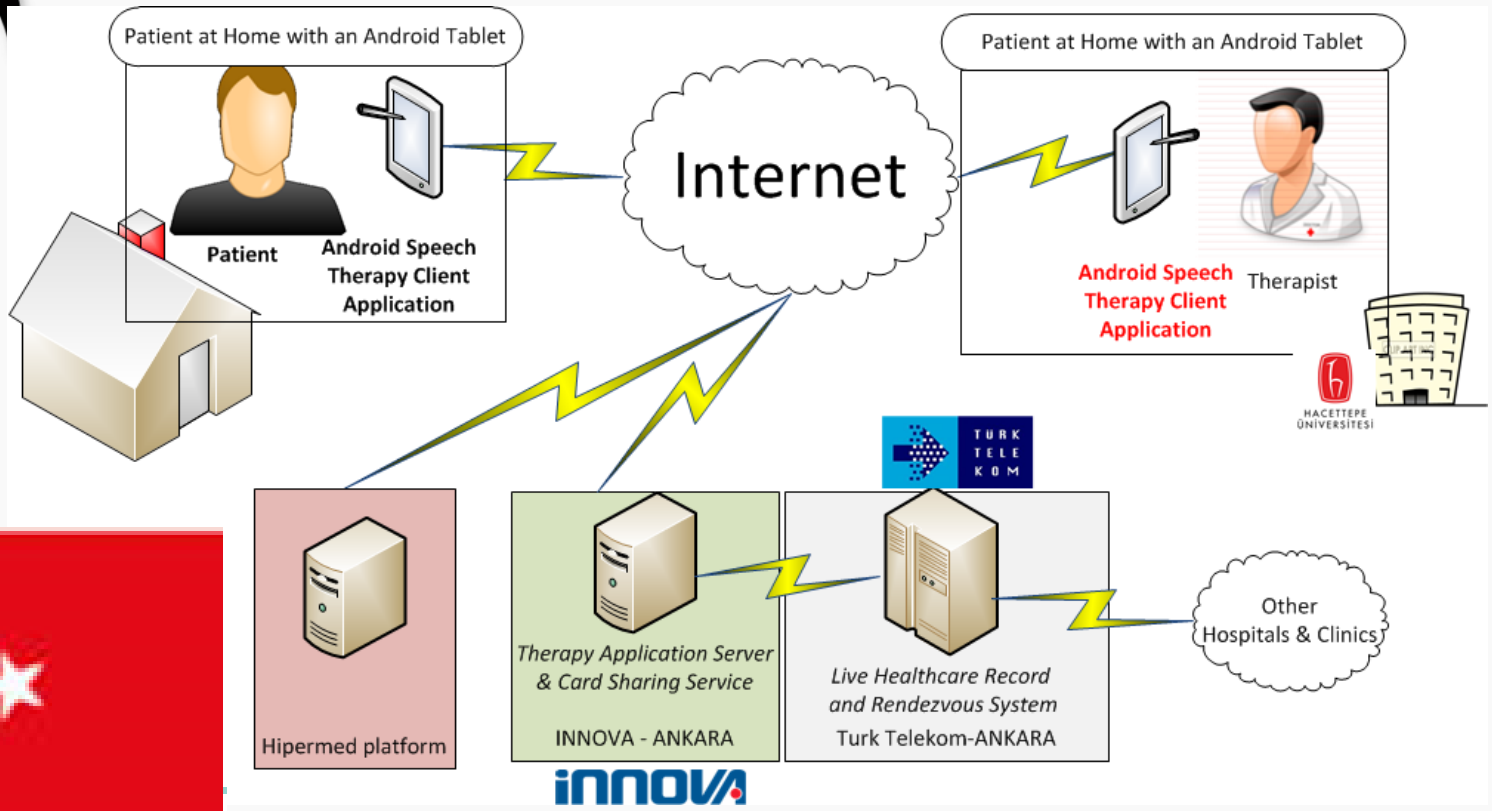
# E-health solutions for doctors: Tele Burn





# E-health solutions for patients: Speech Therapy

- Number of appointments attended by the patient increased
- Therapy cost due to transportation for the patient has decreased considerably
- Time devoted for therapy session has decreased for both: patient & therapist

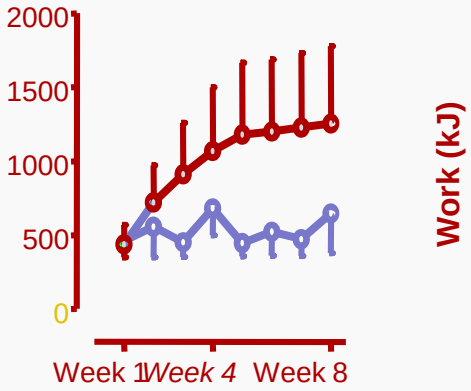


# E-health solutions for patients: videoconference

- Providing mobile videoconferencing to +10M people

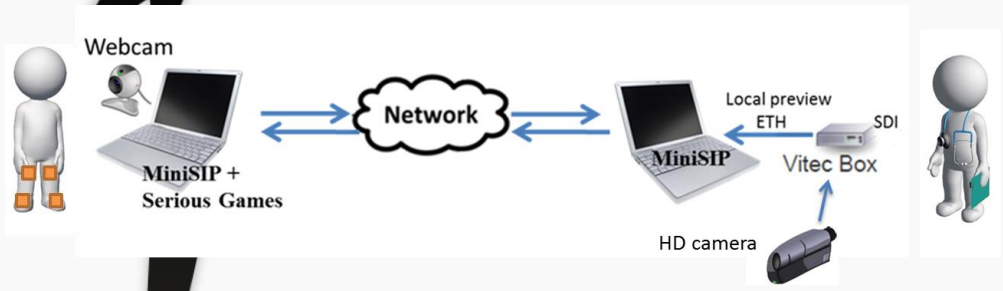
# E-health solutions for patients: Cardio

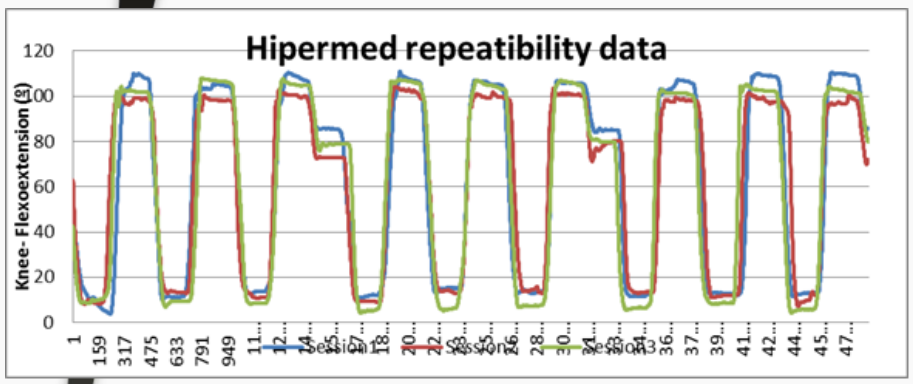
- Reduction in hospital admissions
- Improves patients quality of live and exercise tolerance



# E-health solutions for patients: Rehabilitation

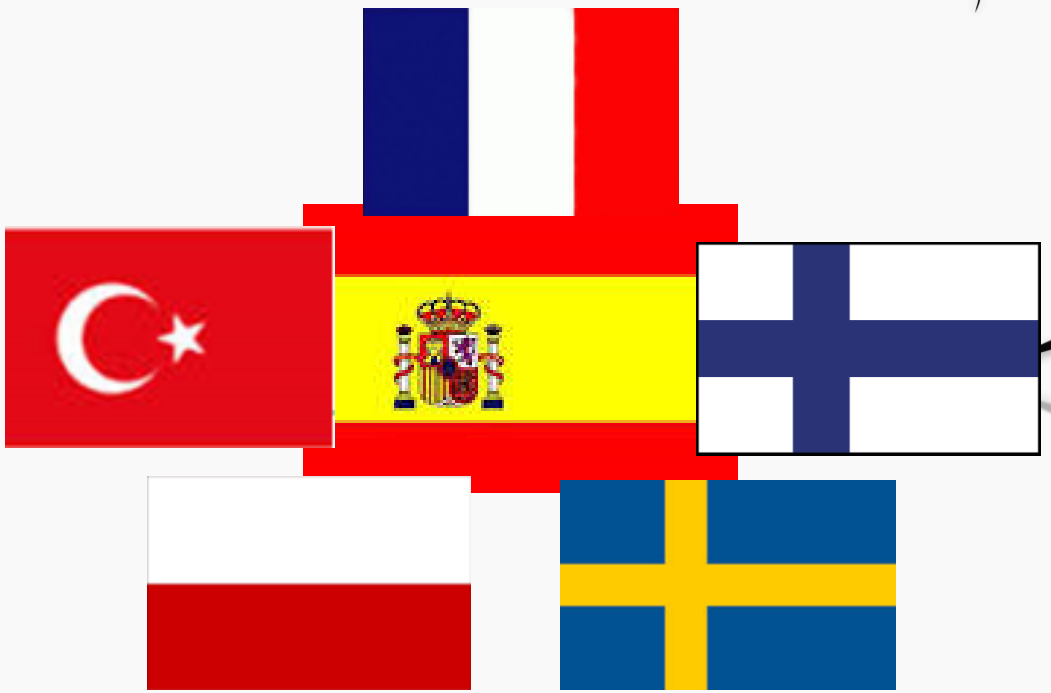
- 83% cost reduction
- 66% of patients prefer HIPERMED rehabilitation system vs conventional sessions



# E-health services
# Everywhere and for
# Everybody

E3 PROJECT
e-health solutions



# Project overview

- Project started December 2014
- Design & implement an **E2E Platform** able to allow **Everybody access to E-health services Everywhere**
- Exploits and extends the results from the HIPERMED Celtic project

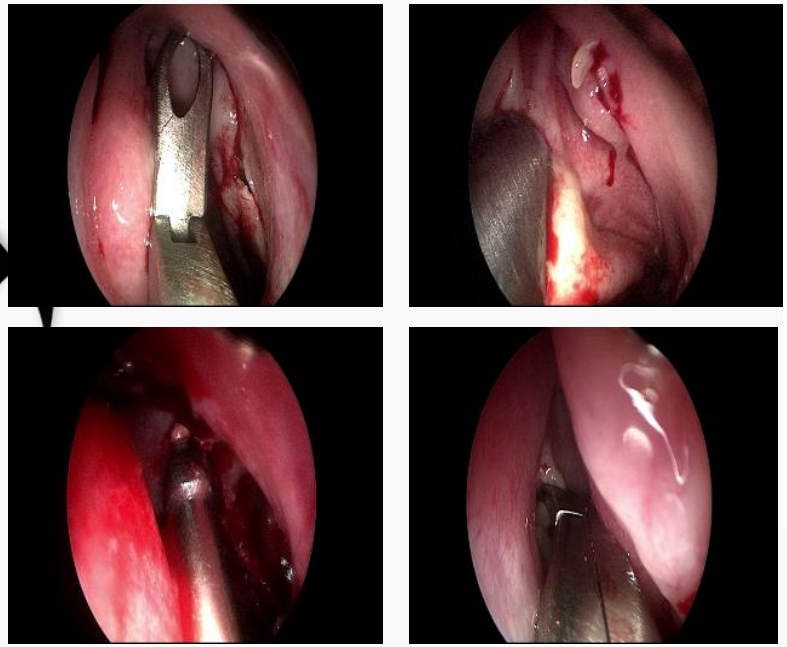
# Main Updates

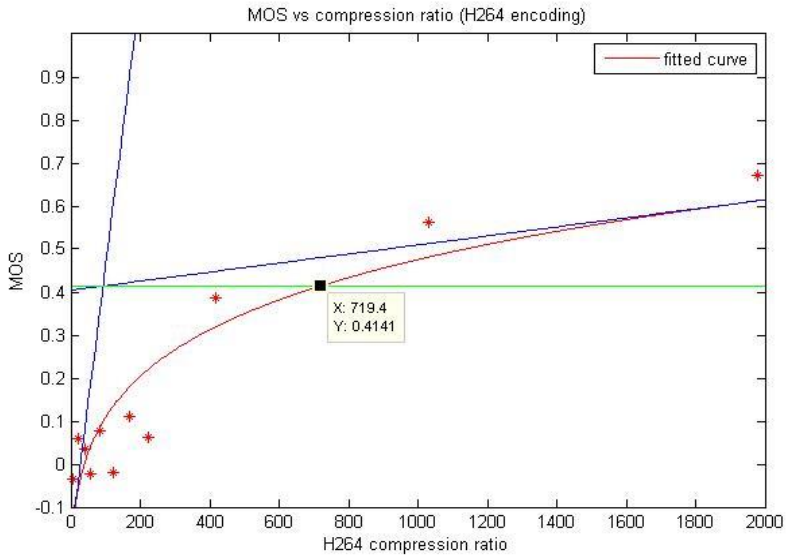
- HIPERMED trusted in Doctors/Hospitals as External Validators. E3 is following this path.
- HIPERMED was working on HIgh resolution and PERformance as well as allowing real time interactivity and HD-3D. E3 will add UHD-4K.
- HIPERMED was working on MPEG H.264. E3 moving to H.265
- HIPERMED lacked of mobility devices connection for the Professional to Professional High PERformance Scenarios
  - E3 Multisite connection aims to allow SD and HD connections simultaneously
  - E3 aims to allow doctors to connect from "Everywhere": Smartphones & Tablets.
- HIPERMED lacked of HIgh bandwidth requirements (4Mbps) for the Professional to Professional High PERformance Scenarios.
  - E3 has already reduced to 1Mbps
  - E3 is working in a multisite best effort connection

# eVIA Innova Bronze Award

- First Award within the first year of Project: Nov 2015

# Video quality assessment: compression threshold

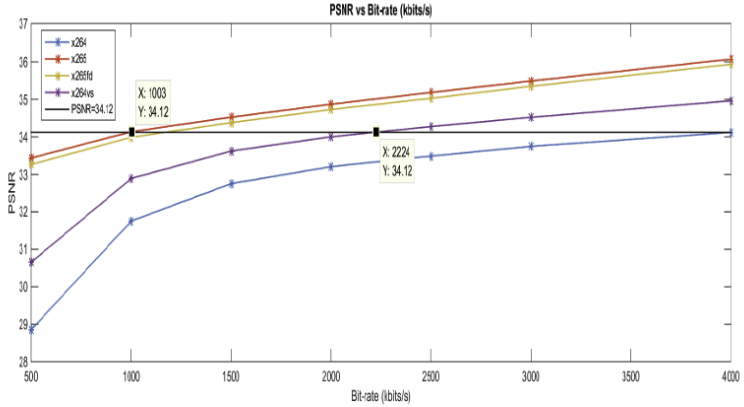





Thanks to **expertise in compression** and in **quality assessment** we keep safe the quality of ENT videos for medical usages **down from 4Mbos to about 1Mbps**

## Streaming tests : Quality issue

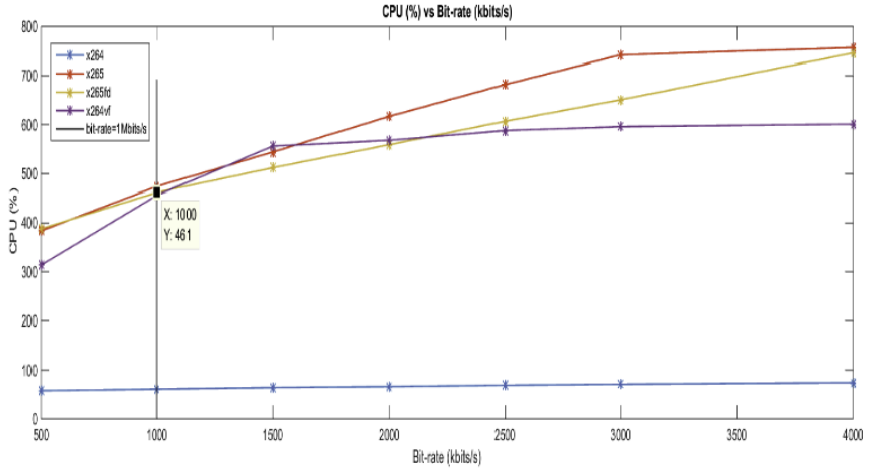
- X264 (bit-rate 4 Mbits/s) ➔ PSNR=33,39
- X265 (PSNR=33,39) ➔ bit-rate=1Mbits/s



# Video quality assessment: Requirements

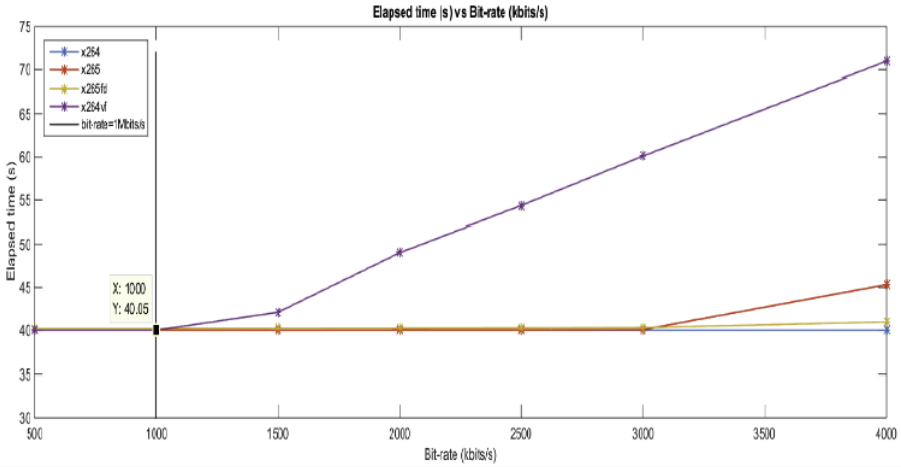
## Streaming tests: CPU issue

- CPU (%) vs Bit-rate (kbits/s)




## Streaming tests: latency issue

Elapsed time (s) vs Bit-rate (Latency):




Working to reduce CPU requirements as increase from single core to an Opto-core processor

Working to reduce processing overhead as H264 has no latency for 40 sec videos

Working to allow asymmetric connections allowing SD and HD videoconference simultaneously

# KPI (Key Performance Indicators)

## Project Results Protection

- # Patents, trademarks, registered design, etc.:
- # Contributions to standards: **1 HEVC**
- # Standards followed: **Following HIPERMED defined standards: Medical and Video**
- # Master/PhD thesis contributing to/using project results: **1 VITEC-UL**

## Project Dissemination

- # Prototypes/Field Trials: **1 PROMETEE HIPERMED-E3 lab in Nancy (France) fully operational in June 2015. Formal inauguration on 29th Sept.**
- # Medical Congress: **1 Nancy (France) 29th Sept 2015 First 3D telesurgery transmission of ENT and Heart Surgeries. Woriking to have one in Espoo-Finaland on June 15th MTR**
- # Journal Publications: : **10**
- # Conference & Papers:
- # Dissemination Events: **4 in 2014 Before project Kick off, 7 in 2015 together with HIPERMED project, 2 in 2016 together with HIPERMED project: 3 booths in MWC2016**

## Project Exploitation

- # new products/services:
- # Improved products/services: **1 NETICTEC/PSNC-UL improved HIPERMED Telco equipment**
- Sales: **1 NETICTEC/PSNC-UL sold 1st equipment to NANCY School of Surgery. 5 more deployed in Nancy Region Hospitals.**
- Expected RoI (Return on Investment):
- # new companies created: **1 NETICTEC**

## Project Impact

- Technoeconomics:
- # new permanent employees hired for project R&D: **10**
- # new permanent employees hired for project exploitation: **2**

# Exploitation Activities

- E3 partners work on HIPERMED project exploitation as this will help us to cash in the investment as well as to improve E3 project requirements and HIPERMED platform.
  - HIPERMED project products have to be adapted to specific patients/doctors needs
  - Deployed E3 improvements in Nancy School of Surgery
- Deployed a first Demonstrator in Nancy (France) in PROMETEE lab fully operational in June 2015
  - Working to standardize this solution in France and replicate in the other project country partners: Spain, Turkey, Finland, Sweden and Poland.

# Thank you!
# Questions?