



ESA ESTEC Contract 23120/10/NL/AD

# ARTES Workshop, Nordwijk 5-6 April 2011



# Modifiable and non-modifiable contributors to diseases

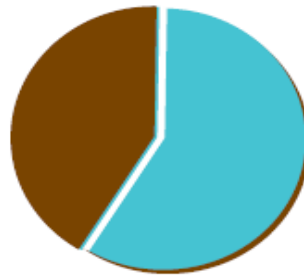
91% Diabetes



83% Heart Disease



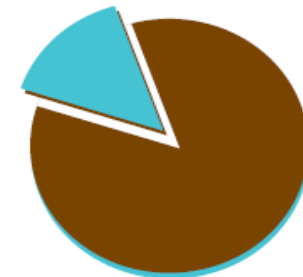
69% Cancer



Current



Goal



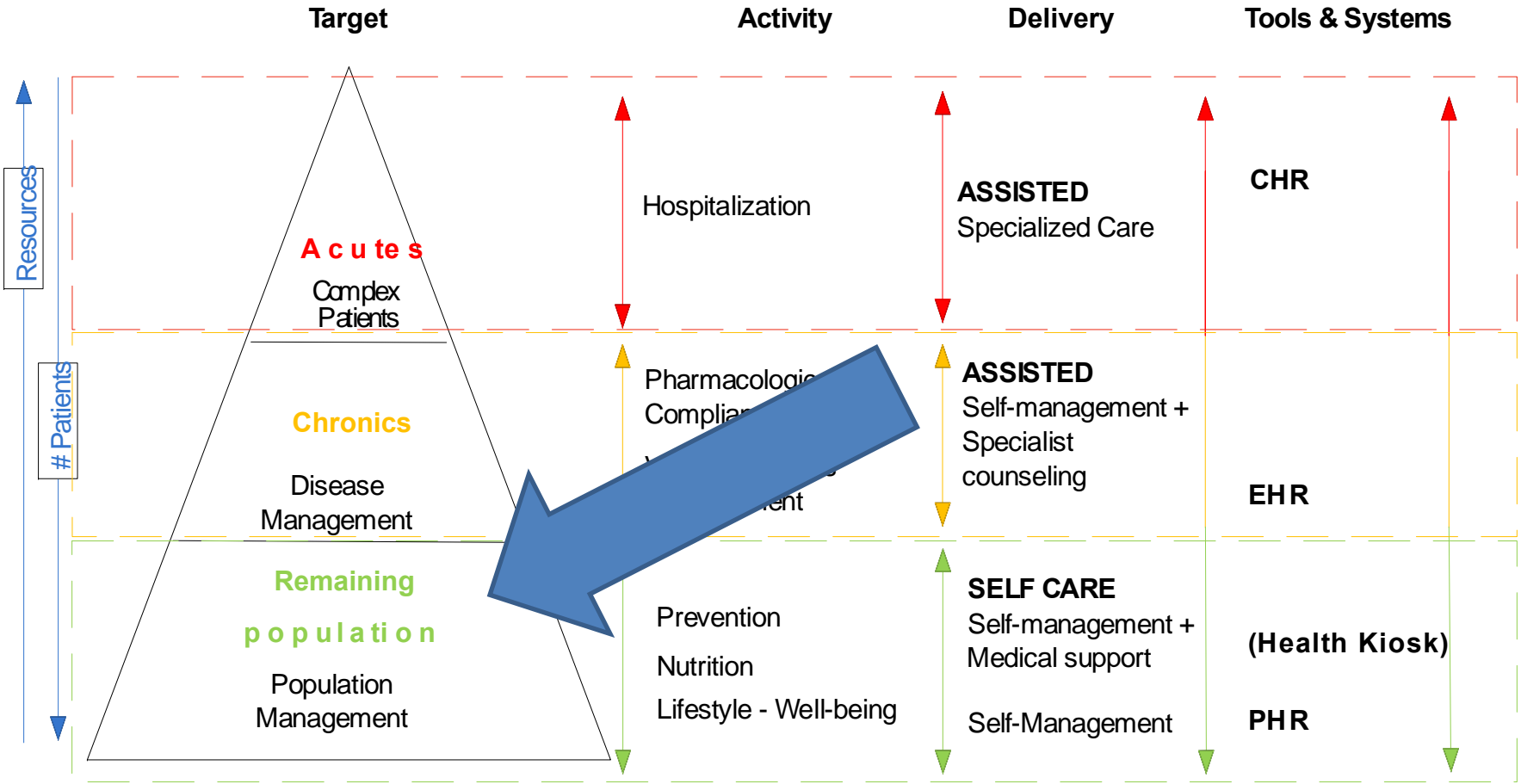
**Non-modifiable Contributors to Disease**

**Modifiable Contributors to Disease**

Hu et al. Diet, lifestyle and the risk of type 2 Diabetes in women. NEJM 2001  
Sep 13;345(11):790-7.



# The need



(Adapted from Kaiser Permanente – Pyramid of Care)

**CHR** = Clinical Health Record  
**ECRF** = Electronic Clinical Report Form  
**EHR** = Electronic Health Record  
**PHR** = Personal Health Record



# The objectives

**TESHEALTH - Telemedicine Services for HEALTH** aims to specify and develop an **integrated system of e-Health applications and services** targeted to **Primary Prevention**.

## Specific objectives

- Increase the person's control on safety, by providing instruments and services for self-care and for creating a link between the individual and the physician environment anytime and anywhere;
- Ensure the exchange of heterogeneous health data among different healthcare service providers (connected health) such as hospitals, pharmacies, labs, etc.;
- Automate the complex healthcare workflow;
- Deploy an integrated heterogeneous telecommunication network including satellite.

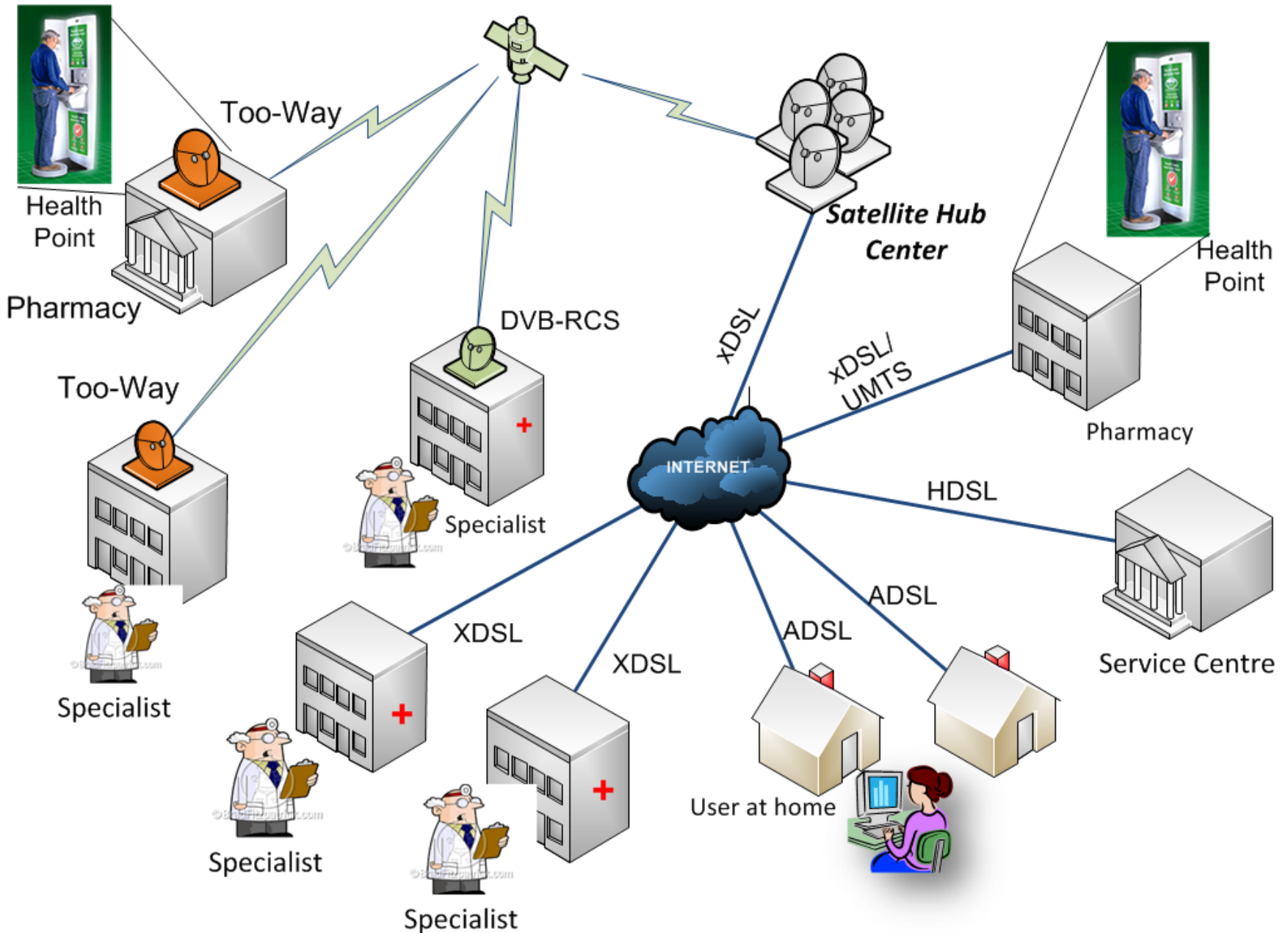


# Project information

- The team: Telbios, prime contractor, Kell, CIISO, CNIT, Fatebenefratelli Hospital
- Approach: **Phase 1** lasting 8 months for the implementation of a demonstrator
- Phase 2**, to implement the overall system and for the services validation.
- Status: Implementation



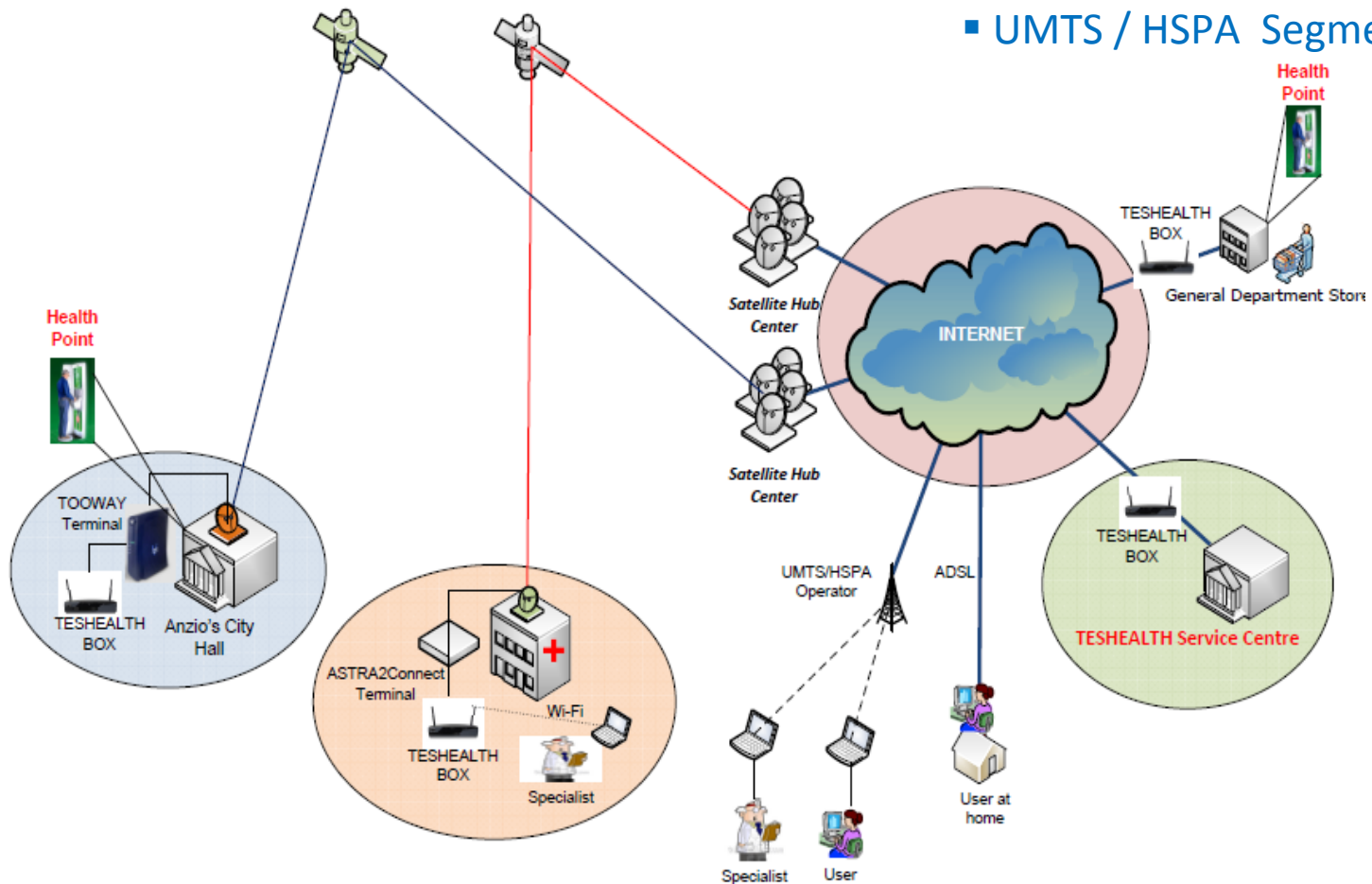
# Reference scenario



# TESHEALTH Network Architecture

Heterogeneous and interoperable network architecture:

- Satellite TOOWAY Segment (S-DOCSIS);
- Satellite ASTRA2Connect Segment (DVB-RCS);
- Wired Segment;
- Wi-Fi Segment;
- UMTS / HSPA Segment.

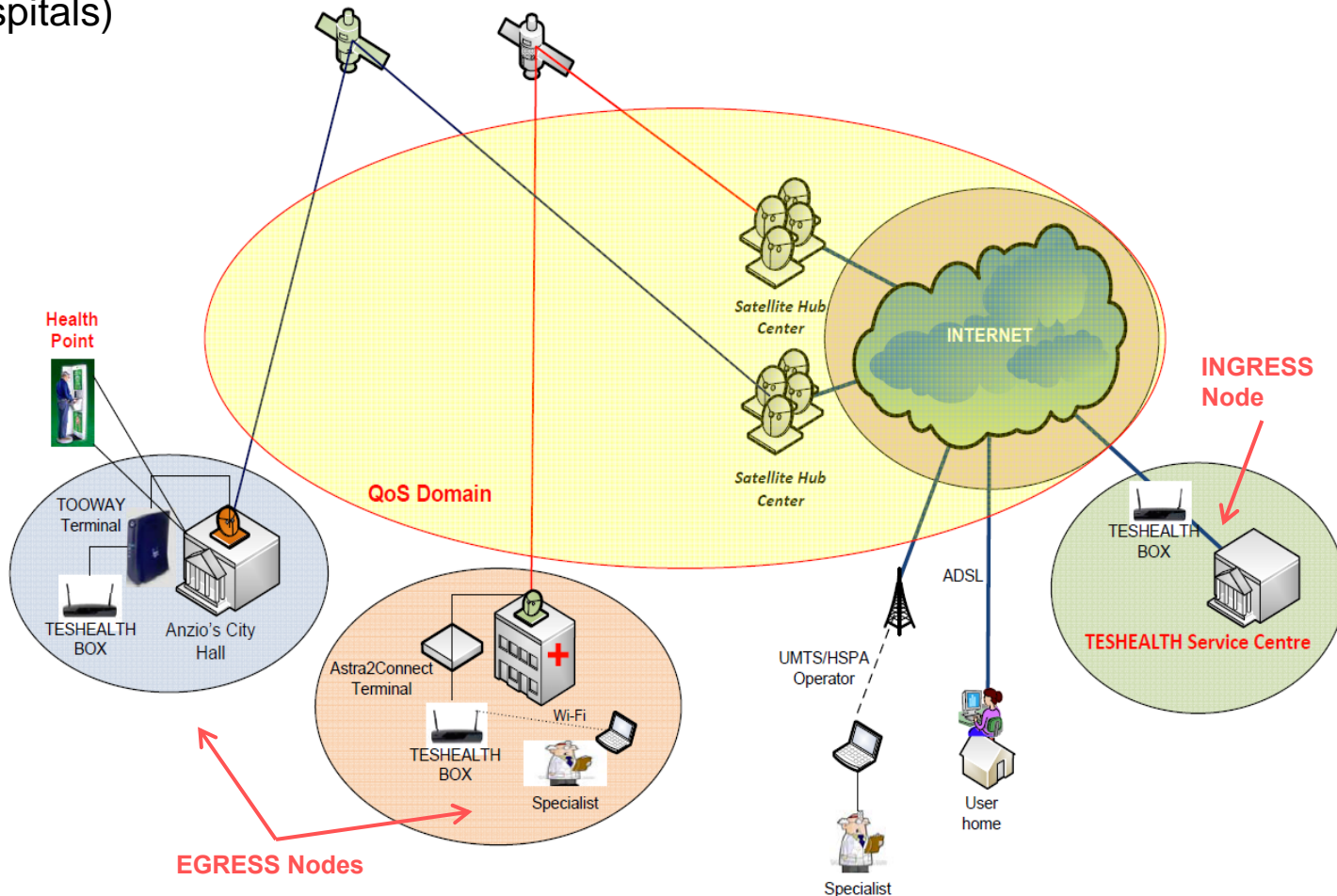




# TESHEALTH QoS Solution

For the QoS **Advanced network control mechanisms** on IP routing devices, the **TESHEALTH Boxes** (Cisco Routers 871W), are placed at the boundaries of the TESHEALTH QoS Domain.

- **INGRESS Node** → TESHEALTH services **server/source** (Service Center)
- **EGRESS Nodes** → TESHEALTH services **clients/destinations** (Health Points and Hospitals)





# TESHEALTH Boxes Configuration

Secure, scalable and flexible network infrastructure:

1) **VPN-IPSec** → **Virtual Private Network with IP Security:**



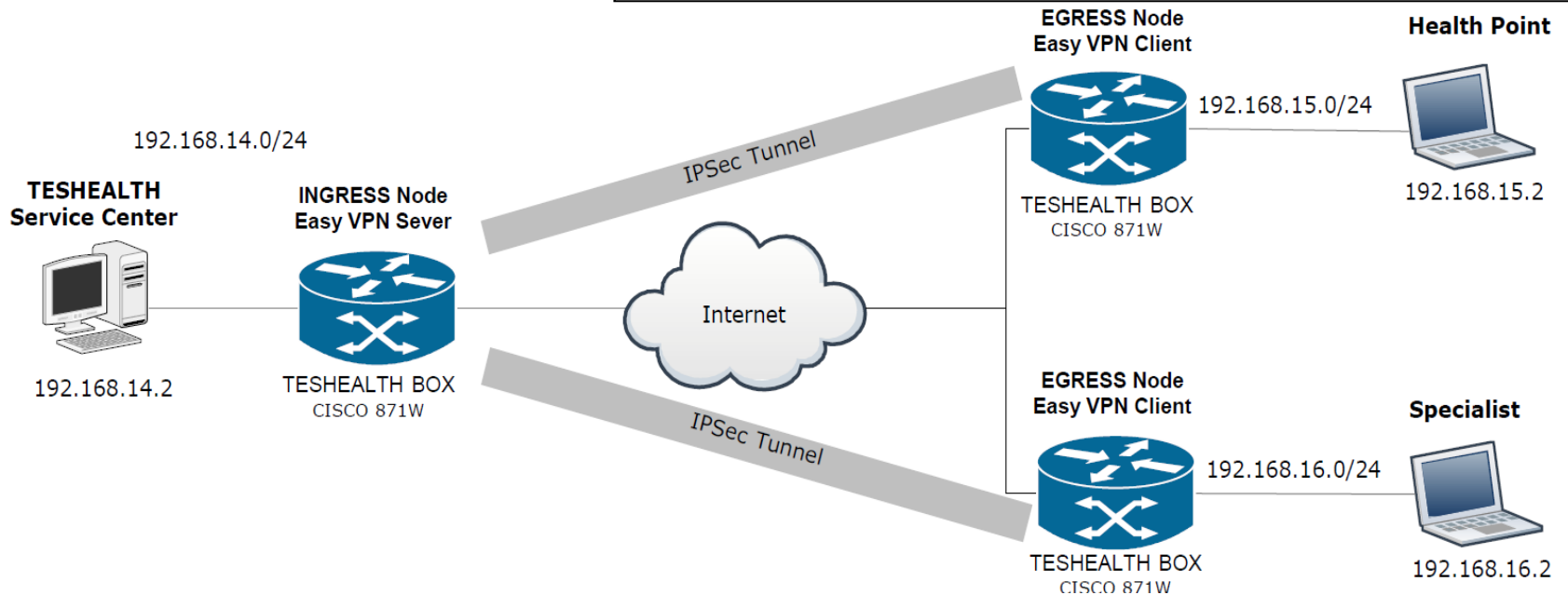
TESHEALTH Boxes **logically connected in a star topology.**

Different **IPSec encrypted VPN tunnels.**

**Internet connectivity** through the **INGRESS Node**.

2) **NAT-T** → **Network Address Translation Transparency:**

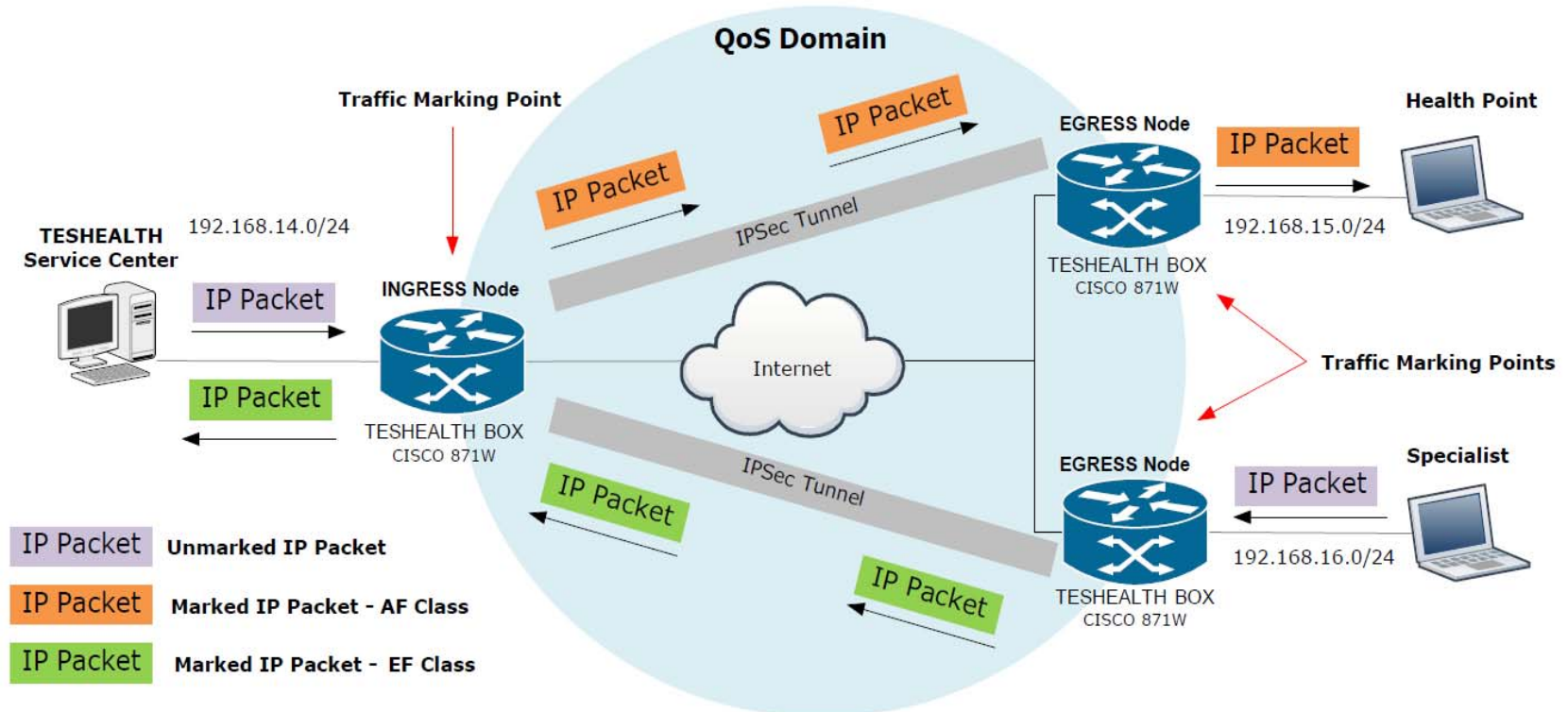
To overcome the uncontrolled NATs along the path among the TESHEALTH Boxes.



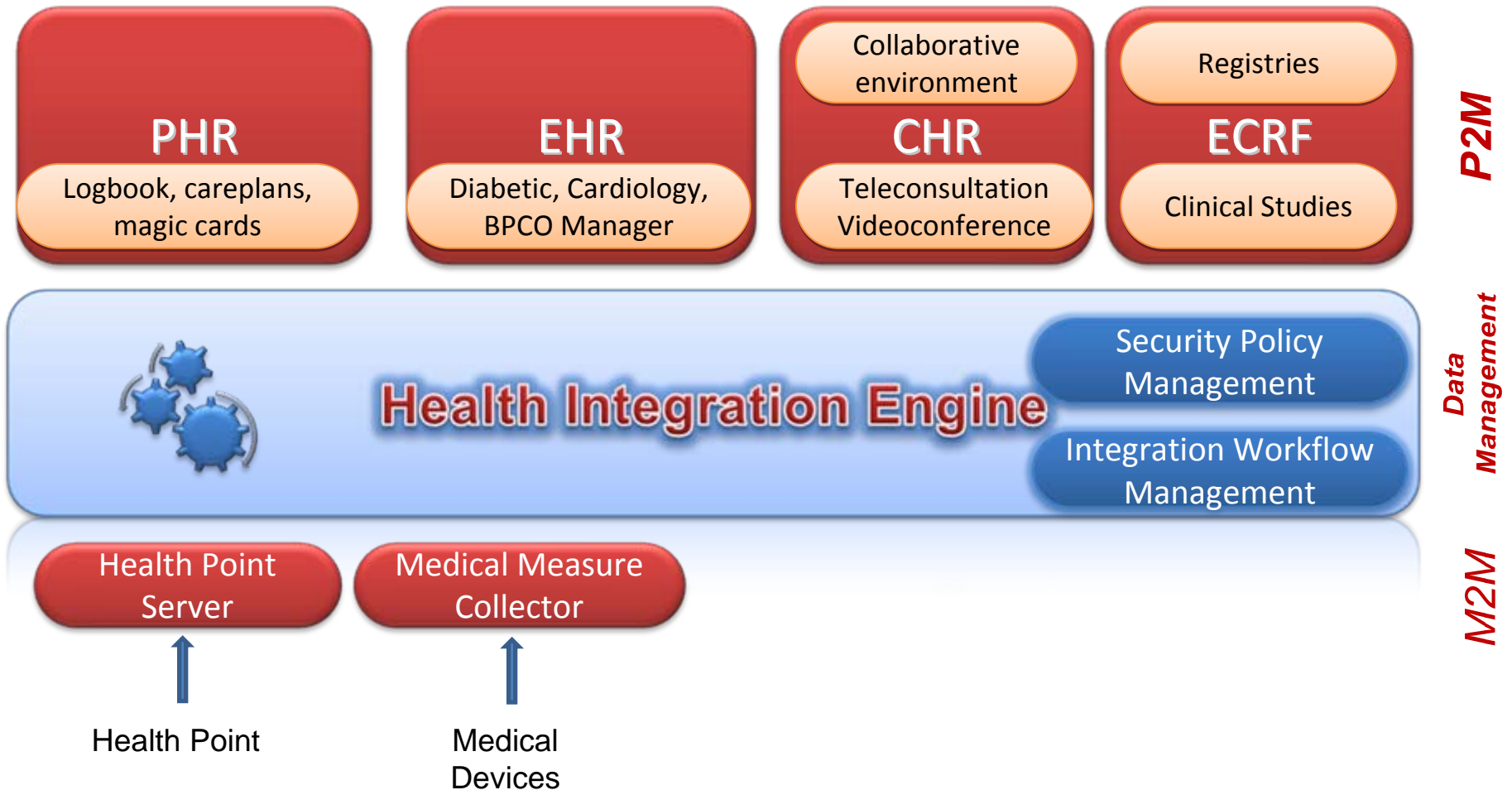
# TESHEALTH Boxes Configuration

## 3) Diff-Serv Differentiated Services:

- ✓ End-to-End QoS functions.
- ✓ Different Per-Hop Behaviours (PHBs).
- ✓ Traffic Marking.
- ✓ Minimum guaranteed bandwidth for each Diff-Serv class.



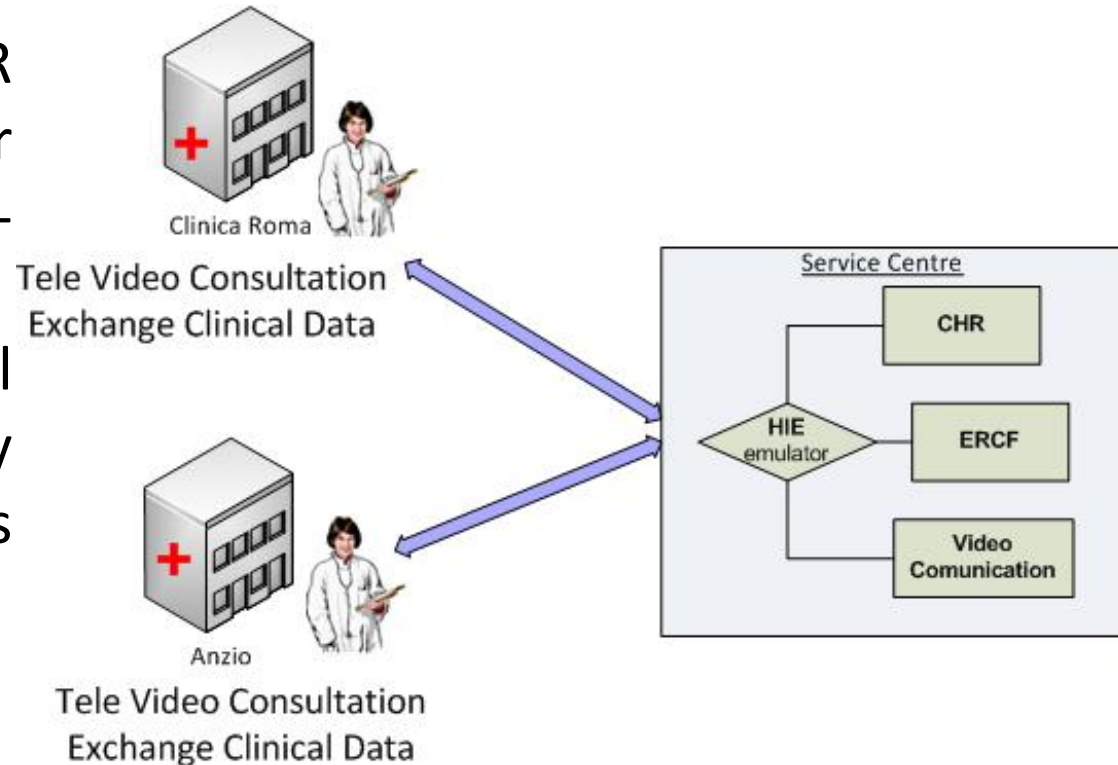
# The service platform



# Professional Pilot Scenario (1/2)

## Teleconsultation

- Clinical data into the CHR can be shared with other hospitals for tele-consultation purposes;
- The tele-consultation will be supported by cooperation instruments and videoconference.
- Session can be registered.
- The patients data are sent, through the HIE, to other clinical data management elements of the chain (e.g. PHR- EHR)



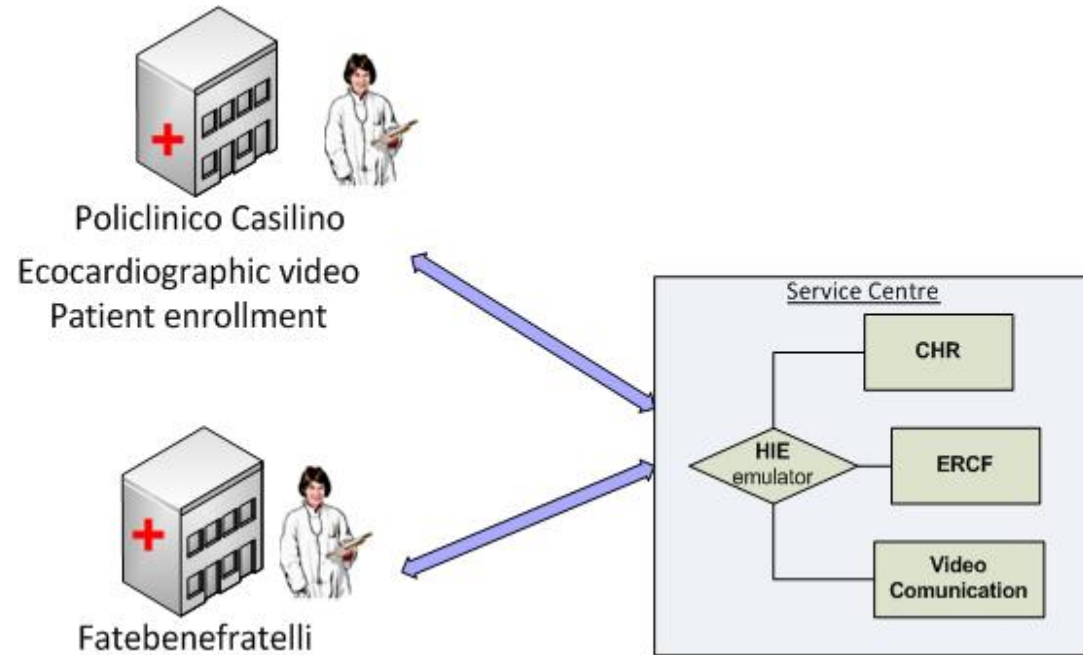
### Numbers

- Anzio inhabitants increases during the summer period from 55.000 to more than 190.000: this increase the request of specialists

# Professional Pilot Scenario (2/4)

## ECRF

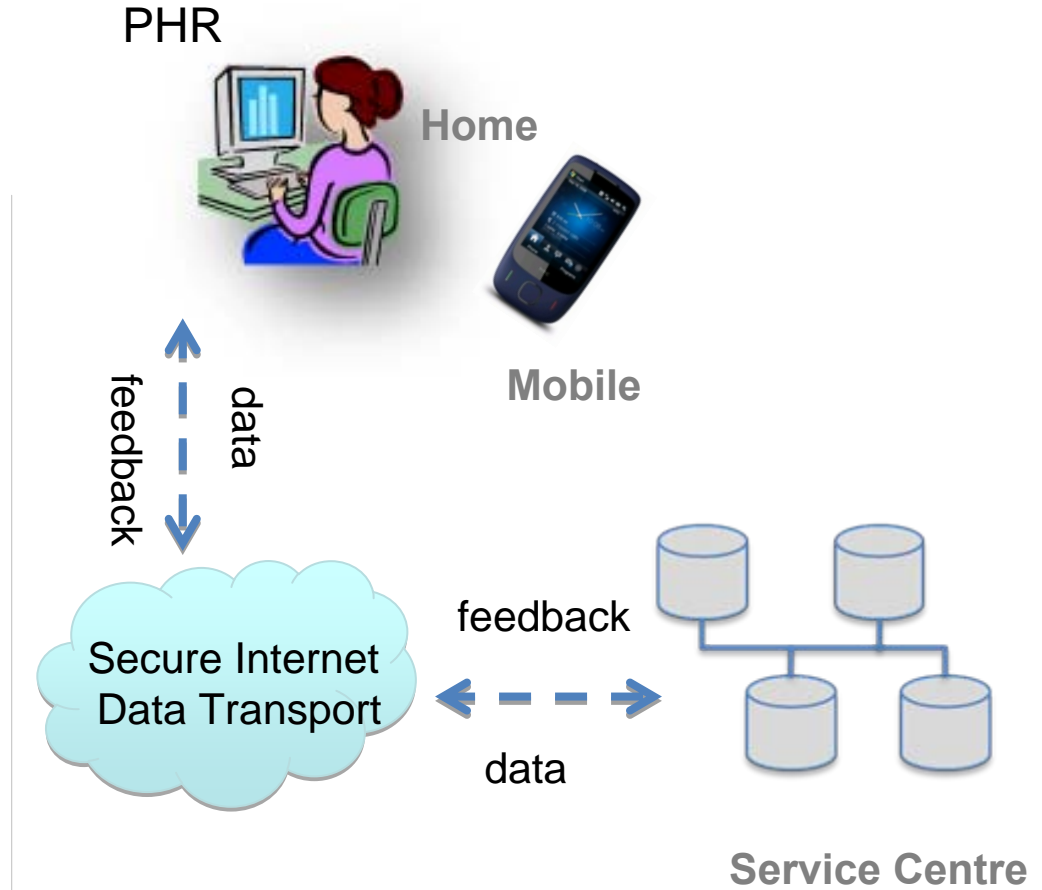
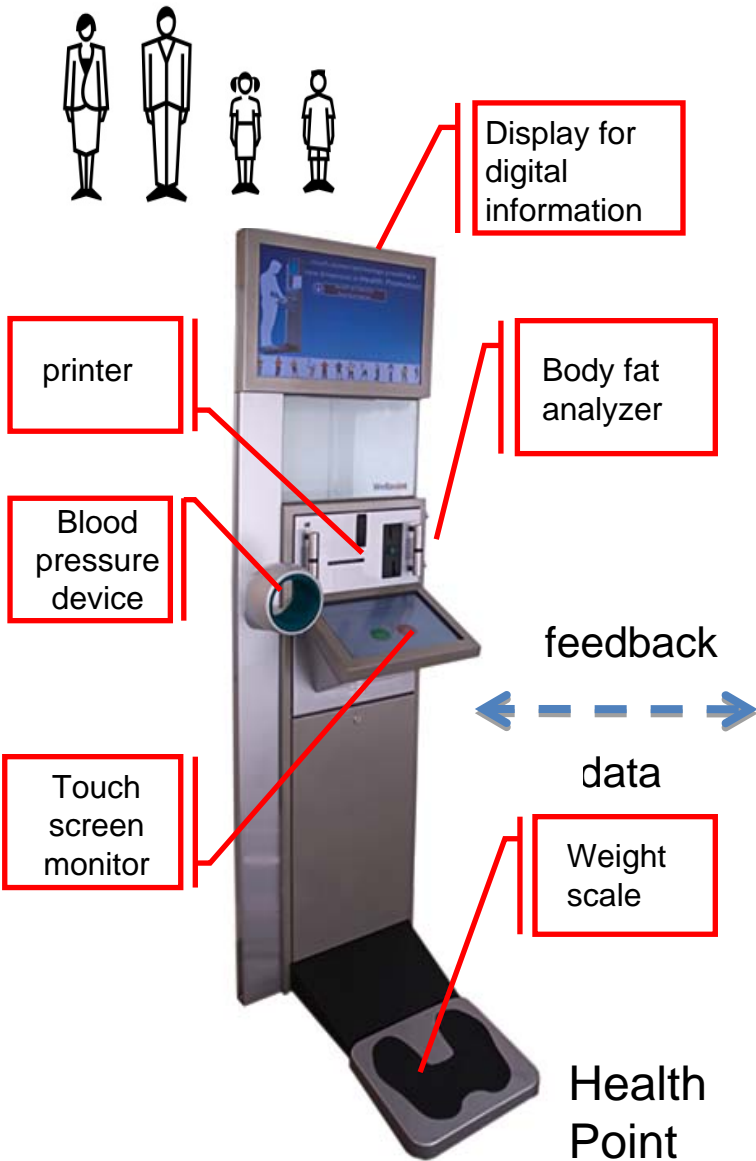
- At the enrolment the patient's data are stored into the ECRF of the involved hospitals
- Patients data are acquired, through the HIE, from the CHR platform
- The ECRF platform includes an engine to automatically extract the data of the eligible patients and calculate all follow up visits according to assigned protocol.
- During an eco-cardiograph examination the Video consultation tool allows to share the exam video feed in real time with the Core lab and immediately validate the data quality.
- Specialist can perform a statistic research over a particular examination.



### Numbers

- More than 80% of echocardiograph examinations are rejected for non good acquisition

# Self-care Pilot Scenario





# Health Point Interactive Application

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## Benvenuto al "Punto della Salute!"

Questo strumento è in grado di calcolare l'indice di massa corporea (BMI), la percentuale di massa grassa e misurare la frequenza cardiaca e la pressione arteriosa.

Inoltre, se lo desideri, potrai richiedere una valutazione del tuo livello di rischio cardiovascolare.

Il test durerà circa 5 minuti.





## Sei già un utente registrato?

La registrazione è gratuita e ti consentirà di tenere traccia dei tuoi risultati.



Fumi o sei stato un fumatore?

Fumo

Non ho mai fumato

Non fumo da almeno 10 anni

Non fumo da circa un anno

# Benvenuto al "Punto della Salute!"

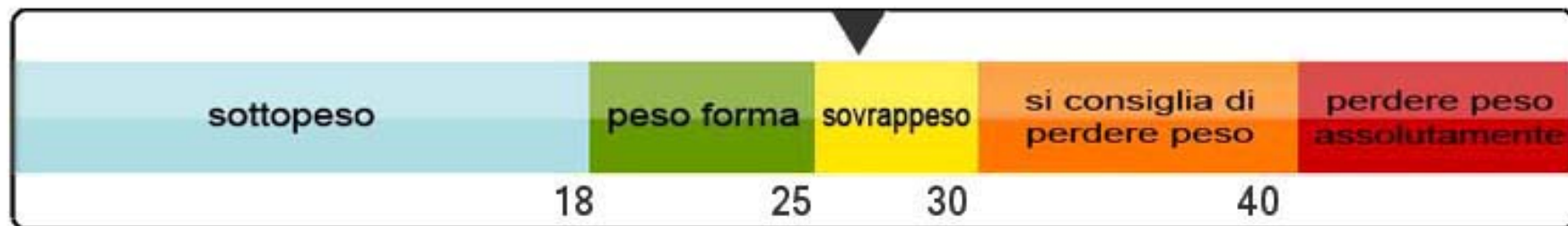
Scegli il test:





## Test 1 di 3: il tuo indice BMI

Il tuo Indice di massa corporea (BMI) è: 27.1



Per rimanere nel tuo peso forma, e ridurre i rischi di gravi problemi alla salute, il tuo valore di BMI dovrebbe essere compreso tra 18,5 e 25.





## Test 3 di 3: pressione sanguigna e frequenza cardiaca

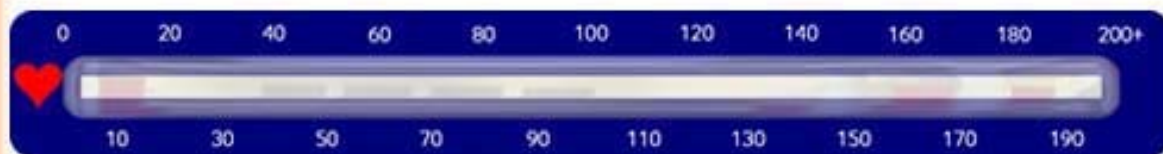
### Misurazione della pressione

Posizionare il braccio sinistro nel bracciale come indicato in figura. La pressione può essere misurata sopra capi di abbigliamento leggeri.

Ricordati di:

- togliere giacca, cappotto o maglione
- non parlare
- rimanere fermo e rilassato
- attendere la fine del test

Nota: Se il bracciale stringe troppo puoi interrompere la misurazione toccando lo schermo in un punto qualsiasi





Benissimo! Hai completato il test sulla tua salute.  
Questo è il tuo risultato sulla tua salute cardiaca.

<b>Rischio cardiovascolare a 10 anni</b>	0.4%
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In base alle informazioni che hai fornito oggi, il tuo rischio a 10 anni di sviluppare un problema di cuore è 0.4%. In altre parole, in un gruppo di 100 persone dalle caratteristiche simili alle tue, 0 incorreranno in un problema di cuore o in un ictus/TIA nei prossimi 10 anni.

Smettere di fumare, maggiore attività fisica, meno cibi a base di latte e carne ed evitare di prendere peso sono tutte abitudini che possono ridurre i rischi di incorrere in futuro in attacco cardiaco ed ictus.





## Risultato del test per Ospite



<b>Età</b>	32	
<b>Altezza</b>	175cm	5' 9"
<b>Peso</b>	83.1kg	13st 1lb
<b>BMI</b>	27.1	
<b>Massa grassa</b>	22.8	
<b>Frequenza cardiaca</b>	88	
<b>Pressione del sangue</b>	114/78	

Per ricevere maggiori informazioni sullo stile di vita sano ed equilibrato puoi consultare il sito [www.telbios.it](http://www.telbios.it).





# The Personal Health Record

demo

viva



# KPI Self-Care Scenario

**Integration** as data exchange among Health Point, PHR and other clinical data tools

**Usability** of the proposed applications in terms of easyness and intuitiveness of the user interface.

**Utilization** as % of users willing to continue over time the "experience" at the health point or at home through the PHR.

**Satisfaction** of the used services



# KPI Professional scenario

- **Integration** - Data exchange among ECRF- CHR and other clinical data tools
- **Satellite** - Assessment of different satellite link to perform video data streaming
- **Video** - Assessment of two different video communication and collaborative tool
- **Service** - reduction number of the rejected echocardiograph examinations



Thankyou:)

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