

Future of Wireless Healthcare

Mobile Health: Challenges & Opportunities

Pekka Meriläinen

Director, Clinical Research
Monitoring Solutions
GE Healthcare Finland

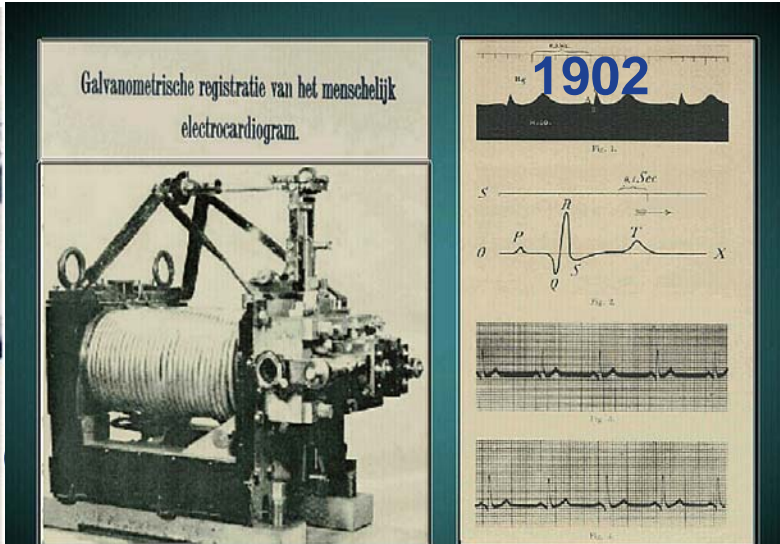
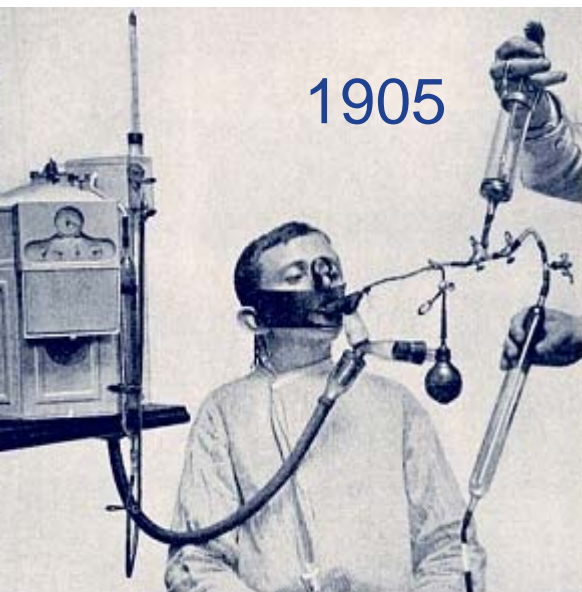
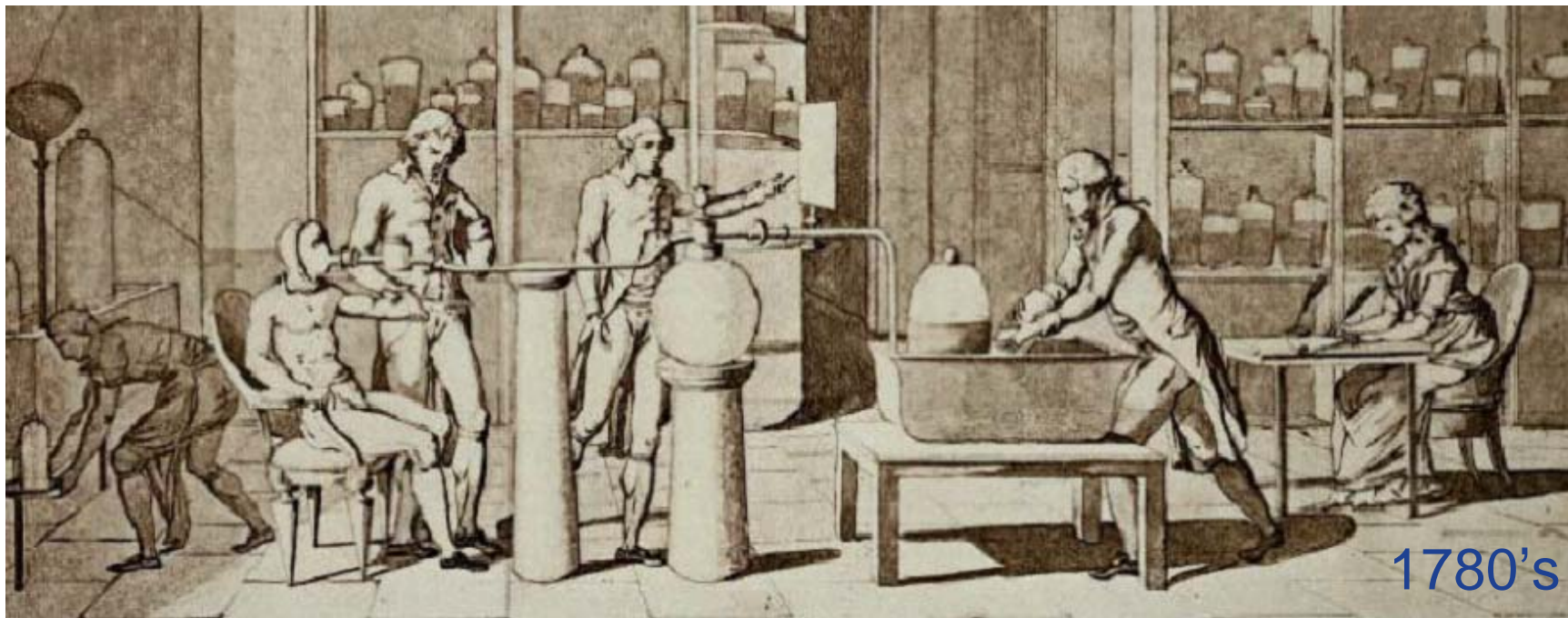
Professor (40%)
Innovation in Biomedical Engineering
Helsinki University of Technology



GE imagination at work



Past of Wireless Healthcare

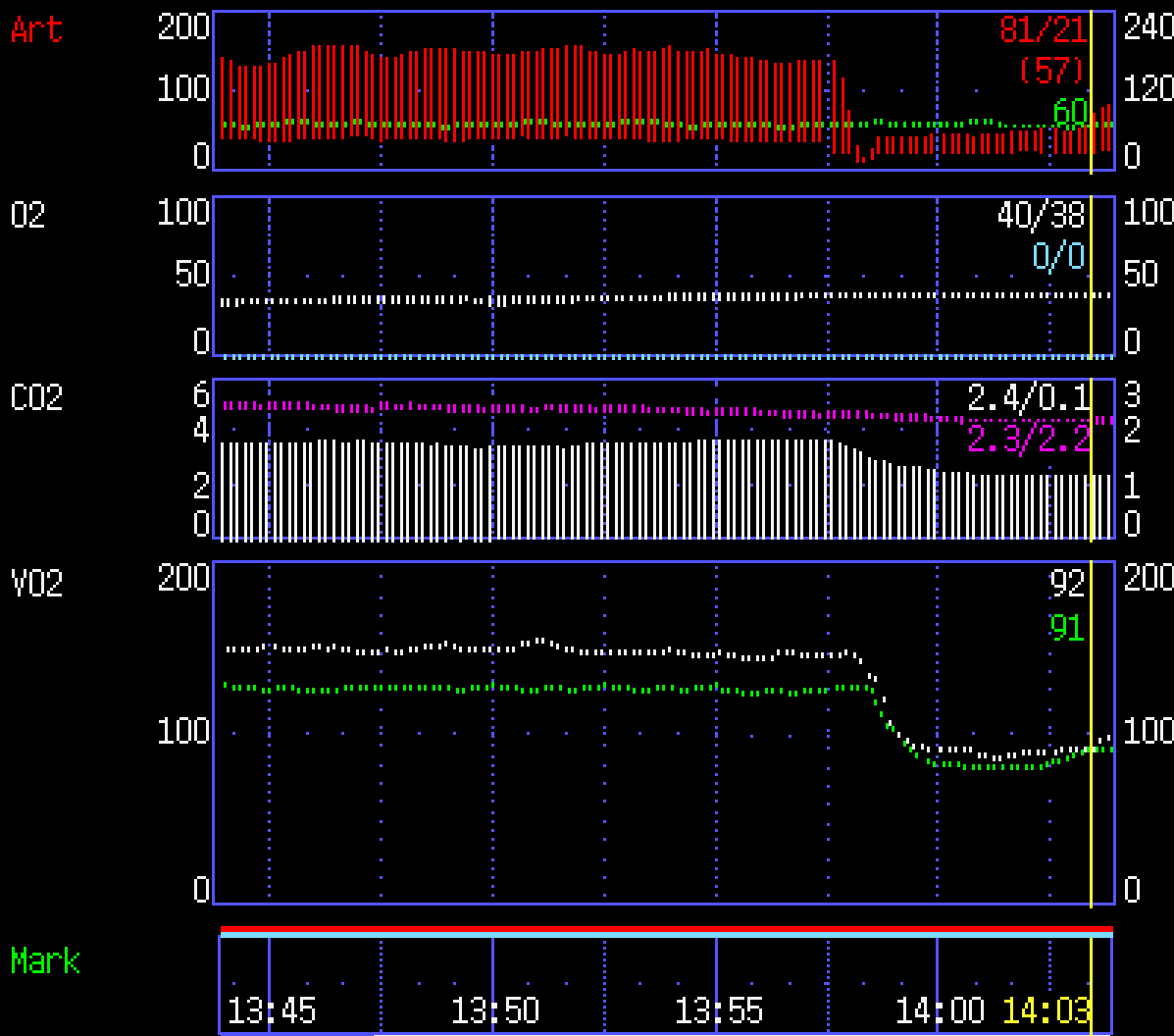


State-of-the-art Wired Healthcare in Operation Room



Obvious need to go wireless for getting rid of cable spaghetti

Data stream in OR: up to 150 parameters @ 100 times / second



HR Art **60** /min Arrh. Analys.

Art mmHg **81/20** (55)

ISO % ET **2.2** FI **2.3** MAC **1.9**

CO2 % ET **2.4** FI **0.1** RR **10** /min

Trend 1/4

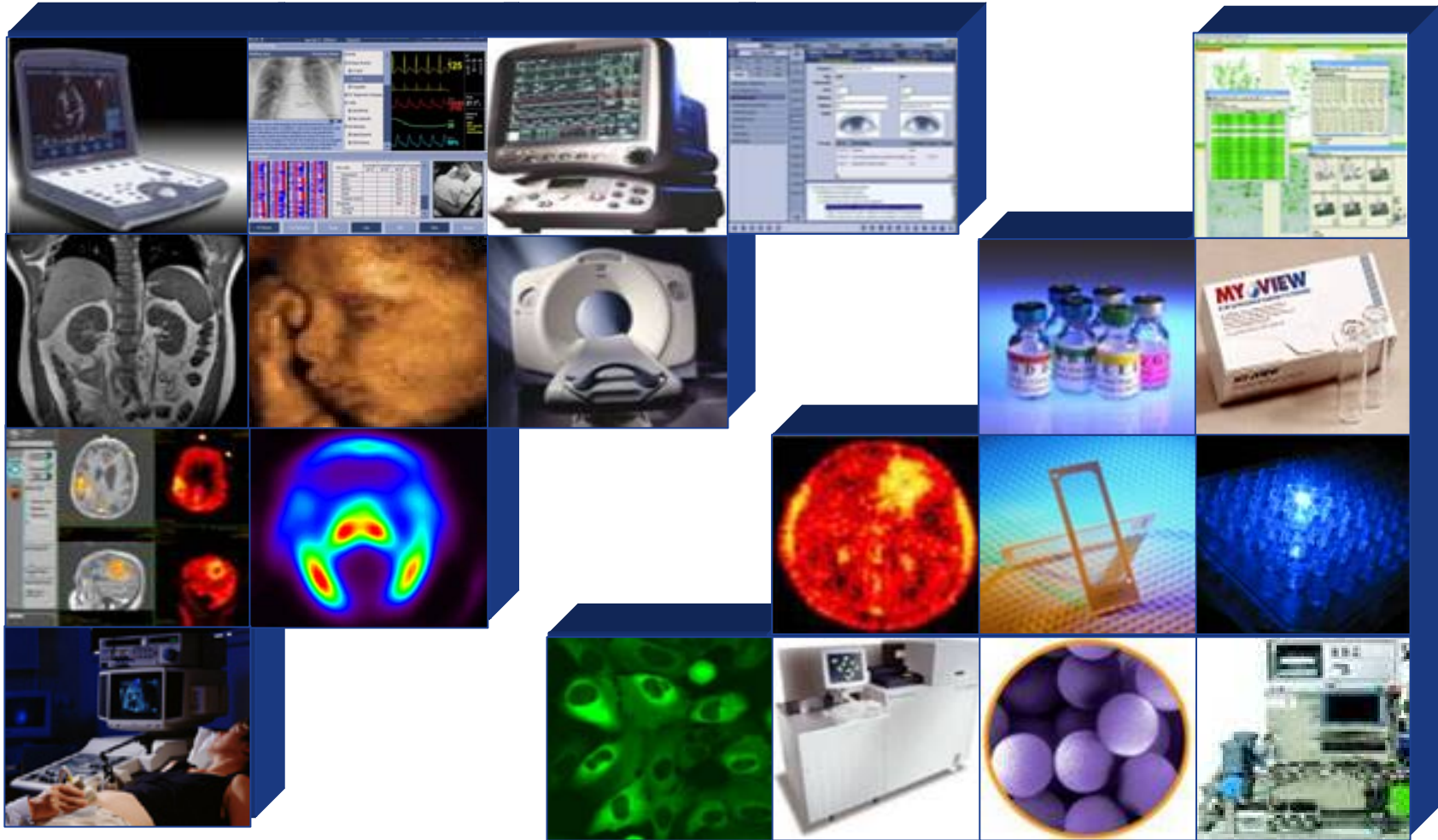
Paw MV	
cmH2O	Adult
Ppeak	26 MVexp 1/min
PEEPTot	3 7.4

EE Average	
kcal/d	RQ
1076	0.89
2hL	10

V02	
ml/min	VCO2
100	92
	RQ
	0.92

Gases			
%	O2 Δ	N2O	Iso
ET	38	0	2.2
FI	41	0	2.3

MEGA TREND: HEALTH TECHNOLOGIES AND BIO-SCIENCES COMING TOGETHER



TECHNOLOGIES

- Imaging, Intervention, & Monitoring
- Information Technology



GE imagination at work

BIO-SCIENCES

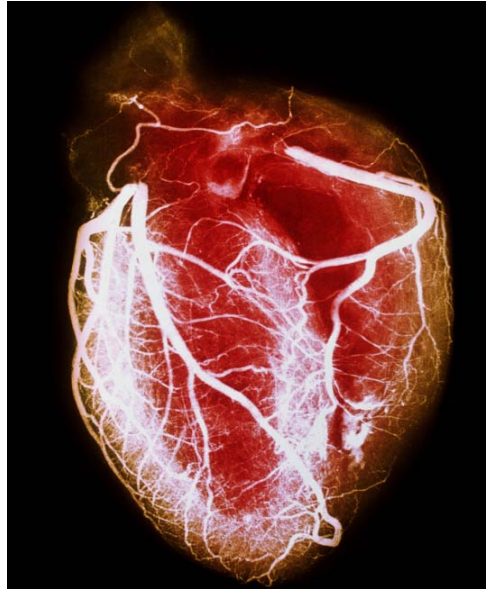
- Molecular Diagnostics
- Pharmaceutical Solutions
- Biomaterials

A new age of healthcare

NOW: One person in three will have cancer



50% die after 1st heart attack



20% aged 75-84 suffer from Alzheimer's disease



21st Century Personalized Healthcare

Predict

Diagnose

Inform

Treat



GE imagination at work

Future of Clinical Information Technologies

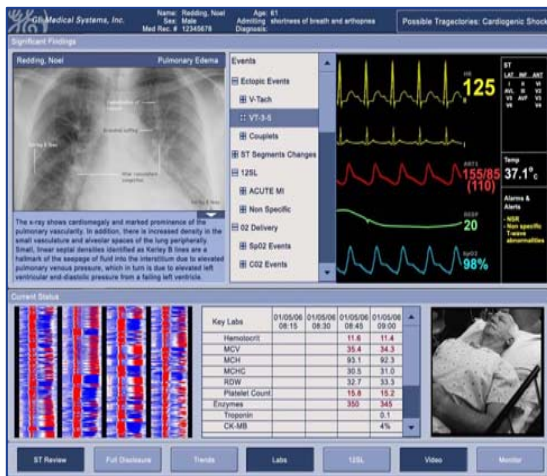
Paper to paperless

Film to filmless

Wired to wireless

Critical information anywhere/anytime

Reduce medical errors



TO BE WIRED OR NOT WIRED, THAT IS THE QUESTION



Depends on where, why, what and how you gonna measure

WHERE?

- Emergency
- Anesthesia
- Intensive Care
- Ward
- Doctor's office
- Home
- Workplace
- Everywhere

WHY? Some most common diseases in Finland:

- Cancer
- Cardiac diseases
- Dementia/Alzheimer/neurological disorders
 - Chronic Obstructive Lung Disease
 - Asthma
- Diabetes II/ metabolic syndrome/ obesity
 - Mental disorders
 - Sleep disorders
 - Alcoholism

PREVENTION, DIAGNOSTICS, FOLLOW-UP OF TREATMENTS?



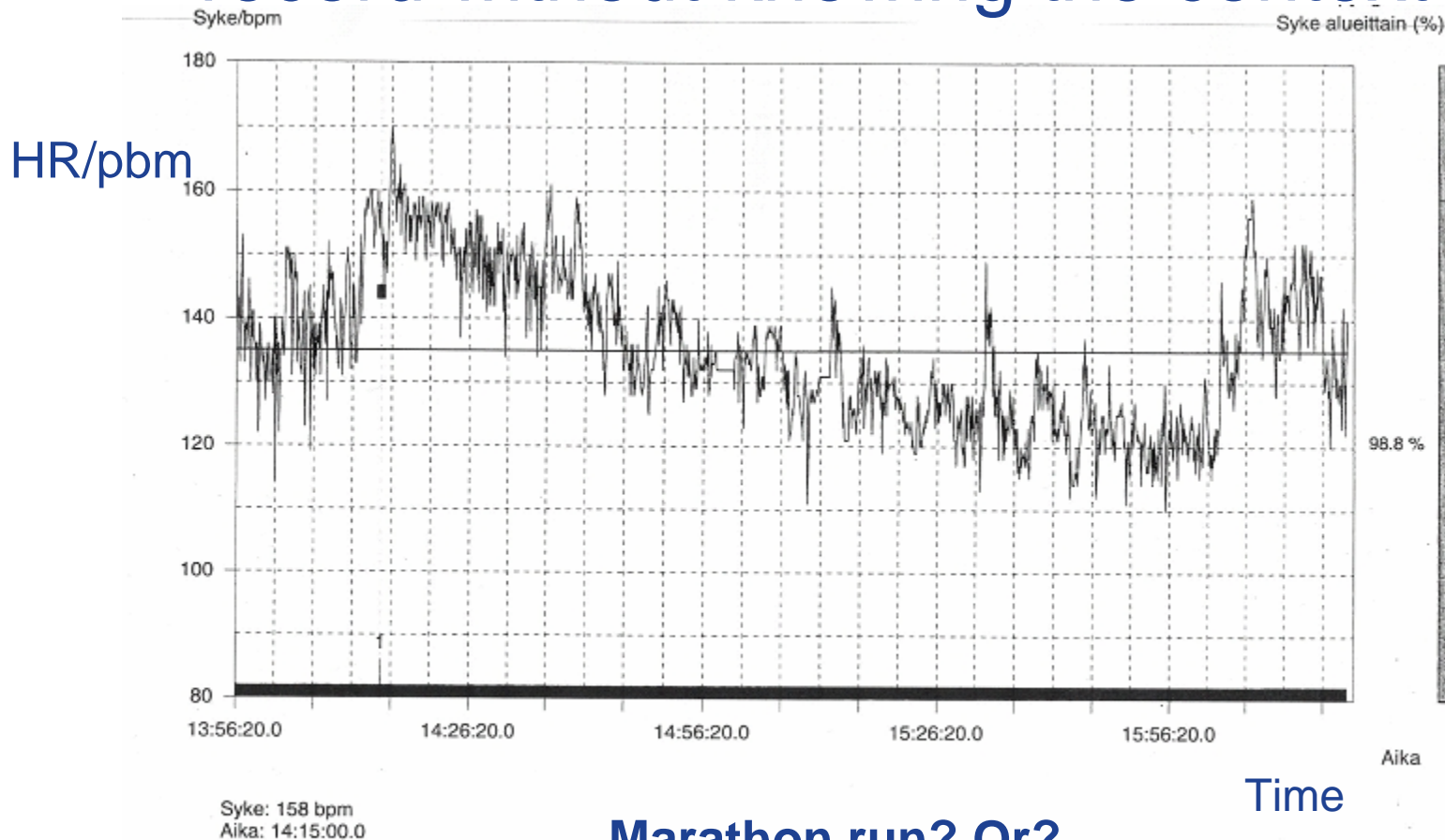
WHAT?

Heart rate
Respiration rate
Lung sounds
Blood pressure
Cardiac output
Oxygen saturation of blood
Blood glucose
Level of alertness/consciousness
Pain
Sleep quality
Physiological and mental stress
Physical activity

HOW? **Non-invasively, unobtrusively!**



What can you see from a wireless heart rate record without knowing the context?



Marathon run? Or?

Henkilö	Liisa	Päiväys	21.04.2006	Keskiarvo	135 bpm	Palautuma
Harjoitus		Kellonaika	13:56:20.0	Harjoituksen pituus: 2:23:14.8		

SOME CONCLUSIONS

The key challenges for mobile wireless healthcare are:

Sensor technology and usability "on the skin" of the patient. Battery technologies.

Service model for analyzing the continuous data stream from millions of patients for making diagnosis and decisions on actions

Focusing on diseases and parameters where wireless can bring most added value

Making doctors and patients guide engineers out of box





Thanks for your attention !