

Aivoterveysten jatkuva-aikainen monitorointi ja sen sovellukset hyödyntäen 5G/6G teknologiaa

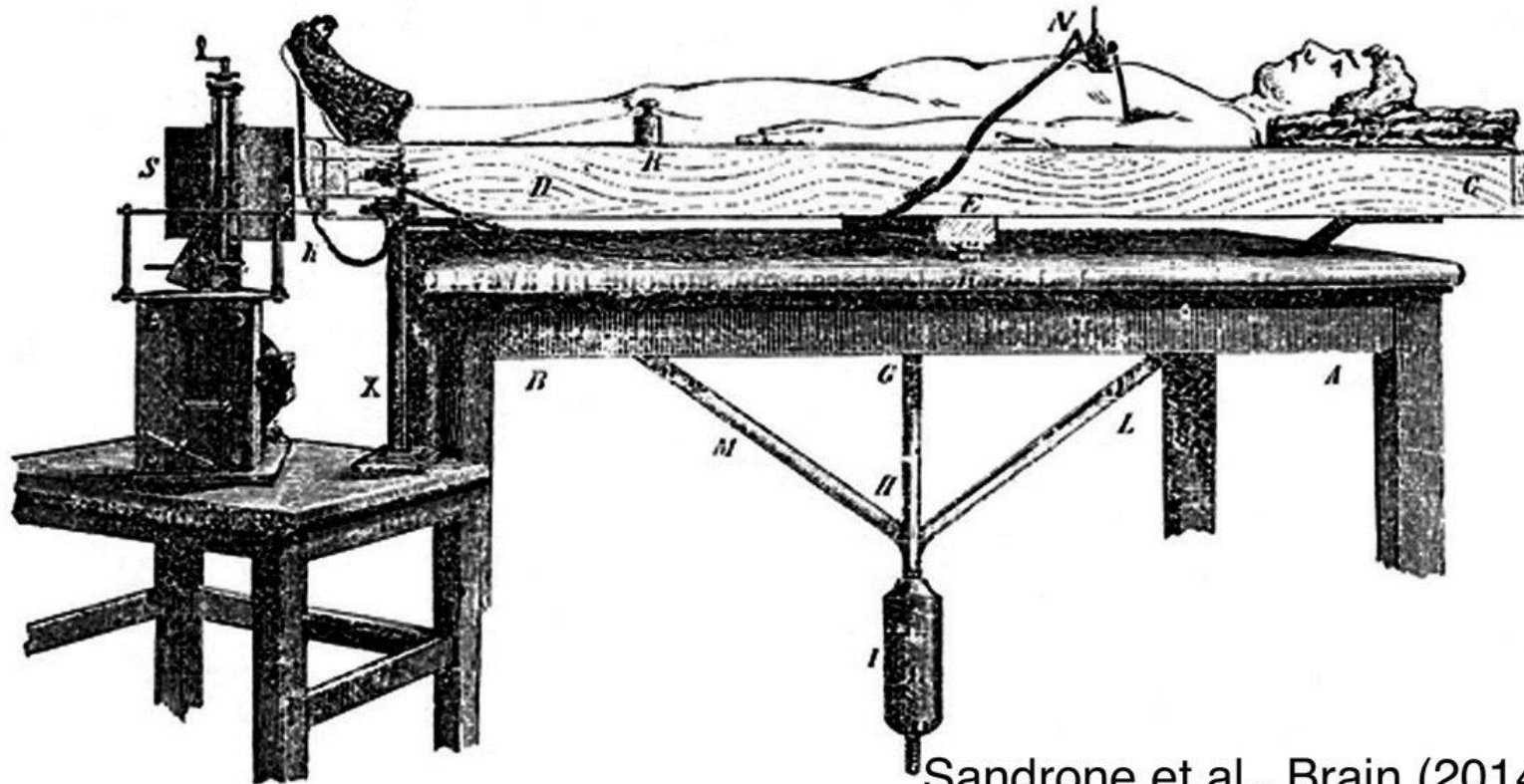
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Oulun yliopisto | University of Oulu



**Probably the first brain monitoring device,
invented 140 years ago!**

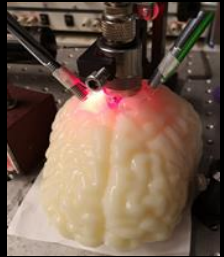


Sandrone et al., Brain (2014)

Weighing brain activity - 'human circulation *balance*', Angelo Mosso, 1882

Comprehensive brain monitoring technology development and research in **University of Oulu**

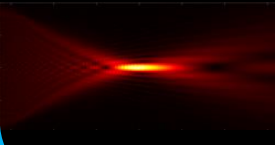
Biomedical engineering research and development



Phantoms

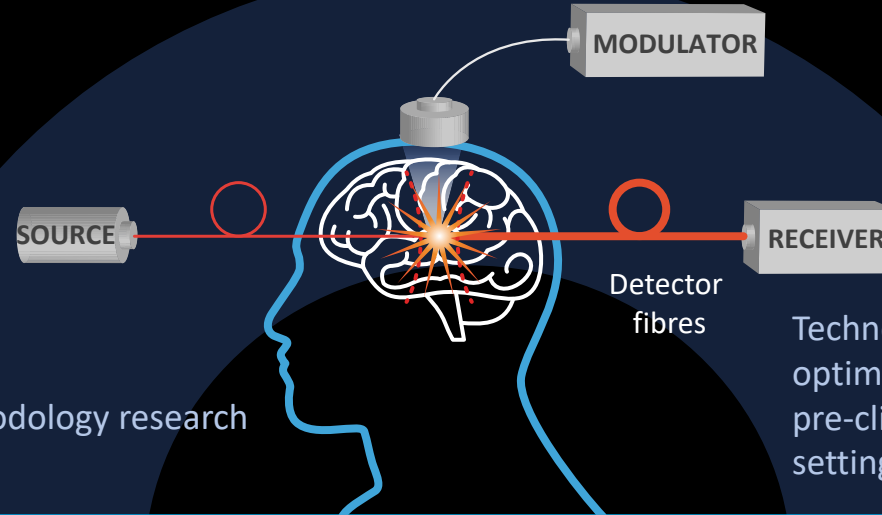


HW/SW design

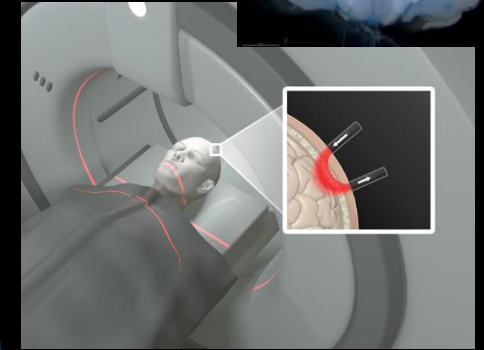


Simulations

R&D
Methodology research
PoP

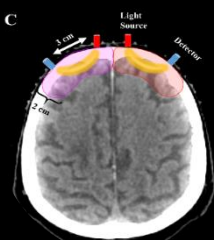


Pre-clinical models



Constant co-work with clinicians

Experimental and Clinical Health Monitoring Technologies



Clinical piloting



Clinical piloting

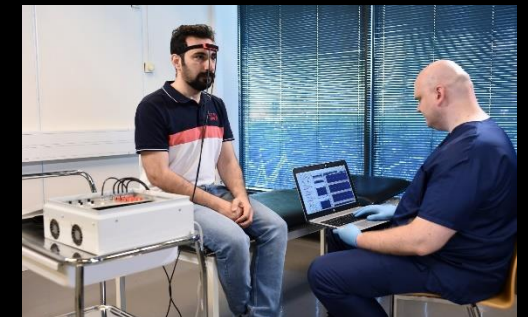
PoC



Development of
analysis models

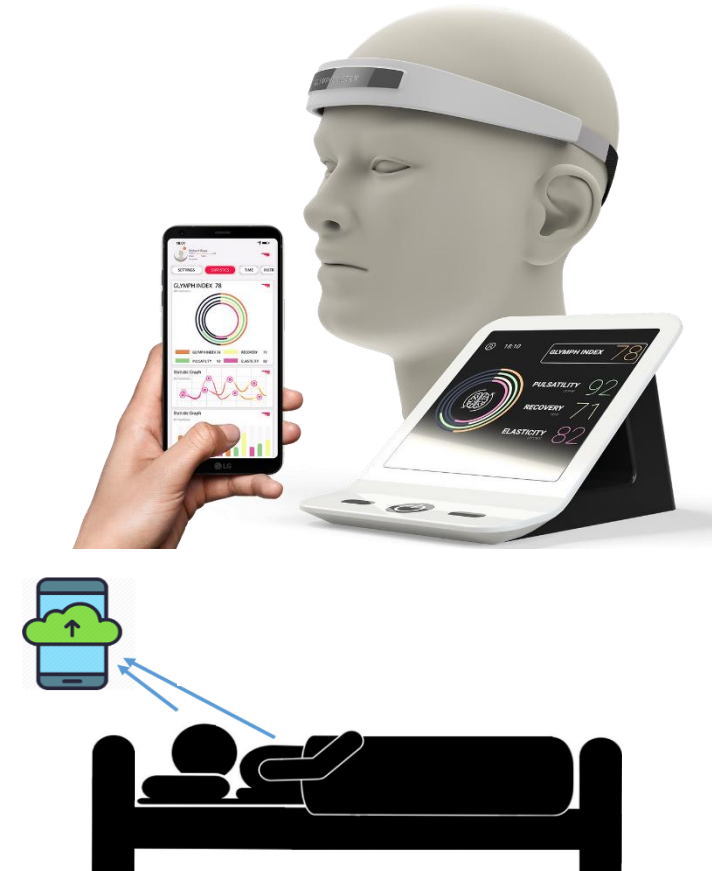
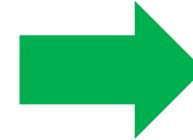
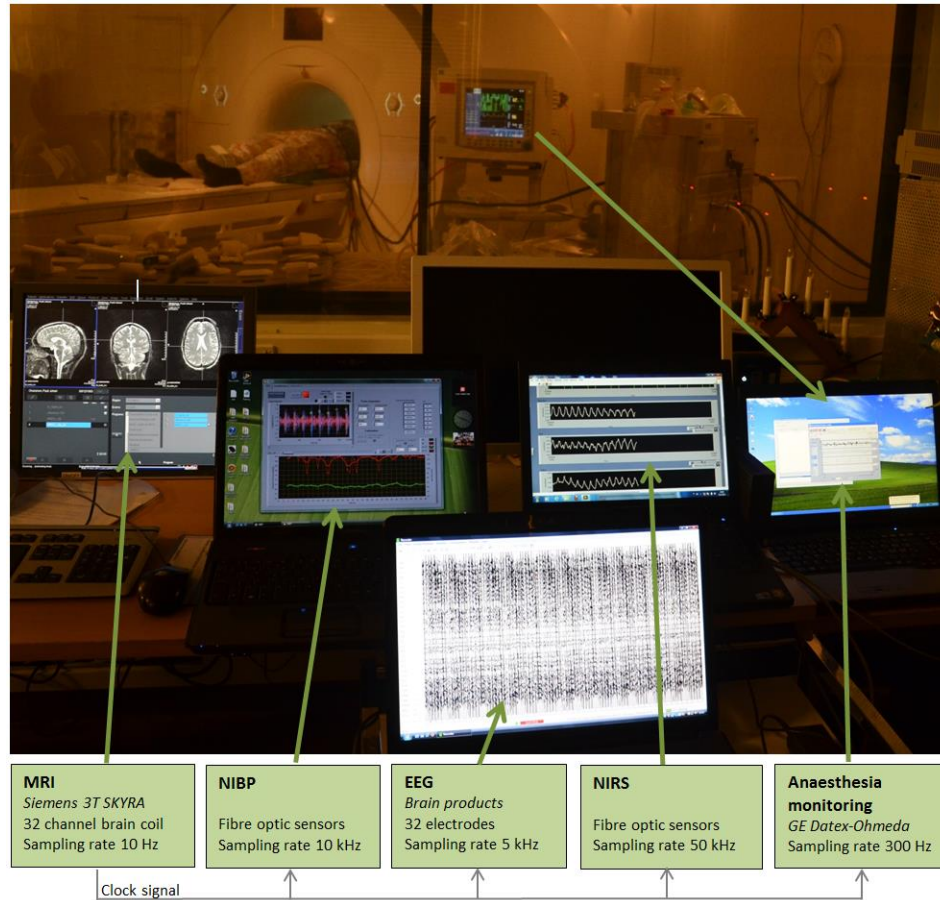
Multidisciplinary
studies

Clinical research collaboration



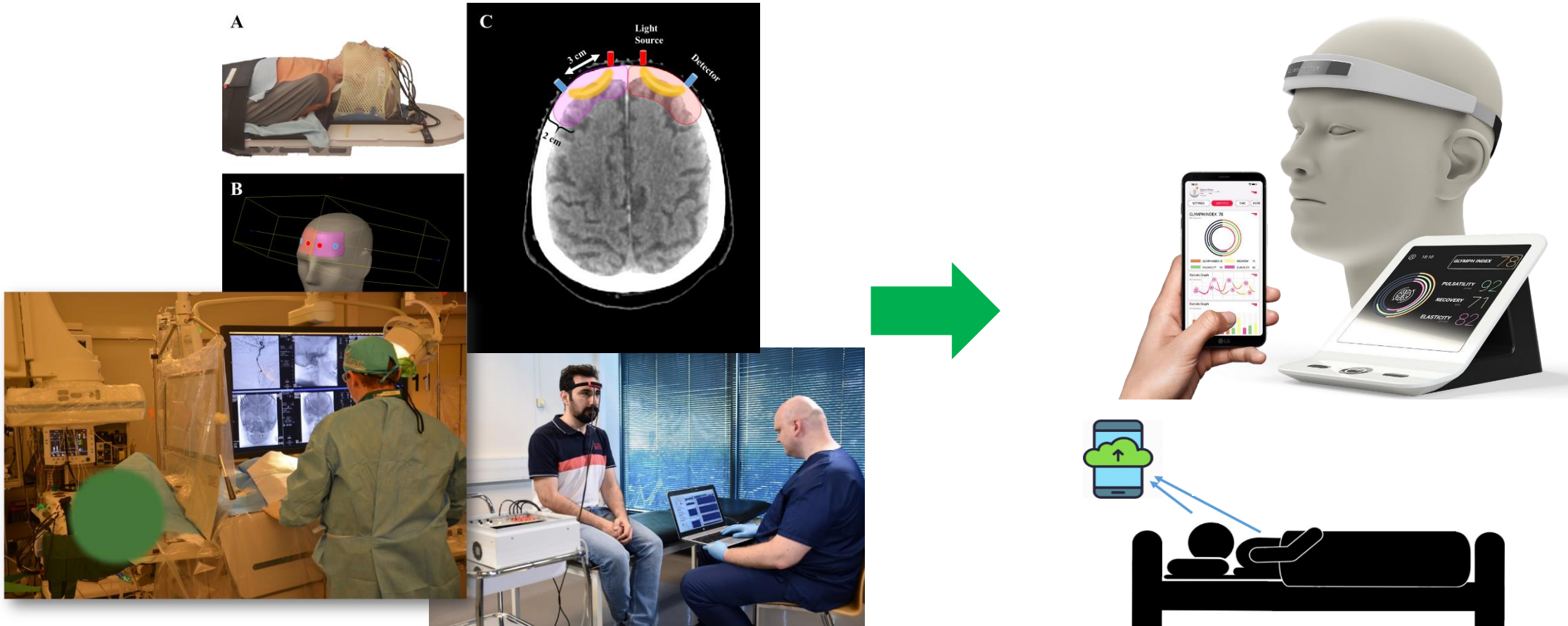
Constant co-work with hospitals

Long-term research on brain monitoring technologies



Left: Multimodal MRI setup including functional MRI, NIRS, blood pressure and EEG recordings simultaneously. Oulu functional neuroimaging group (OFNI) led by prof. Vesa Kiviniemi

Goal: Towards clinical brain monitoring both in hospital and at home



6G enables new concepts, where current medical diagnostics and brain monitoring methods are exploited as a wearable/wireless technology outside hospital.

At present, research focus on **wearable** brain monitoring technologies



World's first wearable neurohydrodynamics insight technology

Glymphometer is an everyday tool for monitoring the brain clearance activity and wellbeing.



WE WANT TO FIND A WAY TO PREVENT NEURODEGENERATIVE DISEASES

Waste removal from the central nervous system is essential for maintaining brain health across the lifespan. Glymphometer is the first wearable technology providing direct insights into the brain clearance activity.



CLEAN BRAIN IS CLEAR MIND

Clinical studies show that dysfunctional brain clearance can contribute to the emergence of neurodegenerative diseases. Our clinically proven wearable technology provides daily insight into the neurohydrodynamics affecting the brain clearance. It enables for medical professionals early intervention and diagnostics – it can revolutionize the way people think about the importance of a healthy lifestyle to brain health.

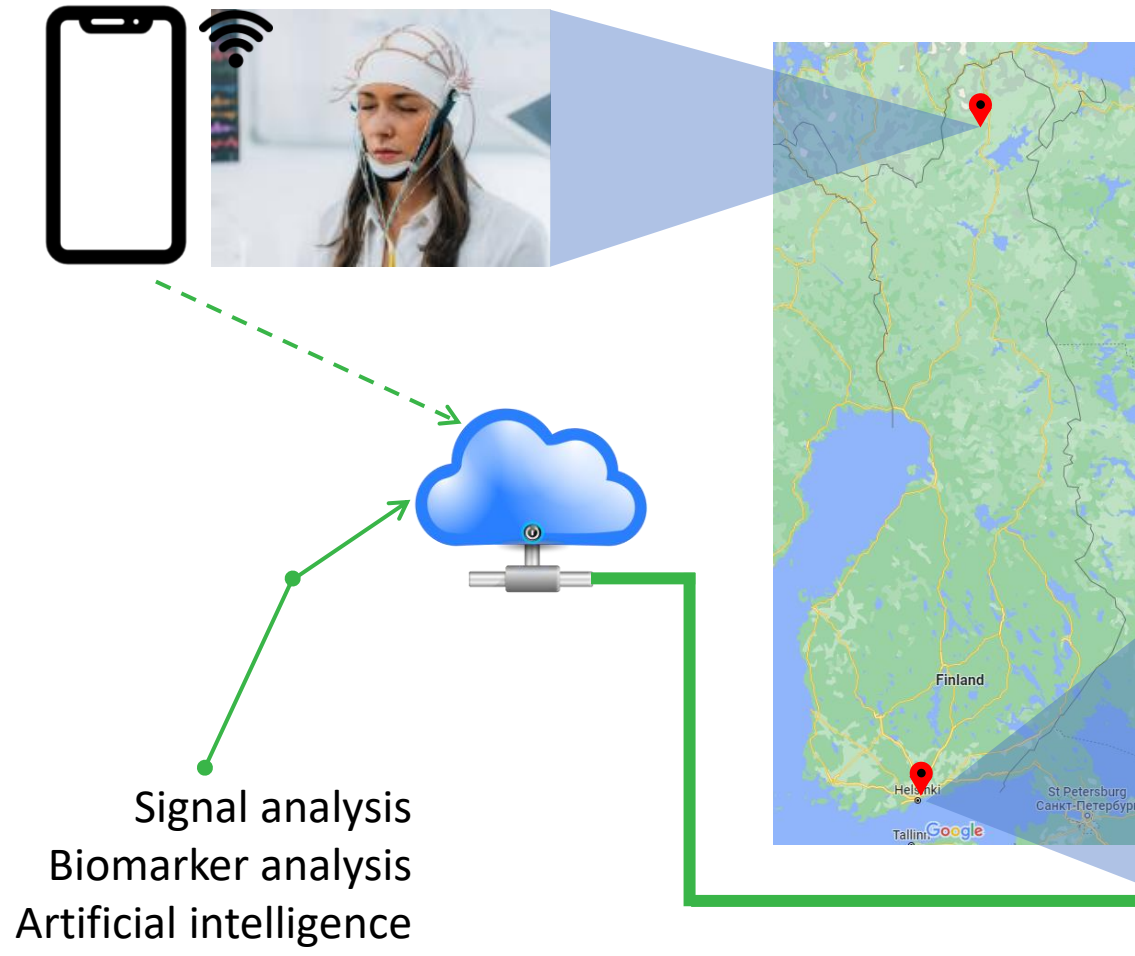




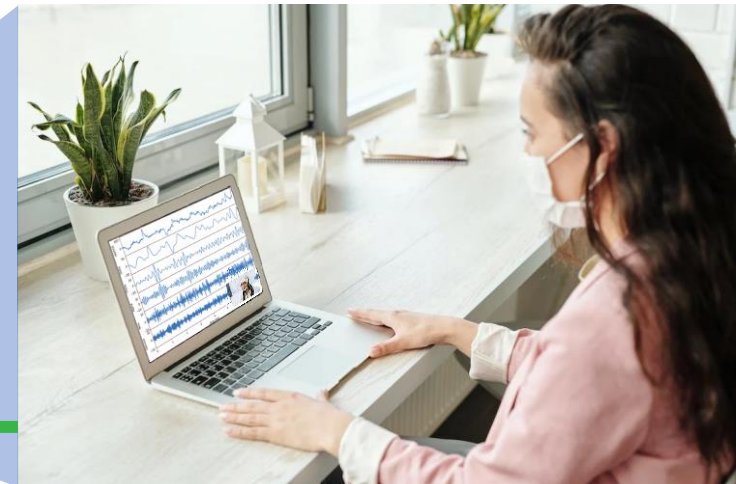
6GESS Health

Examples of brain healthcare/service applications
supported by 5G/6G

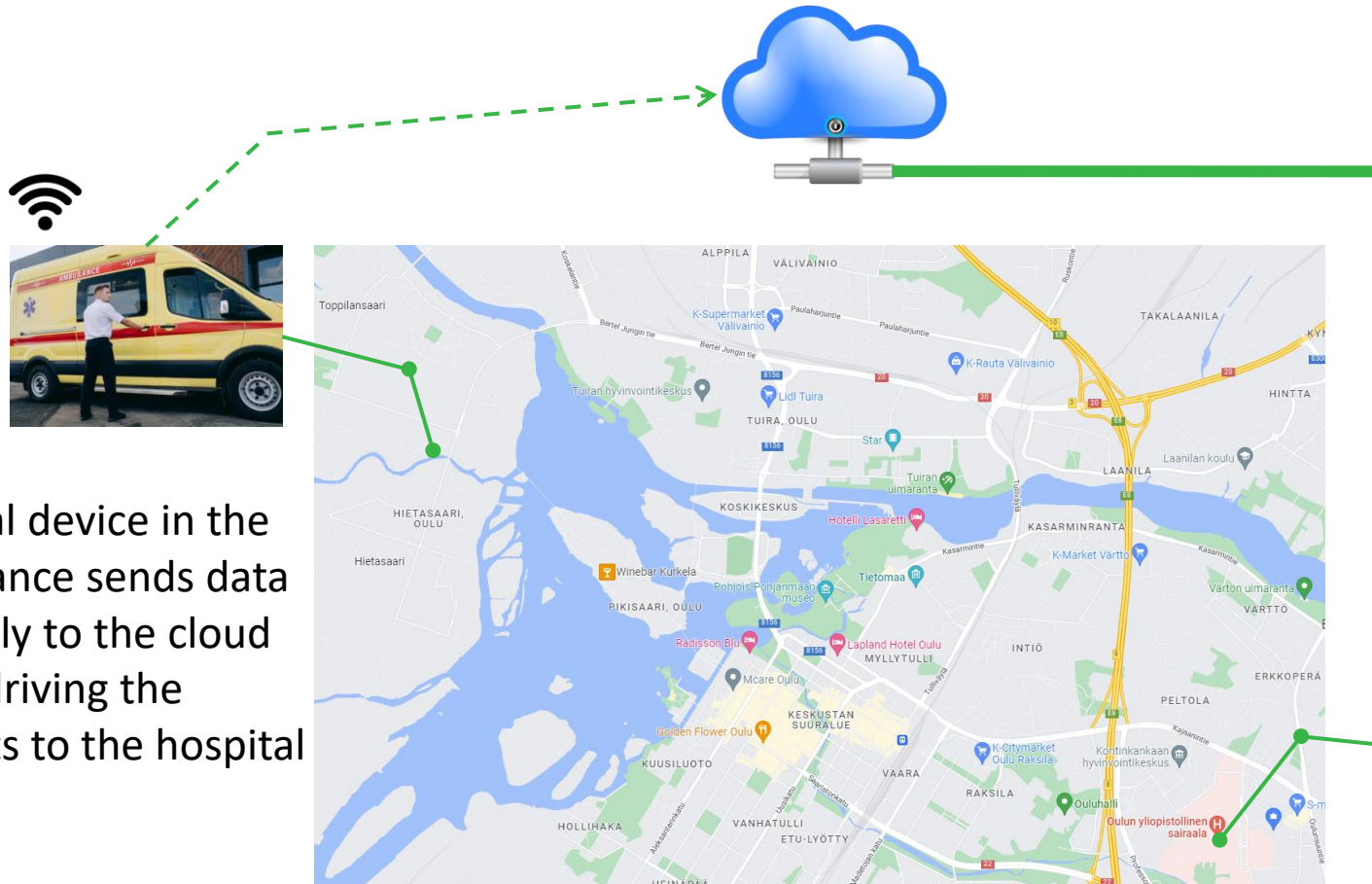
Health service for remote area



- Assisting patients with brain disorders
- Accessing health data by healthcare professionals and certain associations



Immediate high quality remote health data in emergency

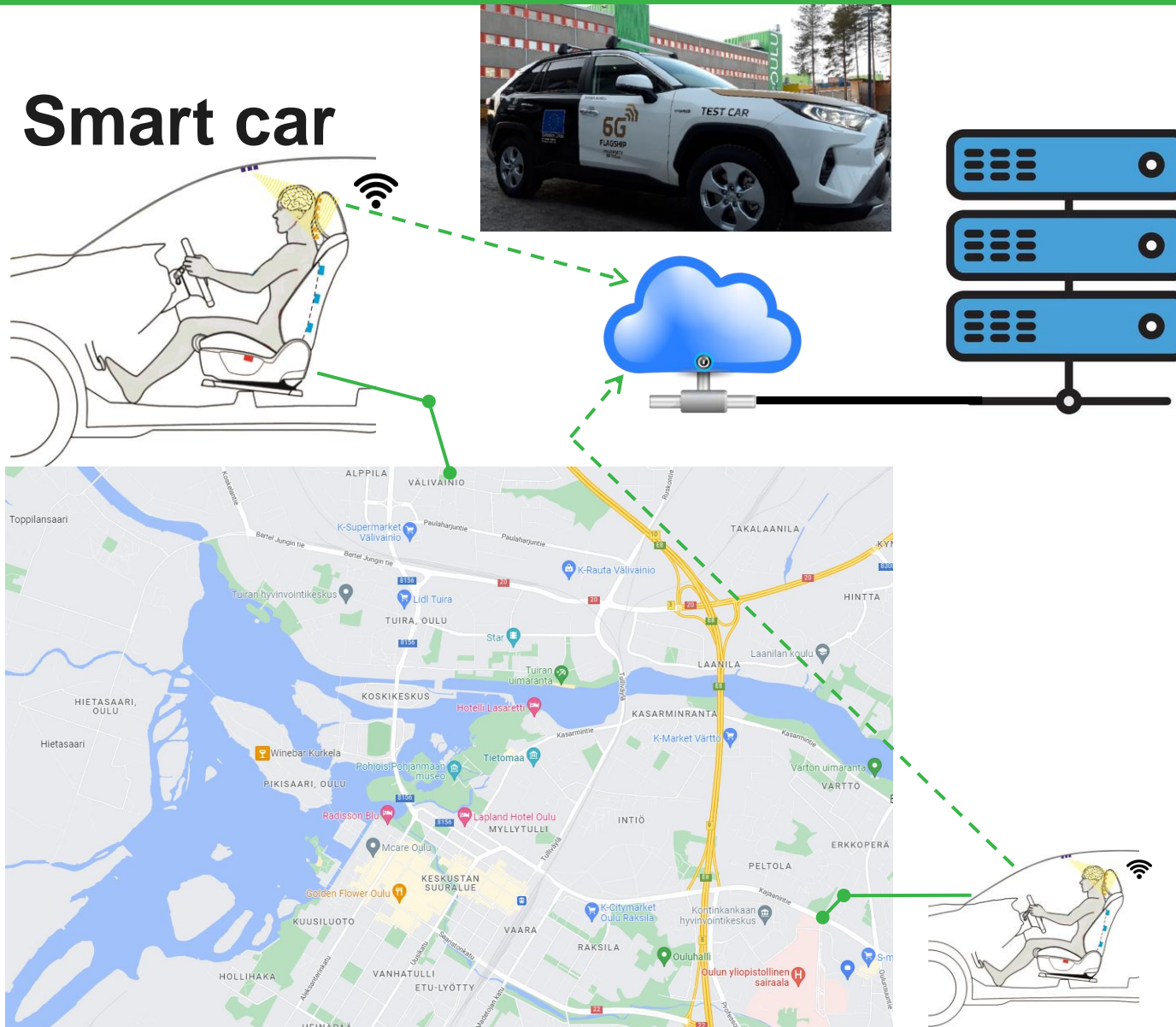


Medical device in the ambulance sends data regularly to the cloud while driving the patients to the hospital

The hospital uses valuable data to prepare for possible treatment, even before the patient arrives in the hospital side.



Smart car



Car information:

- Location,
- Speed,
- ID,
- etc.

Driver information:

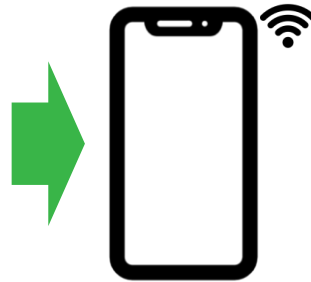
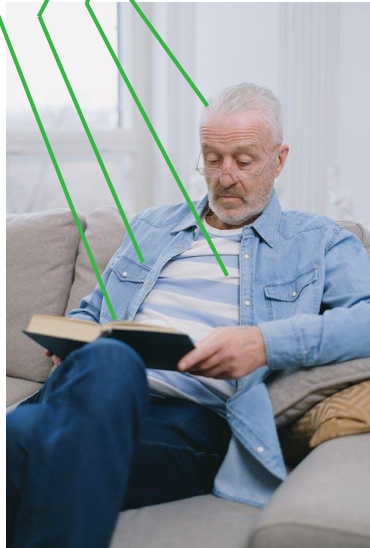
- Brain monitoring
- Vital signs,
- Body movement,
- etc.



- General health analysis
- Possible fatigue
- Brain health (e.g. risk of stroke)
- Possible drowsiness
- Traffic analysis
- etc.

Everyday brain health monitoring

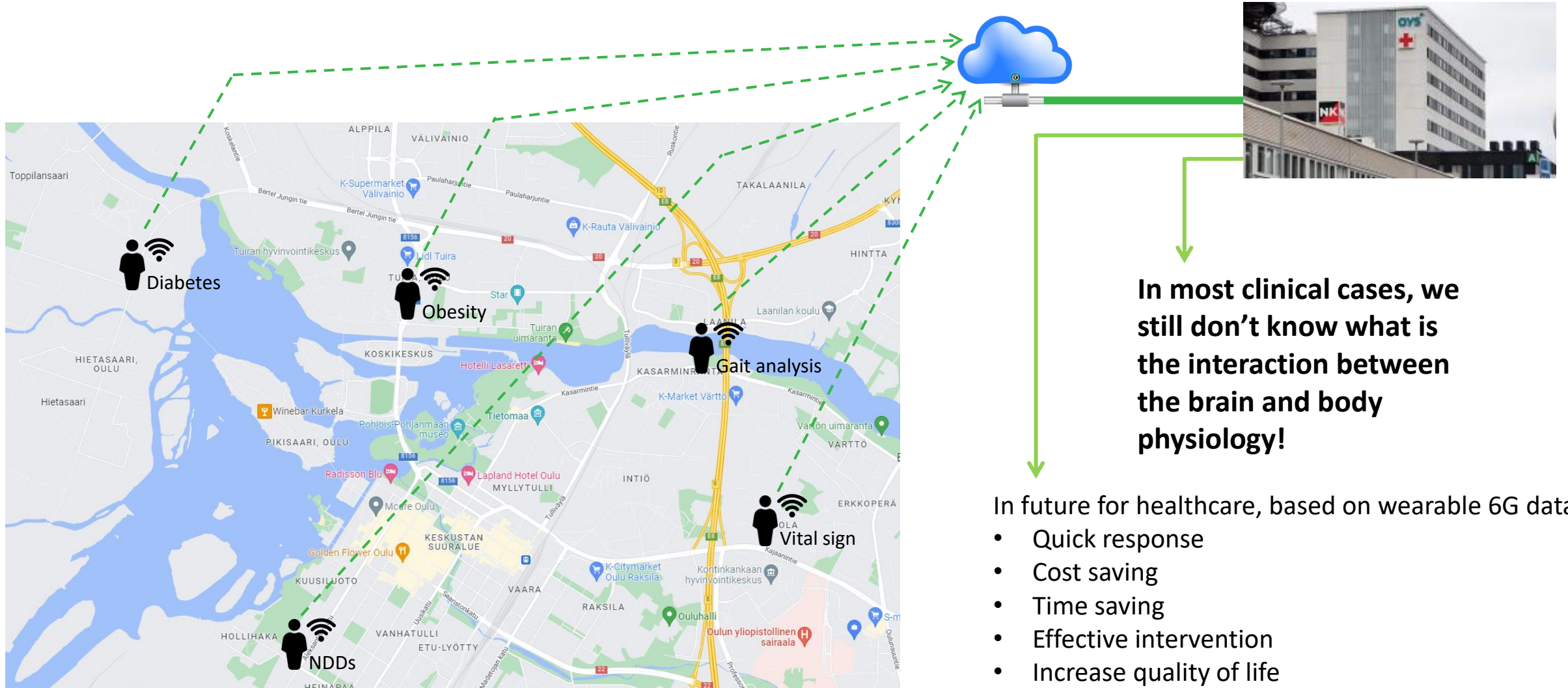
- Activity recognition
- Body temperature
- Cardiac function
- **Brain**
- ...



Home-care monitoring, e.g. for patients with brain disorders for therapeutic monitoring and dose adjustment.

Patients can have a video call for a discussion and possible help immediately.

Clinically valid comprehensive data collection in real-world situations will be possible only using wireless technologies





Kiitos!

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