

Technologies and Innovative Concepts in Telemedicine and Virtual Care

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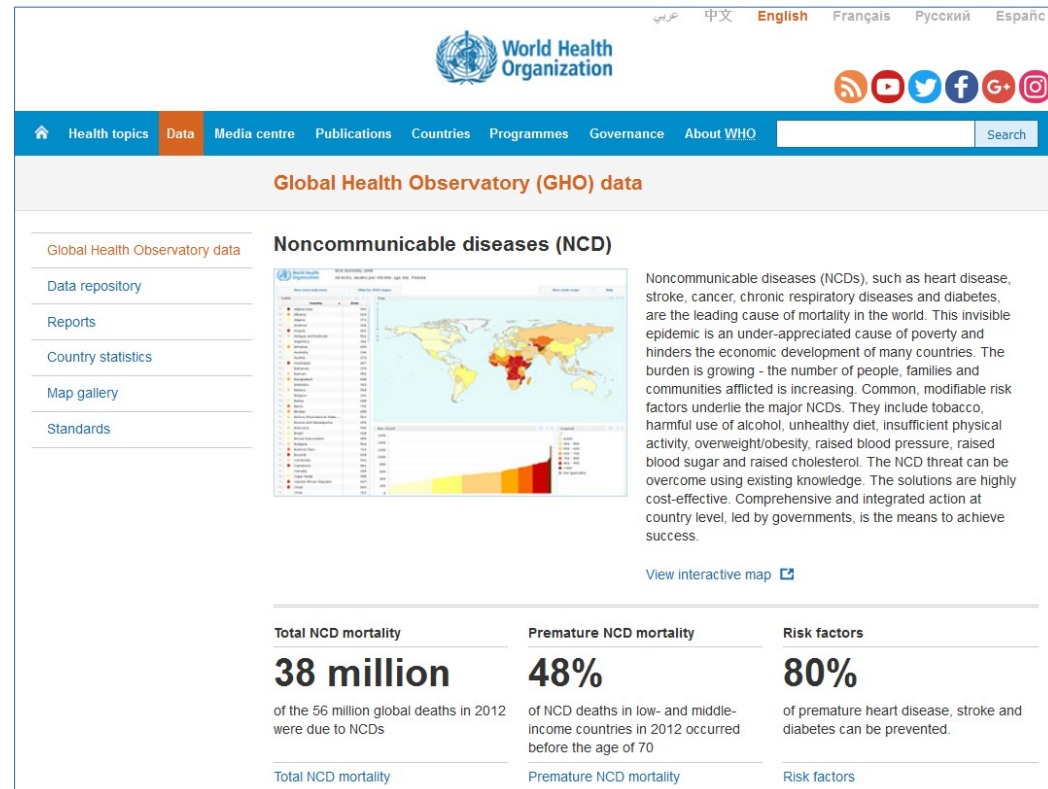
National Centre of Telemedicine Services

14th - 15th November 2016



Motivation

- Disruptive demographic related to population of middle-aged and older adults (est. 33% of overall EU population by 2025)
- Increasing number of patients with chronic conditions (346 mil. people with diabetes worldwide, est. doubled by 2030)
- Growing demands on national health care systems in terms of medical staff and funding expenditures (increase from 9% up to 16% of EU GDP by 2020)
- Lack of care professionals



The most expensive hotel?



Burj Al Arab Jumeirah, Dubai

The most expensive hotel?

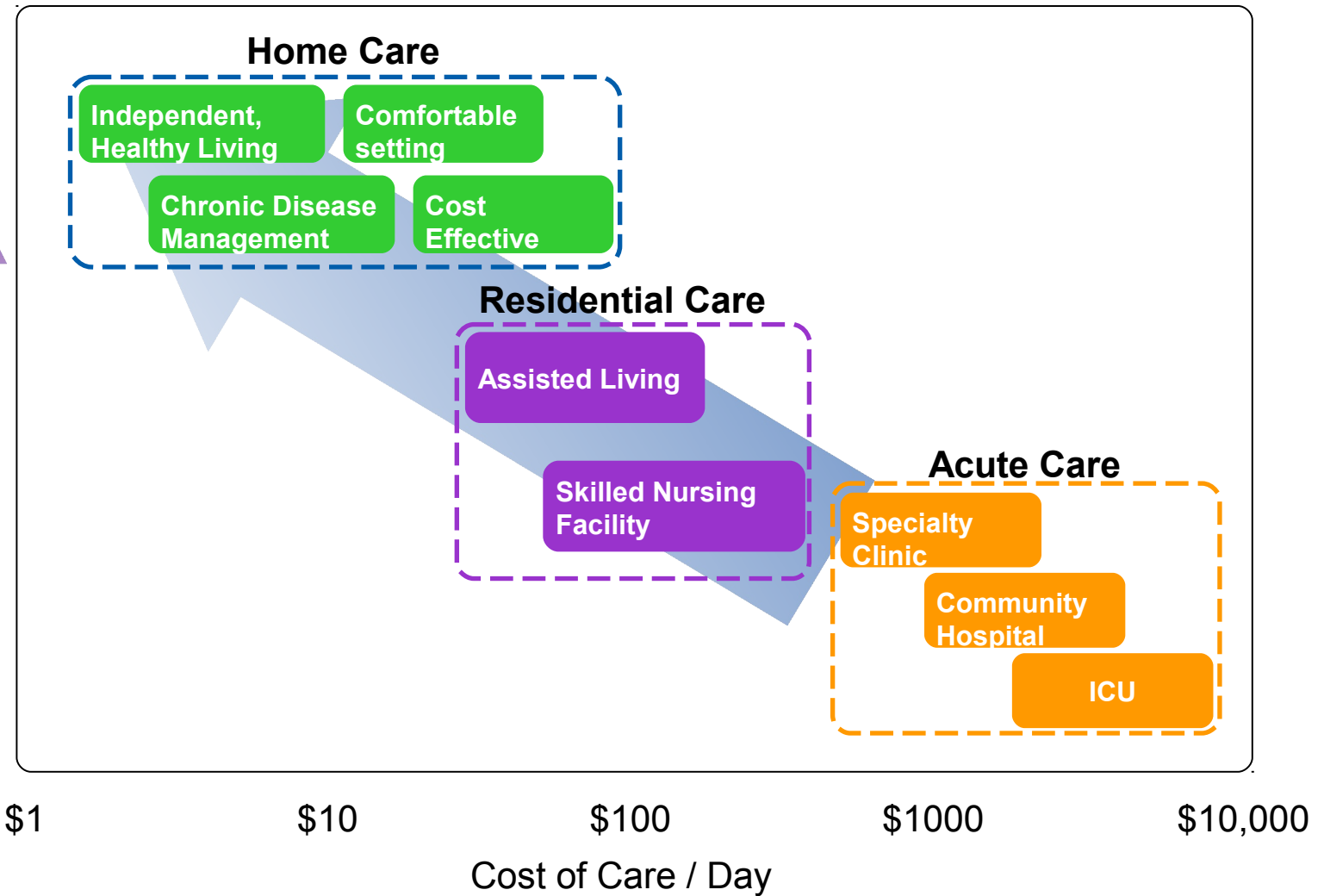


Burj Al Arab Jumeirah, Dubai

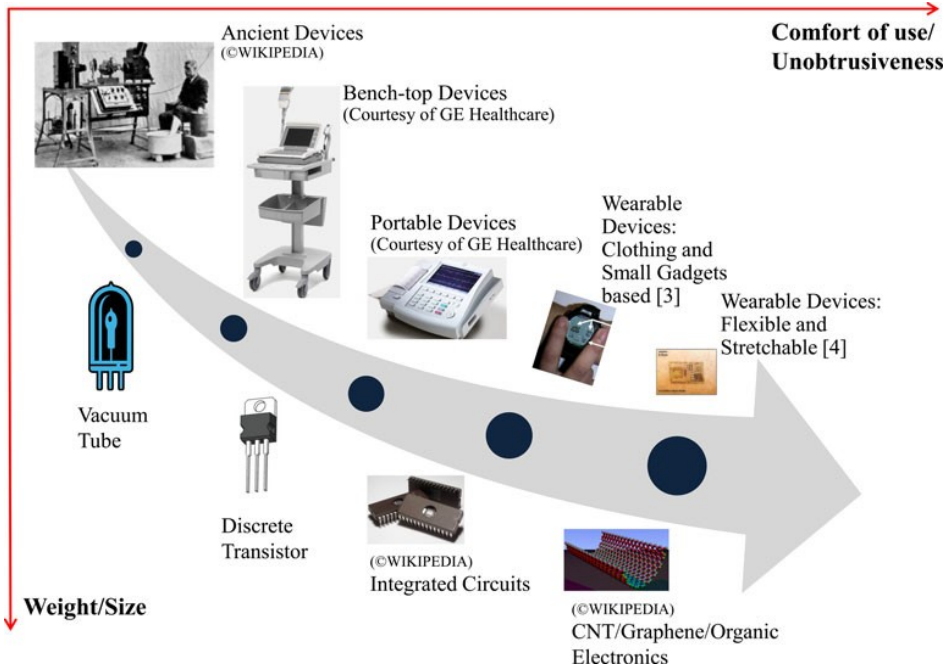


The John Hopkins Hospital, Baltimore, USA

Home = Higher Quality of Life & Lower Costs



Unobtrusive Sensing and Wearable Devices

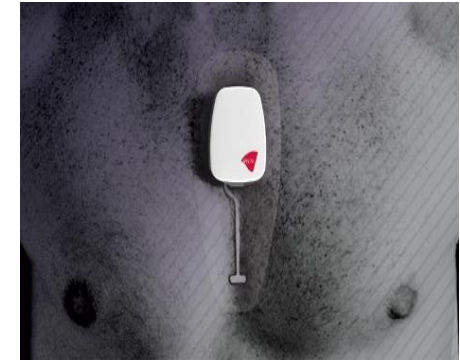


Continuous monitoring:
 physical parameters
 physiological parameters
 biochemical parameters

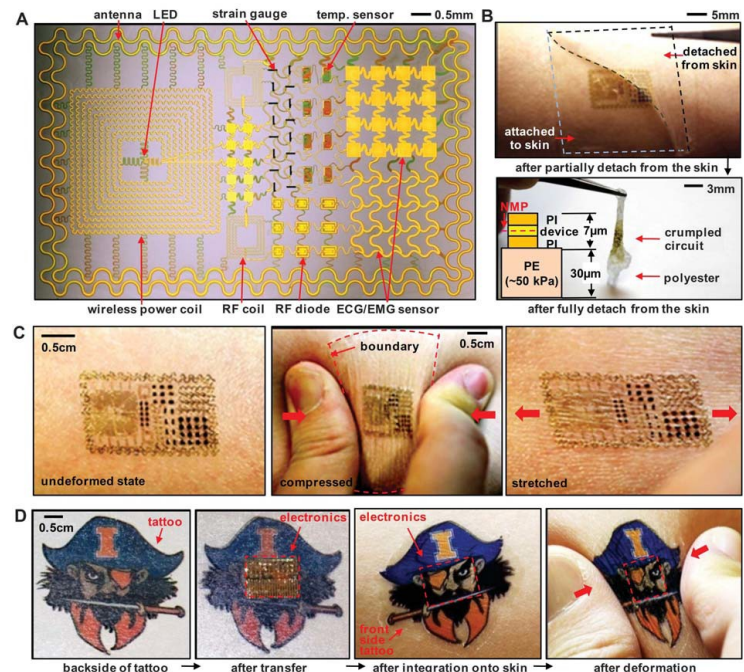
SUPER – MINDS:

Security – Unobtrusiveness – Personalization – Energy
 - Robustness – Miniaturization – Intelligence – Network
 - Digitalization – Standardization

Sensors worn by the subject

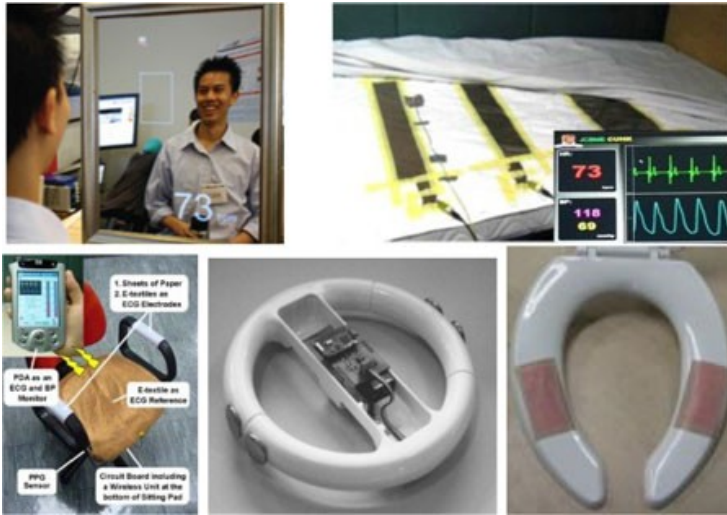


e-skin



Unobtrusive sensing and Wearable Devices

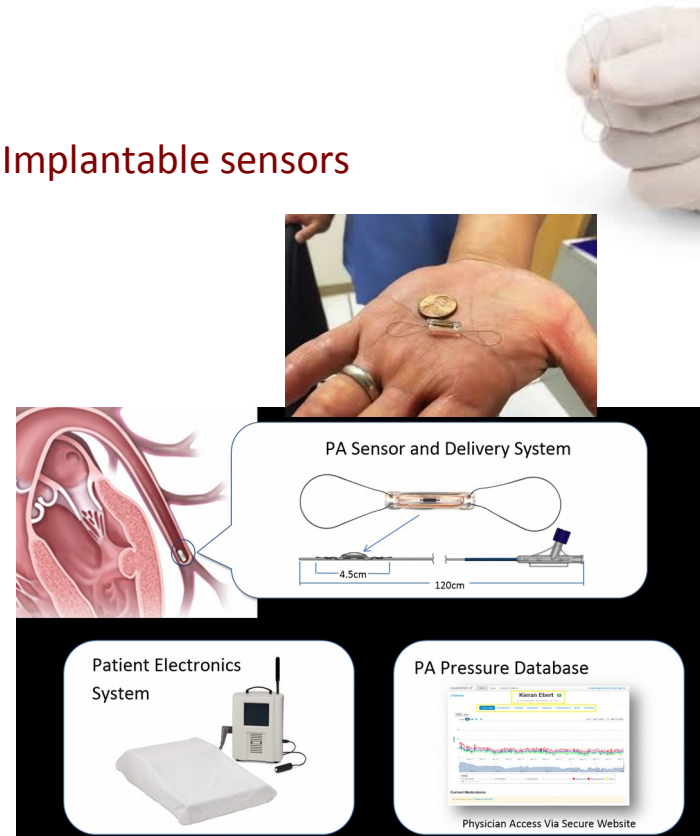
Sensors embedded into the ambient environment



Ingestible sensors



Implantable sensors



Ongoing developments

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ABOUT NEWS TEAMS

FINAL WINNERS FOR THE \$10 MILLION TRICORDER XPRIZE TO BE ANNOUNCED EARLY 2017

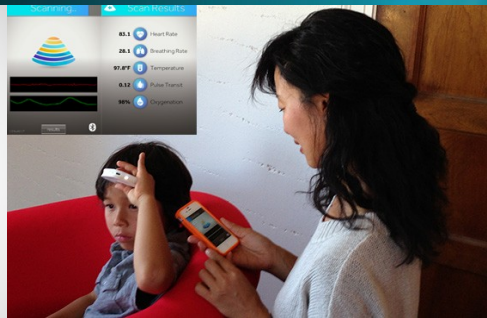
Next phase of consumer testing to start in September 2016

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A \$10 MILLION COMPETITION TO BRING HEALTHCARE TO THE PALM OF YOUR HAND



heart rate



skin/core body temperature



SpO2 (oxymetry)



respiratory rate



blood pressure



ECG



emotional stress



“It is a capital mistake to theorize before one has data”

Arthur Conan Doyle,
1887

Updated version:

“It is a capital mistake to theorize before one has data and understands what they mean”

Data Analytics

Healthcare informatics	Acquisition, transmission, storage, retrieval, use
Multisensor fusion	Statistical, probabilistic approach, AI
Fusion of sensing data with other health data	<ul style="list-style-type: none">• Genetic, medication, laboratory test, imaging, clinical diagnosis• Bayesian, neural network, pattern recognition, logistic regression, FCM
Big Data	V: vast, volume, velocity, variety, value, variation, veracity, valence

Challenges

Rapid and scalable processing	Continuous streams of pervasive health monitoring, capacities for iterative and low latency computations
Handling variety and heterogeneity	Ontologies, data representation languages
Deal with unforeseen events in health	Seasonal and behavioural challenges
Privacy	Cryptographic, randomized responses, condensation, anonymization, perturbation

Standards adoption

HealthSummit
TECHNOLOGY • BUSINESS • RESEARCH • POLICY

DECEMBER 8-11, 2013
Washington, DC Area
The Gaylord National Resort
and Convention Center

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- Overview
- Agenda
- Special Sessions
- Hotspots
- Exhibit Floor Presentations
- Keynote Speakers
- Executive Spotlights
- General Program
 - Business Transformation
 - Health & Wellness
 - Technology
 - mHealth in the Hospital
 - Policy
 - Ventures & Startups
 - Pharma & Life Sciences
- International
 - Around the World
 - Denmark Implements National HIT**

DENMARK IMPLEMENTS NATIONAL HIT

Denmark Implements National HIT Interoperability Standards
Tuesday, December 10 - 11:00 AM - 12:00 PM

SESSION OVERVIEW

In August 2012, Denmark became the first nation ever to mandate standards for interoperability in a national healthcare system when it published its National Action Plan for Telemedicine. The plan incorporates interoperability Design Guidelines published by the Continua Health Alliance into the required architecture for Denmark's national healthcare system. Continua's Design Guidelines convene existing standards to define the architecture for an end-to-end solution in personal connected health. This presentation will broadly cover Denmark's groundbreaking mandate, including the scope, objectives, policy structure and strategy, and will provide an update on implementation. The presentation will provide a helpful overview of Denmark's approach to standardization for government HIT employees, elected officials, device engineers and sales or marketing executives interested in government tenders mandating Continua-compliant devices.

SPEAKERS

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Use cases: Diabetes

Trial design:

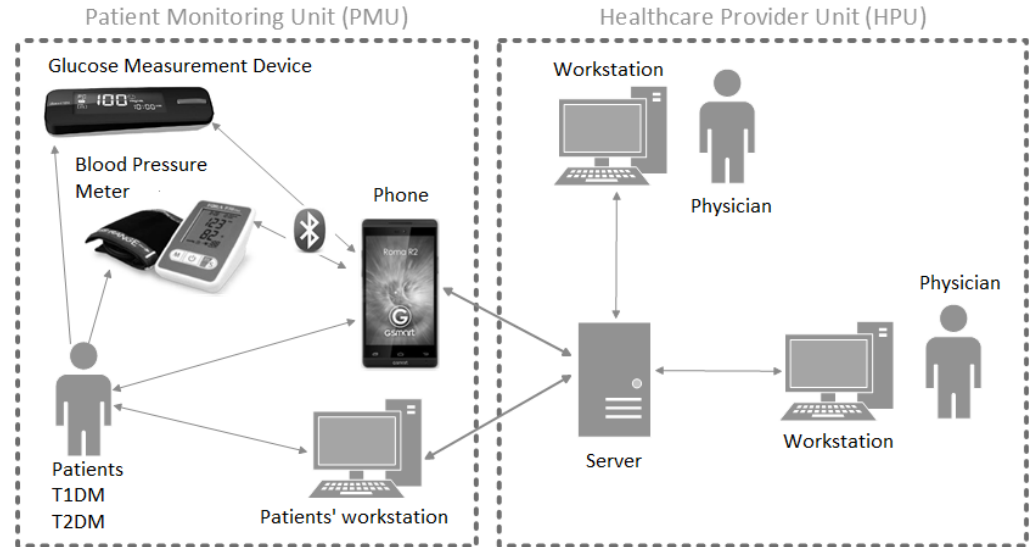
- Prospective, non interventional,
- observational, multicentre study
- 26 outpatient centres for diabetes
- Duration 6 months (y. 2015)
- 400 patients (T1DM, T2DM)

Data:

- Laboratory tests
- Daily glucose measurements
- BP, weight, waist circumference
- Diet, physical activity
- Medication
- General health conditions

Analytics:

- Alarms, trends, situation matching



Outcomes:

7.73±1.62% vs. 7.38±1.57%

7.1±1.54% vs. 6.77±1.45%

(p = 0; baseline for HbA1c for T1DM, T2DM patients)



Project no.: 26240120038

Co-ordinator: Novartis Slovakia, s.r.o

Partners: Medirex Group Academy, n.o.

Anext, a.s.

UK v Bratislave

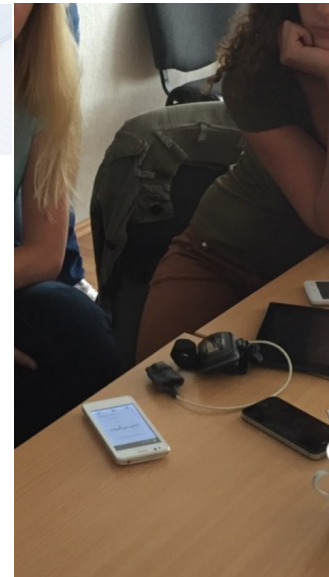
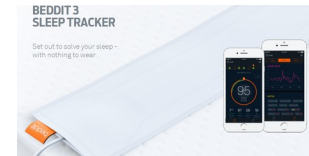
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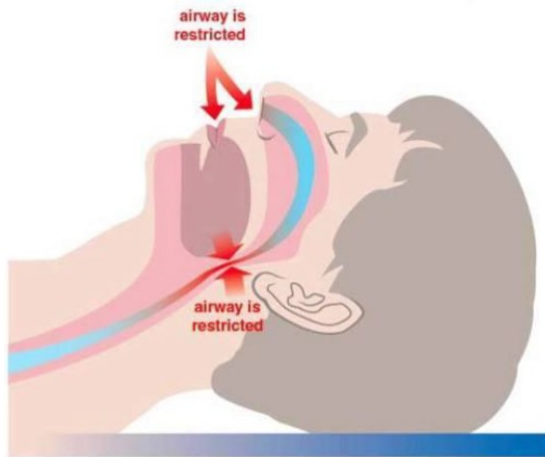
Use cases: Sleep Apnea



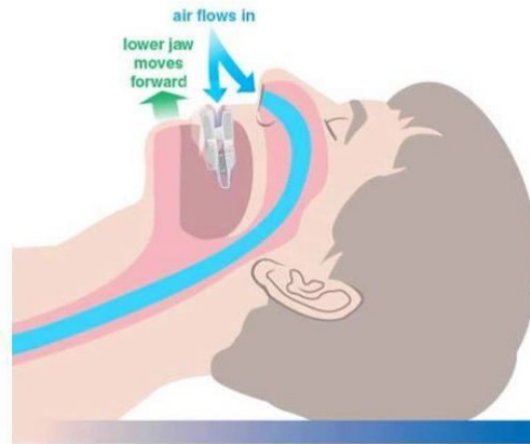
Data acquisition:



Without MAD



With MAD



Data analytics:
AAN, SVM, decision tree classifier,
kNN

In cooperation with:
MUDr. Andrej Thurzo, PhD., MPH, MHA
Faculty of Medicine in Bratislava
Slovak Society for Regenerative Medicine

Thank you

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