HEALTH.E

LIGHTHOUSE INITIATIVE

Health.E
Moore for Medical

Accelerating innovation in medical devices
Enabling “Moore for Medical”

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Moore’s Law
Number of transistors per chip

Eroom’s Law
Number of drugs per billion US$ R&D

Source: Scannell et al., Nature Reviews, Vol.11, March 2012, p.191
• Volumes drive innovation
• Open platforms and standards at all levels
Typical medical product

- Relatively small volumes
- Innovation gets stuck at device level due to lack of open platforms
Healthcare is changing:

Hospital → Point of care, home

M€ Diagnostics → Semi-professional

Blockbusters → Personalized therapy

Cure → Prevent

Pay for treatment → Pay for cure
Fading Borders

ECS

Pharma

Medtec

Organ-on-Chip

wound care

smart catheters

data

e-health

electroceuticals

drug administration

point-of-care diagnostics

wound care

smart catheters

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e-health

electroceuticals

drug administration

point-of-care diagnostics
Digital Health

Treat people in their own environment
Integrate all data into a “digital twin”
Health coaching

2019 E-Health

Remote monitoring and consultation
health coaching

Continuous monitoring

All personal data is collected in a digital representation that can be used to test diagnose and in-silico test therapies

Traditional consultation
Bioelectronic Medicines

Replace or complement traditional medicines:

Pain relief, inflammatory diseases (Crohn, Arthritis), hypertension, obesities, sleep disorders, cardiac rhythm, diabetes, ……

Selective - targeting chronic diseases

Smart – closed loop systems

Small – minimally invasive

Arne Larsson 1958

2019

Small (polymer) encapsulated devices that directly modulate nerves leading to specific organs.

GSK and Google invest $715M in bioelectronics venture Galvani

The SRC is actively defining a US roadmap for bioelectronics
Personal ultra sound

Diagnostic imaging is moving from the hospital to semi-professionals and consumers.

MEMS ultrasound enables high volume consumer applications.

3D ultra sound

2D ultra sound

A huge challenge for established players, a huge opportunity for new comers!
Organ-on-Chip

Human tissue and disease models for:

Drug development (target discovery and screening)
Drug repurposing
Personalized medicine
Safety pharmacology
Food and cosmetics testing
Reduction of animal experiments

Alexander Fleming 1928

iPSC derived human cells form mini organs in a micro-fabricated physiologically relevant environment

2019 parallelism

Definition of a European roadmap for Organ-on-Chip
Device level innovation is slow compared to ECS norm

Causes:

• Fragmentation
• Small volumes
• Point solutions
• Non-standard fabrication
• (Quality) regulations
• Lack of standards

It’s not because of the lack of innovative ideas!

Solution: open technology platforms
Cardiac interventions

Smart catheters assist in coronary interventions, structural heart repair, electrophysiology procedures

Next generation smart catheters:

- Analog $\rightarrow$ digital
- Conventional $\rightarrow$ MEMS
- Point solutions $\rightarrow$ open platforms

2019

(minimal invasive procedures assisted by smart catheters)

Digitization at the tip leads to serialization of data leading to standardization in communication

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Health.E lighthouse:

- **Create Awareness** in the ECS community for emerging opportunities
  - Translate the needs of medtech and pharma into ECS language
  - Identify gaps in strategic research agendas (SRA)
- **Promote Open Technology Platform** model for medical technologies
  - Funnel innovation for medical devices (reduce fragmentation).
- **Create a Sustainable Ecosystem**
  - Consisting of technology suppliers, device manufacturers, end-users
  - Transcending project boundaries
  - Connect to other European initiatives and communities

*Make Europe the innovation hub for medical devices.*
Projects so far connected to the lighthouse:

- ASTONISH
- ECSEL Joint Undertaking
- EnSO Energy for Smart Objects
- POSITION II
- ULIMPIA ULTRA-SOUND BODY PATCHES
- Penta
- VOSTARS
- SOLUS
- ORCHID organ-on-chip in development
- MADiA Magnetic Diagnostic Assay for neurodegenerative diseases
- BIOCDx
KDT/Health.E and the new Health PPP

5D for research and health paradigm shift

Health PPP
Patient and Clinically focussed
Focus on enabling digital technologies
KDT

The ECS industry will play a key role in the realization of patient centric, decentralized cost-effective health care
Vision:
“Moore for Medical”

Mission:
Motivate the ECS community to work towards open technology platforms for medical devices on a device, system, and data level
Health.E Implementation Plan (CSA HELoS)

**Startup:** July 2019
Health.E workshop @ EF ECS Nov. 2019

**Workshop I:**
**Vision**
May 2020 (CEA)

**Workshop II:**
**Strategy**
March 2021 (imec)

**Workshop III:**
**Dissemination**
Nov. 2021 (TUD, Fraunhofer)

- Set up a European network
- Identify opportunities for ECS
- Stimulate open technology platforms
- White Papers: Emerging medical domains: priorities & recommendations

Questionnaire: stakeholders & roadmap

Networking & project cluster support