HEALTH.E

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LIGHTHOUSE INITIATIVE

Health.E Moore for Medical

Accelerating innovation in medical devices

Enabling “Moore for Medical”

Ronald Dekker

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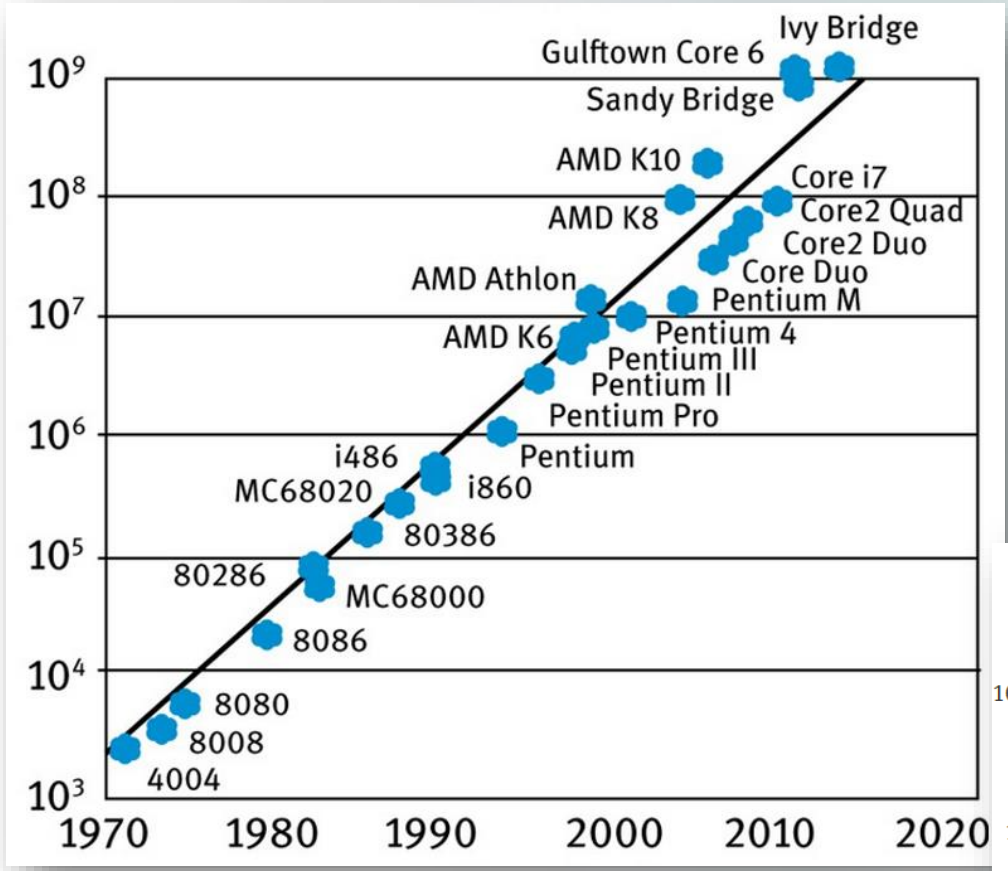
Moore's Law

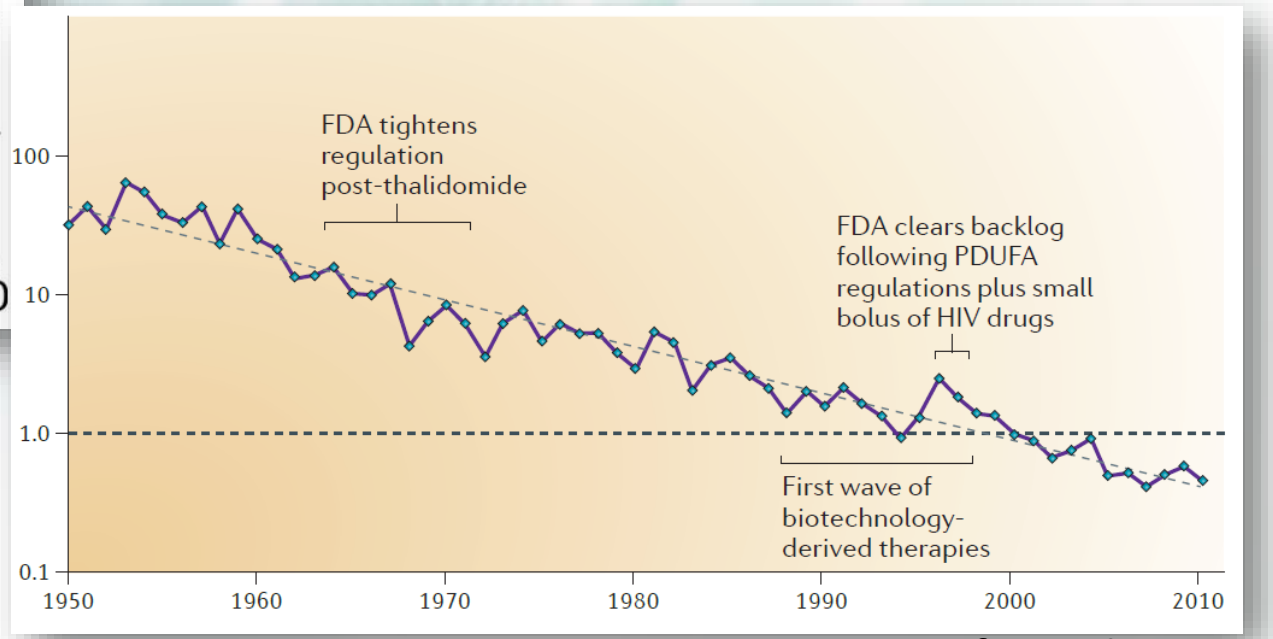
Number of transistors per chip



Year of introduction

Eroom's Law

Number of drugs per billion US$ R&D



Year of introduction

Source: Scannell et al., Nature Reviews, Vol.11, March 2012, p.191

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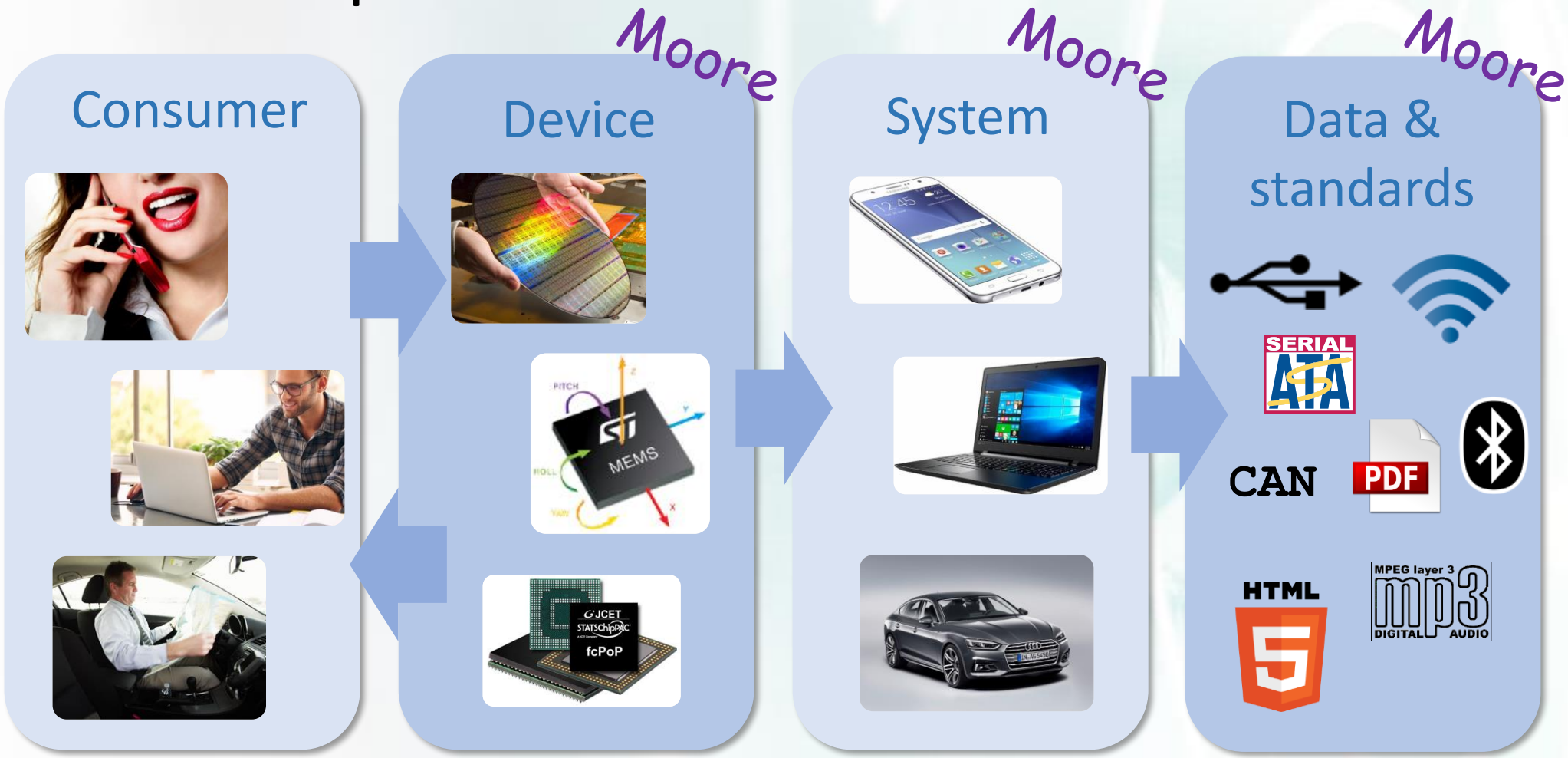
Consumer products



- Volumes drive innovation
- Open platforms and standards at all levels

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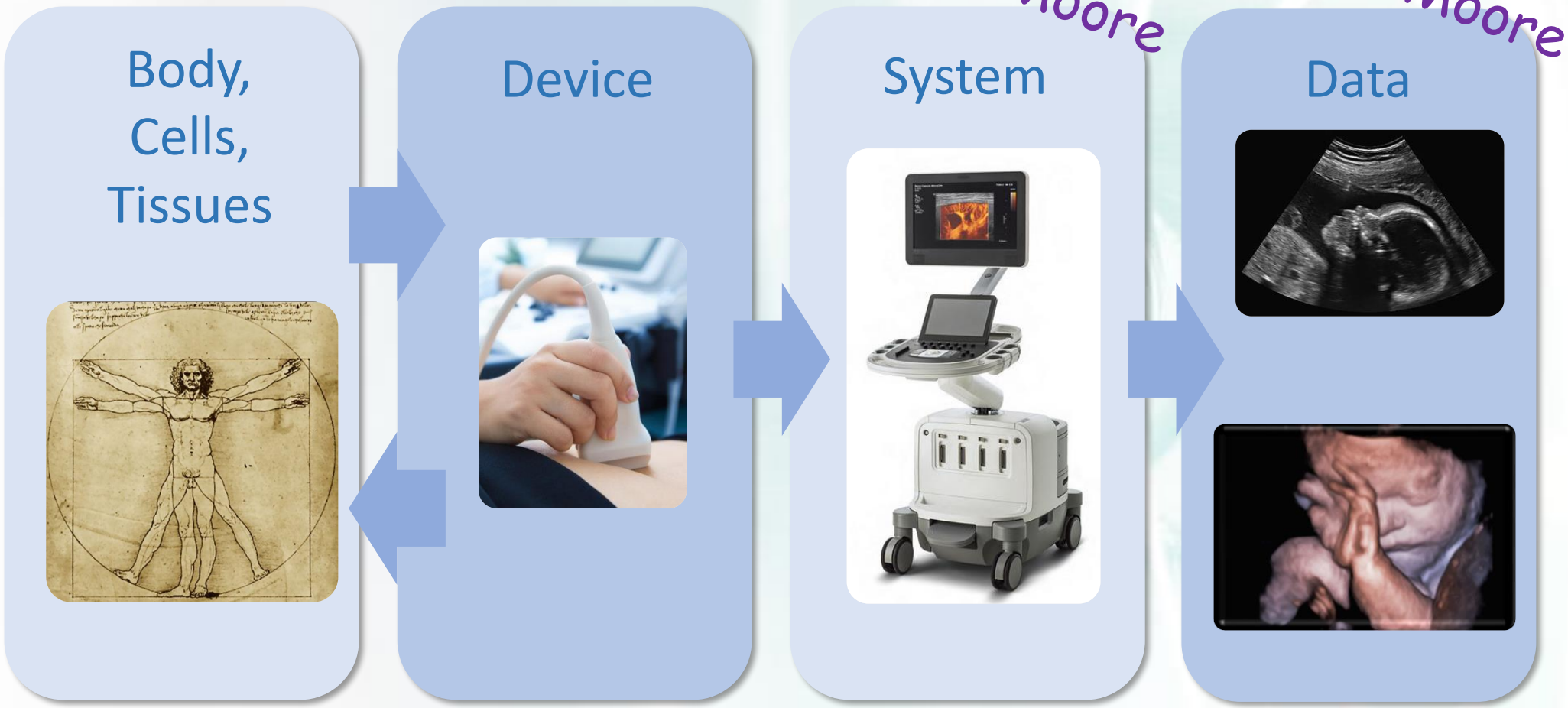
Typical medical product



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

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Healthcare is changing:

Hospital → Point of care, home

M€ Diagnostics → Semi-professional

Blockbusters → Personalized therapy

Cure → Prevent

Pay for treatment → Pay for cure

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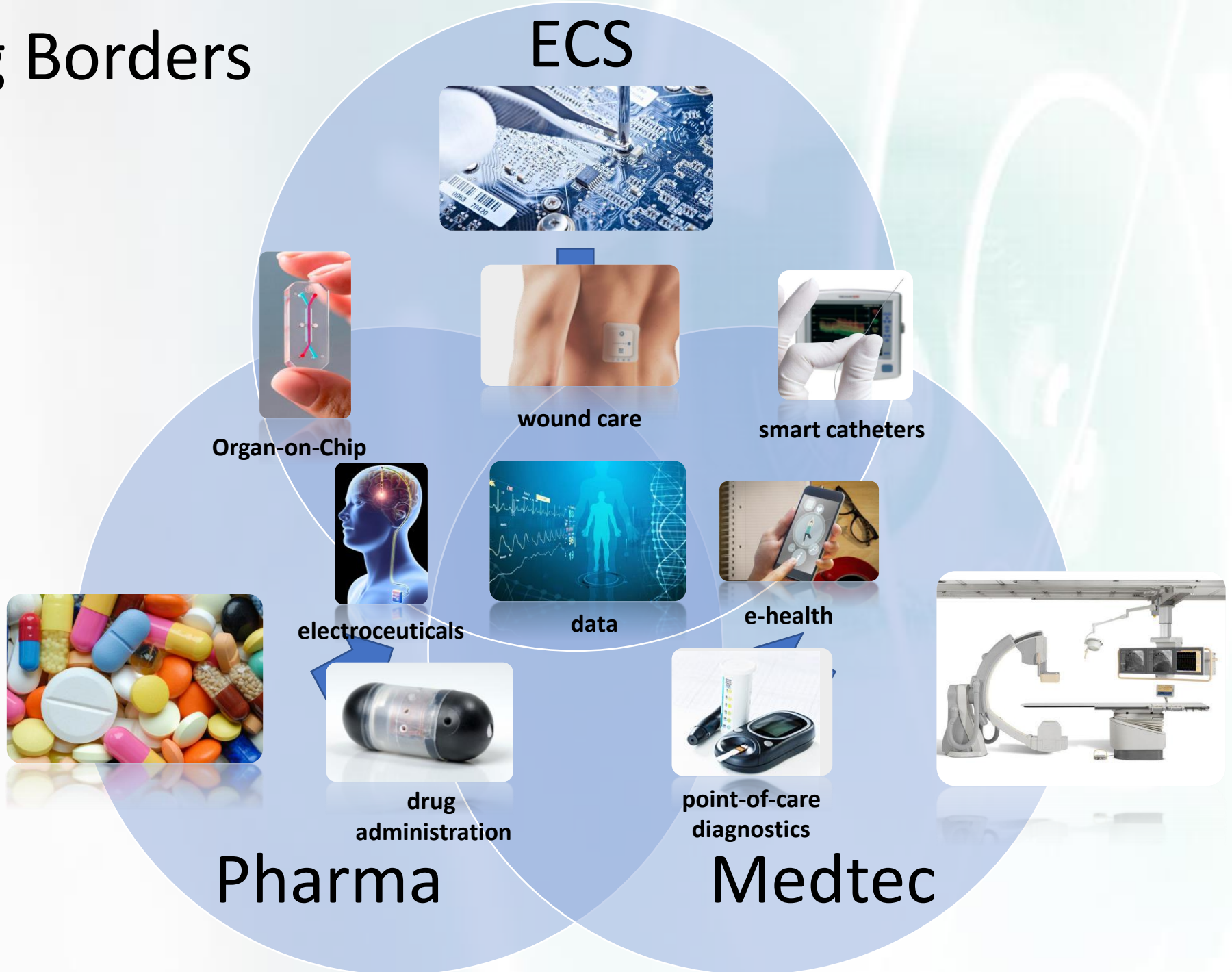
Fading Borders



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Digital Health

Treat people in their own environment

Integrate all data into a “digital twin”

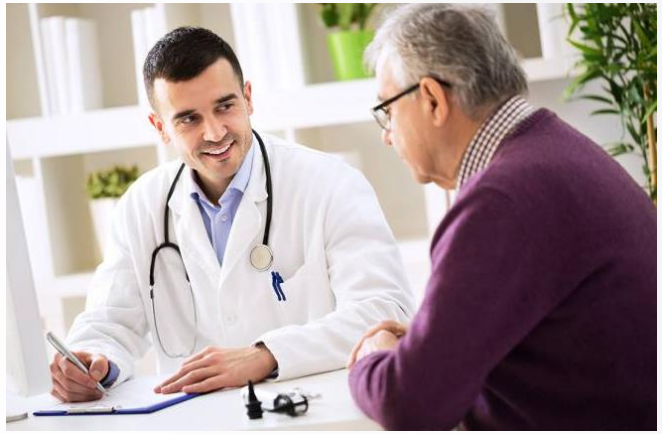
Health coaching

Continuous monitoring

2019 E-Health

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

Traditional consultation



Remote monitoring and consultation health coaching

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Bioelectronic Medicines

Replace or complement traditional medicines:

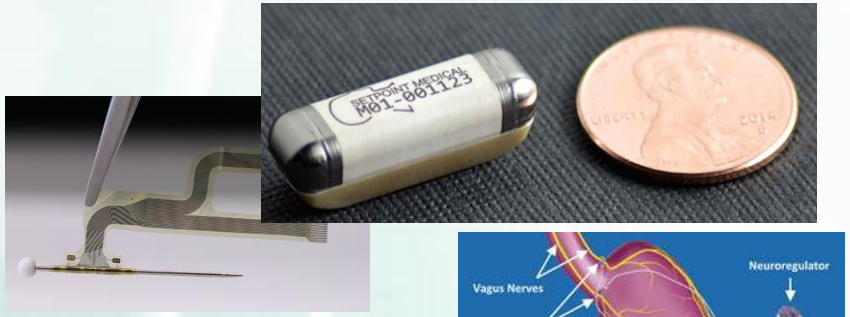
Pain relief, inflammatory diseases (Crohn, Artritis) , hypertension, obesities, sleep disorders, cardiac rhythm, diabetes, ……

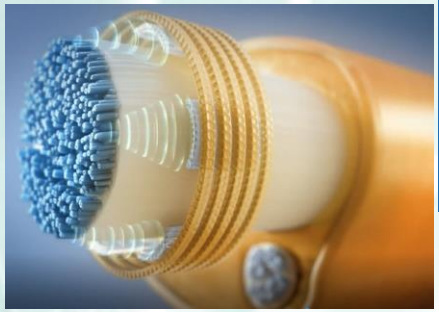
Selective - targeting chronic diseases

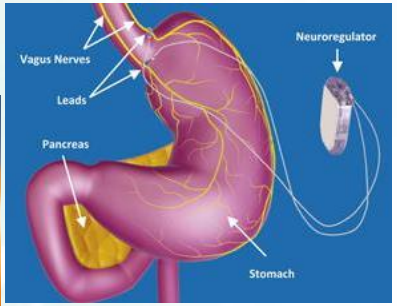
Smart – closed loop systems

Small – minimally invasive

Electroceuticals

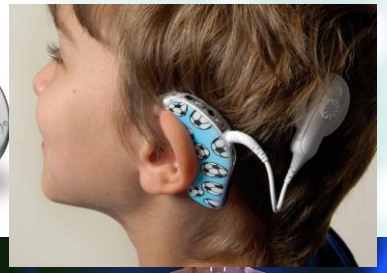


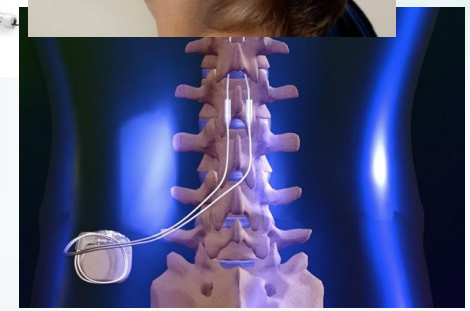




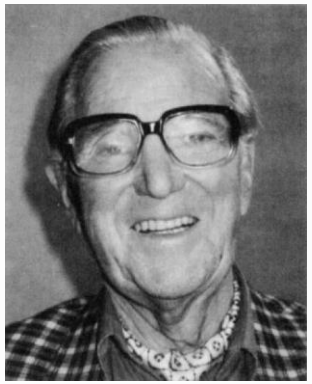
Small (polymer) encapsulated devices that directly modulate nerves leading to specific organs.

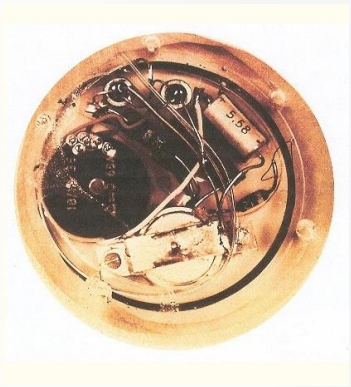
2019





Arne Larsson 1958





GSK and Google invest $715M in bioelectronics venture Galvani

GALVANI BIOELECTRONICS

SRC Semiconductor Research Corporation

The SRC is actively defining a US roadmap for bioelectronics

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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!

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Organ-on-Chip

Human tissue and disease models for:

Drug development (target discovery and screening)

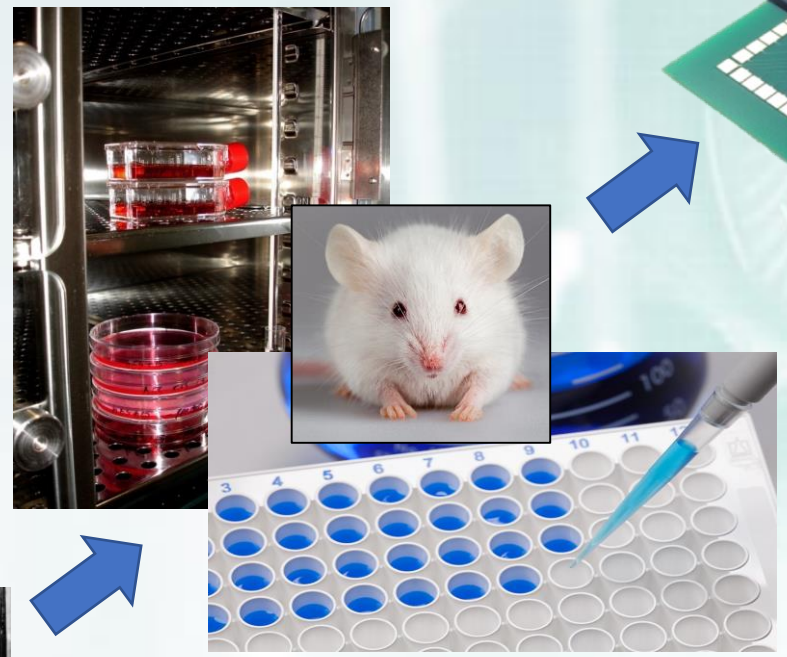
Drug repurposing

Personalized medicine

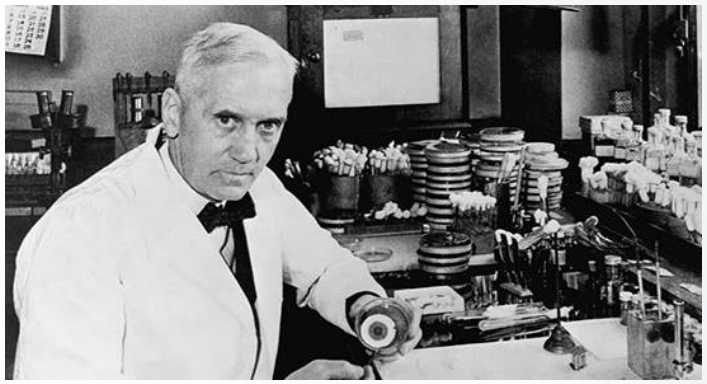
Safety pharmacology

Food and cosmetics testing

Reduction of animal experiments

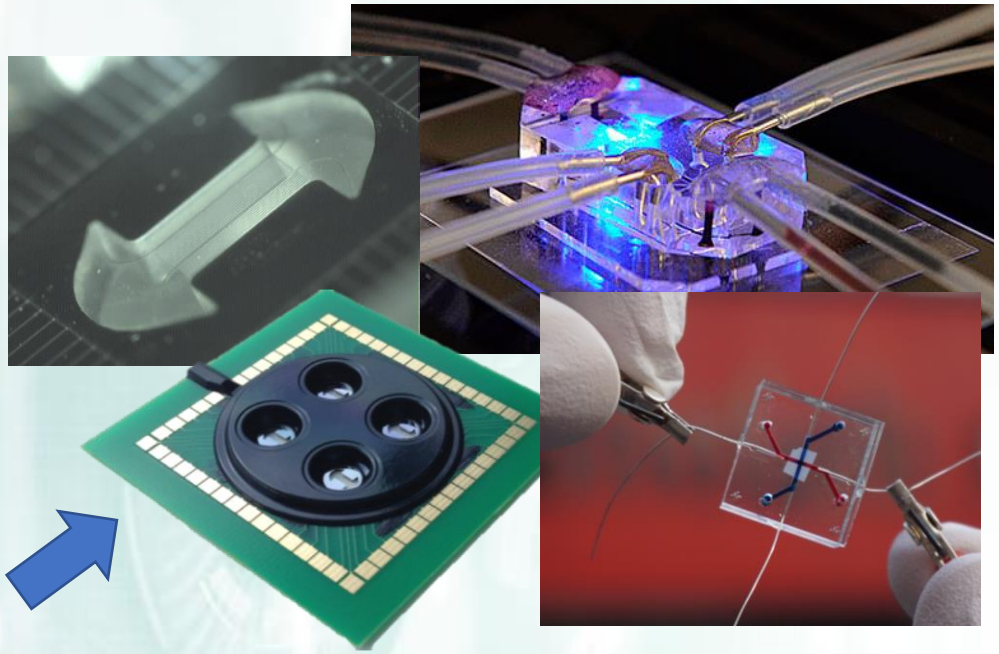


Alexander Fleming 1928



2019 parallelism

Organ-on-Chip



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

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ORCHID organ-on-chip in development

Definition of a European roadmap for Organ-on-Chip

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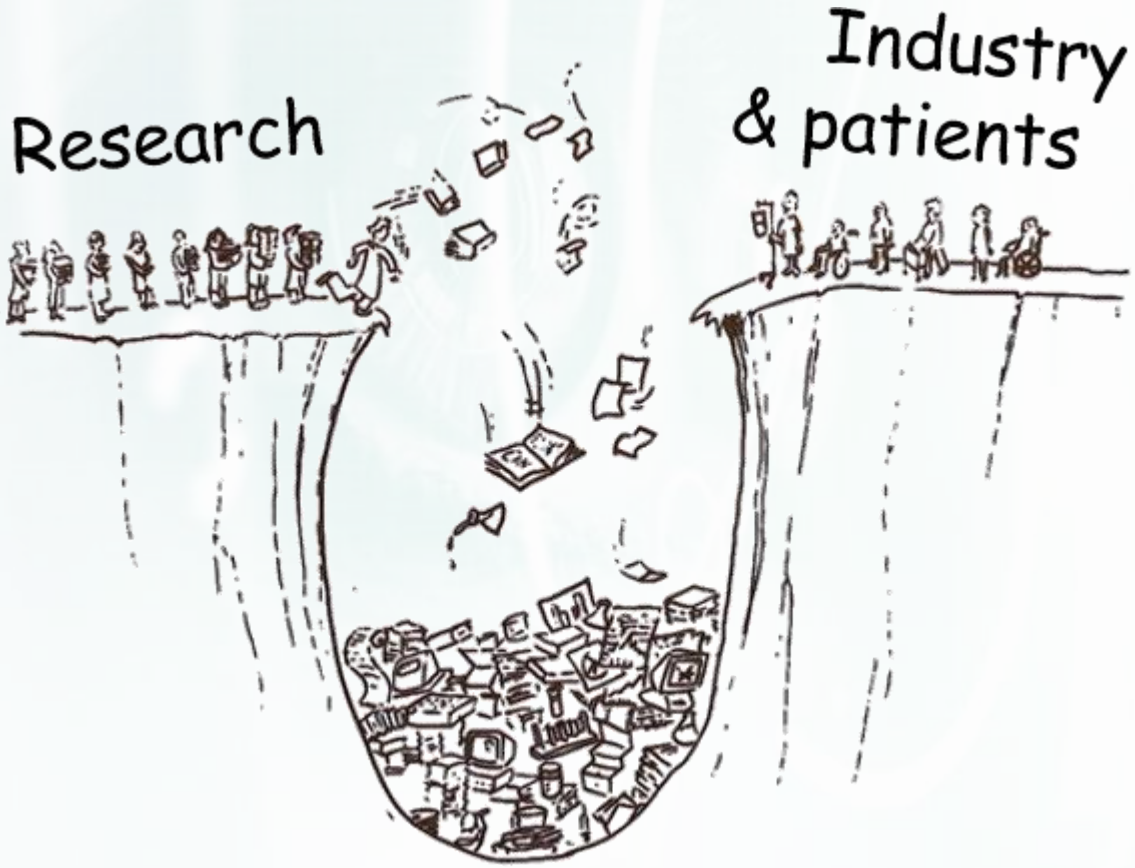
Device level innovation is slow compared to ECS norm

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

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Cardiac interventions

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

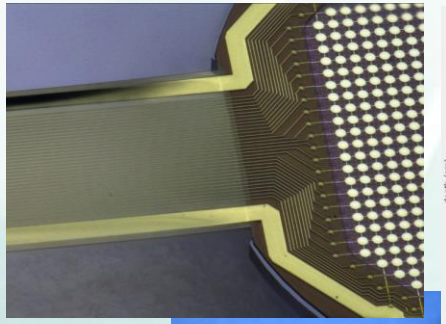
Next generation smart catheters:

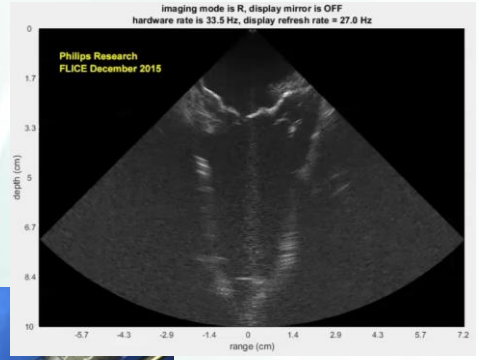
Analog → digital

Conventional → MEMS

Point solutions → *open* platforms

Next generation smart catheters



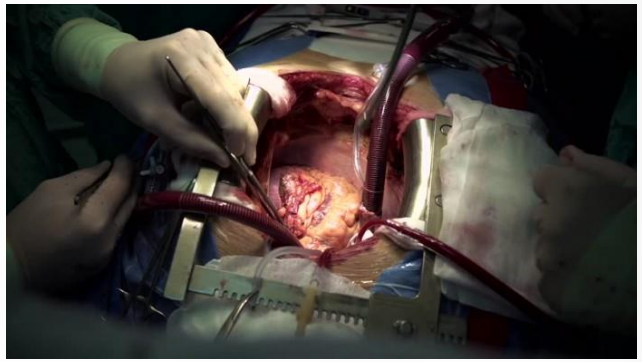


2019

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

minimal invasive procedures
assisted by smart catheters

(open) heart surgery



POSITION II

Grant no.: Ecsel-783132-Position-II-2017-IA

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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.

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Projects so far connected to the lighthouse:

ASTONISH
Advancing Smart Optical Imaging and Sensing for Health

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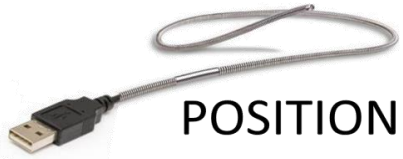
SCOTT
Secure Connected Trustable Things

InForMed



POSITION II

EnSO
Energy for Smart Objects

Penta

ULIMPIA
ULTRA-SOUND BODY PATCHES

VOSTARS

SOLUS

ORCHID
organ-on-chip in development

MADiA
MAgnetic DIagnostic Assay
for neurodegenerative diseases

BIOCDx

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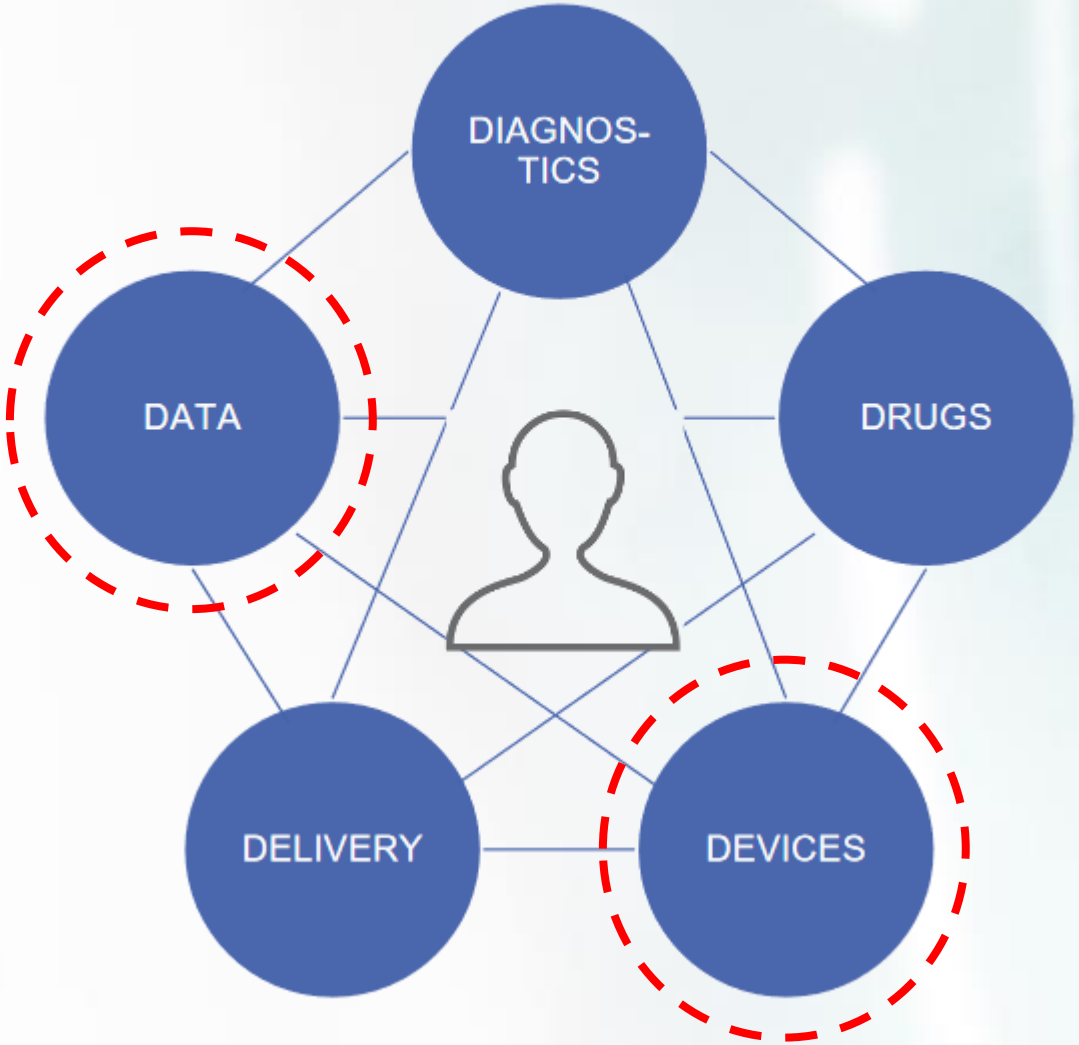
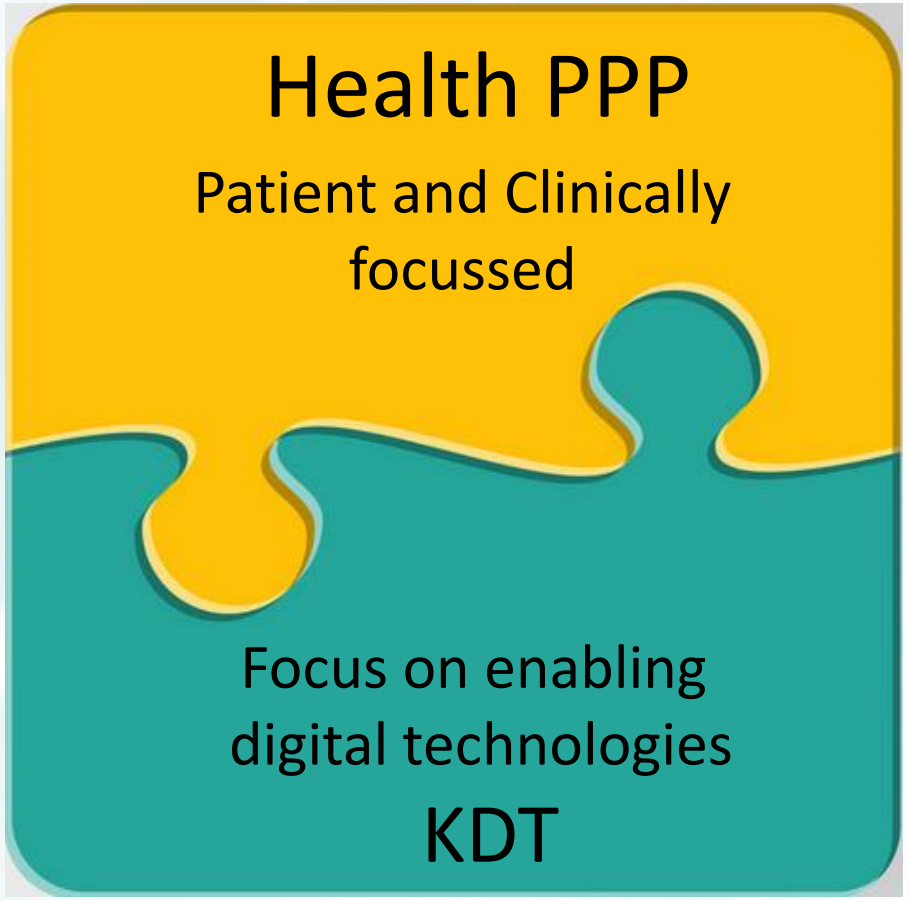
KDT/Health.E and the new Health PPP

5D for research and health paradigm shift





The ECS industry will play a key role in the realization of patient centric, decentralized cost-effective health care

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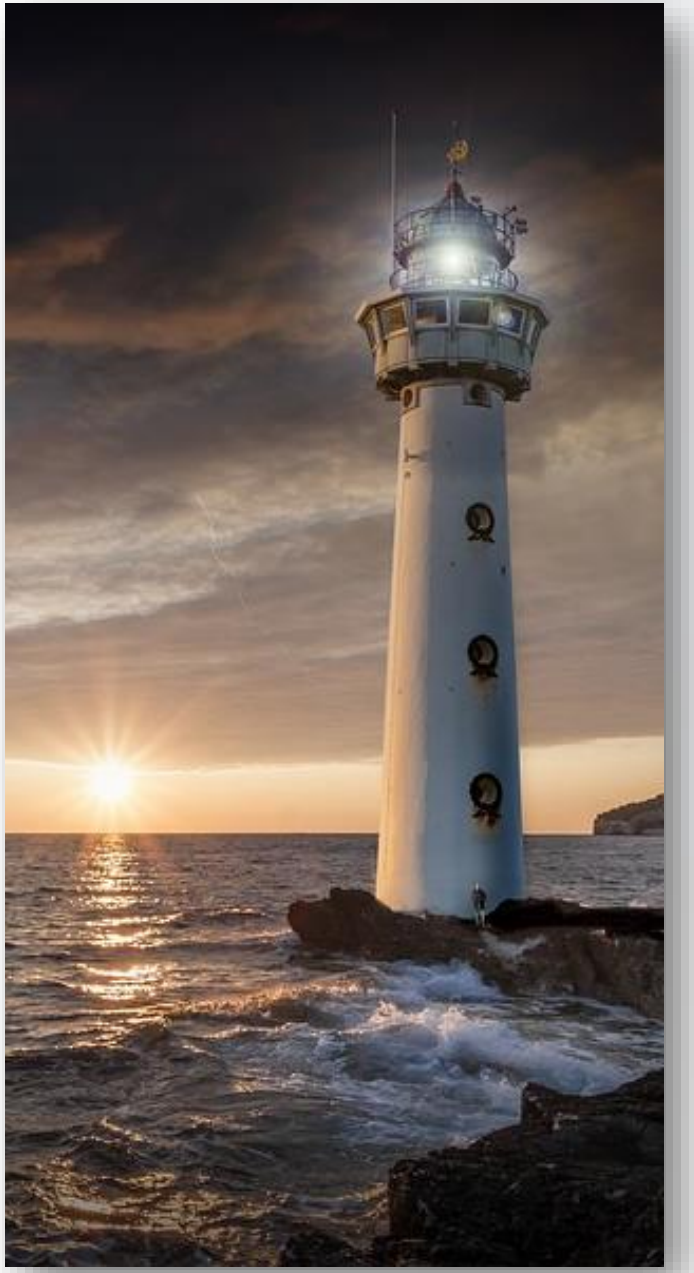

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Vision:

"Moore for Medical"

Mission:

Motivate the ECS community to work towards open technology platforms for medical devices on a device, system, and data level

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Health.E Implementation Plan (CSA HELoS)

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