
Chips JU
ECS 2024
GHENT BELGIUM
5-6 December

Chips JU

# ECS 2024

GHENT BELGIUM

5-6 December

StorAIge

This project has received funding from the ECSEL Joint Undertaking (JU) under grant agreement No 101007321. The JU receives support from the European Union's Horizon 2020 research and innovation programme and France, Belgium, Czech Republic, Germany, Italy, Sweden, Switzerland, Turkey

ECSEL Joint Undertaking

D. GOUBIER - STMicroelectronics

5 December 2024


# AI in the medical Domain a 'clear' view of the complexity


Dalì • Image generator

StorAIge

Strikersoft
IDEAS COME TRUE

SwipeCare

KTH VETENSKAP OCH KONST

**...to make it simple and understandable by all the stakeholders**

# Challenges

StorAIge

- **SEPSIS**
- **Congestive Heart Failure** (CHF)
- **Erratic heart rate** (paroxysmal atrial fibrillation (PAF/AF)

- Data privacy

- Medical dataset

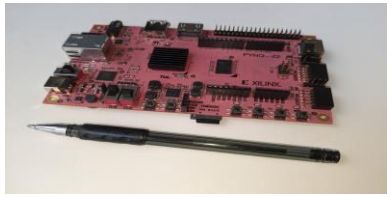

- Ethical validation

IMY. Integritetsskydds myndigheten

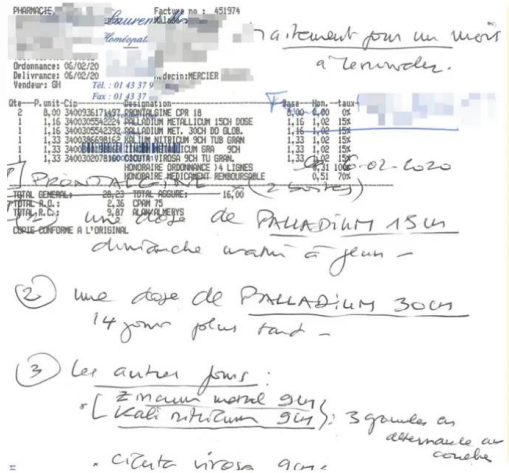
Folkhälsomyndigheten
PUBLIC HEALTH AGENCY OF SWEDEN

EUROPEAN HEALTH DATA SPACE

- Integration challenges



Some documents are difficult to process even by AI!



# Impacts

| 1: Home Care for patients with light to moderate Congestive Heart Failure (CHF) | 2: Nursing Homes with connected GP surgeries, patients with paroxysmal atrial fibrillation (PAF/AF) | 3: Nursing Homes, Sepsis AI-screening |
|---|---|---|
| • 100 000 Swedish patients (1% of population)<br>• Total annual saving per patient:<br>– € 3825<br>• Total potential economic value for Sweden:<br>– € 382 500 000 | • 25 000 patients with PAF in Swedish nursing homes<br>• Total annual saving per patient:<br>– € 3150<br>• Total potential economic value for Sweden:<br>– € 7 875 000 | • 8 000 sepsis cases with fatal outcome in Sweden<br>• 25% reduction of sepsis with fatal outcome -> 2 000 lives saved<br>• Estimated value of life saved:<br>– € 150 000<br>• Total potential economic value for Sweden:<br>– € 300 000 000 |

**The direct economic value for Sweden amounts to €690 mn per annum.**
**EU has 44 times more inhabitants, so the European economic value could exceed €30 000 mn per annum.**
**Add to that saved production-loss for relatives not having to go to hospital with them.**
**The socio-economic value of the increased quality of life is hard to quantify at this stage.**

*Source: Sara Bern Strikersoft sweden*

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# HECS 2024 GHENT BELGIUM 5-6 December

# H2TRAIN

**Call:** HORIZON-KDT-JU-2023-1-IA
**Type of Action:** HORIZON-JU-IA
**Acronym:** H2TRAIN
**Current Phase:** Grant Management
**Number:** 101140052
**Duration:** 36 months
**GA based on the:** HE MGA — Multi & Mono - 1.1
**Start Date:** 01 May 2024
**Estimated Project Cost:** €24,050,477.23
**Requested EU Contribution:** €7,276,633.50
**Contact:** Georgi KUZMANOV

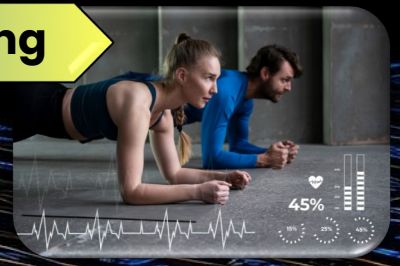
## Enabling digital technologies for Holistic Health-lifestyle motivational and assisTed supeRvision supported by Artificial Intelligence Networks

Juan Antonio Montiel-Nelson

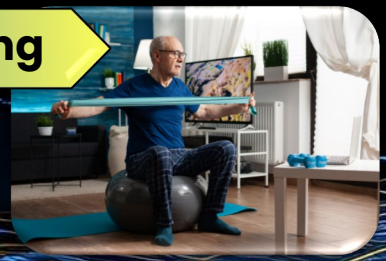
5th December 2024

Remote Assisted Living

Intelligent Sport Coaching




Intelligent Sport Coaching



## Technology Demonstrators

- TD1: Tattoo sweat sensing
- TD2: Glycemic
- TD3: pH
- TD4: ECG, EMG & SpO2
- TD5: Cortisol & Lactate on Graphene
- TD6: In-water activity tracker
- TD7: Energy harvester
- TD8: Biometric cryptography
- TD9: Textile-integrated tracker
- TD10: Edge-cloud AI continuum

## Foundational & Cross-Sectional Technologies

- Edge-cloud AI continuum
- Biometric cryptography
- Glucose
- Ph level
- ECG, EMG, SpO2 and SmO2
- Activity tracker
- Energy harvester
- Cortisol and Lactate on Graphene
- Sweat Tattoo Sensor
- Textile-integrated Device

On Cloud for Data Analysis and Prediction

On Edge for Self-Calibration & Data Extraction

On Fog for Sensor Digital Twin

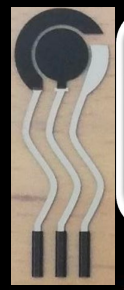
State-of-the-Art, Devices, Components & Models

More beyond State-of-the-Art

1D & 2D Materials

Optical – Colorimetry

Electrical – Chronoamperometry



Screen printed graphene sensor

System architecture edge-cloud continuum

- Commercial production devices and systems.
- Star-ups created.
- AIoT industry implementing H2TRAIN technology.
- Energy harvesting industry implementing H2TRAIN technology.
- Biosensing industry implementing H2TRAIN technology.

**Project Development Timeline** | **Large Scale Demonstration stage TRL 7-8** | **Market implementation TRL 8-9**

2024 2025 2026 2027 2028 2029 2030 ...

Project Start at TRL 1
Strong consortium
Webpage created

Novel biosensing device integration (28 JUNE-4 JULY)

Embedded Intelligence (5 – 11 JULY)

System of systems (12 – 18 JULY)

Project End
- TRL 5-6 Short Scale Demonstration stage.
- Path for TRL 5-6 established.

- Maturation and validation of the technology at larger scale.
- Key stakeholders engaged.
- Business case and business model towards commercialization developed.

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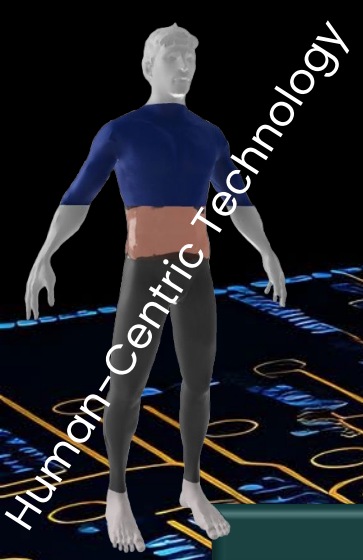


Hospital

Ambulatory

Home

- Commercial production devices and systems
  - TinyML-sensor, Integrated textile systems of systems, edge gateways, and cloud servers.
- Star-ups created for textile integrated wearables, biomarker sensing, and data fusion.
- Artificial IoT industry implementing H2TRAIN technology based on digital twins for sensors, activity analysis and performance estimation.
- Energy harvesting industry implementing H2TRAIN technology.
  - RF, PZT and Thermoelectric Power Units
- Biosensing industry implementing H2TRAIN technology.
  - Biomarker screen-printed electrodes, biomarker sweat tattoo on flexible substrate, ad-hoc optical and electrical interface.

**Large Scale Demonstration stage TRL 7-8**

**Market implementation TRL 8-9**

2027 → 2028 → 2029 → 2030 →

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This research is supported by the European Commission and the National Authorities of Austria, Finland, Germany, Italy, Poland and Spain

CHIPS-JU GA 101140052

Co-funded by the European Union

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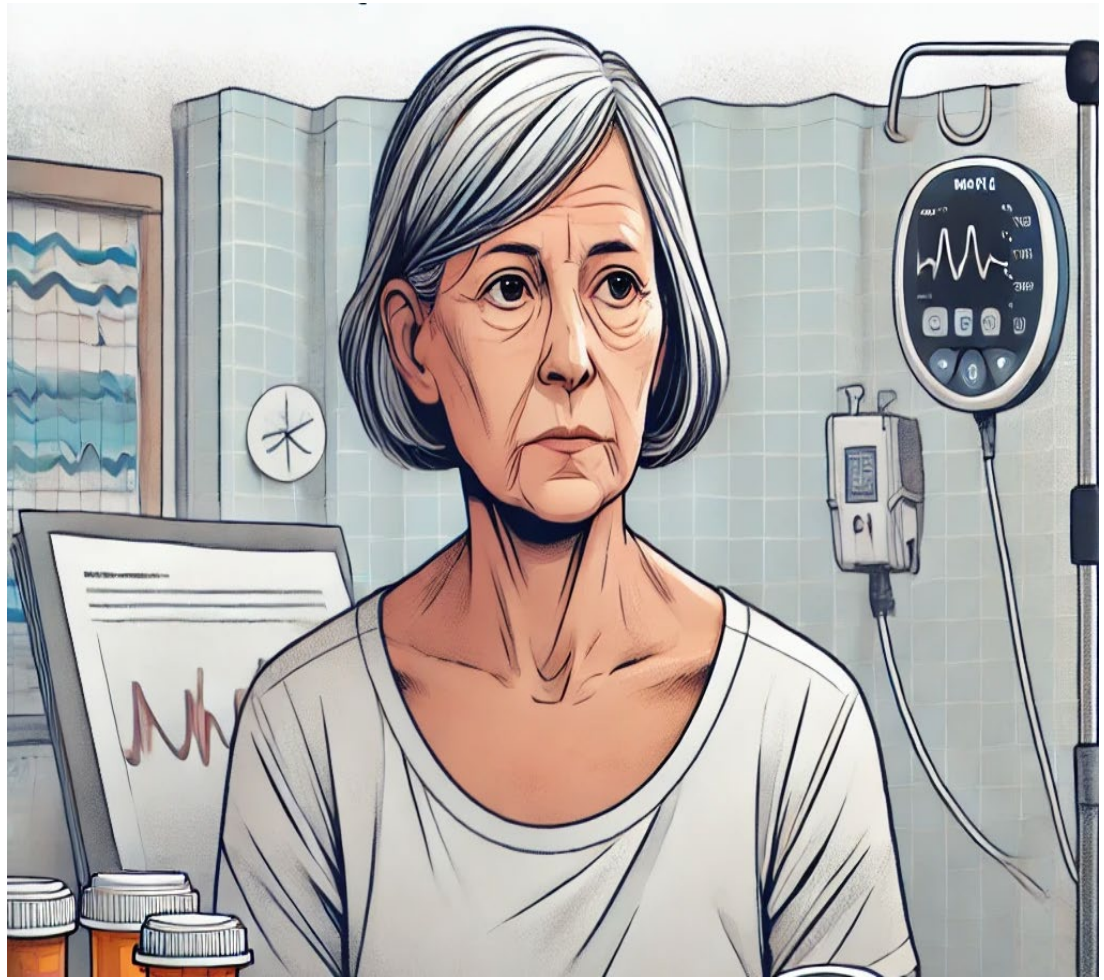
« From chips to healthcare services »
Bridging Innovation & Care for real-world impact
Olivier Horbowy - STMicroelectronics

# Patient Medical Report

**Name:** Dall-eDa - **Age:** 56 - **Sex:** Female



## Medical History

- **Type 2 Diabetes Mellitus**: Currently managed with medication and lifestyle adjustments.
- **Early-Stage Heart Failure**: Under cardiology supervision with ongoing treatment to stabilize heart function.
- **History of Severe Infections**: Includes a prior episode of **sepsis**, which required prolonged intensive care and months of recovery.

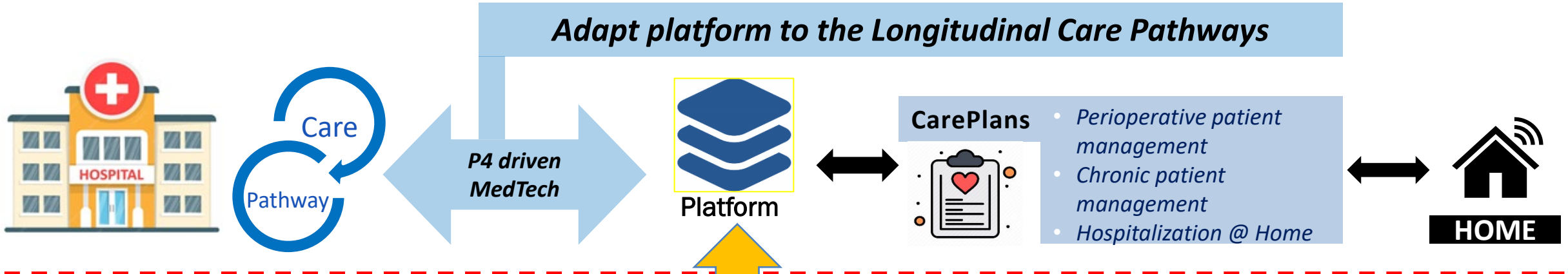
## Current Condition

- Multi-morbid patient requiring chronic disease management across specialties.
- High risk for recurrent infections and complications related to comorbidities.
- Fragmented care pathways, leading to inefficiencies and delayed interventions.

## Care Needs

- Continuous, real-time monitoring of critical health parameters (e.g., glucose levels, cardiac function, infection markers).
- Early detection and prevention of potential sepsis recurrence.

# « From chips to healthcare services »: Empowering innovation

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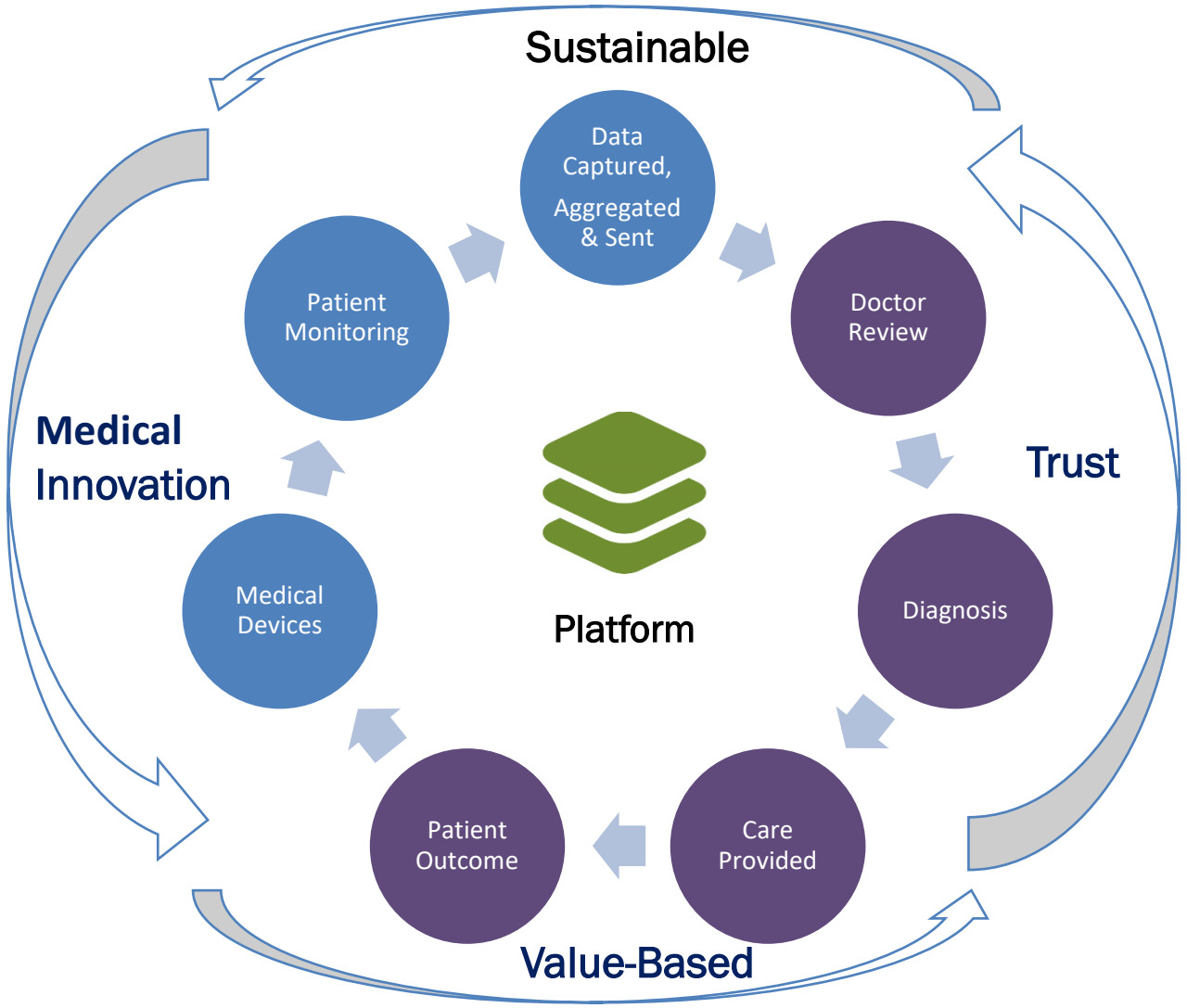
**Feed Platform**

| | | | |
|---|---|---|---|
| ***Use cases*** | **Hospital** | **Ambulatory** | **Wellbeing** |
| ***Enablers*** | Security & Privacy: ***Protecting patient data through secure transmission*** | | |
| | Edge Computing & Embedded AI: **Processing data in medical devices for faster decision-making** | | |
| | Interoperability: ***Interconnecting health systems for seamless data flow & augmented decision making*** | | |
| | AI tools : ***Predictive, participatory, personalized, preventive medicine & scalability*** | | |
| | Embedded & Cyber-Physical medical devices: ***sense, act, think, connect*** | | |

# « From chips to healthcare services »: Empowering collaboration




**Sustainable:** *environmental, economic & social sustainability while ensuring equitable & high-quality care*

**Value-based:** *improving patient outcomes relative to the cost of deliveringthose outcomes, emphasizing quality, efficiency & patient-centered care*

**Trust:** *confidence of patients, healthcare providers & stakeholders in the security, privacy, reliability and ethical use of digital health technologies & data*

**Medical innovation:** *development & integration of advanced technologies – from chips to medical devices to platforms – to enhance healthcare delivery, diagnostics, treatment & patient outcomes*