

Tekoäly ja SOTE-ala

PROFIT-hanke

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ITEA 4 is the Eureka Cluster on software innovation



PROFIT

Optimising workflows to enable smart hospitals

To optimise workflows and reduce staff burden in healthcare environments, the ITEA project PROFIT (PProcedure optimisation and data-driven Operational efficiency in healthcare environments) will enable smart hospitals via a facilitated and safe deployment of AI and the introduction of innovative solutions for asset management, alarm responses, operational efficiency, and clinical assistance and support to healthcare personnel.

Addressing the challenge

Chronic diseases affect a third of adults worldwide and are rising through rapid urbanisation, unhealthy lifestyles and ageing populations. Meanwhile, healthcare systems are under pressure: expenditures cost 10% of the average EU GDP, while a global shortfall of 13 million nurses is expected by 2030. This calls for smart hospitals, which connect people, data and technologies for better end-to-end care experiences and seamless transitions across care settings. The first challenge on this path is to increase operational efficiency to free up time for patient care.

Proposed solutions

To streamline tasks, improve patient outcomes and reduce human error, PROFIT will introduce novel solutions that optimise and simplify workflows across different areas. For smart asset management, technologies like edge intelligence, IoT and cloud computing will be combined to design smart, real-time location systems and AI to optimise hospital processes. For smart alarm responses and context-aware information management, context-driven information and communication nursing tools will improve resource utilisation, work processes and patient care according to end-user needs. For clinical procedure assistance and workflow efficiency, PROFIT will design a healthcare compute platform and a QA framework facilitating the deployment of AI-based medical algorithms while

respecting requirements and regulations. Crucially, these innovations will be interconnected within and beyond the hospital to address entire patient journeys. This will include the integration



▲ PROFIT: technologies for optimising hospital processes and enhancing quality of care

of healthcare, social services and long-term care in a holistic and person-centric approach. Technological innovations will be introduced in various areas and clinical use cases and demonstrators will be built to exemplify and validate how the PROFIT solutions will be used in practice and how they complement each other in the clinical workflow.

Projected results and impact

PROFIT's primary outcome will be a

holistic solution that can be integrated within the existing healthcare system and with the existing products' portfolio of the industry partners. Its final goal, however, is firmly on improving quality of care, patient and practitioner experiences, and contributing to the sustainability of the healthcare systems. PROFIT's market value chain is also relatively short as the industrial partners have existing sales channels to healthcare providers, enabling them to swiftly exploit new products and expand

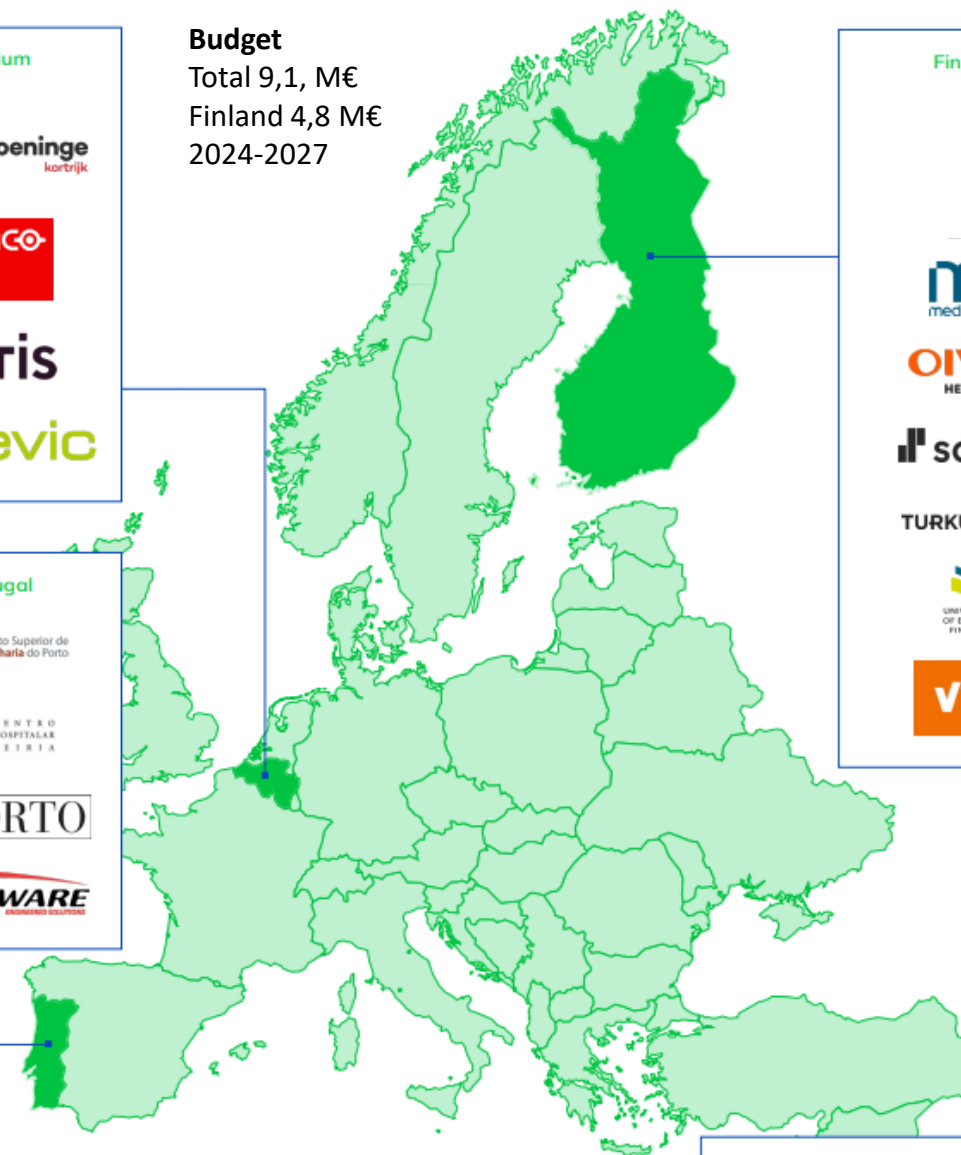
to new markets. The market potential is very promising; the global healthcare AI market, for instance, will reach US\$ 148 billion by 2029 at a 48% compounded annual growth rate. Additionally, the project will investigate new business models and develop integrated demonstrators and proof-of-concept systems for pre-clinical validation. This makes PROFIT a comprehensive first step towards truly smart hospitals.

Project partners



Budget

Total 9,1, M€
Finland 4,8 M€
2024-2027

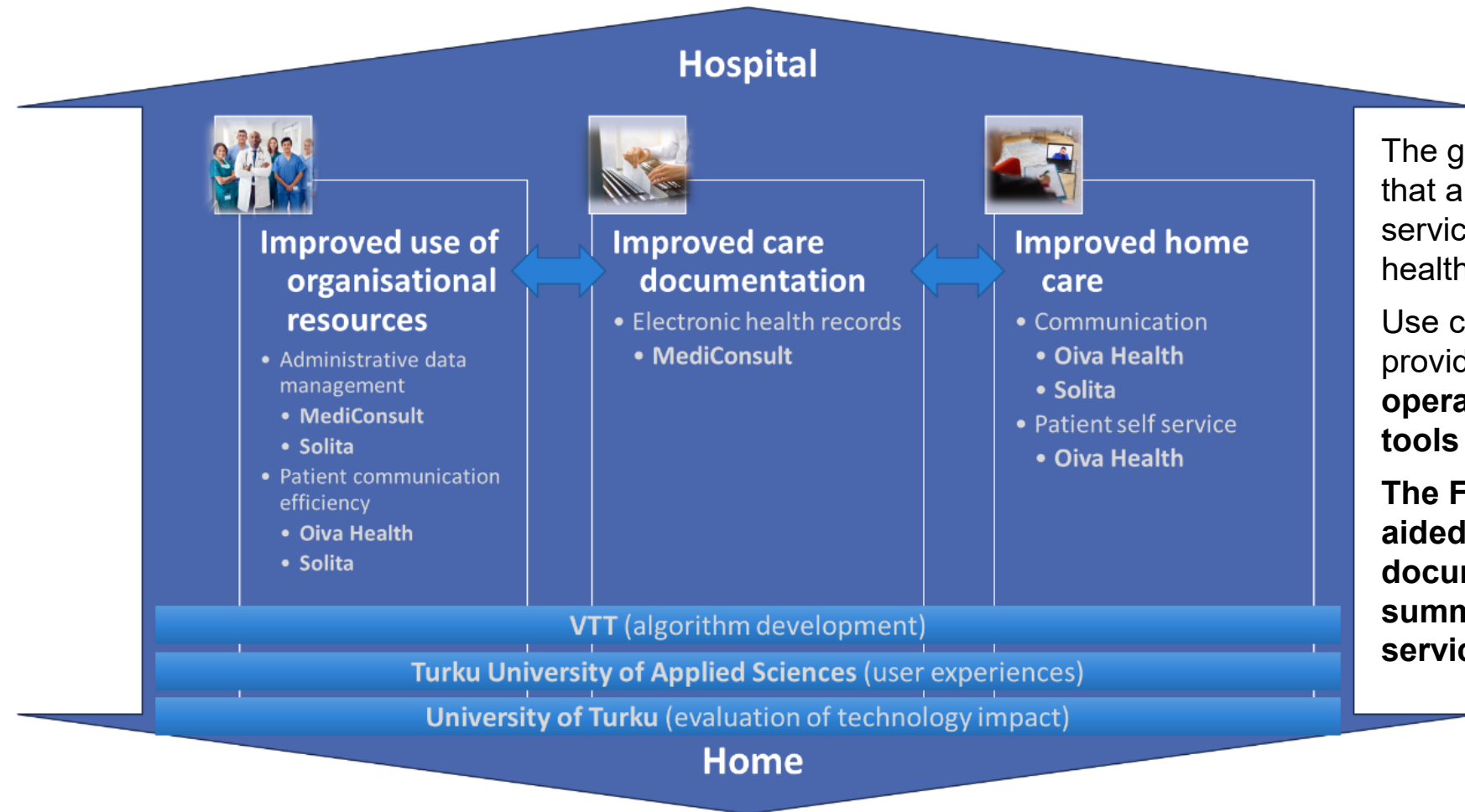


[Project leaflet in ITEA portal](#)

Project funded by



Key tasks and Finnish actors involved in project

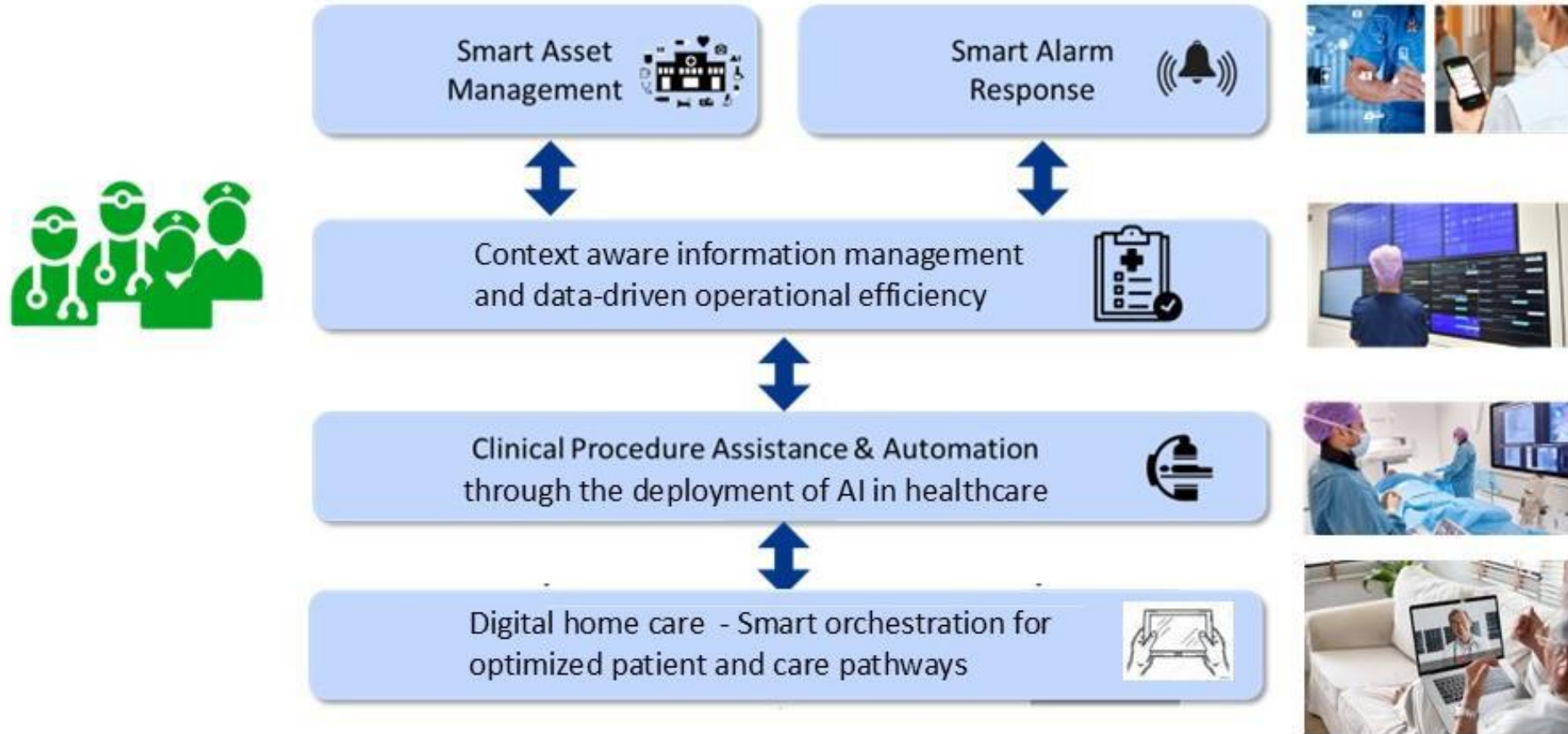


The goal is to develop technological **AI solutions** that alleviate the **labor shortage** in wellbeing services counties and **reduce the workload** of healthcare professionals.

Use cases cover the **whole value chain** needed to provide care personnel **from bedside work to operations management** with new innovative **AI tools** and the data sources needed.

The Finnish consortium will mainly focus on AI aided context-aware information management, documentation, patient information summarizing, care pathway orchestration and service need prediction with evaluation.

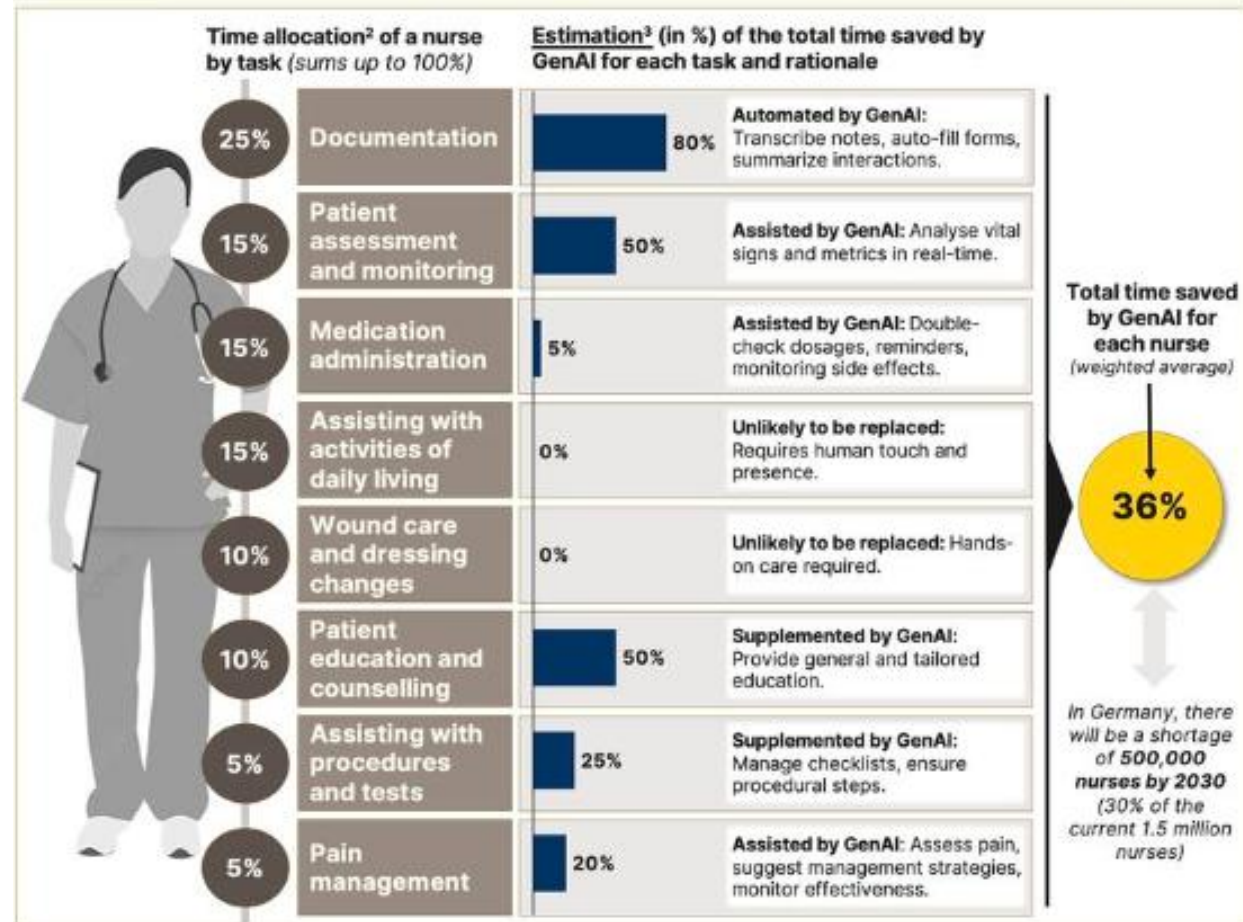
PROFIT approach towards operational efficiency and staff well-being



GenAI in nursing, TLGG, Thomas Hagemeyer

GenAI x Nursing: GenAI could save over 30% of each nurse's time, helping to address the staffing shortages¹, which is expected to reach up to 30% in many countries by 2030+.

Illustrative calculation of the time saving potential enabled by GenAI for nurses






1. Nursing staffing shortage is one of the major challenges healthcare systems will be facing in the future
 2. The allocation is an estimate based on various published research and studies: it will vary by country / department in the hospital
 3. Estimation based on a TLGG past project with a regional hospital in Germany
 Sources: Public research, studies and reports (using an LLM prompt), TLGG analysis & Research

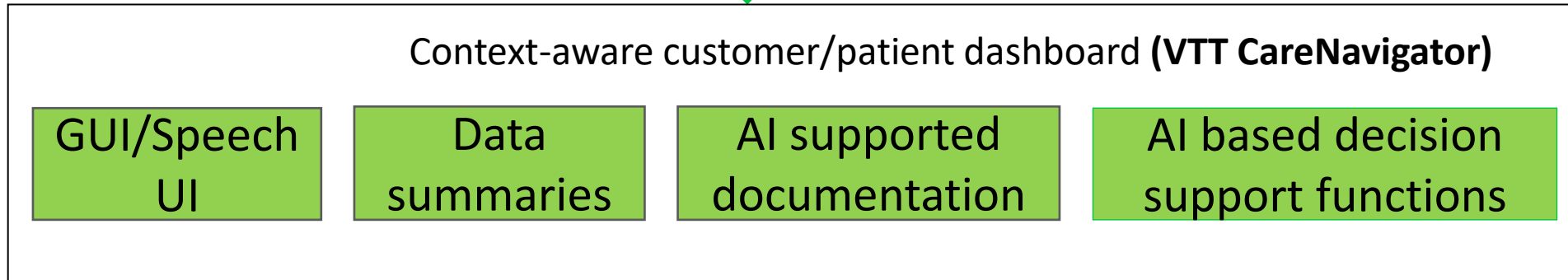


R&D Result Examples

VTT CareNavigator



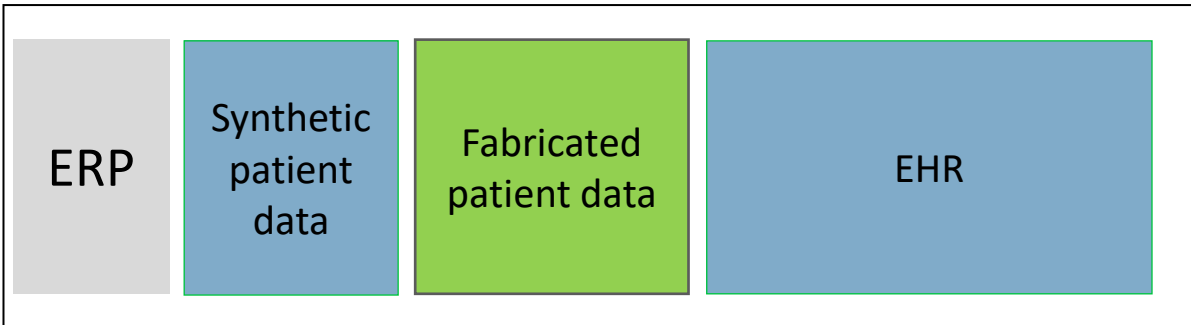
-  PoC in CareNavigator
-  Next steps in project
-  Might happen in future...



Local data and contextual information



Data from national services (phase 2)



Local information systems*



Kanta services*

* Synthesized data can be used in development phase for demonstration and testing

VTT CareNavigator

← ID: 300010, Female / Age 77
☰

Health information
 Discussions
 Patient's risks
 Forms

Health information

Close Timeline ⌵

Symptom: E11 Diagnosis: Tyyppi 2 diabetes Permanency: Kyllä Valid: Kyllä Date: 2023-08-14

Category	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Diagnoses						C18, I10, I48	F00, I48, M80		I10, I48	I25, I10	C18, E11	
Medicines						Ramipril Orion 5 mg, Seloken ZOC 50 mg, Kapesitabiini Orion 500 mg	Donepezil Orion 10 mg, Seloken ZOC 50 mg, Fosastad 70 mg		Ramipril Orion 5 mg, Seloken ZOC 50 mg	Fluorouracil Accord 20 mg, Seloken ZOC 50 mg, Ramipril Orion 5 mg	Metforem 500 mg	
Laboratory						Ramipril Orion 5 mg, Fosastad 70 mg, B12-vitamiini 280.00 pmol/l, Leukosyytit 9.60 E9/l, Kreatiniini 75.00 µmol/l	CEA 6.00 ng/ml, Kreatiniini 67.00 µmol/l, Kreatiniini 66.00 µmol/l, Kalsium 2.30 mmol/l		Seloken ZOC 50 mg, Fosastad 70 mg, B12-vitamiini 280.00 pmol/l, Leukosyytit 9.60 E9/l, Kreatiniini 75.00 µmol/l, CEA 6.00 ng/ml, Kreatiniini 67.00 µmol/l, Kreatiniini 66.00 µmol/l, Kalsium 2.30 mmol/l	Seloken ZOC 50 mg, Ramipril Orion 5 mg, Fosastad 70 mg, B12-vitamiini 280.00 pmol/l, Leukosyytit 9.60 E9/l, Kreatiniini 75.00 µmol/l, CEA 6.00 ng/ml, Kreatiniini 67.00 µmol/l, Kreatiniini 66.00 µmol/l, Kalsium 2.30 mmol/l	HbA1c 47.10 mmol/m, Kalsium 2.20 mmol/l, Leukosyytit 4.80 E9/l, LDL 3.60 mmol/l, Kreatiniini 88.00 µmol/l	
Risks						Kaatumisriski						
Other		116.2 cm, 167.1 cm, 81.2 kg			Koronarokote, Influenssarokote, Pneumokokkrokote			97/167, 84/154			102/162	

Select discussion type: Care discussion ✓

Use microphone Start recording Test 1

Use microphone and speaker Test 2

Record a care discussion

Send prompt Close

Guest 2: Have you had a fever or, for example, shortness of breath?

Guest 1: No fever, and my breathing has been normal.

Guest 2: It shows that you have osteoporosis, hypertension, diabetes, and Alzheimer's disease.

Guest 2: Have you taken your medicines as usual, for example ibuprofen, warfarin, and paracetamol?

Guest 1: Yes, I have—my dosette box helps—but now I'm not completely sure whether I took last night's medicines.

Guest 2: I understand.

Guest 2: Have you checked your blood pressure or blood sugar recently?

Guest 1: My sugar was 9.5 this morning. I haven't measured my blood pressure for a few days.

Guest 2: What about urination—any difficulty or pain?

Guest 1: No, there hasn't been any change.

Guest 2: It sounds like your situation needs a more thorough assessment. It would be good for a doctor to check you; the dizziness, possible swelling, and possibly irregular medication use could be related to how you're feeling.

Guest 1: Yes, that's what I was thinking too.

Guest 2: I'll forward this to the doctor today and ask them to assess next steps—possibly call you or book an appointment. If needed, a home visit can also be arranged.

Guest 1: Okay. Thank you very much.

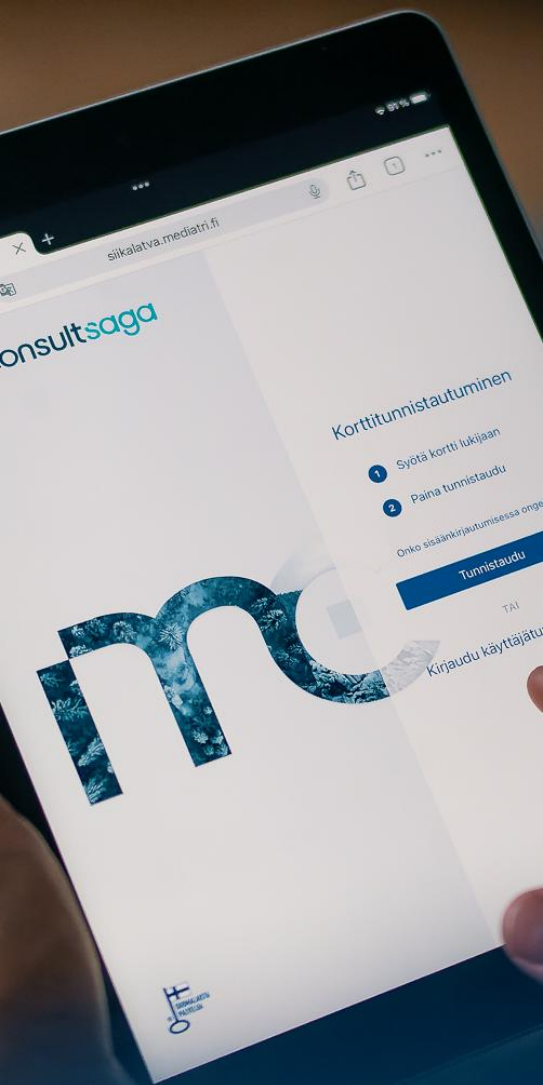
Guest 2: I'll document this conversation in your patient record and inform the doctor. If needed, we'll contact you again today.

Guest 1: Good, I'll wait for the call. Thanks again.

Guest 2: Thank you for calling, and take good care of yourself. We'll get back to this soon.

Jouni Kaartinen: Write a summary of the care discussion in english

AI assistant: The patient called reporting a couple of days of dizziness/unsteadiness and fatigue, with unusually strong pain in the right leg this morning and a possibly swollen knee. No fever, shortness of breath, or urinary symptoms. Blood glucose was 9.5 in the morning; blood pressure has not been measured recently. The patient usually takes medications with help but is unsure if last night's doses were taken. Given the symptoms and medical history (e.g., atrial fibrillation, hypertension, type 2 diabetes, osteoporosis, Alzheimer's disease, and fall risk), the nurse assessed that a more thorough medical review is needed, documented the call, and forwarded the case to a doctor for same-day follow-up (phone call, appointment, or possible home visit).



Tekoälyavusteinen kirjaaminen arjen hoitotyössä

Mediconsult Oy

Mediconsult PROFIT-hankkeessa

- Puheesta tekstiksi, rakenteinen kirjaaminen ja tekoälyavusteiset yhteenvedot
- Human-in-the-loop: ammattilainen hyväksyy aina sisällön ja ohjaa tekoälyä palautteella
- Integroitu suoraan Mediconsult Saga® - asiakas- ja potilastietojärjestelmään

Asiakkaamme hyödyt

- Työn tehokkuus: Vähemmän manuaalista kirjaamista, enemmän aikaa asiakkaalle/potilaalle
- Rakenteinen ja paremmin hyödynnettävä tieto
- Parempi tiedon jatkuvuus hoito- ja palveluketjuissa

Saga Terveystieteidenhuolto

- Kirjaaminen vastaanotolla ja hoitotilanteessa
- Hoitajakson yhteenvedot ja prosessit

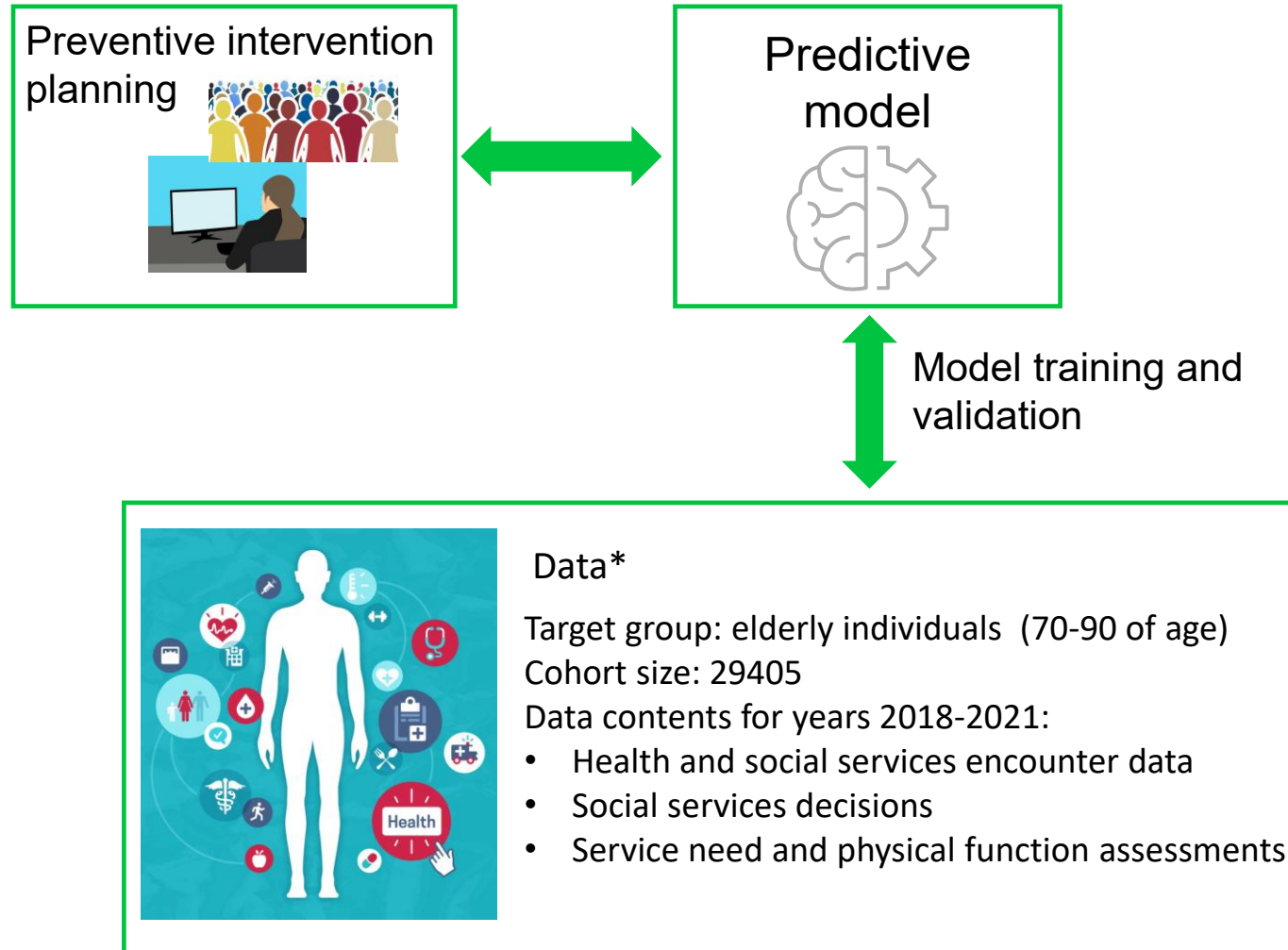
Saga Sosiaalihoito

- Kotikäynnit ja asiakastilanteet
- Automaattiset yhteenvedot ja tehtävien seuranta

Luotettava ja vaatimustenmukainen tekoäly

- Tietosuoja ja datan luokittelu
- Ammattilainen hyväksyy ja validoi
- Roolipohjaiset käyttöoikeudet
- EU AI Act huomioitu

Predictive models to support preventive care



Study setting

Endpoint: start of home care services next year

Predictors:

- demographics
- healthcare visits
- diagnoses
- operations
- medication
- laboratory tests

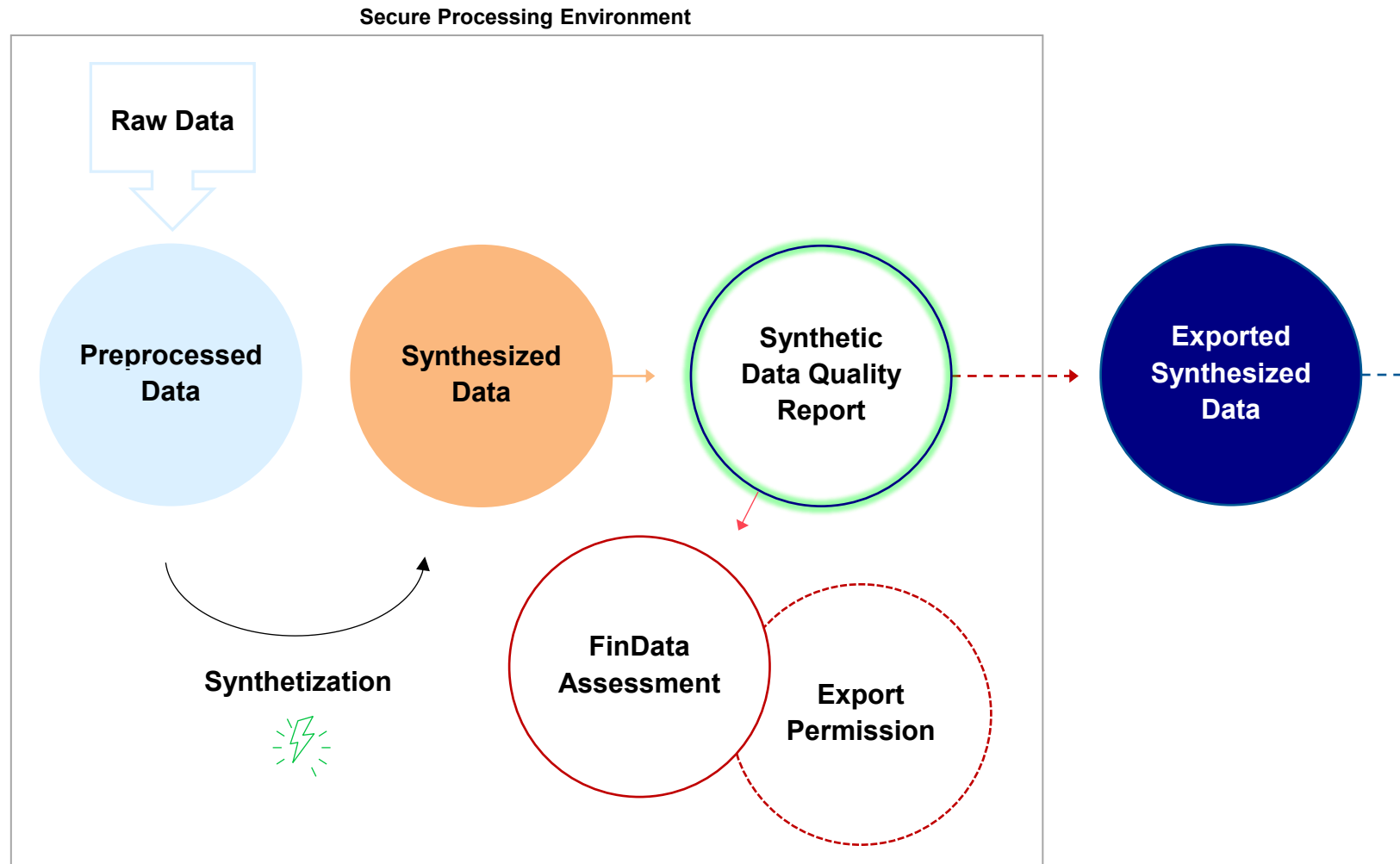
Analysis by diagnosis groups:

cancer, coronary artery disease, cerebrovascular disease, musculoskeletal disease, mental health condition, dementia, chronic respiratory disease, substance abuse

Methods:

- logistic regression
- Extreme Gradient Boosting (XGB)
- others based on first results

Synthetic Data Generation for PROFIT



Synthetic Data Usage
Synthetic data generation within a secure processing environment enables broader experimentation, including:

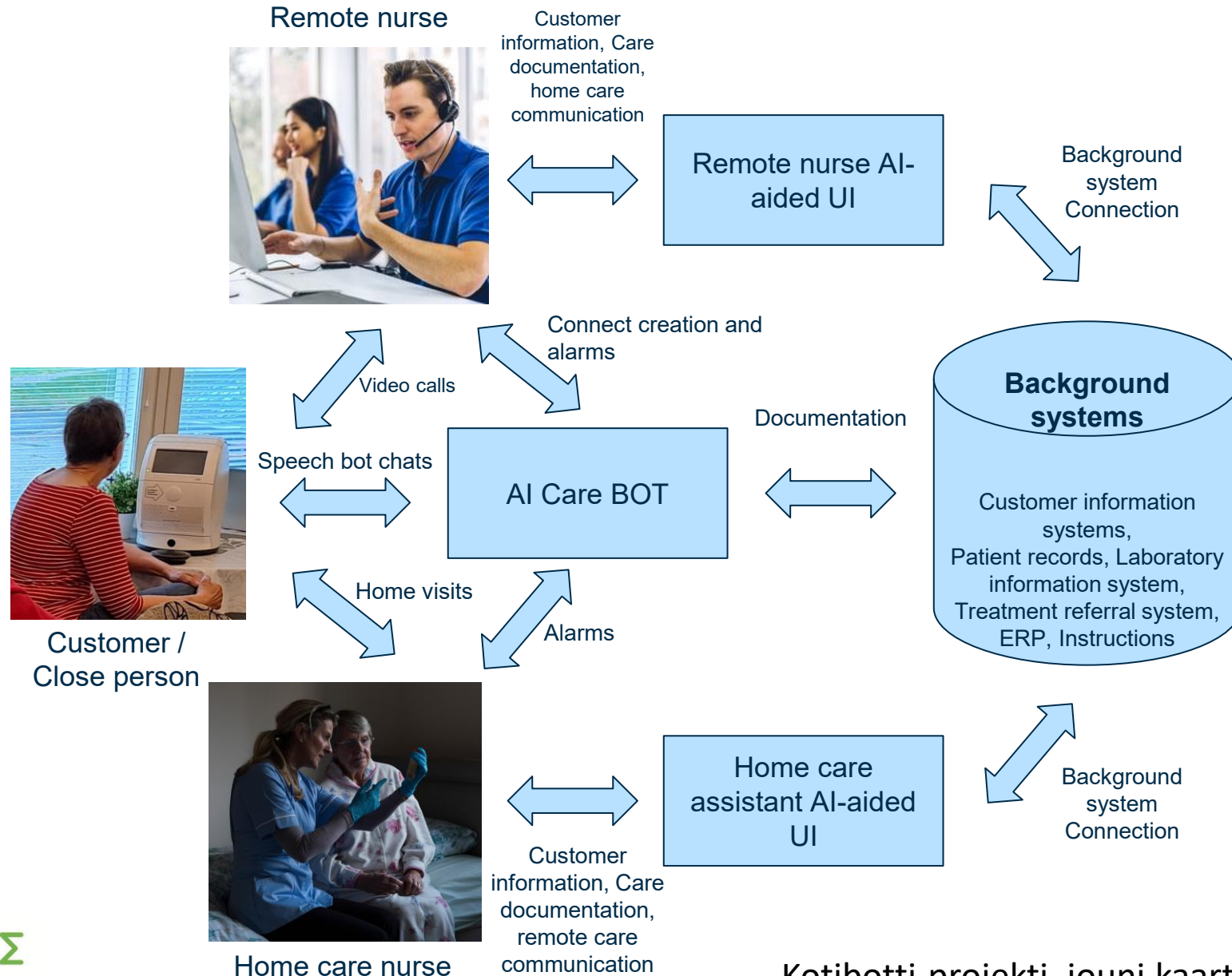
- Use for demos
- Model development & validation
- Integration of LLMs in data analysis

Digital Home Care

- Public home care service providers have offered digital home care for over ten years
- Digital home care has gained a stable position as an integral part of home care services
- Millions of digital home care visits are conducted yearly
- National-level goals support the expansion of digital home care services
- The Oiva Health platform serves as the technical foundation for the service concept
- As the volume of digital home care continues to grow, service providers have identified the need for new features to be developed on the platform



Speech bots as a part of elderly home care service system



Accelerating Patient Journey Orchestration – Co-Creation in Action with Collab Health AI

Collab Health AI in Patient Journey Orchestration

Helps **simulate and test optimal care pathways** for different patient groups, using AI-powered scenarios.

Supports **modelling of seamless service flows** (e.g., emergency care, appointment scheduling, home care).

Enables **data-driven analysis of touchpoints**, improving self-service channels and automating processes.

Facilitates **scenario building and decision support**, guiding smarter resource allocation and strategic choices.

Collab Health AI also supports the co-design of the Patient Journey Orchestration data model, enabling shared understanding, validation and iteration between experts and AI from day one.



What is Collab Health AI?

A **co-creation model** combining people and AI in real time, in a same room.

Designed specifically to support **strategic planning and digital service development** in social and health care.

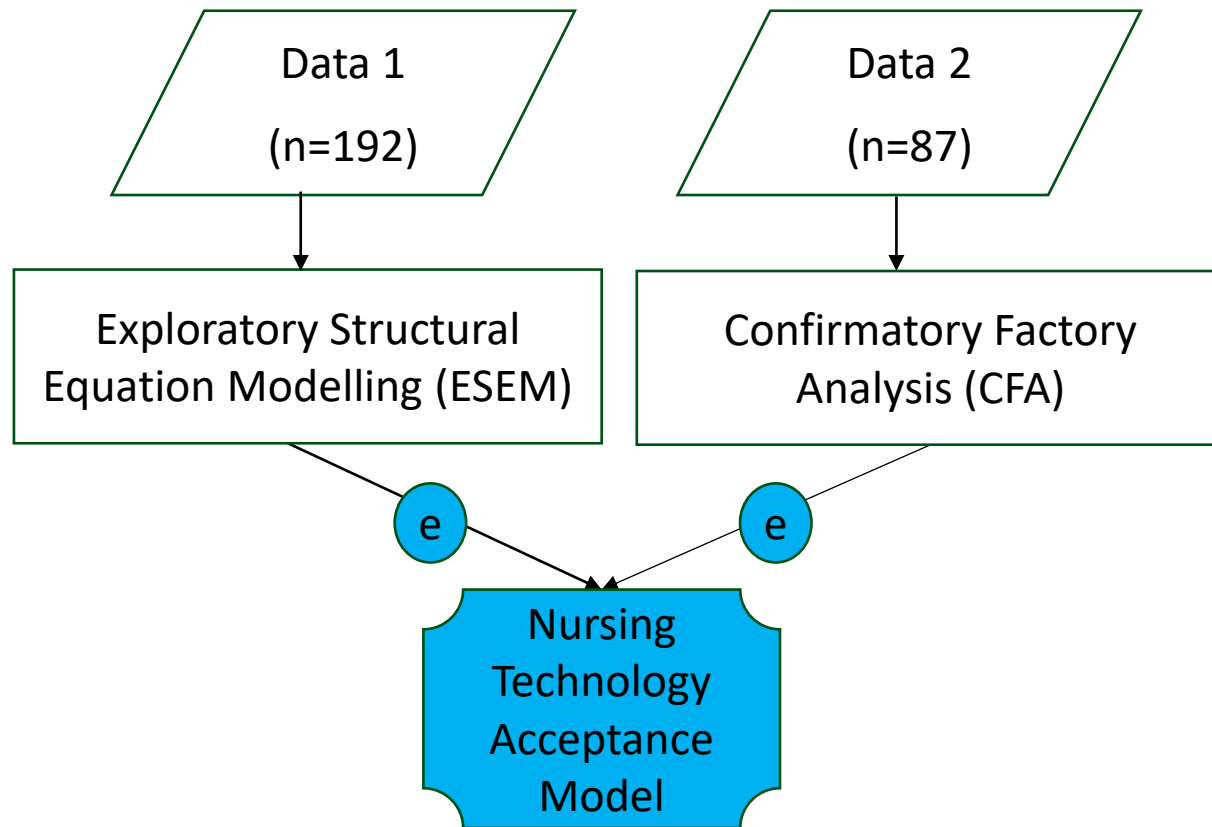
Enables **agile pilots and process simulations in real-world contexts**.

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Nursing Technology Acceptance Model / Background

- To support the understanding of individual determinants of technology use, several established theoretical frameworks have been widely applied, such as the Technology Acceptance Model (TAM) and the extended unified theory of acceptance and use of technology (UTAUT2).
- Traditional technology acceptance models do not fully capture the specific characteristics of health and wellbeing contexts ([Schomakers et al. 2022](#)).
- Existing research on technology acceptance within the healthcare has predominantly focused on patients or other professional groups, despite **nurses being one of the largest and most frequent user groups of health technologies** ([Tetik et al. 2024](#)).
- Turku University of Applied Sciences is developing Nursing Technology Acceptance Model
 - Additional factors **we added (emotional, willingness, trust, benefit)**
 - Informants
 - 1st step: Students

Preliminary Analysis and Results from the 1st step



- Students from Bachelor-level nursing programme
 - 54.5% had a previous degree and work experience in social or healthcare
 - 73.8% had undergone clinical practice as part of their studies
 - **AI-related attitudes were more positive among students with prior work experience**
- **One item from Emotional Experiences** strengthens construct representation of **user feeling in technology use**
 - New item reinforces the emotional variables in the UTAUT2
 - Theoretically relates to **self-management and the ability to make one's own decisions in technology use**

UEF in PROFIT: value for patients, professionals and organisations

How our work contributes to PROFIT and to healthcare AI more broadly

For patients

- Safer, more acceptable AI at the bedside: clinical evaluation and ELSI analysis test fairness, safety and acceptability before scale-up.
- More time for direct care: workflow optimisation reduces non-care tasks and supports the patient encounter.
- Evidence reflects real patient populations through testing in two integrated social and health services regions.

For professionals

- Lower documentation and cognitive load through context-aware information management and smart alarm responses.
- Evidence on how AI changes everyday clinical work, not only whether the technology performs in the lab.
- Health science framing keeps professional needs and roles visible in technology design and assessment.

For organisations

- Real-world evidence from two of Finland's five university hospital sites for procurement and scaling decisions.
- Health services management research links the technology to workforce, care quality and cost outcomes.
- ELSI and governance framing support the EU AI Act and EHDS compliance and reduce deployment risk.

AI Benefits and Challenges

Benefits:

- Fast and demonstrative data summaries and form filling
- Fluent uniform care documentation during care work
- Multilingualism on-line
- Decision support (medical, work process, directing)
- Automated functionalities
- More time for care and encountering
- Better services for patients
- Resourcing, load and well-being at work

Challenges:

- Coordination of technology and work processes
- Adequate AI model and effectiveness validation
- Data availability
- Model transparency
- Regulation compliancy
- LLM hallucination
- Speech to text: dialects and foreign accents
- Expertise change of professional in long term (Is AI too trusted?)
- AI ethic
- Slow cultural change in healthcare

Thank you for your attention!
Any questions?

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