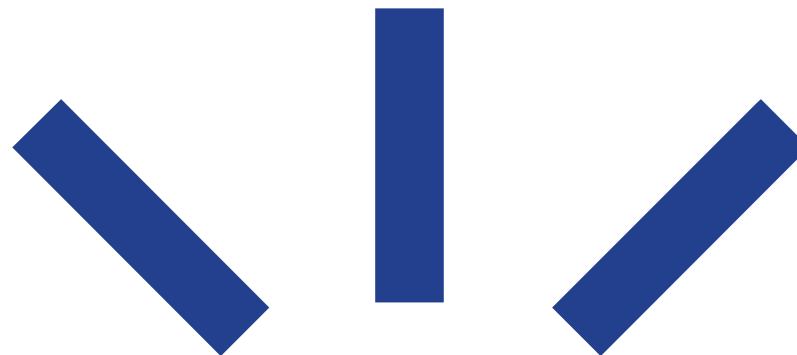




Implementing AI in Finnish Healthcare

-national initiatives and local experiences

Jarmo Reponen, MD, PhD, radiologist;

Professor of Healthcare Information Systems;

Research Unit of Health Sciences and Technology;

University of Oulu;

Finland



Background and experience

- 40 yrs. as a licenced physician, 25 yrs. teaching future radiologists as a chief radiologist
- 36 yrs. in medical informatics R & D & I
 - Research topics: Assessment of ICT systems, Usability and User experience, AI and Decision support,
 - Leader: First teleradiology network in Finland 1991-1995
 - Leader: First University Hospital Electronic Patient Record in Finland, the "ESKO"-system 1996-2006
 - Leader: First in the world Mobile Medical App, MOMEDA 1998-2000
 - National and Nordic benchmarking of healthcare ICT systems since 2003-
 - Former Finnish representative international standardization (CEN TC 251, ISO-, DICOM-co-operation)
 - In expert teams defining the requirements for national Kanta-services (Health Information Exchange)
- 30 yrs. in the boards of national and international medical ICT associations
 - E.g. Finnish Society of Telemedicine and eHealth, Nordic Telemedicine Association, EuroPACS (now: European Society of Medical Imaging Informatics), International Society for Telemedicine and eHealth, European Congress of Radiology
- 19 yrs. teaching e-Health to students of biomedical engineering and medicine
- Project leader in the 4,3 M€ MEDigi – project for digitizing medical and dental education 2018-2021
- Vice-Leader of the 5 M€ DigiHealth research profile at University of Oulu





Content of the lecture:



Instruction for Copilot: *"The doctor uses a smartphone to record patient information with the help of large language models."*

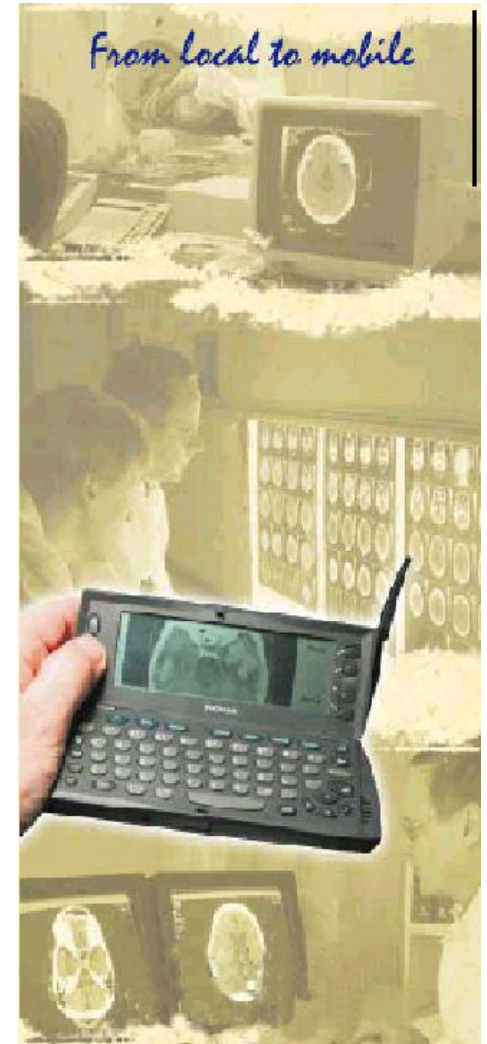
3

1. National initiative: Finnish AI Ecosystem in Social and Health Services

1. Purpose and Structure
2. Participants and Current Priorities
3. Proof of Concept AI Projects
4. Finnish AI Vision

2. Examples of AI solutions in one Wellbeing Services County: the Oulu experience

1. AI Research: Collaboration between University of Oulu and Oulu University Hospital
2. Practical AI Implementations in **Pohde** Wellbeing Services County
3. Using AI and LLM to help clinicians in documentation
4. Radiology AI implementation
5. Resident / Citizen services



MOMEDA, the world's first healthcare mobile app, was developed in OULU in 1998-2000. Funded by EU 4th Framework R&D program



Oulun yliopisto

AI Ecosystem in Social and Health Services (SOTE)

Better service, productivity, and
job satisfaction through AI solutions

Network Coordinating Committee:



Ministry of
Social Affairs and Health



Finnish Institute for
Health and Welfare

HUS

UNA

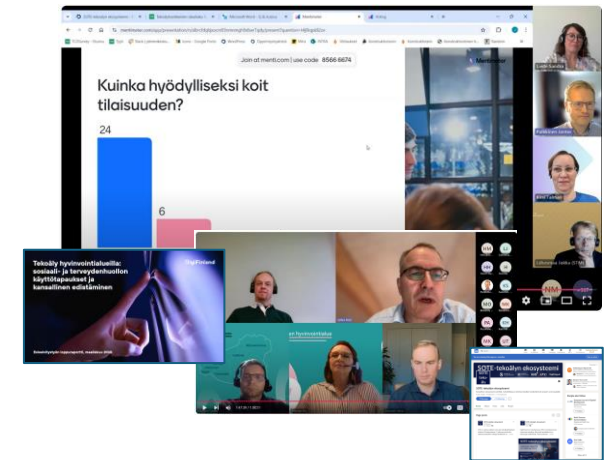
DigiFinland

Ecosystem slides on the
courtesy of Jukka Lähesmaa
and Laura Välikkilä from the
SOTE AI Ecosystem

AI Ecosystem in Social and Health Services (SOTE)

In brief

- **An informal collaborative network** of social and healthcare stakeholders, including authorities, businesses, and researchers
- **Aims to enable and fund the effective and responsible utilization of artificial intelligence in social and healthcare services in Finland**
- Established in the summer 2024 by the Ministry of Social Affairs and Health, operating until further notice
- The Coordination Group includes the Ministry of Social Affairs and Health, the Finnish Institute for Health and Welfare, the HUS Group, the joint authority for Helsinki and Uusimaa, Una Ltd, and DigiFinland Ltd. DigiFinland acts as the ecosystem's practical operations coordinator

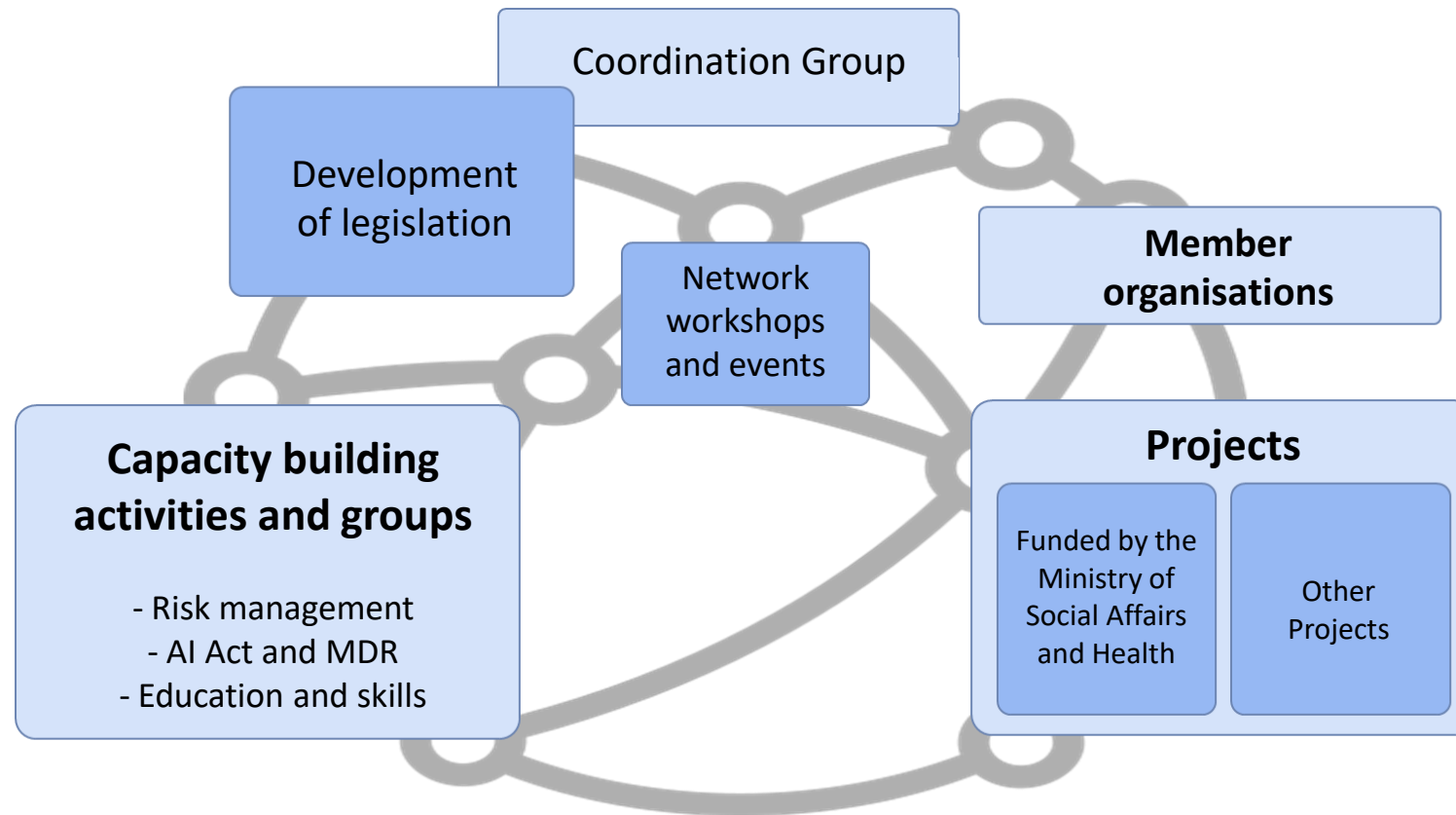


See Link:

<https://digifinland.fi/en/ai-ecosystem-in-social-and-health-services-sote/>

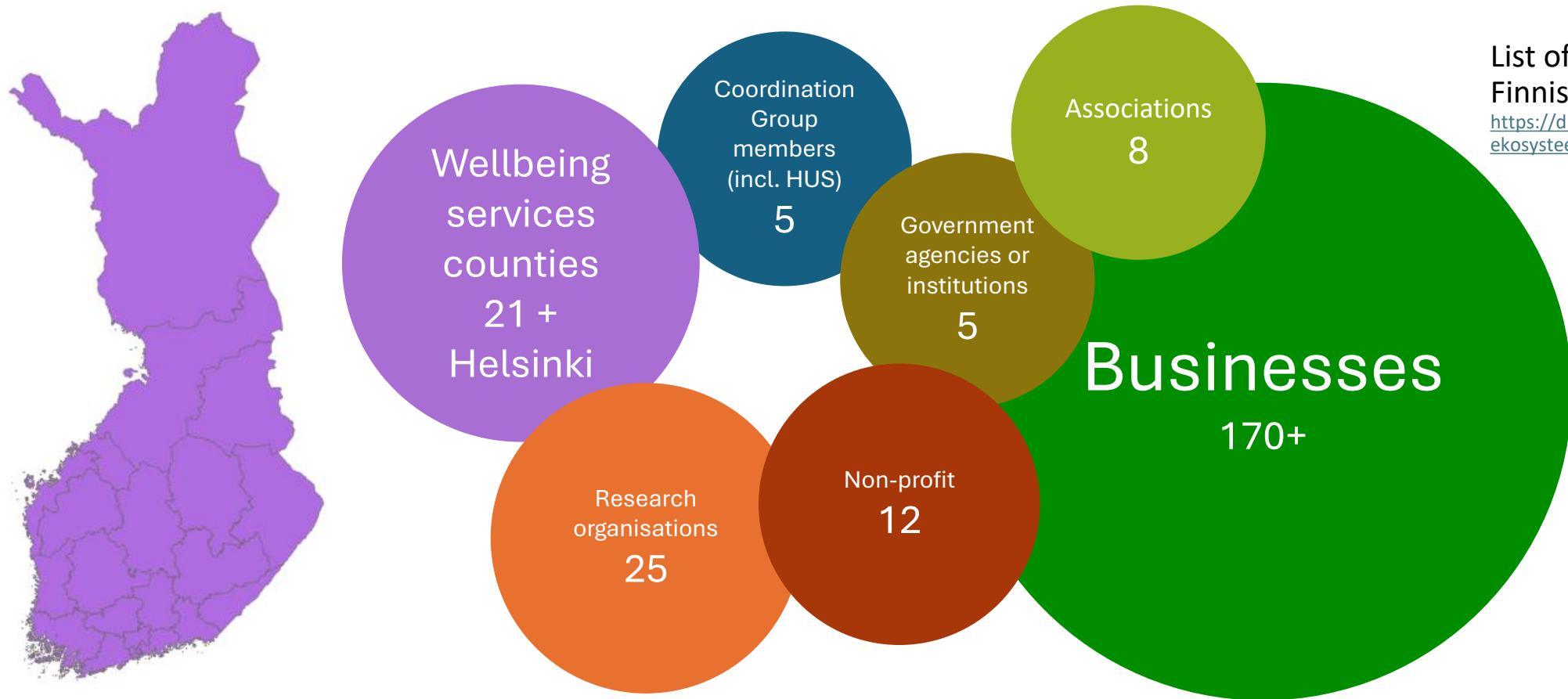
AI Ecosystem in Social and Health Services (SOTE)

Ecosystem structure



AI Ecosystem in Social and Health Services (SOTE)

The number of participating organizations has reached 260. (Oct. 6th, 2025)



List of the members in Finnish available:

<https://digifinland.fi/sote-tekoalyn-ekosysteemi/jasenet/>



Ministry of
Social Affairs and Health



Finnish Institute for
Health and Welfare

HUS*

UNA

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AI Ecosystem in Social and Health Services (SOTE)

Year 2025 priorities



Pilot projects



AI Vision and AI impact analysis



National capabilities and involvement of all stakeholders



Growth and international collaboration

Studies and Reports published, including:

1. [AI Vision 2035 for Social and Healthcare Services](#) *(In English)*
2. [AI Readiness and Challenges in Wellbeing Services Counties](#) *(In English)*
3. [Legal Review of AI in Social and Healthcare](#)
4. [Mapping of Potential AI Use Cases](#)
5. [Guidelines for Evaluating Impact](#)



Ministry of
Social Affairs and Health



Finnish Institute for
Health and Welfare

HUS*

UNA

DigiFinland

Funding of for AI projects in wellbeing services counties 2025-

- Oct 2024 an Open call
- 50 Applications submitted
- Expert evaluation
- Emphasis on effectiveness
- 10 projects selected
- Started Jan 2025
- Follow-up in the Ecosystem

AI Ecosystem in Social and Health Services (SOTE)

Total of 10 funded pilot projects, Ministry contribution € 2.3 million.

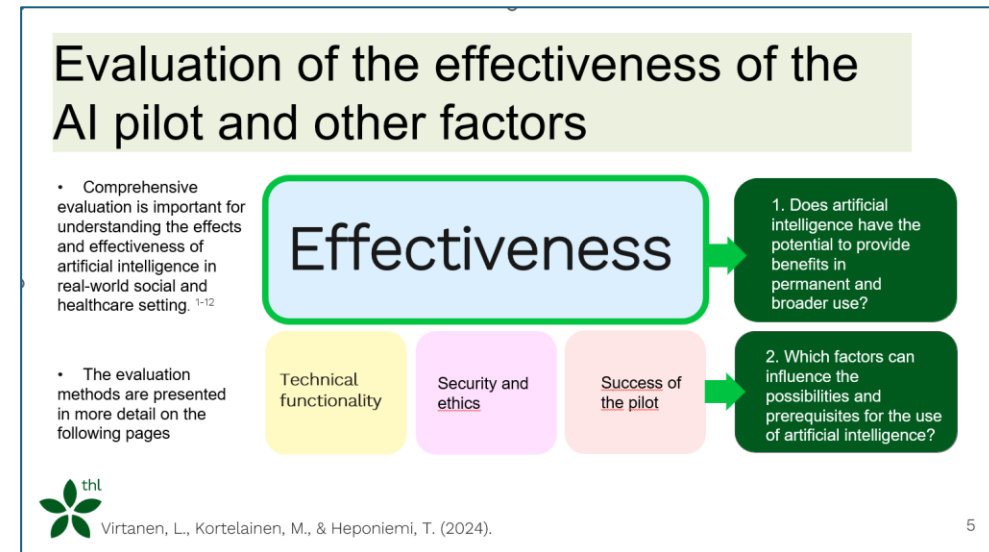
1. AI Assistant for Professionals
2. AI-Assisted Child Service Needs Assessment
3. AI-Based Prediction of Functional Capacity Changes
4. AI-Generated Summary of Client Background and Risk Information
5. LingAI: Real-Time Language Interpretation
6. AI based Real-Time Interpretation Solution
7. Implementation of AI-Assisted Medication Risk Assessment
8. AI-Assisted Documentation in the Wellbeing Services County
9. AI in Cancer PET Imaging
10. AI-Based Tools for Digital Obesity Treatment

- Support functions
- Interpretations (real time)
- Automatic professional / client discussion documentation
- Summarizing data to support professionals

AI Ecosystem in Social and Health Services (SOTE)

Impact and effectiveness assessment

- Guide for assessment made by Finnish Institute for Health and Welfare (THL)
- All pilots were / are requested:
 - to include preliminary estimations to the applications for the call
 - To make impact and effectiveness assessment during the piloting
- THL will make a summary on the results after the piloting period



Available in Finnish at: <https://digifinland.fi/wp-content/uploads/2024/09/SOTE-tekoalykokeilujen-arviointiohjeet.pdf>



AI vision

Published in May 2025

Available at:

<https://digifinland.fi/wp-content/uploads/2025/09/SOTE-AI-Ecosystem-AI-Vision-2035.pdf>

Summary: AI vision 2035

The joint AI vision 2035 of the SOTE AI ecosystem describes how artificial intelligence can be used to reform healthcare and social welfare.

- Around 300 members of the SOTE AI ecosystem participated in the vision work Polis discussion and two workshops in March–April 2025.
- **Based on the ecosystem's proposals, a future of "strong healthcare and social welfare AI" was formed, where artificial intelligence will have a significant impact on service provision and will also make independent decisions.**
- An AI coach will enhance people's wellbeing and health, as well as strengthen their own role in prevention. The coach will support the management of personal health data and help in finding the right service. Access to care will become faster.
- Artificial intelligence will coordinate prevention at both individual and population level. Automated screenings, individual services, and treatments will support broad national prevention efforts.
- With the help of artificial intelligence, health and social services will be accessible to everyone across Finland. Open and easy-to-use AI-based services will be available in public spaces and at home.
- The roles of healthcare and social welfare professionals will diversify. More time will be freed from routine tasks to work directly with clients. As a virtual colleague, artificial intelligence will produce analyses and suggestions to support the work. The work will also include demanding supervision of automation.
- Artificial intelligence will be able to independently carry out assessments of the need for services as well as selected diagnostic and care processes. In clinical work and knowledge-based management, the focus will shift from data collection and analysis to drawing conclusions and making decisions. The processes of knowledge-based management will become automated.



Shared Vision of the Ecosystem



2 conversations



Ca. 300 participants



Ca. 10.000 votes



2 workshops

● Agree

● Disagree or neutral

In the future, artificial intelligence (AI) will complement and support human work

98 %

AI in the social and healthcare sector could be a success factor for Finland in international competition

88 %

AI will be an important part of social and healthcare services by 2030

87 %

AI enables entirely new types of jobs for social and healthcare professionals

83 %

The potential of AI has been sufficiently understood in social and healthcare organizations

81 %

The cost-effectiveness of AI has not yet been sufficiently studied

80 %

With AI, social and healthcare services can be enhanced without compromising ethics and morality

73 %

By 2035, AI will reduce the need for social and healthcare professionals more than expected

45 %

0 20 40 60 80 100

91%

of respondents have had **positive experiences** with the use of artificial intelligence

68%

of respondents use artificial intelligence **daily**

81%

of respondents believe that significant savings can be achieved in **social welfare** with the help of artificial intelligence if documentation is automated or a better situational picture is obtained

80%

of respondents believe that artificial intelligence can do **shift planning** better than humans

20%

of respondents believe that **nothing will change**

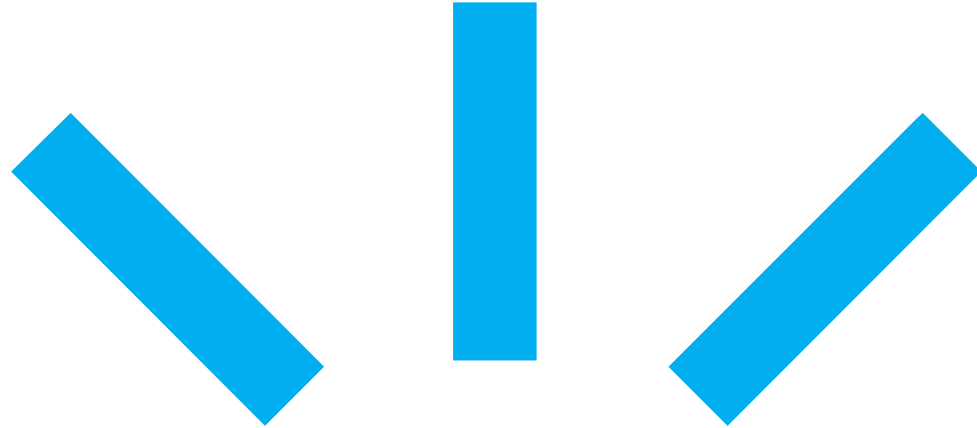
AI Ecosystem in Social and Health Services (SOTE)

Next steps:

- Roadmap based on the AI vision
- Social debate
- Data infrastucture of Health AI
- Health AI competences and skills



Instruction for Copilot:
“Show artificial intelligence helping us with management of health care data in acute patient care.”



Examples of AI Research and Services at University of Oulu (UOULU), Oulu University Hospital (OYS) and North Ostrobothnian Wellbeing Services County (Pohde)



AI: from competitor to partner: CARDS – an AI-based decision support system developed in Oulu

Year 2015->

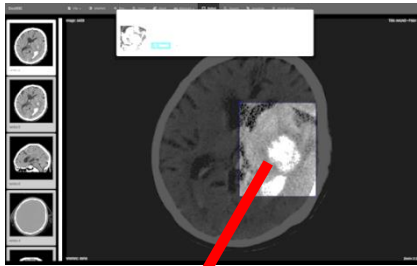


Image source: <http://seemik.com/>



- Computer software – an assistant that does not make diagnoses, but helps the radiologist in interpretation by retrieving previous similar cases [1,2].
- It fetches reference cases from reports and the image archive.
- “**Assisting Intelligence**”.

1. Martynov P, Mitropolskii N, Kukkola K, Mutanen L, Reponen J, Mäkyinen A (2016) **CARDS: the decision support tool for radiologists examining head CT images**. ECR 2016 / B-0233. DOI: 10.1594/ecr2016/B-0233.

RESEARCH ARTICLE **Open Access**

2. BMC Medical Imaging (2017) 17:59 DOI 10.1186/s12880-017-0229-1

 CrossMark

Testing of the assisting software for radiologists analysing head CT images: lessons learned

Petr Martynov^{1*} , Nikolai Mitropolskii¹, Katri Kukkola¹, Monika Gretschi², Vesa-Matti Koivisto³, Ilkka Lindgren², Jani Saunavaara⁴, Jarmo Reponen⁵ and Anssi Mäkyinen¹

Oulun yliopisto

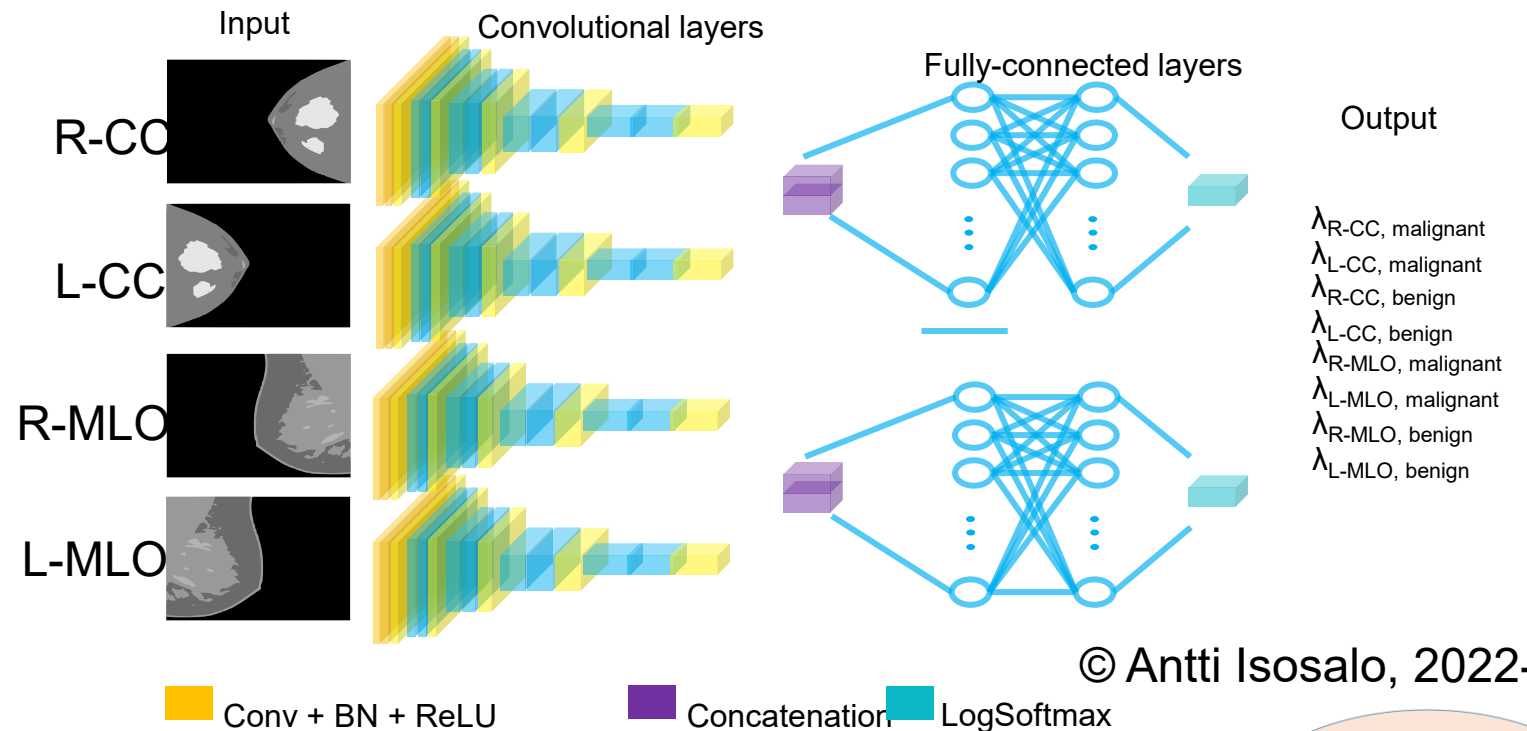


Anssi Isosalo's doctoral dissertation 2024: fine-tuning an AI model on Oulu's mammography dataset; pre-trained model is important, fine-tuning is necessary

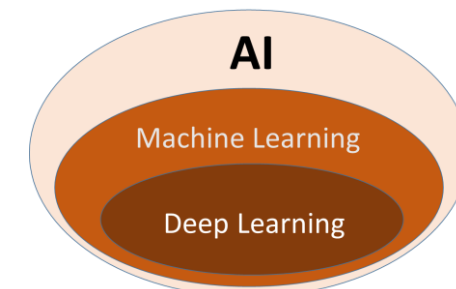
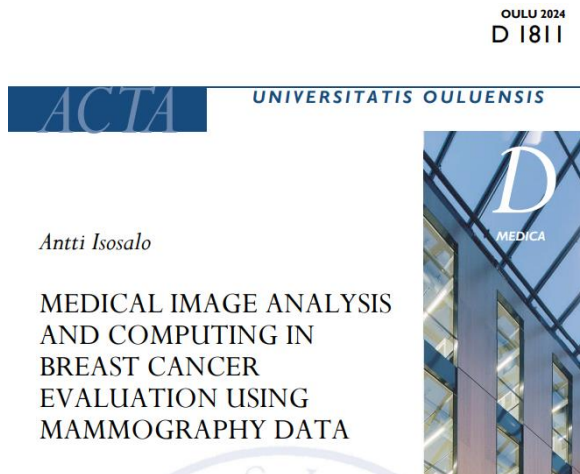


Schematic figure of the multi-view breast cancer classification model utilized in the experiments.

Transfer learning scheme was applied, and the pre-trained New York model was finetuned with **OYS screening mammography dataset with 8,829 examinations** (4321, 362 and 4146 normal, malignant, and benign findings). Malignant examinations were biopsy confirmed.



© Antti Isosalo, 2022-24



Practical AI Implementations in the North Ostrobothnia Wellbeing Services County (Pohde)

For Supporting Healthcare Professionals:

- AI-assisted documentation (Pohde-AI)
- Instruction libraries
- Agents and bots
- Copilot
- Smart Symptom Checker

Medical Imaging and Diagnostics:

- Acceleration of MRI image reconstruction
- Knee X-ray osteoarthritis classifier
- Lung cancer screening tool
- Fracture detection tool
- Digital pathology diagnostic aid

For Local Residents /Citizens:

- PohdeBot -health services advisory tool
- Route Cludo recommendation tool
- AI translator for websites

Artificial Intelligence Supporting Documentation = Pohde-AI

- **Development** began in February 2024, involving **doctors** and **nurses** and **social care professionals**. In addition to Pohde, EskoSystems Ltd (development) and the University of Oulu (research) are participating.
- The AI application Pohde-AI **listens** to the conversation between the professional and the client, **transcribes** it, **summarizes** it with a LLM, and **displays the output**.
- The output can be **refined with prompts** multiple times if the user is not satisfied. It can also be manually supplemented if needed.
- The final output is copied and attached to the customer/patient **information system**.
- The tool is in **pilot use in patient care** starting from **November 2024**, and in **social services client work** starting from **May 2025**.

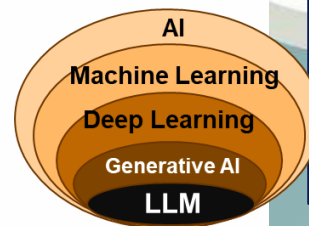


Suomen telelääketieteen ja eHealth seura ry.
eHealth2024 kansainvälinen konferenssi
XXIX Kansallinen telelääketieteen ja eHealth seminaari

O-24: Co-development is crucial for implementing large language models for social and health care

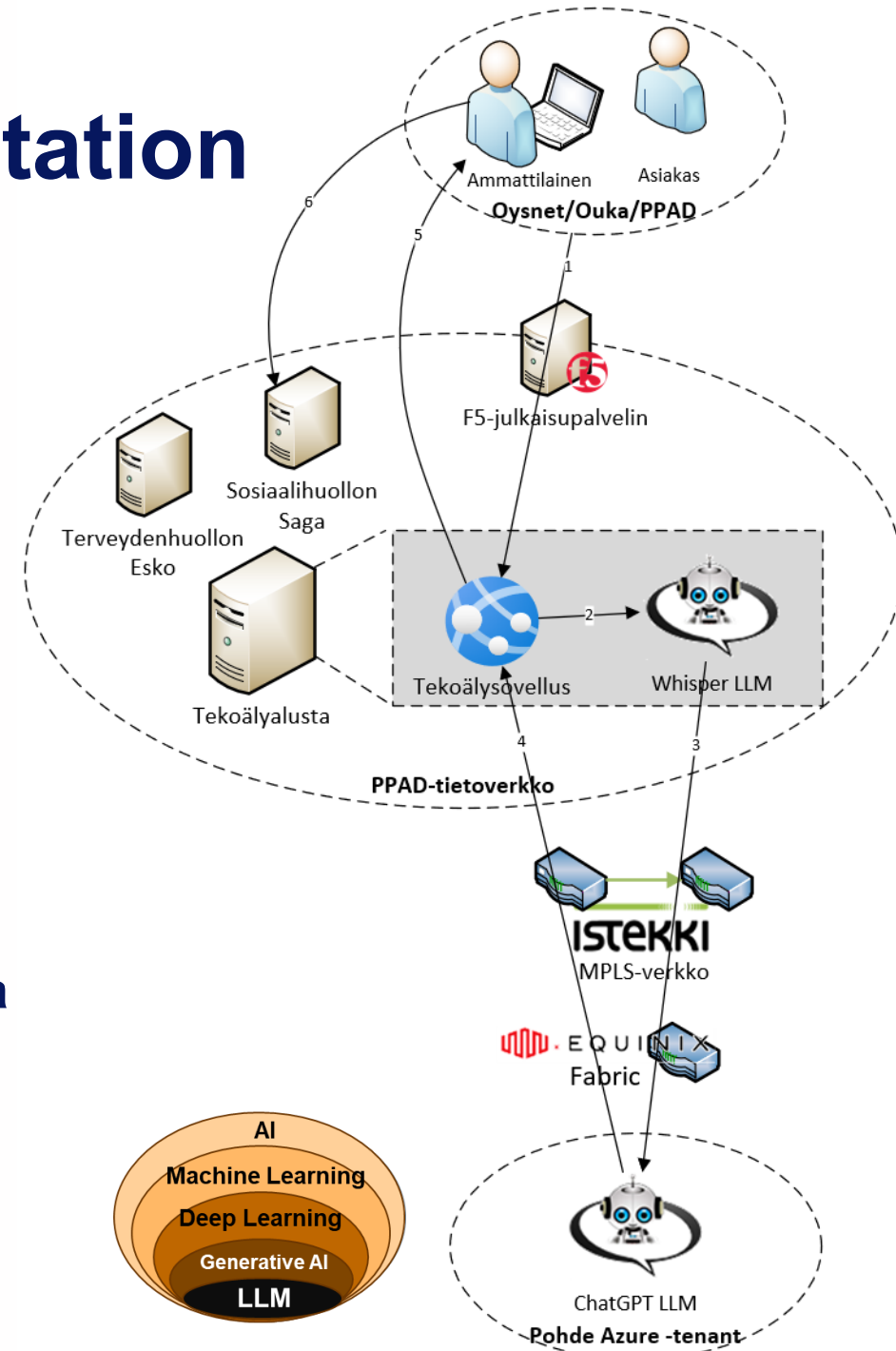
Jaana Kokko¹, Roni Huhta², Mikko Reinikka¹, Timo Alalääkkölä¹, Miia Jansson³, Henna Härkönen³, Santeri Rytty¹, Miika T. Nieminen^{1,3}, Jarmo Reponen³, Heikki Mikkonen¹

¹Wellbeing services county of North Ostrobothnia (Pohde), Oulu, Finland; ²ESKO Systems Ltd, Oulu, Finland; ³Research Unit of Health Sciences and Technology, University of Oulu, Finland



Pohde-AI: Technical Implementation

- Esko Systems Ltd. has developed an AI application that **modularly uses various language models**, both **locally** and in a secure **cloud**.
- It records conversations, transcribes them via one model, and summarizes with another model.
- The AI output is shown to professionals in a separate app, **not directly entered** into client or patient systems.
- Data is **securely transferred** from Pohde's network to a **protected cloud service**.
- For social services, the **abuse monitoring** feature was disabled due to the sensitive nature of cases.



Future of Pohde-AI:

- 
1. Show the referral related to the visit.
 2. Show the current status recorded from previous visits.
 3. Show the plans recorded from the previous visit.
 4. Show the three most recent imaging studies and their recorded statements.

- 
1. Update the patient's care plan...
 2. Draft a referral for an MRI...
 3. Draft the required information for a Physician statement B...

Before the Visit



During the Visit



After the Visit

Benefits and Impact

- Increased efficiency in the work of social and healthcare professionals
- Enhanced meaningfulness of work
- Professionals can focus on the patient, which improves the customer service experience

Prerequisites for Implementation

- Use cases are clearly defined
- The technology performs well enough that professionals are willing to adopt it

Disadvantages and Risks

- Complexity of regulation and interpretations by wellbeing services counties slow down development and limit benefits

Future Opportunities

- Professionals have already identified several good use cases, and new needs continue to emerge
- The technology has already demonstrated its capabilities in the Pohde AI-assisted documentation project



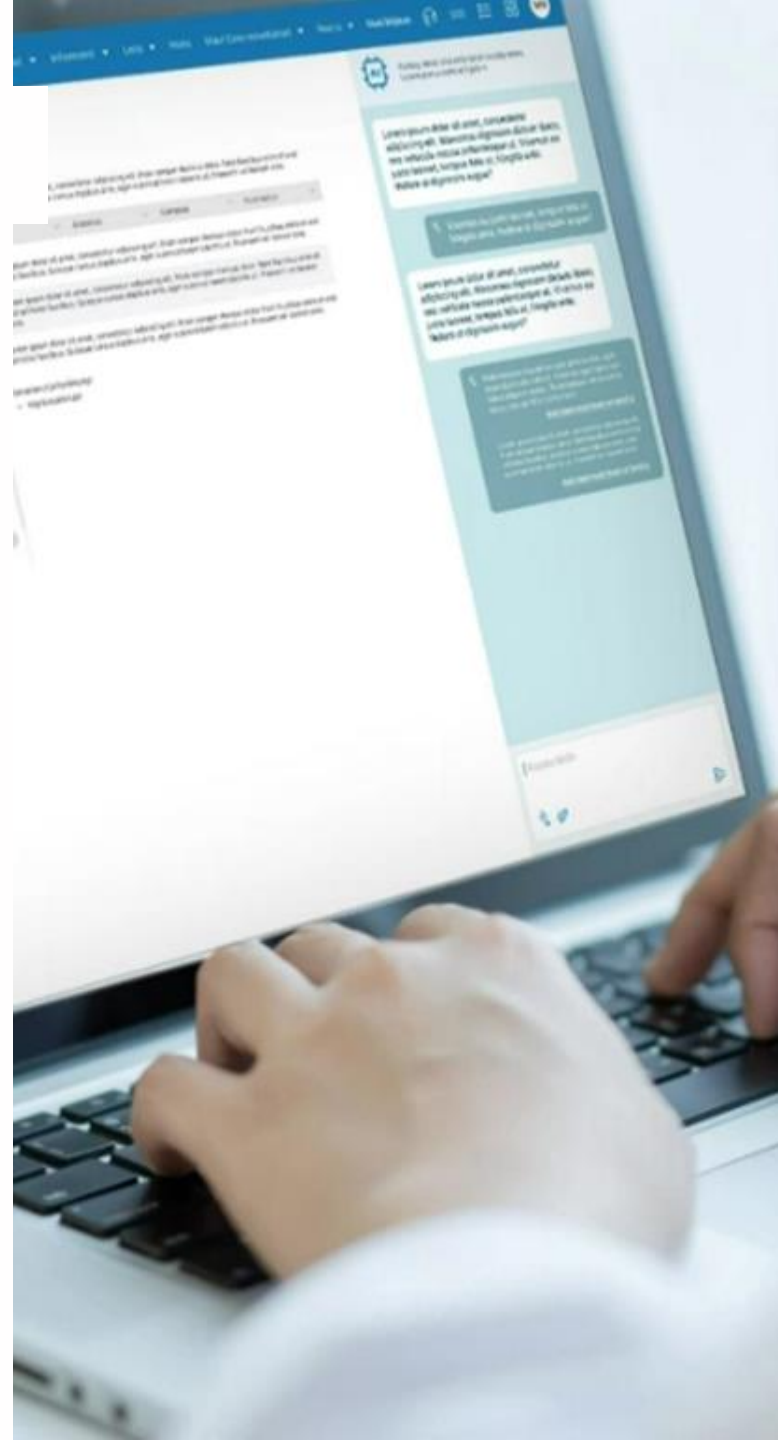
Pohde

Pohjois-Pohjanmaan
hyvinvointialue

AI in Process Management

Instruction Library

- **Pohde's Instruction Library** provides a shared, up-to-date, and accessible platform for managing guidelines and instructions.
- The project defines criteria for updating and **standardizing patient, client, and operational instructions** to meet current care challenges and improve guidance.
- AI will be used to analyze situations and deliver accurate, timely instructions to staff—**streamlining workflows and ensuring high-quality service**.
- **Piloted in Pathology. Infection control pilot upcoming.**



 KUINKA VOIN AUTTAA?

Kerro diabetes-hoitoketjuun liittyvistä vastuista Pohjois-Pohjanmaan alueella

Pohjois-Pohjanmaan alueella diabeteksen hoito on järjestetty siten, että jokaisessa sote-keskuksessa on diabeteshoitaja, joka vastaa perusseurannasta ja ohjaa tarvittaessa erikois-sairaanhoidon¹.

Tyypin 1 diabetesta ja haastavia tyypin 2 diabetesta sairastavien hoito on keskitetty Pohjanmaan diabetesyksikön Vaasan ja Pietarsaaren toimipisteisiin tai keskussairaalan endokrinologian poliklinikalle¹.

[Lähdelinkki](#)

Miten kerron lyhyesti insuliinipumpun käytöstä potilaalle?

Insuliinipumppu on pieni laite, joka antaa sinulle insuliinia jatkuvasti ihon alle. Sinun täytyy syöttää pumppuun tietoja aterioistasi ja verensokeristasi, jotta se voi annostella insuliinia oikein. Voit lukea lisää insuliinipumpusta ja sen käytöstä täältä.²

Lue lisää aiheesta
¹terveyskyla.fi
²makingdiabeteseasier.com

Kirjoita tähän



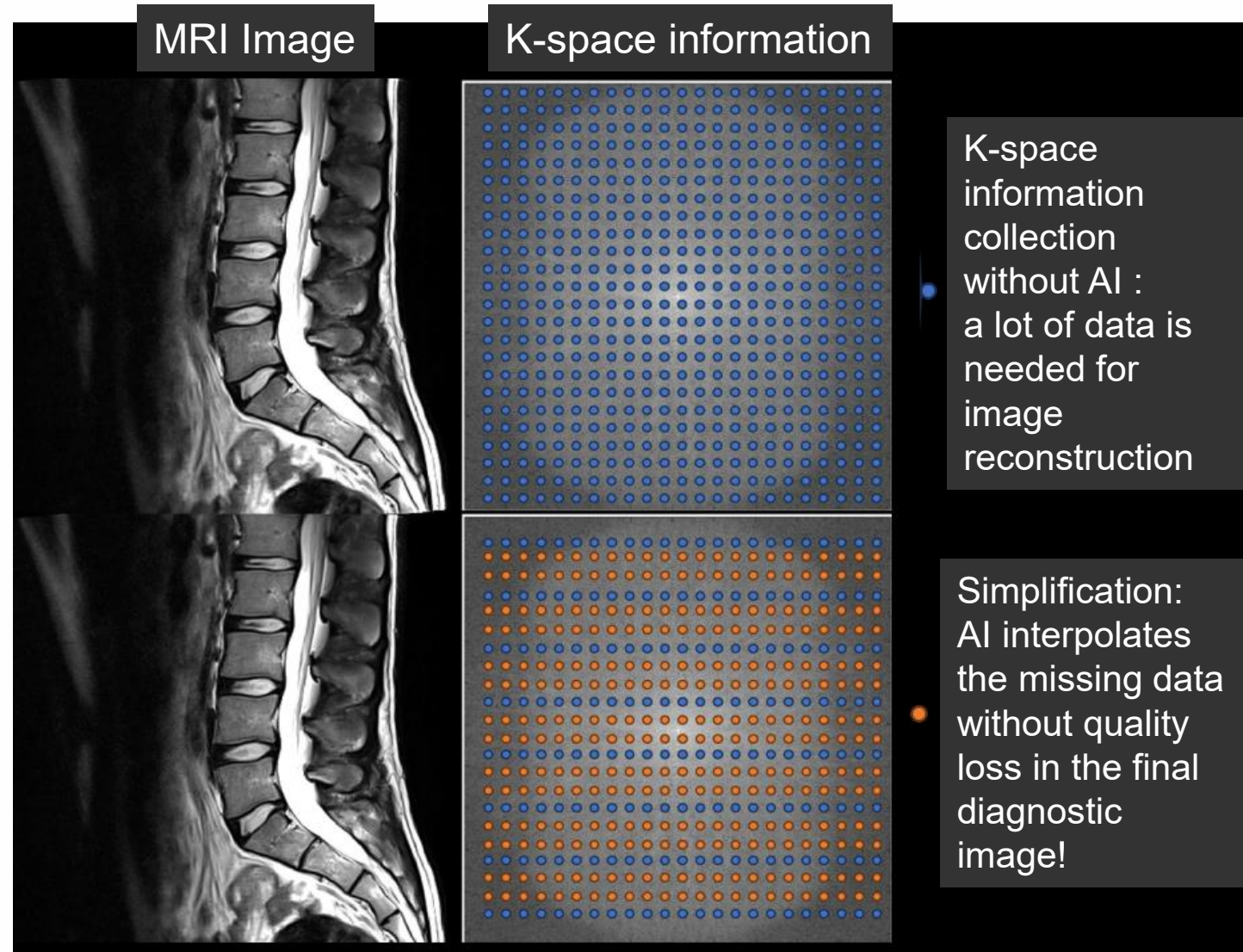
Pohde

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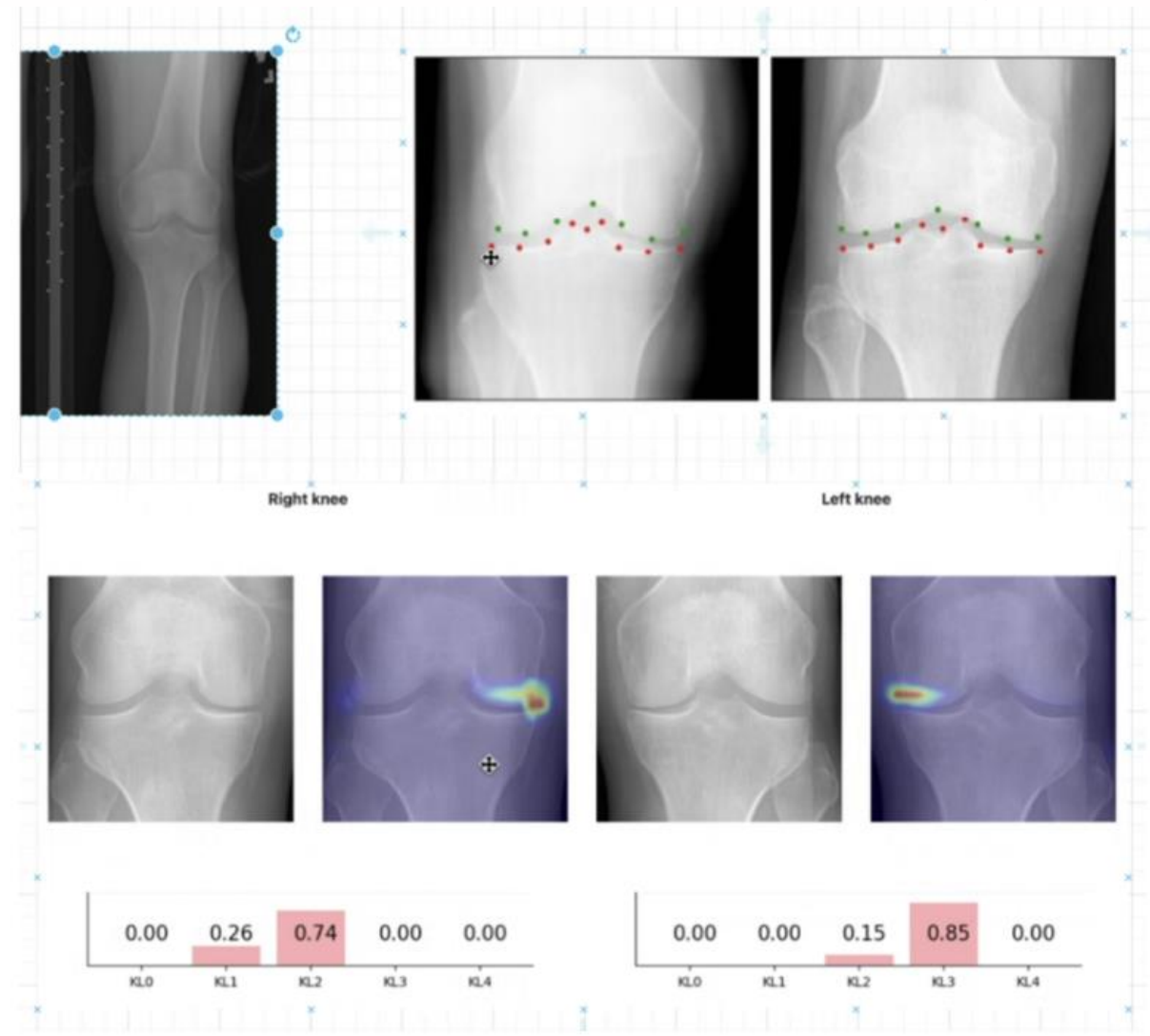
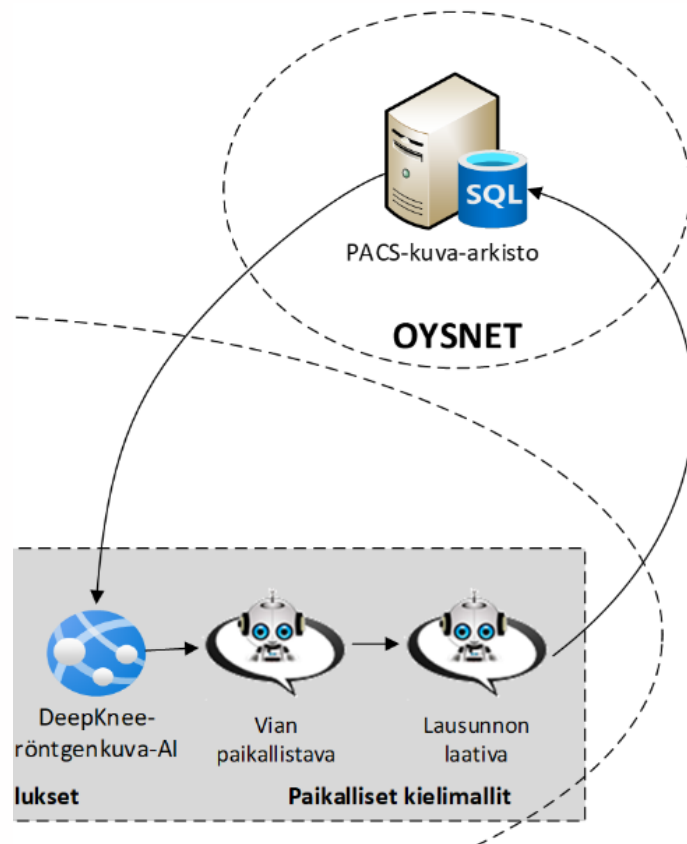
AI in Medical Imaging

AI-assisted acceleration of MRI imaging

- By improving the quality of MRI images with AI assistance, imaging times can be reduced by up to half.
- Several appointment durations have already been shortened by one third (e.g., from 30 minutes to 20 minutes)
- The new Oulu University Hospital needed only 6 MRI scanners instead of previous 7 MRI scanners due to this.



"DeepKnee" assists in KL-classification of knee osteoarthritis



SCIENTIFIC REPORTS

OPEN

Automatic Knee Osteoarthritis
Diagnosis from Plain Radiographs:
A Deep Learning-Based Approach

Aleksai Tiulpin¹, Jérôme Therasse², Esa Rahtu¹, Petri Lehenka² & Simo Saarakkala^{1*}
Knee osteoarthritis (KOA) is the most common musculoskeletal disorder. KOA diagnosis is currently
conducted by assessing symptoms and evaluating plain radiographs, but this process suffers from
subjectivity. In this study, we present a new transparent computer-aided diagnosis method based on
the Deep Simple Convolutional Neural Network for automatically score knee OA severity according
to the Kellgren-Lawrence grading scale. We tested our method using the data solely from the
Multicenter Osteoarthritis Study and validated it on a randomly selected 2,000 subjects (2,000 knees)
from Osteoarthritis Initiative dataset. Our method achieved a sensitivity, specificity, and accuracy of 0.83 and
average prediction accuracy of 0.74, compared to the conventional score for a committee of clinical
experts. Here, we also report a radiological OA diagnosis area under the ROC curve of 0.89. Besides
this, we present attention maps highlighting the radiological features affecting the network's decision.
Such information makes the decision process transparent for the practitioners, which builds better trust
toward automatic methods. We believe that our model is useful for clinical decision making and for OA
research; therefore, we openly release our training codes and the data set created in this study.

Tiulpin et al., Scientific Reports 8(1): 1727, 2018.

Published in
Tiulpin et al.
Scientific Reports
8(1): 1727, 2018.

Estimation of Kellgren and Lawrence (KL)
classification with a confirmation "heat map".



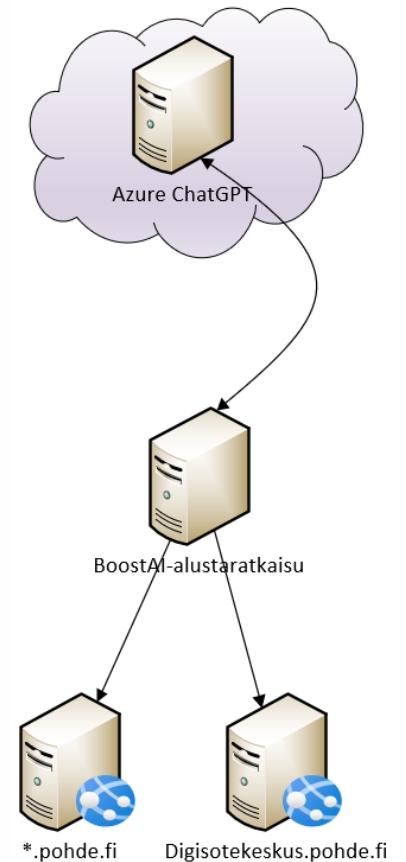
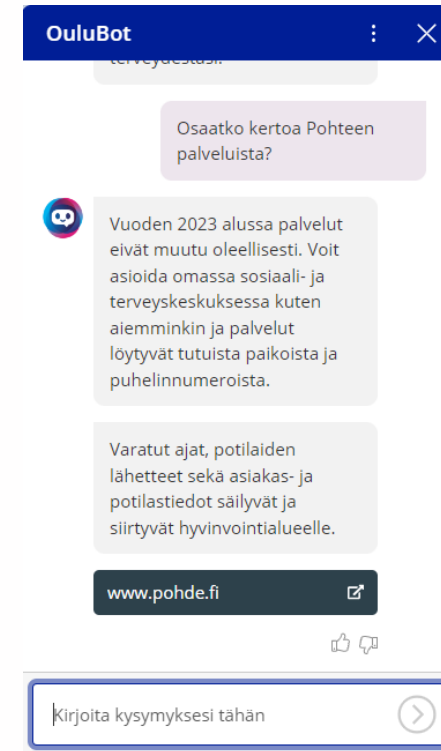
Pohde

Pohjois-Pohjanmaan
hyvinvointialue

AI for Residents

"PohdeBot" for general guidance and the Digital Social and Health Center's chat service

- The City of Oulu and Pohde use a shared **OuluBot platform** to implement conversational ChatBots.
- The City of Oulu has extensive experience with the platform and its development. In **April 2024**, an AI based on a large language model (**ChatGPT 4 Turbo**) was introduced to complement the trained bot.
- The AI currently in use is **ChatGPT 4o**, which has proven effective.
- Pohde** will begin using the "**PohdeBot**" on the same platform in **autumn 2025** within the **Digital Social and Health Center**, including **general advisory** services.



Summary

- North Ostrobothnia Wellbeing Services County (Pohde) and new Oulu University Hospital (OYS) actively seek for new AI solutions to improve their services.
- Development is done in close collaboration with commercial partners and University of Oulu.
- Pohde is an active member of the Finnish SOTE – AI Ecosystem.



© Sanna Krook, Pohde

Nordic Conference on Digital Health and Wireless Solutions

Will be organized again in Oulu Finland, on **June 16th to 17th, 2026 !**

The first Nordic Conference on Digital Health and Wireless Solutions in 2024, was a pivotal event for professionals, researchers, and industry leaders to discuss, collaborate, and gain insights into the latest advancements in digital health and wireless solutions.

24 international experts as Invited Speakers, the Scientific Program with 17 sessions, oral speeches selected among 100 submissions. Exhibition and Site Visits arranged.

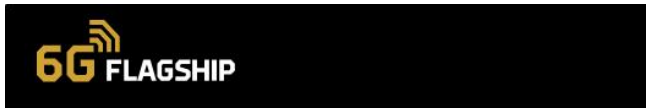
Springer Verlag published a two volume book in their CCIS series,
with more than 900 pages.



nordic-digihealth.com

Some highlights of the previous year 2024 conference:

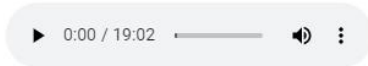
READ MORE: <https://www.6gflagship.com/news/pioneering-digital-health-at-the-nordic-conference-on-digital-health-and-wireless-solutions/>



31 MAY 2024



Pioneering Digital Health at the Nordic Conference on Digital Health and Wireless Solutions



The Nordic Conference on Digital Health and Wireless Solutions brought together a community of passionate researchers and healthcare professionals in the scenic setting of the Hotel Lasaretti in Oulu, Finland. Organised by the University of Oulu's **6GESS** and **DigiHealth** research programmes from May 7-8, 2024, the conference created a vibrant space for exploring

The conference commenced with **Professor Jarmo Reponen**, the Conference President, welcoming attendees and highlighting Oulu's celebrated strides in healthcare innovation. He traced the evolution of Oulu's digital health technologies from their nascent stages in the 1990s to their current significant role. His account highlighted how digital infrastructure has become the foundation for Finland's innovative healthcare solutions, exemplified by the Finnish national health service reforms seamlessly integrating digital transformation to transform service delivery.



Photo: Eveliina Halttu, Kulmakuvaamo

Professor Jarmo Reponen, President of the Nordic Conference on Digital Health and Wireless Solutions, welcomed a large audience of interested professionals, researchers, and industry leaders at the premier event in Oulu, Finland. The conference, organized by the 6GESS and DigiHealth research programmes from the University of Oulu, is a key platform for discussing the latest advancements in digital health and wireless communications.



Photo: Eveliina Halttu, Kulmakuvaamo

"Our vision for future medical healthcare technology involves significant integration of AI in computer systems," says Professor Tomohiro Kuroda the Director of Division of Medical Information Technology and Administrative Planning of Kyoto University Hospital.

Professor Tomohiro Kuroda from Kyoto University, Japan, set the stage with the first keynote address. He provided a comprehensive overview of Japan's digital health strategy and discussed the intricacies and multiple challenges of integrating a unified electronic health record system nationwide. Professor Kuroda's insightful presentation offered the audience a global perspective on the complexities involved in advancing digital health initiatives. His candid discussion of the hurdles faced in Japan shed light on the persistent obstacles nations around the world must overcome to realise the full potential of digitised healthcare systems. The audience gained invaluable insights into the intricate interplay between technological advances, regulatory frameworks and the seamless integration of digital solutions into existing healthcare infrastructures.

On-Site Visits: Future Hospital and Beyond



Photo: Henna Härkönen

Conference attendees explored cutting-edge facilities, including Future Hospital OYS2030, OYS TestLab and Knoppi, MITTLAB, and Accessible Home (Mahdollistava Koti). The tours also featured the Nokia OTAVA Lab and Oulu University's Health Tech Research Labs: Multimodal Sensing Lab, UBICOMP Lab, and Human Body Twin Lab, showcasing the latest in health technology and innovation.

During the Nordic Conference on Digital Health and Wireless Solutions, attendees had the unique opportunity to visit the **Future Hospital OYS2030**, the "smartest hospital in the world". This cutting-edge facility showcased advanced medical technologies, including AI, robotic surgery, digital imaging, and telemedicine. Participants learned about the hospital's commitment to integrating new technologies and sustainability to provide high-quality care. The Future Hospital aims to be fully operational by 2030, setting a new standard in healthcare innovation.

Participants also explored the **OYS TestLab** and Knoppi, a specialised environment replicating hospital units for product testing, and the **MITTLAB** for medical imaging research. The Accessible Home demonstrated technology-supported living solutions for individuals with special needs. Nokia's OTAVA lab highlighted advanced 5G testing capabilities, and the University Health Tech Research Lab presented

NORDIC CONFERENCE ON
**Digital Health and
Wireless Solutions**

June 16-17, 2026

**Kontinkangas Campus,
University of Oulu,
Finland**

All accepted papers will be published
in an Open Access book by Springer!

**Paper submission
deadline 15.12.2025 at
nordic-digihealth.com**



The topics include (but are not limited to):

Digital Health Transformation, Innovations and Future Visions
Digital Healthcare Pathways
AI and LLMs in Healthcare: tools for professionals, aids for citizens
Data-Driven and Modelling-Based Decision Support
Health Technology Assessment & Impact Evaluation
Education in Digital Health
Wireless Technologies and Medical Devices
Connectivity Architectures and Cybersecurity in Digital Health
Novel Sensors & Bioinformatics
Remote Healthcare, eRehabilitation & Telemedicine
User Experience & Adoption of Health Information Systems
Health Data Sharing, Including Citizen-Generated Data
Omics-Driven Precision and Personalised Medicine
Digital Interventions for Prevention and Therapy of Chronic Conditions
Ethics, Health Economics, Regulation & Implementation Research



Tack! Kiitos! Thank you!

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