AI4HOPE

Newsletter 2

November 2025

Transforming Dementia Care:

Integrating Innovation, Evidence, and Digital Solutions for Holistic Support in Europe

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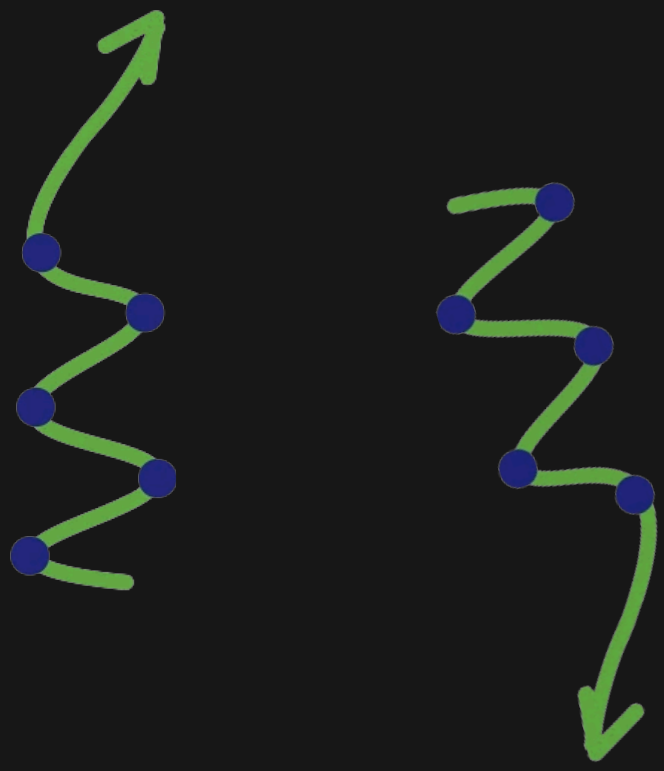
Federated Learning and Homomorphic Encryption for Personal Data Management in AI4Hope

Dementia poses an increasing challenge across the European Union, driven by the ageing population. **Digital health interventions** offer significant potential to improve both the accessibility and quality of dementia care. These technologies are being evaluated for multiple purposes — including education, symptom management, care planning, decision-making, and facilitating communication between patients, healthcare professionals, and caregivers. However, current studies often suffer from methodological biases and inconsistent outcomes, limiting their broader applicability.

Effective **data-driven treatment and monitoring** of dementia are essential for enhancing patient safety, managing public health responses, and improving the quality of life of both patients and survivors. The EU-funded AI4HOPE project aims to strengthen dementia-related policymaking by identifying holistic interventions, developing innovative digital tools, and applying artificial intelligence to assess the real-world impact of digital health solutions.

Within AI4HOPE, one of the key objectives is to ensure that **AI models** can be effectively deployed across regions with diverse populations and healthcare contexts — while fully preserving **data privacy.** To achieve this, the project leverages **Federated Learning** combined with **Homomorphic Encryption,** a powerful framework that allows AI systems to learn collaboratively from distributed data sources without sharing sensitive information.



This approach enables multiple institutions to train AI models locally, keeping patient data within their secure environments. Federated Learning coordinates this distributed training process by aggregating encrypted model updates rather than raw data. Still, even these updates can pose security risks if intercepted or reverse-engineered. Here, Homomorphic Encryption plays a crucial role — allowing computations to be performed directly on encrypted data without ever decrypting it.

In conclusion, Federated Learning represents a major advancement toward responsible, privacy-preserving, and collaborative AI. Its adoption continues to expand — from healthcare to everyday applications like mobile devices — supporting a more ethical and inclusive digital ecosystem. The synergy between Federated Learning and Homomorphic Encryption provides one of the most robust architectures available today for secure and trustworthy AI, especially in sensitive domains such as healthcare, finance, and personal data management, where privacy is not only a priority but a legal and ethical imperative.

Silvia González, ITCL Technology Centre

Part of the Coordinating Team

Maria Jaakkola, University of Turku

Please tell us about the AI4HOPE project, what are the goals of it?

AI4HOPE is a feasibility study on digital interventions for people with dementia. In AI4HOPE the participants will use different digital interventions, like virtual reality, games, and reminiscnece, while we follow their wellbeing with questionaires and smartbands tracking different biological signals. With explainable AI we try to predict different health outcomes and AI assistant is also used with the interventions.

What do you consider to be the main added value of the project?

The most important outcome of this project, as I see it, is to see if the people with dementia happily accept the digital interventions as part of palliative care, of do they find them just as extra burden. They are in a very stressful situation with their lives. It would be great if we could see that these digital interventions could make their lives nicer, or at least that they are curiously trying them. However, if they dislike or are completely uninterested in the whole concept, that is also valuable information and gives us some directions where to not take the palliative care. If they end up disliking the interventions, it would be interesting to know if it is due to the content of the intervention, the technical usage, or the whole concept.

As the AI4HOPE project coordinator, what aspects of your role do you find most rewarding? Is there a particular moment or accomplishment that stands out?

This far my favourite moments have been those when some messy part of the project gets properly defined and it becomes clear what and how to do it. I also find it rewarding when the benefits of combining technical and clinical researchers become obvious. There has been times when the technical partners discuss something and the clinical partners give some input that is relevant and often even very intuitive, but we would not have thought of it without the clinicians. This works both ways.

The AI4HOPE project has now completed more than one year. What significant achievements has the consortium managed to make over this period?

At this point we do not have the main results yet, but the project design is defined. We have made countless big and small decisions on what and how to do things in practice, so that we can obtain the goals of the study. Now we have decided the digital interventions and planned the pilot studies.

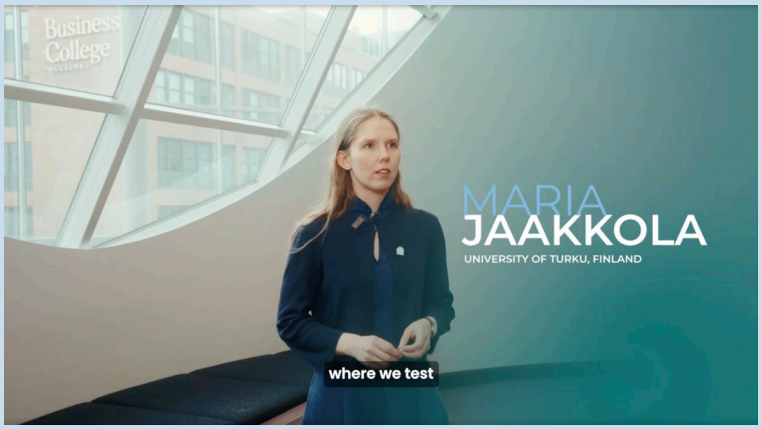
What challenges have you encountered during the implementation of the project? How has the team addressed or adapted to them?

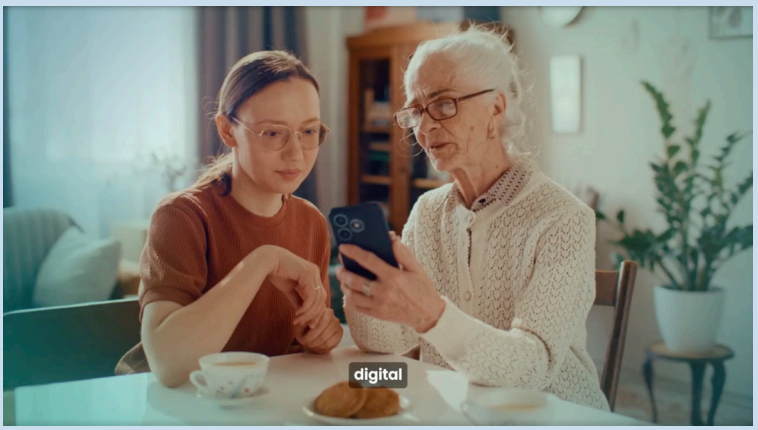
Surprisingly, the biggest obstacle this far has been selecting a suitable wearable device for our purposes. It was very tricky to find out what signals the different smartbands and –watches actually offer to the end-user. Manufacturers communication typically focuses on different sport programs and summary metrics. We solved this by contacting the customer supports and seeing if they actually answer something helpful. Some gave us only links to their online shops, but others were more supportive.

In this short video, Maria Jaakkola from coordinating partner Turun yliopisto - University of Turku explains the goals of AI4HOPE.

Watch full video

Testing whether people with dementia find digital interventions helpful or burdensome / Learning how explainable AI can predict wellbeing outcomes / Understanding how technology and clinical care can complement each other

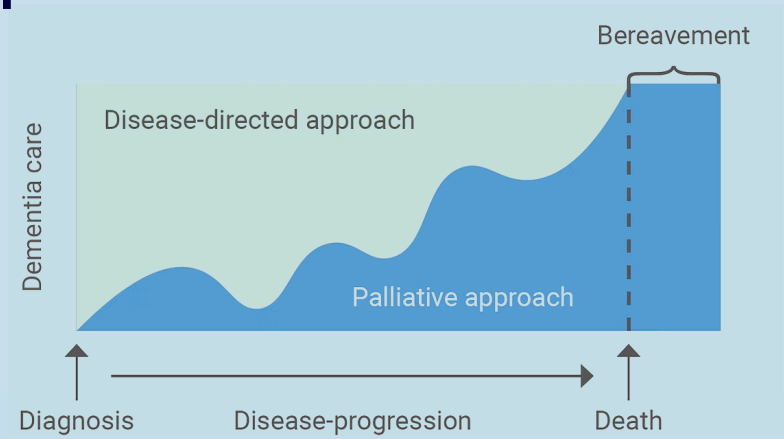




This information sheet has been developed by Alzheimer Europe and the European Association for Palliative Care, in collaboration with the European Working Group of People with Dementia and the European Dementia Carers Working Group.

Read full

A Palliative Approach to Dementia Care



FORMER DEMENTIA CARER

At first, the idea of palliative care felt daunting, but for me, it came to represent comfort and reassurance. After my partner's diagnosis, I felt like I was just discharged and left to figure things out on my own. But with palliative care, there was a sense of continuity, I wasn't abandoned. I felt included, supported, and truly looked after throughout the whole journey.

Examples of a Palliative Approach to Dementia Care

In England, a dementia service incorporates a palliative care approach into standard dementia care. Thus, people with dementia at any stage have a holistic needs assessment, advanced care planning and ultimately good end-of-life care. These services are highly flexible in their working patterns to meet the needs of users. Activities are guided by the person's history, personality and preferences, emphasising their independence and empowerment. The service staff also help to support the person with dementia in making advance care plans, thereby ensuring that future care aligns with their wishes. This diminishes potential carer guilt and distress when making important decisions on their behalf.

Close collaboration with GPs and community nurses is essential to ensure necessary equipment is in place, when the end of life approaches. One service offers up to three support visits from the team for the carer following the death of a person with dementia. If additional support is warranted, a referral to bereavement services is made. Another service offers a bereavement call and a follow-up three months later from the bereavement counselling team.

In the Republic of Ireland, a Specialist Palliative Care service based at an acute hospital accepts people with life-limiting illnesses, such as dementia. Within such services, community palliative care Clinical Nurse Specialists are trained in dementia care, and end-of-life support is available 24/7 through an external "night nurse" service.

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Training Caregivers to use VR Glasses and Applications

HUMADEX from the University of Maribor (UM FERI) joined the dedicated staff at Dom Nine Pokorn Grmovje, Žalec, an elderly home, for a special workshop communicating and disseminating our work within the European projects AI4HOPE PROJECT and MEDViEW EU Project. As part of the AI4HOPE PROJECT, we trained caregivers to use VR glasses and applications that will soon support residents with dementia. With VR, we aim to:

Improve focus in daily activities;
Stimulate memory and cognition;
Open doors to virtual worlds and hardly reachable places.

This is just the beginning of our pilot within the AI4HOPE PROJECT, where we're building an Advanced Care Planning Decision Support System (CPDSS) to improve quality of life and ensure truly patient-centred care. We're proud to see innovation and compassion coming together for elderly care.

7th International Seminar on Palliative Care

At the Faculty of Medicine of
the University of Porto

At the seminar, our team presented the project, highlighting the University of Porto's (UP) contribution to the design of the application used in the co-creation sessions. We also showcased two posters featuring the results of the second co-creation session conducted in Portugal—one developed with people with dementia (PwD) and another with caregivers. Notably, the poster titled "Co-creation of Digital Tools for People with Dementia: Report from a Second Session within the AI4HOPE Project" was awarded the **Best Scientific Poster Prize** at the event.

Poster "Co-creation of Digital Tools for People with Dementia: Report from the Second Session within the AI4HOPE Project", authors: Filomena Nascimento, Joana Brig[1], Maria Luísa Weber, Ramona Barros, Luisa Castro, Ana Ferreira, Joana Muchagata, Pedro Marques, Francisca Rego, at the 7th International Seminar on Palliative Care, Faculty of Medicine of the University of Porto.

Poster "Promoting Well-Being through Technology: A Guided Session Presenting AI4HOPE to Caregivers", authors: Maria Luísa Sousa Weber, Ramona Barros, Filomena Nascimento, Joana Briga, Luisa Castro, Ana Ferreira, Joana Muchagata, Pedro Marques, Francisca Rego, at the 7th International Seminar on Palliative Care, Faculty of Medicine of the University of Porto.

Oral communication "Co-designing AI solutions for Dementia: mobile app", authors: Joana muchagata, Ana Ferreira, Luísa Castro, Pedro Vieira Marques, Francisca Rego, in the panel Pitch: Innovation in Palliative Care, at the 7th International Seminar on Palliative Care, Faculty of Medicine of the University of Porto.

Alzheimer Europe Conference in Bologna

Great to connect with the dementia care community and share ideas on how digital tools can make support more personal, meaningful, and human.

Project partner Francisco Madueño Chulián from ITCL Technology Centre is representing the project and engaging with the community on advancing digital tools that support emotional well-being in dementia care.

EAPC World Congress

The AI4HOPE project hosted its pre-congress session at the 19th World Congress of the European Association for Palliative Care (EAPC) in Helsinki

Our session, titled "Rethinking Dementia Care: Technology-Driven and Person-Centred Palliative Care," brought together physicians, leading experts and patients to explore how digital innovation can transform the future of dementia care.

It was emphasized that AI will play a lasting role in dementia care, especially for future generations — but its usability depends on inclusive, patient-centred development.

Topics covered included:

- Innovations at the intersection of dementia and palliative care;
- The AI4Hope digital dementia journal and companion tools;
- Co-designed resources like the dementia and palliative care information sheet;
- A forward-looking roundtable on technology in care planning.

A huge thank you to all speakers and attendees for an inspiring exchange of ideas and experiences!

Publication: Artificial Intelligence-Based Approaches for Advance Care Planning: a Scoping Review

Umut Arioz, Matthew John Allsop, William D. Goodman, Suzanne Timmons, Kseniya Simbirtseva, Izidor Mlakar & Grega Mocnik

The potential for Artificial Intelligence (AI) to optimize future healthcare decision-making is vast. Our review, based on an analysis of 41 key studies, confirms that AI models show promising predictive performance in identifying patients who need timely Advance Care Planning (ACP) discussions.

However, the field faces a critical hurdle: transparency and reproducibility. We found that while models are demonstrating success, many studies lack the essential components needed for clinical validation, specifically open-access data and source code availability. This absence significantly undermines trust and limits the rigorous scrutiny required for health tools.

To advance this field responsibly, our research outlines a clear roadmap:

Prioritize Open Data

1

Urgent need for shared, open-access datasets.

Focus on the Process

2

Shift AI development beyond mere prediction toward supporting the entire ACP lifecycle, including the initiation, real-time review, and dynamic updating of patient preferences.

Enhance Equity

3

Develop AI tools that support culturally sensitive ACP discussions.

Read publication