Secur-e-Health magazine

Edition 2025

Editorial Page

Over the past three years, 30 partners from five countries have joined forces across six work packages to deliver an ambitious European initiative: Secur-e-Health (November 2021 – December 2025).

30 partners from IT and medical sectors

5 countries involved

6 work packages driving the activities

Duration: November 2021 → December 2025

Sensitive health data is often kept in silos, limiting its potential for legitimate medical, research, and data analysis purposes. The Secur-e-Health project addresses this challenge by combining **digital identity technologies** with **privacy-preserving data analysis techniques** within a secure system infrastructure. This approach allows hospitals, service providers, and research institutions to collaborate more effectively, leading to improved predictive models, more efficient treatments, accelerated clinical research, and, ultimately, better healthcare outcomes.

This magazine reflects on our journey so far, highlighting the achievements, perspectives, and ambitions of the consortium. It stands both as a **showcase and as an archive** of our collective efforts, illustrating the impact of international collaboration in the fields of e-health and cybersecurity.

Thierry St-Jacques-Gagnon – Co-founder CTO, Kelvin zéro

"Secur-e-Health has been a powerful vector of convergence, bringing together experts and professionals determined to contribute to the future of global health. Our shared goal is to enable a smoother and more secure flow of health data, ensuring that privacy and security remain uncompromised. This improved circulation and sharing of data are key steps toward advancing medical treatments, saving lives, and ultimately improving the human condition."

Table content

Privacy, Identity & Consent

IAM: Secure Access and Consent Management

CSIT FINLAND has implemented an Identity and Access Management (IAM) solution for VTT's research data platform. Client organizations can onboard their own users, while VTT administrators review and assign appropriate permissions. Once approved, accounts and entitlements are automatically provisioned to Microsoft Entra ID. An additional connector forwards the necessary attributes to ShinyProxy, which enforces fine-grained access to datasets used by scientists for federated learning.

Users authenticate with either Kelvin Zero passwordless cards or Microsoft multi-factor authentication (MFA), providing secure and flexible sign-in options. To improve sustainability and autonomy, CSIT migrated the IAM backend from a commercial product to an open-source solution in H1, completing the transition smoothly.

In parallel, CSIT developed a consent management service for Bittium. Bittium submits consent requests to the CSIT Consent Server, which emails end users for approval. Users can approve or deny access and specify details such as data-use expiry. Integration with IDENTOS UMA for enhanced federated consent is currently in progress.

These capabilities are being integrated into the broader Secur-e-Health IAM framework to streamline access, strengthen security, and support user autonomy across partners.

Juha Kunnas - Consultant, CSIT Finland

Unlocking Health Data: A New Era of Secure, Patient-Centric Access

ITEA' Secur-e-Health project provided IDENTOS with a critical platform for advancing our mission to put patients in control of their own health data. The project allowed us to improve our federated health access solutions by testing our platform with three different partners, and under new scenarios. This collaboration provided invaluable feedback, which contributed to our customer solutions and new commercial pursuits, and validated our approach for scalability.

Our work on the project also improved our capabilities in key health standards like FHIR (Fast Healthcare Interoperability Resources). This led directly to our participation in the HL7 Canada Connectathon and the Canada Health Infoway projectathon for CA:FeX (Canadian FHIR Exchange) and IUA (Internet User Authorization), a crucial step toward broader technology adoption and interoperability.

Looking ahead, we're now active members of the HL7 FHIR at Scale Taskforce (FAST) group and are planning for future participation in events like the Consent IG Connectathon. The project has not only enhanced our solution but has also opened doors to new commercial opportunities, including federated consent management in the U.S. and expanded capabilities in Prince Edward Island and the US and Canada.

ITEA Secur-e-Health has been more than a project; it's a testament to what's possible when technology and collaboration unite to create a healthier, more connected future for everyone.

Alec Laws - CTO, IDENTOS Inc.

Seamless Privacy-by-Design: Integrating Linksight and ZorgTTP in Secure-e-Health

The Secure-e-Health project marks a significant milestone in privacy-preserving data collaboration with the technical integration of the Linksight Multi-Party Computation (MPC) platform and the ZorgTTP pseudonymisation solution. This powerful combination enables healthcare organizations to securely analyze and share sensitive data without compromising patient privacy.

Linksight's MPC technology allows multiple parties to compute insights from distributed datasets without revealing the underlying data. ZorgTTP complements this by pseudonymising personal identifiers, ensuring that data remains linkable in a controlled and secure manner throughout the process. This means that multiple identifiers across different studies can be linked via the ZorgTTP pseudonymisation service, enabling researchers to expand their analyses without needing to share the underlying data.

Together, these technologies form a robust privacy-by-design architecture that meets stringent data protection standards. The integration streamlines the user experience, eliminating the need for complex manual steps and reducing operational overhead. Customers can now benefit from a seamless workflow that supports secure, compliant, and scalable data collaboration across institutions.

The operational launch of this integrated solution is scheduled for fall 2025, bringing a new era of trusted data sharing to the healthcare sector.

Bastiaan van Schijndel – Innovation manager, ZorgTTP

Martine van de Gaar – CEO & Co-founder, Linksight

Secur-E-Health: Technology for a Healthy Data Economy

The Secur-E-Health project is about *privacy enhancing technologies (PETs)*: digital tools that allow data to be collected, processed, analyzed, and shared while protecting personal data confidentiality and privacy. In our project, PETs are used to securely access *health data* stored for example in hospitals or with insurers, for various purposes like scientific research. The activities in the project have led Almende to some fundamental questions: who controls this data, and how do we maintain control over who uses it and for what purpose?

Everywhere around us, we see that data is used for *profit*: citizens are treated as data profiles that provide their data for free to commercial organisations or even governments. *We pay with our data.* At Almende, in contrast, we believe that health data shouldn't be seen as a commodity, but rather as a common property, a *commons*. This aligns with the name of our company, "Almende," which is a Dutch word for "the commons."

In Secur-E-Health, we have taken steps toward a data commons by developing our EdgeVault technology: a secure vault for storing, managing and sharing personal (health) data with privacy enhancing technology built-in by design. The EdgeVault enables people to choose what they share, for what purpose, and with whom, and to extract value from the shared data themselves.

In a healthy data economy, control over data isn't the revenue model. Rather, it is the use of data seen as a commons, for services that provide direct added value for yourself and others in a transparent manner. With Almende's EdgeVault, we enable new business opportunities in this direction while also contributing to the shift that the world needs: towards a healthy data economy.

#Healthdata #dataspaces #datacommons #privacy #PET
https://almende.com/research-and-development/innovation-domain/health/

Andries Stam, Almende

Federated Analytics
&
Privacy-Preserving Computing

Federated learning enables privacy-preserving multicenter biomarker analysis in heart failure

Heart failure (HF) is a complex clinical syndrome that entails high mortality, morbidity, and hospitalization rates worldwide. To improve HF prognostication, adequate risk assessment is warranted. Plasma biomarkers of disease activity such as natriuretic peptides (NT-proBNP) play a key role in this respect. The research groups of the Erasmus MC and UMC Utrecht, The Netherlands, explored the use of federated learning (FL) combined with privacy-enhancing technologies (PETs) for risk prediction in real-life HF populations, enabling multicenter analyses without sharing patient-level data.

Temporal data on clinical characteristics and serum biomarkers were collected from 3655 HF patients (Erasmus MC N= 2530; UMC Utrecht N=1125) using electronic health records, especially the Healthcare Information eXchange (HiX) system developed by ChipSoft™. Data on the composite study endpoint of all-cause mortality, heart transplantation and left ventricular assist device implantation were obtained from HiX and municipality databases. Using the Linksight platform, FL/PET was used to train time-dependent Cox models jointly at both centers, relating (changes in) clinical and biomarker data with the composite endpoint.

As key finding, we observed consistent and strong associations between several routinely measured blood biomarkers and the risk of reaching the composite endpoint. Strong associations were specifically observed for urea, NT-proBNP, Red Cell Distribution Width, estimated Glomerular Filtration Rate, thrombocyte count and hemoglobin.

The study demonstrates that FL/PET allows secure, privacy-preserving multicenter analytics while improving clinical insight. Overall, this work illustrates a technological innovation in multicenter healthcare research, showing that privacy-conscious approaches can unlock the potential of real-world data across institutions without compromising ethical or legal standards.

Eric Boersma - Professor of Clinical Epidemiology, Erasmus MC

Isabelle Kardys, Erasmus MC

Jannick Dorresteijn, University Medical Center (UMC) Utrecht team

UMC Utrecht's role in the Secur-e-Health consortium

At UMC Utrecht we are proud to be part of the Secur-e-Health consortium, which brings together hospitals, researchers, insurers, and technology partners to explore new ways of working with health data securely. Our main contribution lies in combining patient information from our hospital records with outcome data from our insurance partner Achmea, without actually sharing sensitive details. This became possible thanks to the consortium's multi-party computation (MPC) infrastructure — a privacy-preserving method that allows joint analyses while keeping everyone's data safe.

During the past years, our team focused on identifying patients with cardiovascular disease in our electronic health records and linking these securely with insurance data. This collaboration has allowed us to "recalibrate" a widely used cardiovascular risk model so that it better reflects the outcomes of our own patient population. In simple terms: we can now provide more accurate estimates of future health risks for people treated at UMC Utrecht, which in turn may support doctors and patients in making better-informed treatment decisions.

For us, the project demonstrates how powerful cross-sector collaboration can be. It is inspiring to see how medical, technical, and legal experts join forces to solve challenges that none of us could tackle alone. We believe Secur-e-Health shows the way forward: using advanced technology to unlock the value of health data while fully respecting privacy.

We look forward to the next steps and to continuing this exciting journey with all consortium partners.

Jannick Dorresteijn, University Medical Center (UMC) Utrecht team

Building Trust in Health Data – VTT's Role in Secur-e-Health

At VTT, our journey in the Secur-e-Health project was about more than just technology. It has been about trust. As Finnish consortium national coordinator, we've worked alongside a diverse international consortium to tackle one of healthcare's most pressing challenges: how to use sensitive health data responsibly, securely, and effectively.

Our team's focus has been on enabling secure, decentralized data analysis. This means developing ways for hospitals and research institutions to collaborate without ever needing to move or expose patient data. Through federated learning and privacy-preserving techniques, we've helped build a system where insights can be shared, but data stays protected.

A concrete example is our work on a federated cardiovascular disease (CVD) prediction model. VTT has led the technical implementation of a prototype where CVD risk models are trained collaboratively across multiple sites, without centralizing patient data. This approach allows us to combine the strengths of local datasets while maintaining strict privacy and regulatory compliance. We have also contributed to simulation studies and technical validation, ensuring the model's robustness and real-world applicability.

One of the most rewarding aspects has been seeing how technical innovation can align with ethical responsibility. From modeling disease recurrence to integrating homomorphic encryption, our work has shown that it's possible to advance AI in healthcare without compromising privacy.

We're proud to highlight the contributions of our VTT team members: Gaurang Sharma, Juha Pajula, Jaakko Lähteenmäki, Khaoula El Mekkaoui, Visa Vallivaara, Markus Rautell, Aada Illikainen, Antti Väänänen and Mika Hilvo—each bringing unique expertise to the project.

Antti Väänänen, Senior Scientist, VTT Technical Research Centre of Finland

Local Computation, External Code

Amsterdam UMC proudly participated in the Secur-e-Health project, a pioneering initiative focused on developing privacy-enhanced technology for secure medical data exchange. The hospital's role was instrumental in shaping practical clinical use cases and evaluating cutting-edge technologies to ensure they met real-world healthcare needs.

A key achievement was the successful implementation of local computations of flow within the left atrium of the heart, which was realized in a secure environment where medical data remained locally stored at Amsterdam UMC while computational code originated from outside partners in Barcelona. This innovative approach preserved patient privacy by minimizing data transfer, demonstrating how advanced privacy-preserving techniques can be applied effectively in a clinical setting.

Throughout the project, Amsterdam UMC also dedicated significant effort to addressing legal and ethical considerations surrounding patient data exchange. We collaborated closely with legal experts and ethicists to establish frameworks that safeguard patient privacy while enabling essential data sharing for improved care. This comprehensive approach helped build trust with patients and stakeholders alike, ensuring compliance with data protection regulations.

The project not only enhanced technical capabilities but also fostered a culture of responsible data management. By successfully integrating privacy-preserving computations into clinical workflows, Amsterdam UMC demonstrated its major role in digital health innovation and ethical data stewardship.

Overall, the participation in Secur-e-Health has positioned Amsterdam UMC as a model for secure and ethical health data exchange, paving the way for future advancements in patient-centered, privacy-preserving healthcare solutions.

Henk Marquering - Professor of Radiology, in particular Translational Artificial Intelligence, Amsterdam UMC

Harnessing AI and Real-World Data for Smarter Cardiovascular Care

Success Clinic is Finland's leading pharmaceutical market research company, providing data-driven insights to customers across the Nordic region. By combining real-world healthcare data with advanced analytics, the company helps pharmaceutical companies and healthcare organisations make informed decisions. Its services range from tailored studies to e-training and consulting, supporting innovation across nearly all therapeutic areas.

Since March 2023, Success Clinic has been part of the international ITEA Secur-e-Health project, contributing to the Finnish use case focused on cardiovascular disease. The company played a key role in gathering, harmonising, and analysing cardiovascular data from national health registries. Working closely with VTT, Success Clinic ensured that the data was made securely available to other project partners in a privacy-preserving manner.

A major achievement has been the development of AI and machine learning models to predict cardiovascular disease risks, design optimal treatment paths, and generate synthetic data for research without compromising patient privacy. These models include algorithms that forecast the likelihood and timing of cardiovascular events, offering powerful tools to prevent disease progression and hospital readmissions. Importantly, predictive solutions are already being integrated into partner platforms such as Mediconsult, embedding innovation directly into the patient journey.

In parallel, Success Clinic hosted a master's thesis project published in February 2025 and has actively contributed to European discussions on health data governance, including Findata and the European Health Data Spaces.

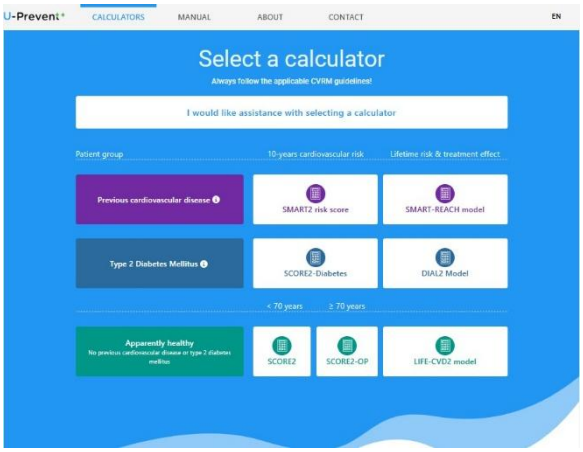
If you want to go deeper, please use the link below to read the master thesis written by Ripatti, Vili

https://aaltodoc.aalto.fi/items/56bf87d5-925d-4ee4-a437-239bb3c113cd

Ornela Bardhi - Head of Data Science, Success Clinic

Clinical Decision Support & EHR Integration

U-Prevent Matures



U-Prevent is a software as a medical device (SaMD) designed to support healthcare professionals in clinical decision-making for patients at risk of developing, or redeveloping, cardiovascular disease. Utilizing patient-specific characteristics and medical data, U-Prevent calculators estimate individual risk profiles and supports appropriate treatment selection showing the risk reduction effects. This enables care professionals to engage in shared decision-making with their patients, fostering personalized medicine by increasing risk awareness and clarifying the potential effects of different treatments. Before the Secur-e-Health project U-Prevent could be accessed for free on the internet. In Secur-e-Health ORTEC accomplished:

- U-Prevent Connect: U-Prevent Connect seamlessly integrates U-Prevent with electronic patient record systems, enabling physicians to automatically prepopulate patient data in U-Prevent at the start of each consultation. This integration streamlines workflow, saves valuable time, and significantly reduces the risk of manual data entry errors. U-Prevent Connect is now available as a subscription service.
- U-Prevent Premium: The previously freely accessible website has been upgraded to U-Prevent Premium, available exclusively to registered healthcare professionals. This transition enables the introduction of a fair-use subscription policy, ensuring high-quality service for regular users. Occasional or incidental users will still have access to U-Prevent free of charge.
- SMART2 Local Tuning: The SMART2 calculator use-case demonstrated the ability to refine algorithms using local data in a privacy-enhancing manner, without requiring significant changes to the medical device. This approach allows hospitals with unique patient populations to benefit from optimized risk assessments algorithms at commercially viable costs.

The Secur-e-health project helped to mature U-Prevent. Now ready for commercialization.

MENNO BRANDJES - DIRECTOR ORTEC LOGIQCARE, ORTEC BV

Predictive Risk Models Integrated into Saga HER

As part of the Secur-e-Health project, Mediconsult has successfully developed and integrated advanced predictive health models into the Saga Electronic Health Record (EHR) system. These models provide clinicians with powerful decision-support tools to assess patient risks directly during care.

Three predictive models have been embedded into Saga EHR:

- SCORE2 / SCORE2-OP: Estimates 10-year risk of cardiovascular disease.
- FINRISK: Calculates the likelihood of heart attack or stroke within 10 years.
- Life expectancy model: Developed by Success Clinic, offering a patient-specific estimate of life expectancy to support prevention and long-term care planning.

The integration of these models means that doctors can now view risk assessments as part of the patient's health record, enabling more personalized and preventive care. Instead of relying solely on clinical judgement or separate tools, clinicians receive clear, evidence-based insights in real time, improving both efficiency and patient outcomes.

This achievement was made possible through close collaboration between Success Clinic and Mediconsult. Success Clinic contributed the novel life expectancy model, while Mediconsult ensured seamless technical integration of all models into Saga EHR.

In parallel and together with VTT, Mediconsult established a federated learning environment. This approach makes it possible to train AI models directly within local health record systems without transferring patient data. Mediconsult contributed by providing the technical infrastructure, ensuring that the models can be tested in a secure, real-world healthcare setting.

By embedding predictive analytics into everyday clinical workflows, the project demonstrates how digital health innovation can move from research to practice, ultimately supporting better healthcare decisions across Finland and beyond.

#EHR #predictivehealthcare #cardiovascularrisk #digitalhealth #AIinmedicine

Ville Salaspuro - Medical Director, Mediconsult Oy

Petri Alhainen - Project Manager, Mediconsult Oy

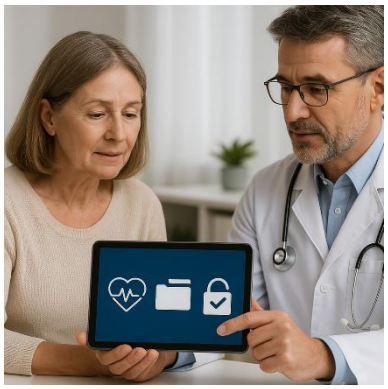
In collaboration with Success Clinic Oy and VTT

Building Trustworthy Infrastructures for Cross-Organizational Health Data Sharing

A key ambition of the Secur-e-Health project is to enable secure and privacy-preserving health data analysis across organizations. Much medical data remains siloed, limiting its potential for predictive models and better care. MEDrecord, a Dutch SME and provider of digital health platforms, has taken important steps during this reporting period to address these challenges.

Compliance and interoperability

MEDrecord reinforced its ISO 27001 and NEN 7512–certified infrastructure and introduced standardized REST APIs for secure EHR integration. As one of six Dutch PGO (Personal Health Environment) providers with its MedSafe solution, it connects to over 8,400 healthcare institutes. MedMij certification ensures compliance with the national framework, while work with FHIR-based healthcare information building blocks prepares MEDrecord for the European Health Data Space (EHDS).



Privacy, consent, and agentic frameworks

Data protection remains central. MEDrecord upgraded consent management and encryption protocols, ensuring GDPR compliance and patient trust. In parallel, it is developing an innovative agentic framework by building an Agentic shell around each FHIR-based backend, powered by its own MCP (Model Context Protocol). This enables intelligent agents to interact securely with healthcare data while respecting interoperability and security standards.

Toward collaborative innovation

These developments enable large-scale, privacy-preserving collaboration. Institutions can exchange encrypted insights without transferring raw data, lowering risk while ensuring reproducible research. This advances predictive modeling, earlier diagnosis, and personalized treatment. By uniting compliance, interoperability, and trust, MEDrecord supports Secur-e-Health's mission and prepares for wider European adoption.

Deniz Alara Yazgan - Project Coordinator, MEDrecord

Jan-Marc Verlinden, MEDRecord

Joanna Morozowska – Project Manager, MEDRecord

Devices, Surgery & Rehabilitation

Bittium MedicalSuite - MDR Approved Remote Monitoring Service Platform

- Bittium Enhances Healthcare with Innovations in Remote Monitoring and Diagnostics

Bittium has taken significant steps to improve the efficiency and cost-effectiveness of healthcare by developing advanced remote monitoring and diagnostics solutions. The company's medical technology business focuses on measuring and analyzing the electrical activity of the heart (ECG) and conducting Home Sleep Apnea Tests (HSAT).

As part of the Secur-e-Health project, Bittium has been researching authentication, identity management, and the use of the FHIR interface in selected use cases. Based on these studies, a cloud-based version of the Bittium MedicalSuite™ Remote Monitoring Service is now available to customers in selected countries. The platform's authentication relies on Single Sign-On (SSO) and Multi-Factor Authentication (MFA), ensuring secure and user-friendly access.

- CE-certification Confirms Compliance with Medical Device Regulation (MDR)

Bittium launched the cloud-based MedicalSuite platform following research and development conducted within the Secur-e-Health project. Platform two key components – the Bittium MedicalSuite Center and the Bittium MedicalSuite Mobile – have received EU Medical Device Regulation (MDR) certification, enabling commercialization across European markets.

- Bittium HolterPlus™ – Combining Traditional and Modern Cardiac Monitoring

The Bittium HolterPlus™ solution enables long-term remote cardiac monitoring by securely transferring ECG data and the patient's digital diary, recorded with the Bittium Faros™ device, via a mobile connection to the Bittium MedicalSuite™ platform. The data is analyzed using the Bittium Cardiac Navigator™ software, allowing cardiologists to review results remotely and provide the treating physician with follow-up instructions.

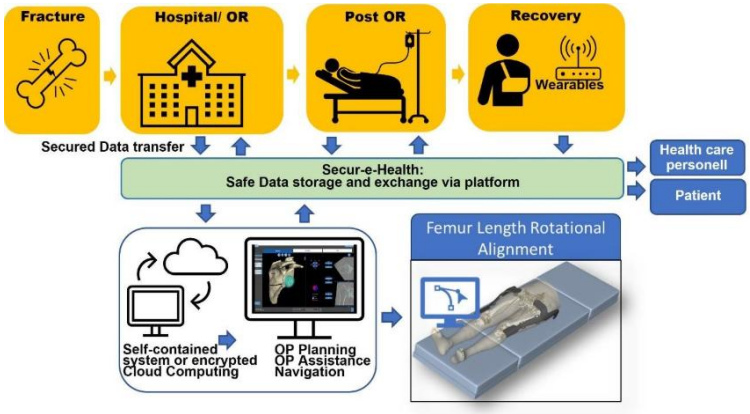
By integrating reliable cardiac monitoring with secure digital infrastructure, Bittium continues to advance connected healthcare and empower professionals with precise, data-driven insights.

Mika Tuomainen Product Manager – Medical Analytics, Bittium

Enabling a new level of fracture reconstruction via computer-assisted surgery system

As part of the ITEA project "Secur-e-Health" Stryker has contributed to a groundbreaking solution that enhances the treatment of complex bone fractures. Working alongside with the other German partners, OFFIS, Oncare and University clinics of Aachen on Smart Fracture Care, Stryker developed a computer-assisted surgery system that supports surgeons in reconstructing long bone fractures with greater precision.

Traditionally, trauma surgeons have had to rely heavily on experience and estimation, especially in emergency situations where planning is limited. This often leads to complications such as misalignment or leg length discrepancies. The new system changes that by using advanced imaging – X-rays and CT scans – to create detailed 3D models of the fractured bone. These models, combined with data from the healthy side and a proprietary bone database, guide the surgeon step-by-step through the procedure.



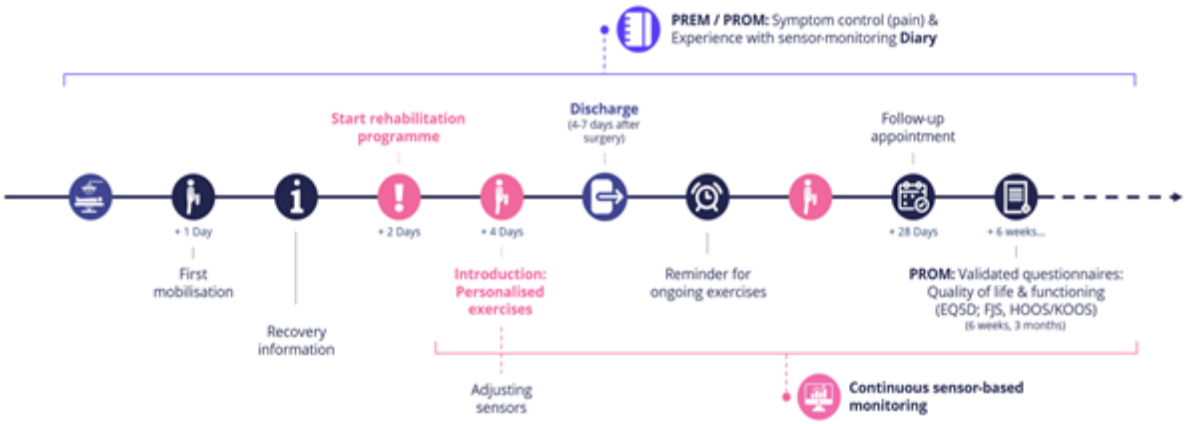
To tackle the clinical needs that are mentioned above, data from the patient must be recorded, stored and analysed to use them for the improvement of the treatment. All these patient data are sensitive and must be treated in a secure manner. Therefore, patient data security was a top priority. The system uses a security-by-design approach, ensuring sensitive information remains protected through encryption, anonymization, and secure access controls, e.g. via two factor authentication which can also be hooked up to security card systems like the Kelvin Zero security card.

Patients benefit from more personalized care, improved surgical outcomes, and better rehabilitation monitoring. The system also integrates with emerging digital health infrastructures like Germany's electronic patient file (ePA), paving the way for smarter, more connected healthcare.

Stryker's contribution to Smart Fracture Care marks a significant step toward safer, more effective trauma treatment – bringing digital innovation directly to the operating room.

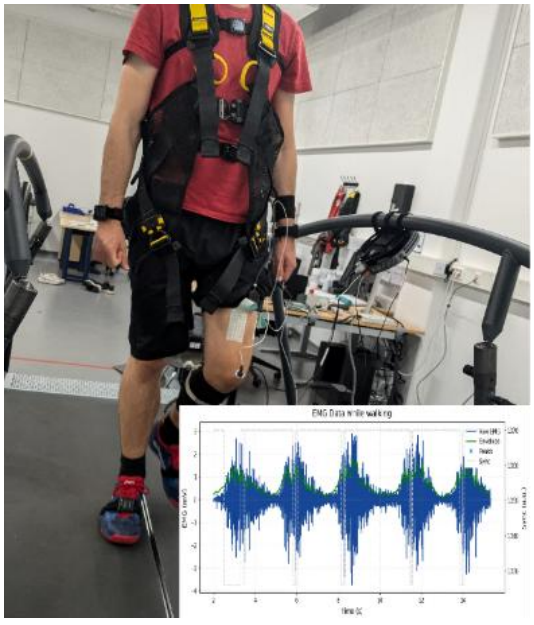
Dr. Ralf Schwanbeck, Sr. Lead Coordinator Innovation Research, Stryker

Enhancing the rehabilitation process to improve individual outcomes following lower limb fractures.



A broken leg or hip might heal in weeks - but recovery often takes much longer, and for many patients, it doesn't go as smoothly as it should. Gaps in communication, missing information, and non-personalised treatment can slow down or even hinder rehabilitation progress. That's why OFFIS and Oncare have joined forces to rethink the entire rehab journey - from hospital to full recovery - using cutting-edge sensor technology, a secure patient platform, and a truly patient-centred approach.

At OFFIS we developed a wearable device to monitor the rehabilitation process, and additionally we validated a secure, privacy-preserving approach for data acquisition, transmission, storage, and analysis. Additionally, we investigated the usability of electrical muscle signals to monitor rehabilitation progress, thereby contributing to fundamental research in this field.



At Oncare we provided the myoncare-platform (MDR, IIa-certified) with a browser-based frontend for healthcare professionals (HCP) and Apps for patients with integrated pathway technology to improve cross-sectoral communication and data-transfer. With the newly integrated analysis of the sensor data from OFFIS, displayed in the myoncare-dashboard, HCPs can monitor patient daily activities as well as adapt rehabilitation exercises to individual needs. And, of course, all data transfers, storages and displays are protected, with end-to-end encryption and user specific token-based authentication.

Thanks to the Smart Fracture Care project, OFFIS and Oncare have achieved a major step forward in personalised rehabilitation. By presenting the results of AI-driven analysis of sensor data and patient reported outcomes (PROM/PREM) through the myoncare platform, care teams receive a clear, daily picture of each patient's progress and limitations, enabling them to tailor therapy precisely to individual needs. This integrated approach allows patients to feel safer and more supported throughout their recovery - staying connected to their care team, receiving personalised guidance, and regaining mobility faster. At the same time, healthcare professionals across sectors have secure, GDPR-compliant access to all relevant data from the recovery phase, enabling easy and continuous care. This marks a significant leap toward smarter, more human-centred rehabilitation.

Finn Siegel - Researcher, OFFIS e.V. - Institut für Informatik

Dr. Sylvia Jung - Senior Projectmanager, Oncare GmbH

Clinical Insights on Non-Union Fractures

Being part of the Secur-e-Health project has been both professionally enriching and personally meaningful. As a representative of the University Hospital, our role as a clinical partner was crucial in bridging research with real-world patient care. Our main contribution focused on improving the understanding of non-union fractures, which remain a significant challenge in orthopedics. By providing clinical data, case studies, and patient outcomes, we supported the development and validation of new technologies aimed at advancing fracture healing and monitoring.

A key aspect of my involvement was ensuring that these insights informed the design and evaluation of innovative products. This collaboration allowed us to test and refine solutions in a clinical setting, ensuring they addressed genuine medical needs rather than theoretical assumptions. We also contributed to the exploration of AI approaches, offering clinical expertise to guide algorithm development. The potential of AI to support diagnosis, predict healing outcomes, and personalize treatment strategies became particularly clear throughout the project.

A personal takeaway has been the power of interdisciplinary collaboration. Engineers, data scientists, and clinicians worked side by side, and I saw how combining different perspectives accelerated progress beyond what any discipline could achieve alone. Reflecting on this, I see tremendous opportunities for the project to shape the future of digital health, particularly in creating smarter, safer, and more patient-centered solutions. Secur-e-Health has shown me not just what is possible, but what is urgently needed in modern healthcare.

Maximilian Praster - Head of Biomechanics and Modelling Division, UKAC

Explainable & Generative AI

Volumetric 3D Visualization of Explainable AI Confidence

As part of the Secure eHealth project, PS-tech enhanced its volumetric medical visualization application, Vesalius3D, to support the visualization of explainable AI (XAI) results. In collaboration with TU Eindhoven, PS-tech integrated confidence maps produced by XAI algorithms into the spatial context of the original medical data.

A confidence map is an overlay that indicates the degree to which each data point contributed to an AI-generated diagnosis. In 2D datasets, these points correspond to image pixels; in 3D datasets, they correspond to voxels within the reconstructed scan volume.

Vesalius3D now supports loading both 2D medical images and full 3D volumetric scans alongside their corresponding XAI confidence maps. This allows clinicians to gain direct insight into the reasoning behind the AI's diagnostic suggestions. Regions that positively influence the AI's decision are highlighted in shades of blue, while areas with a negative influence are shown in red.

By using Vesalius3D's powerful volumetric inspection, editing, and segmentation tools, users can closely examine both the original data and the confidence overlays. This capability enhances the interpretability of AI outputs and helps clinicians better understand the factors behind automated diagnostic conclusions.

Ultimately, these tools support medical professionals in evaluating the reliability of AI-generated diagnoses. By integrating explainability into the clinical workflow, Vesalius3D helps build trust in AI-driven methods and paves the way for responsible and effective AI adoption in healthcare.

Vesalius3D - 3D DICOM Viewer for Windows | High Quality 3D Medical Visualization

#VolumetricVisualization #explainableAI #MedicalVisualization #AI

Geoffrey Wielingen, PS-tech

Martijn Liem, PS-tech

Empowerment of the Secur-e-Health project for TU/e

Most rewarding aspects of our involvement in the Secur-e-Health project have been the opportunities to perform impactful research on a challenging scientific topic with high societal impact. The project allowed us to translate research on explainable AI (XAI) in healthcare into concrete educational and scientific outcomes. Additionally, through close supervision of bachelor's and master's students, we explored a range of research questions aligned with the project's vision such as the impact of federated learning on explainability in medical image analysis, the robustness of 3D XAI methods across domains, and the effects of data augmentation on interpretability. These not only provided meaningful learning experiences for us and students, but also resulted in publications contributing directly to the literature on XAI in healthcare.

The project also created a valuable context for collaboration. In particular, we worked with PS-Tech to combine our XAI methods with their 3D medical imaging visualization tools. This integration made it possible to present explainable AI outputs in a more intuitive and clinically aligned format. The collaboration not only expanded the technical dimension of our work but also offered direct insight into how visual explanations can better meet domain-specific expectations.

Another impactful outcome has been the successful launch of the XAI-NL Community, which is a national initiative connecting researchers and companies in the Netherlands who work on XAI. What started as a project-driven conversation is now an active, growing network with its own bi-annual meet-ups, an official webpage, and a LinkedIn presence. Beyond knowledge sharing, it has become a space where researchers and practitioners regularly exchange ideas, initiate collaborations, and collectively shape the future of XAI in healthcare and beyond.

Gizem Karagoz, eindhoven Univeristy of technology

Tanir Ozcelebi – Associate professor, eindhoven Univeristy of technology

Nirvana Meratnia – Professor, Eindhoven University of Technology

Secur-e-Health: Enhancing Patient Care with Secure AI

The Secur-e-Health project aims to revolutionize healthcare by addressing the challenge of fragmented and sensitive patient data. Solita's core contribution is a secure integration platform that connects diverse health data sources—from electronic health records and legacy systems to consumer IoT devices and other wearable technologies. This is achieved by utilizing standard libraries to enable secure and standardized data exchange. For example, a key part of our work involved creating a library to convert data from the EDF format to HL7 FHIR, which enables the platform to build a single, comprehensive view of a patient and significantly enhance care.

A key technical innovation is our on-premises Large Language Model (LLM) Retrieval-Augmented Generation (RAG) system. This solution uses Generative AI to distill complex patient records into clear and concise summaries. By keeping the LLM on-premises, we ensure sensitive data remains within a secure local environment. This approach provides healthcare professionals with powerful, context-aware insights, enabling them to make faster and more informed decisions. It allows providers to focus on direct patient care, enhancing both the quality of care and operational efficiency.

To build on this, we've also leveraged Federated Learning (FL) for secure, large-scale data analysis. This method enables collaborative model training across multiple institutions without requiring the sharing of raw patient data. In a successful technical trial, we demonstrated the feasibility of this approach. This trial proved our ability to securely use collective data to unlock powerful insights while upholding the highest standards of privacy.

Tuomas Granlund - RegOps Development Director, Solita Oy

Sari Kaari - Quality Manager, Solita Oy

Manu Setälä - Head of Research, Solita Oy

Secure Digital Identity & Market Adoption

Kelvin Zero – Advancing Privacy-Preserving Digital Identification and Passwordless Authentication

As both technical and project lead for Secur-e-Health, Kelvin Zero plays a central role in shaping the project's secure digital identity framework. Acting as national coordinator for the Canadian consortium, the company is deeply invested in ensuring that every component of the system meets the highest standards of security, scalability, and interoperability across geographies and use cases.

Kelvin Zero establishes privacy-preserving digital identification practices and strengthens authentication and authorization processes throughout the ecosystem. The company provides the system infrastructure that supports most of the project's technical foundations, including identification protocols, authentication schemes, integration with custom access controls, API standardization, and secure patient journey management.

Within the project, Kelvin Zero is developing a decentralized Digital Identification system that is portable and verifiable, using biometric ID cards compatible with smart card readers and mobile devices. This system integrates securely with Thales Luna 7 HSMs, ensuring robust cryptographic key management and backend protection.

In the Canadian use case, Kelvin Zero collaborates with the Montreal Heart Institute to deliver an integrated solution for site-less clinical trials, enabling remote identification, digital signatures, and seamless interoperability.

Kelvin Zero is proud to have contributed to Secur-e-Health alongside committed and expert partners. This collaboration has been an invaluable opportunity to help build a more secure and connected world, where health data can flow safely to address global healthcare challenges.

As passwords remain responsible for nearly 80% of all security breaches, Kelvin Zero continues its mission to promote a passwordless future, offering scalable, user-centric authentication solutions that protect every user with simplicity and strength.

Thierry St-Jacques-Gagnon – Co-founder CTO, Kelvin zéro

Alexandre Peyrot – Project manager, Kelvin Zéro

Wrap-Up – Toward a Secure and Connected Future for Healthcare

After three years of intense collaboration, the **Secur-e-Health** project stands as a clear demonstration of what can be achieved when experts from healthcare, technology, and research join forces around a common goal: enabling secure, privacy-preserving, and interoperable data exchange across Europe and beyond.

Through the combined efforts of **30 partners from 5 countries**, the consortium has delivered a comprehensive ecosystem that brings together **digital identity**, **data security**, **AI innovation**, and **clinical impact**. Each contribution, from secure infrastructures to explainable AI, from federated analytics to passwordless authentication, has strengthened the collective mission: to make health data flow safely and responsibly.

This magazine highlights the diversity and excellence of our partners and the tangible results of their work. It also marks an important milestone, as the project nears its conclusion in **December 2025**.

The journey does not end here. The technologies, frameworks, and partnerships built under Secur-e-Health will continue to evolve, driving the next generation of **secure, human-centered digital health solutions**. Together, we have proven that it is possible to protect privacy **and** unlock the power of data to improve healthcare outcomes.

Alexandre Peyrot – Project manager, Kelvin Zéro