ITEA 4

Project Profile

HeKDisco

From clinical to evidence-based medicine

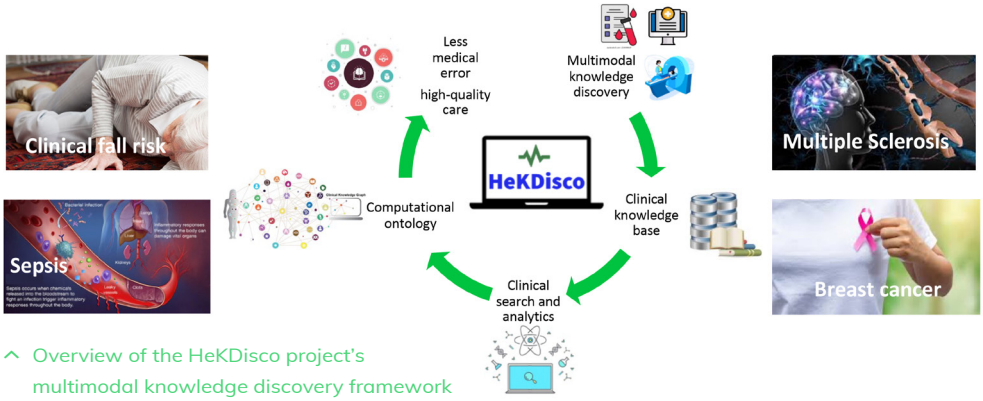
The ITEA project HeKDisco enhances health information systems with multimodal data processing and knowledge discovery, utilising standard medical information models and terminology systems. By integrating clinician experience, patient values & preferences and empirical clinical guidelines in a knowledge discovery process, HeKDisco will create a knowledge base for early diagnosis, innovative treatments, and outcome prediction.

Addressing the challenge

Clinical medicine (CM) relies mostly on the individual knowledge and skills of physicians, yet many treatments show different outcomes for different patient groups. Additionally, clinical ontologies are defined manually by health professionals at the cost of great human effort and time spent, especially given their high workloads and variety of domains. These factors combine to increase the risk of medical errors and adverse events, which occur in 8-12% of EU hospitalisations.

Proposed solutions

Evidence-based medicine (EBM) provides a solution by describing average results for patient groups, and HeKDisco (Health Knowledge Discovery) aims to utilise this in a novel knowledge discovery process for healthcare systems that provides physicians with reliable evidence on different treatment stages and clinical events. Multimodal data processing, knowledge discovery, and ontology platforms will be generated at a local level and combined in a centralised knowledge discovery platform that will obtain the statistical relations between medical interventions and outcomes on a high-level scale. To address privacy, the underlying AI will share analytical results, model parameters, and ontological concepts instead of individual medical data. HeKDisco utilises a common data model to represent observational patient data using standard medical and healthcare information models and terminology systems. AI algorithms will also be used for knowledge discovery and developing decision support systems based on a standardised common data model. Finally, a semantic distributed search engine will employ a data-driven computational ontology to identify relationships between descriptive and predictive knowledge parameters through an online platform.



Overview of the HeKDisco project's multimodal knowledge discovery framework

Projected results and impact

The HeKDisco project will develop several AI-based software applications based on a common data model for various purposes: (1) brain image quantification and tracking of multiple sclerosis (MS) disease progression; (2) extracting pathology parameters from histopathology images and reports; (3) extracting clinical parameters for sepsis; and (4) extracting sensor-based parameters for fall risk assessment. This will enable physicians to search for any clinical concept (such as diseases, therapies, side-effects, etc.) and receive information on its association with various clinical facets. This capability will primarily help create corrective action plans that minimise hospital visits, thereby improving the quality of life for patients and reducing healthcare costs. Moreover, the project addresses the market gap in healthcare knowledge discovery caused by strict data use agreements and complex access control on medical data. By proposing innovative solutions to deal with these challenges, HeKDisco will allow new services to be applied in the health data processing, health data analysis, and healthcare knowledge discovery & ontology markets, all of which are expected to grow considerably. Healthcare analytics, for example, is projected to be worth USD 75.1 billion by 2026, with a compound annual growth rate of 28.9%. Overall, strategies to reduce adverse healthcare-related events could prevent over 750,000 harm-inflicting errors per year, leading to more than 3.2 million fewer hospitalisation days, 260,000 fewer permanent disabilities, and 95,000 fewer deaths annually. HeKDisco intends to play a role in making this a reality.

Project partners

HeKDisco
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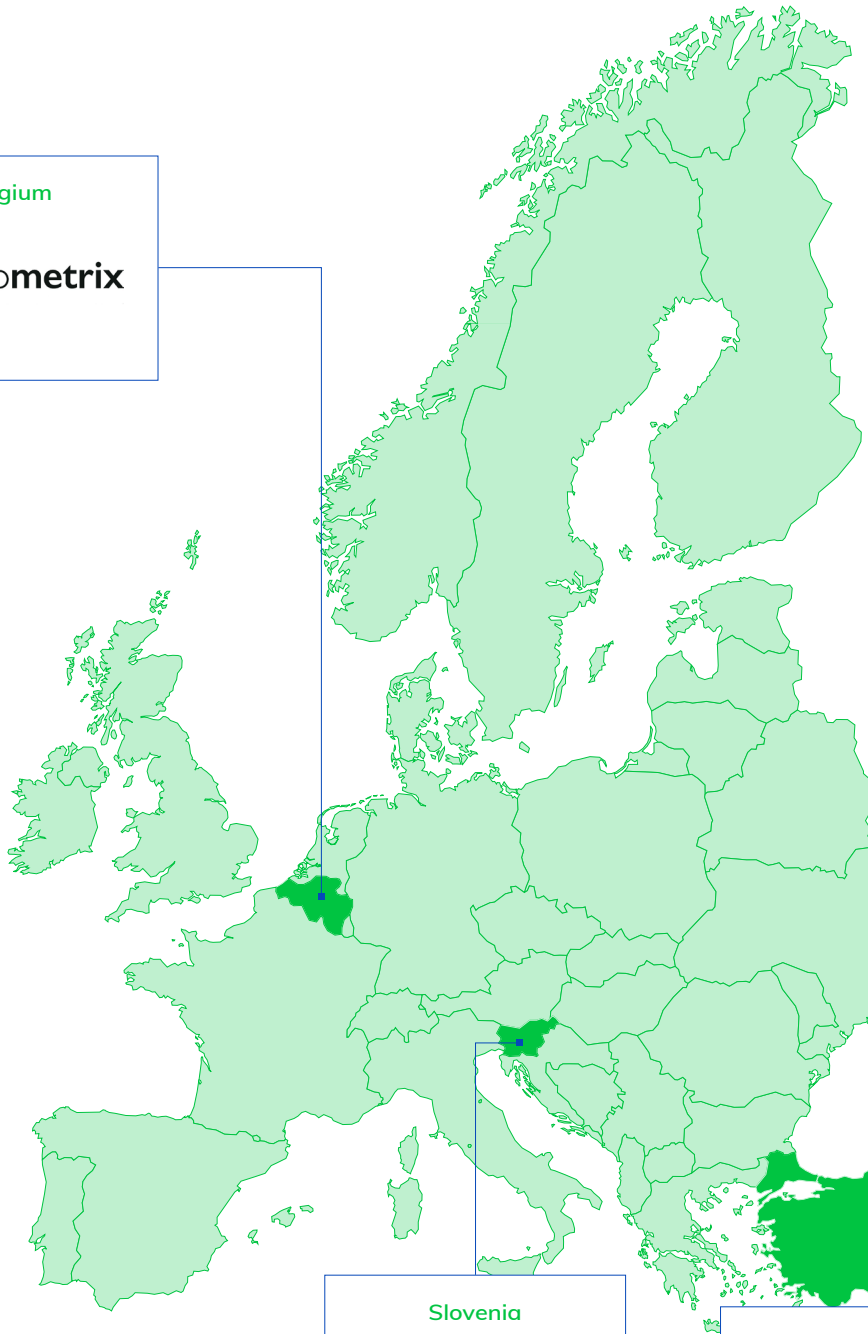

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TÜBİTAK

Project start
October 2021

Project end
January 2025

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