ITEA 4

Project Results

Winner
ITEA Award
of Excellence
2025

Business
impact

IWISH

Optimising the operating room

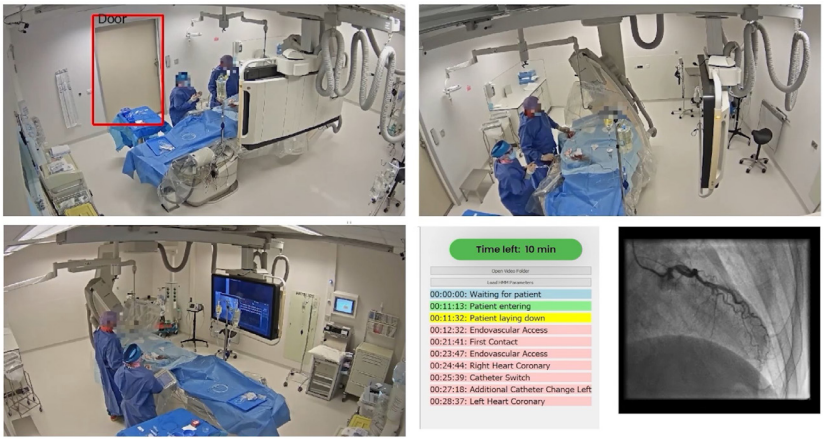
To address severe operating room (OR) inefficiencies, the ITEA project IWISH (Intelligent Workflow optimisation and Intuitive System interaction in Healthcare) investigated solutions for automated procedure tracking, scheduling optimisation, synthetic data generation and gaze tracking.

ORs are one of the most expensive areas of hospitals, costing around EUR 1,500 per hour. However, clinical procedure scheduling does not account for real-time status updates, while the dynamics and unpredictability of complex clinical procedures and a lack of insight into user experience each contribute to suboptimal use of staff and equipment. Given that there are over 25,000 ORs in Europe, each losing around 240 hours annually in changeover times alone, the estimated yearly costs of OR inefficiencies amount to a staggering EUR 9 billion.

Arising from the ITEA project IMPACT, which promoted automated data collection and artificial intelligence (AI) throughout the clinical pathway, IWISH focused on solutions to combine automated data gathering with AI-enabled data analytics applications. Notably, the project developed automated video-based tracking of staff or equipment to derive key events in a clinical procedure's progression. This can be used in tandem with scheduling optimisation software applications that support the staff responsible for scheduling multiple ORs in parallel, helping them deal with disturbances, delays and malfunctions. To supplement this, IWISH also worked on synthetic data generation and eye gaze tracking. By providing valuable insights into the clinical workflow, the project helped tackle the multidisciplinary time and resource constraints that reduce the efficiency of patient care.

Technology applied

To achieve automated procedure tracking, IWISH created a series of machine learning algorithms for intraoperative phase recognition, activity recognition across unobserved/untrained procedures, and the detection of performance gaps and risks. This allows for the scaling up of intraoperative tracking to ORs and the transformation of phase detection into procedure end-time prediction.



IWISH demo

With end-time prediction, the project demonstrated that real-time information collected during procedures can be translated into a key scheduling parameter. For scheduling optimisation, IWISH could thus develop an AI engine for elective appointment booking and dynamic procedure rescheduling based on unplanned events. Within the project, procedure tracking and scheduling optimisation were applied to four use-cases (gynaecology, cardiac catheterisation, laparoscopic gallbladder surgery, and intelligent OR resource allocation), providing a better understanding of the dynamics and variety of such procedures.

Outside of the OR, gaining access to the data needed to develop algorithms is a cumbersome task. As a result, it is expected that around 75% of business will use generative AI to create synthetic data by 2026, up from less than 5% in 2023. To support this, IWISH helped develop the Syntho Engine, a scalable, mature synthetic data generation platform that is well-suited to clinical data and combines all available data generation methods in one place for maximum speed and minimal clicks. Finally, the project provided a foundation for future research on gaze tracking, identifying the current limitations on its use in more dynamic procedures while demonstrating its potential in calmer settings like radiology.

Making the difference

Through its work on a wide range of approaches to OR optimisation, IWISH has provided a rich foundation for further research and commercial exploitation. For automated procedure tracking, the project has improved the performance of machine learning algorithms for

intraoperative phase recognition from 70-90% to a consistent 90%. When faced with unobserved or untrained procedures, the algorithms for activity recognition also achieve comparable pose tracking – up from as low as 4% accuracy at the start of the project. Together, these factors enable the real-time detection of delays, and have helped IWISH to achieve a 36% improvement in the number of procedures completed close to the predicted end time.

Synthetic data is increasingly important to healthcare because of both its ease of access and its avoidance of patient privacy infringement. With the Syntho Engine, IWISH has made an important contribution to this: the time taken to access data for AI or analytics has dropped from between four weeks and four months to almost immediate. Additionally, the project validated this synthetic data versus real-world data and achieved a negligible performance drop of just 0.6%. The company Syntho has therefore been able to release the engine as a license-based product and is working to expand it to other industries such as finance and governance. In the process, their involvement in IWISH has allowed them to grow from three to 15 employees.

The future

Having deployed IWISH solutions in multiple hospitals, thereby demonstrating strong scalability, the next step for the partners is continued research to exploit the results as internal or commercial tools. For example, Barco aims for the first release of products with built-in gaze tracking support by the end of 2028, while Philips will implement and test IWISH technologies integrated with their X-ray imaging system in cooperation with clinical partners. At the consortium level, follow-up research may include further work on video-based tracking, situational awareness and clinical intelligence. Given the strong involvement of end users throughout IWISH, its outcomes will reach clinical practice over the years to come, helping to make optimised OR procedures a reality and thereby contribute to a reduction in the enormous costs of healthcare.

Major project outcomes

Dissemination

- 11 publications and 19 presentations at conferences/fairs

Exploitation (so far)

New products:

- Syntho Engine 3.0: Platform for AI-generated synthetic data featuring seamless deployment at customer's secure environment
- Surgical operation scheduling tool: Prototype application to minimise patient waiting times, maximise operating room utilisation, and enhanced overall efficiency
- Procedure scheduling optimizer: AI-supported software application that predicts durations and optimises the scheduling of clinical procedures

New service:

- Activity Analysis AI engine: AI-enabled application to derive activities from "stick figure" output from secure camera processing software

New systems:

- Software for enhanced surgical data accuracy with image blurring and labeling, improving AI model predictions, and supporting precise surgical planning
- Video-based workflow analysis: AI-enabled application to automatically recognise key events and clinical phases in catheterization procedures

Standardisation

- Participation in relevant IEC and ISO committees, e.g. IEC 62 Software Network and Artificial Intelligence Advisory Group
- Involvement in IEEE Standards Association working group to establish synthetic data privacy and accuracy standards
- Contribution to United Nations Economic Commission for Europe (UNECE) working group on synthetic data, resulting in publication 'Synthetic Data for Official Statistics - A Starter Guide'.

ITEA is the Eureka RD&I Cluster on software innovation, enabling a large international community of large industry, SMEs, start-ups, academia and customer organisations, to collaborate in funded projects that turn innovative ideas into new businesses, jobs, economic growth and benefits for society. ITEA is part of the Eureka Clusters Programme (ECP).

https://itea4.org

IWISH

AI2021-066

Partners

Belgium

- Barco

The Netherlands

- Almende
- Delft University of Technology
- Leiden University Medical Center
- Philips Electronics Nederland BV
- Philips Medical Systems Nederland
- Syntho

Singapore

- Workforce Optimizer

Türkiye

- ARD GROUP
- CONSULTECH DANIŞMANLIK
- MIA Teknoloji
- Özel Bandırma Royal Hastanesi ve Sağlık Hizmetleri

Project start

February 2022

Project end

April 2025

Project leader

Robert Hofsink, Philips Medical Systems Nederland

Project email

robert.hofsink@philips.com

Project website

https://itea4.org/project/iwish.html