Success story

IMPACT

Transforming healthcare with intelligence-based innovations

The global healthcare sector is facing immense pressure. Increasing patient demand, limited staff capacity, and the need for cost-effective solutions create a complex landscape that calls for innovation. Traditional evidence-based healthcare, while effective, often involves labour-intensive data processing steps, resulting in inefficiencies.

Therefore the 14 project partners from the ITEA project IMPACT (Intelligence-based iMprovement of Personalised treatment And Clinical workflow support) introduced a revolutionary shift from evidence-based to intelligence-based healthcare. This transition was designed to enhance patient quality of life and improve public health but also to reduce costs and improve the working experience for care providers. By leveraging data intelligence, IMPACT has unlocked new possibilities in personalised diagnosis and treatment planning, minimally-invasive and robotic-assisted surgery, and clinical workflow optimisation.

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Project start
October 2018

Project end
September 2021

Project leader
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More information
https://itea4.org/project/impact.html

Taking healthcare to the next level of data intelligence

Building on a series of successful ITEA projects going back to 2010, IMPACT takes the healthcare domain to the next level of data intelligence. The IMPACT project began with the identification of two healthcare trends: personalisation and robotic assistance. Personalised treatment planning, combined with advanced robotic systems, enables minimally invasive procedures that enhance precision and improve patient recovery times, ultimately leading to workflow optimisation and efficiency. However, for these innovations to be successful, seamless data integration was crucial.

IMPACT focused on data intelligence by incorporating medical imaging data into data lakes and the automation of labour-intensive processing steps like image segmentation. By doing so, patient and imaging data could be efficiently used for diagnosis and personal treatment planning, which traditionally involve large amounts of manual work.

IMPACT addressed these real-world clinical challenges in three uses-cases: cardiac treatment, liver oncology and brain oncology:

- **Cardiac treatment**: The development of FEops' HEARTguide, a simulation tool for virtual device deployment, revolutionised preoperative planning, reducing procedural time and increasing accuracy.
- **Brain oncology**: The project accelerated image acquisition, segmentation, and treatment planning.
- **Liver oncology**: Robotic-assisted control was not yet integrated, but shows promising results for the future with e.g. real-time motion compensation for breathing, leading to improved needle placement accuracy for tumour treatments.

By introducing Philips' efficiency dashboards integrating multiple data sources, NewCompliance's automatic performance improvement analysis, and Barco's application-agnostic multi-modality display system which calibrates multiple image modalities according to the clinical case, the project successfully streamlined operations at various levels, from the operating table to entire hospital departments.

Improving time efficiency, accuracy, and overall healthcare workflows

Overall, IMPACT has demonstrated remarkable success in improving time efficiency, accuracy, and overall healthcare workflows. FEops HEARTguide significantly reduced procedure times by 30%, cutting the use of x-ray contrast agents by 25% and lowering radiation exposure by 14%. In brain oncology, the segmentation planning time for brain metastases has been halved, reducing from 60 minutes to 30 minutes, while MRI acquisition times have decreased significantly to just 6-8 minutes. In terms of accuracy, tumour visibility during surgery has been improved, allowing for a 20% reduction in the required excision margin, thus preserving more healthy tissue. Breathing motion compensation has also contributed to better needle placement precision, reducing the need for additional iterations. Moreover, workflow optimisation has been enhanced through innovations such as video-based tracking technology that maintains patient privacy through automatic face-blurring, as well as advanced 3D models that facilitate real-time segmentation, ultimately improving robotic-assisted surgery effectiveness.

Real-world exploitation

IMPACT has already begun real-world exploitation, securing a foothold in the rapidly expanding healthcare IT market, valued at approximately USD 280.25 billion. The 25 new products, services and systems include Quantib's CE-certified micro-bleeding detection and SyntheticMR's improved MR quantification method, both of which have demonstrated compatibility with the major MRI imaging equipment vendors.

Following the success of the IMPACT project, the partnership between SyntheticMR and Philips has continued to grow. Together, the companies now offer Smart Quant 2D and 3D - a powerful combination of SyntheticMR's SyMRI and Philips' SmartSpeed - designed to significantly enhance imaging speed, efficiency, and accuracy. The 2D version is already offered to customers world-wide and SyMRI 3D has now secured regulatory approvals in the US, EU, and Japan, with a full roll-out on Philips 3T systems planned for 2025.

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FEops has signed a contract for preoperative planning of 2,000 patients with a TAVI manufacturer and released the Left Atrial Appendage Occlusion (LAAO) workflow to the market. The number of LAAO procedures that were planned using FEops HEARTguide has grown by more than 700% since 2020. There was also a significant impact on the number of employees in FEops, which nearly doubled since the start of the IMPACT project.

In terms of access to new domains, Swedish SME Inovia has extended their data lake towards medical imaging data, thereby integrating information which was siloed or stored in different formats into one data source.

For Philips, the results of the IMPACT project have found a continuation in new collaborative projects such as ASSIST and IWISH, focussing on the development of data/AI-enabled applications to simplify workflows and optimise efficiency in Image Guided Therapy procedures. Through a digital co-creation environment, clinical partners are closely involved in the development of such innovative imaging applications, with the aim to integrate them in the Philips Azurion imaging platform.

At Barco, the outcomes of the ITEA IMPACT project have been successfully translated into advanced functionalities that enhance both the Barco Nexxis platform and the Intuitive Workflow Tools (IWT). These innovations have contributed to more streamlined surgical workflows and greater flexibility in diagnostic imaging configurations - ultimately supporting better clinical outcomes and user experiences.

Across the consortium, eight people were hired thanks to the project. and Quantib-U, a joint venture of Quantib and UMCU targeting AI for precision diagnosis was established. In 2022, Quantib was acquired by RadNet, a U.S. leader in diagnostic imaging services, and in 2023, became part of DeepHealth, RadNet's subsidiary and global leader in AI-powered health informatics. Technologies developed within the IMPACT project are now integrated into DeepHealth's Population Health portfolio which enables AI-powered large-scale diagnostics and screening programmes.

IMPACT's contributions extend beyond technological advancements to standardisation efforts, ensuring continued regulatory alignment and broader industry adoption. Project partners actively contribute to international working groups, including those on DICOM imaging standards, Intravascular OCT standardisation and validation, AI in medical devices, and IEC and ISO committees.

The next step

IMPACT's journey does not end here. With initial success paving the way, project partners have secured participation in follow-up initiatives, such as the ITEA project ASSIST and the Eureka Clusters Joint AI Call project IWISH. ASSIST develops technologies and solutions to get the physician back in control of the clinical procedure by assisting or automating part of the physician's tasks during image-guided therapy procedures, while IWISH develops solutions to optimise complex clinical procedures and integrate these into new or existing products.

By integrating innovative technology with practical healthcare applications, IMPACT has achieved an enormous success in optimising healthcare performance. As hospitals continue to embrace intelligence-based systems, the project's innovations will serve as a cornerstone for the future of precision medicine, ultimately improving quality of life for both patients and healthcare providers worldwide.