ITEA 2

INFORMATION TECHNOLOGY FOR EUROPEAN ADVANCEMENT

Project Profile

SoRTS
Making high quality of care affordable

According to the World Health Organisation, cancer will have surpassed heart disease as the world's leading killer by 2030. Cancer treatment is a 'growing business' in a number of cases; it is going from an acute to a chronic disease, significantly increasing the related healthcare cost. A study in the U.S. shows the direct costs of cancer approximating to 5% of all healthcare costs in 2020. Since cancer drugs are inefficient in 75% of the population, surgery often is unavoidable. This, combined with changes in demographics (aging world population) and staffing shortages, shows that there is a clear need for new methods to handle more patients within acceptable healthcare costs, while ensuring a high quality of care.

The ITEA 2 SoRTS project aims to increase productivity and effectiveness in cancer treatment and reduce patient risk by supporting healthcare professionals in the transition from invasive, open surgery to minimally invasive, image-guided intervention and treatment (IGIT). Such oncological treatments range from ablations such as RF, high intensity focused ultrasound and laser, to radiotherapy treatments such as brachytherapy and external beam therapy. Improved productivity and effectiveness in healthcare enabled by IGIT are expected to significantly lower healthcare costs due to shorter hospital stay and higher throughput.

REAL-TIME FEEDBACK

One of today's main IT challenges for IGIT is the availability of coupled real-time feedback of the imaging and therapy systems during interventions. SoRTS tackles this challenge by tailoring therapies to individual patients through linking imaging systems and therapeutic systems into image guided interventional systems for oncology. To provide the required architecture for adaptive real-time image guided therapies, SoRTS will develop a Real-time Therapeutic Procedure

MRI system with all attributes necessary for scanning

SoRTS
(ITEA 2 ~ 12026)

Partners
Elekta
Philips Healthcare
Technolution
Utrecht University Medical Center (UMC)

Countries involved
Finland
The Netherlands
Sweden

Project start
January 2014

Project end
December 2016

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Supervisor (RTPS) that allows real-time communication and supports heterogeneous algorithms, deployed on heterogeneous high-performance computing hardware including visualisation chains. Since the evolutionary roadmaps of hardware and software platforms are characterised by independent technology life cycles, algorithms and deployment strategies must be platform independent.

SoRTS will define a software architecture, in which application components can easily get access to input data and can share results. The envisaged architecture will maintain real-time acquired data cand state information, such as patient data, procedural parameters and planning data, in a central vault. The data in this vault is accessible in real-time by all components involved. The application components can be implemented as services transforming input data into output data. Such a service oriented architecture eases the development of new therapeutic procedures and other services and is therefore a major step towards an open innovation platform.

INTEGRATION IS KEY

A more intimate integration into a many-core hardware platform allows the exchange of more data,
including real-time reconstructed 3D images. This integration is relevant to all sorts of image-guided, real-time feedback systems, including medical applications, security and nanotechnology applications, and offers great prospects for dissemination and exploitation. Novel techniques such as real-time hypervisors will be used to combine the existing real-time systems into a single platform, meanwhile safeguarding the internal integrity of the components. Dynamic real-time resource management will allow the optimal use of available computer resources, thereby boosting the real-time system performance. The characteristic time scales on these real-time systems vary with orders of magnitude. A preferential approach that will be explored in SoRTS is to combine control systems on a shared hardware platform, while enabling the evolutionary migration into a tightly-coupled system.

SoRTS will demonstrate the real-time platform for three therapy systems: MRI-guided linear accelerator for tele-therapy, MRI-guided brachytherapy and MRI-guided HIFU therapy. Outcomes of the project are expected to significantly improve on current state-of-the-art for all three therapy systems.

MORE SCOPE, MORE VALUE ALL ROUND

The impact of SoRTS on imaging systems is expected to be significant. Real-time interfacing between MRI systems and MR-guided therapy systems will widen the application scope for MRI from diagnostic imaging to interventional imaging for therapy, which represents a significantly larger market. Philips will use the SoRTS innovations in embedded software to extend its range of interventional diagnostic imaging products. Within the project context, interventional MRI will take its first step from research tool towards a product for clinical practice thereby expanding the MRI market. The heterogeneous platform developed in SoRTS will allow the combination of a variety of imaging systems with a variety of therapeutic systems thus increasing value to the clinical customer. Image-based treatment control can be expected to further reduce hospitalisation stays and hospital visits. More accurate dose control will allow for better treatment and less side effects. Most of the larger European hospitals will be installing one or multiple of image-based treatment delivery systems in the coming decade. In all, this leads to an annual market opportunity of 50-100 MRI systems in Europe.

The partners will exploit the project results in several ways. The industrial partners will use the results in their future products for hospitals, with demonstrator experience leading to the delivery of products. These end systems will involve products from several companies, both large companies and SMEs. In addition, the applicability of the results will expand into other domains.
the development of embedded systems and thus reduce development time and cost, while improving product quality at the same time.

Building of the MR-Linac system at UMCU

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- ITEA 2 – Information Technology for European Advancement – is Europe's premier co-operative R&D programme driving pre-competitive research on embedded and distributed software-intensive systems and services. As a EUREKA strategic Cluster, we support co-ordinated national funding submissions and provide the link between those who provide finance, technology and software engineering. Our aim is to mobilise a total of 20,000 person-years over the full eight-year period of our programme from 2006 to 2013.

- ITEA 2-labelled projects are industry-driven initiatives building vital middleware and preparing standards to lay the foundations for the next generation of products, systems, appliances and services. Our programme results in real product innovation that boosts European competitiveness in a wide range of industries. Specifically, we play a key role in crucial application domains where software dominates, such as aerospace, automotive, consumer electronics, healthcare/medical systems and telecommunications.

- ITEA 2 projects involve complementary R&D from at least two companies in two countries. We issue annual Calls for Projects, evaluate projects and help bring research partners together. Our projects are open to partners from large industrial companies and small and medium-sized enterprises (SMEs) as well as public research institutes and universities.

EUREKA

SoRTS
(ITEA 2 - 12026) March 2015