ITEA Magazine

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ITEA4

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ITEA Magazine November 2022 — Number 43

ITEA is the Eureka Cluster on software innovation

Dear ITEA Community,

We were very happy to meet several of you at the 2022 ITEA PO Days and Family reunion, which were the first major physical events organised by ITEA in three years. It was a pleasure to be in Helsinki, to work together, celebrate the finalisation of ITEA 3 and the start of ITEA 4, and to get inspired by the ITEA Community.

The PO Days demonstrated the strength of the ITEA Community with the emergence of very good project ideas. The Public Authorities and the ITEA Office acknowledge the quality of these ideas. With this strong start, we are confident of receiving excellent Project Outlines on 15 November for ITEA Call 2022, the second Call of ITEA 4. This year the physical PO Days were complemented by some online events (PA presentations, project idea pitches) that enabled us to dedicate more time for networking and consortium building during the physical event. The experience of organising two online PO Days during the COVID pandemic has taught us to combine the best of the online and physical events.

The ITEA Family reunion was an opportunity to come back to ITEA 3 achievements and to look at the ITEA 4 challenges. It was a pleasure to have Rudolf Haggenmüller and Philippe Letellier, the former ITEA Chairman and Vice-chairman, sharing some of their memories. It was also a great opportunity to stress the importance of SMEs for ITEA, and several of them presented their story and their relationship with ITEA and the ITEA programme. Another session illustrated that to make ITEA a successful collaborative research programme, we need a diversity of profiles including Board representatives, Board Support Group and Steering Group members, Public Authority representatives, project leaders and mentors. All stakeholders of this rich ecosystem were on stage to deliver some strong messages about ITEA's history and future. To make ITEA 4 a success, we have been inspired by the keynote speech of Sietske Rozie, Radiologist M.D., and the visionary talk of ITEA Chairwoman Zeynep Sarılar on sustainable happiness.

This new edition of the ITEA Magazine continues to illustrate the health and richness of ITEA with articles presenting the successful projects ReVaMP2 and SPEAR (Eureka "Best Sustainability Innovation" Award winner), the fast exploitation of the PIANiSM project results by the Portuguese company Vizelpas, the testimonies of the Spanish Public Authority, Steering Group member Jos van Sas and the SME KE-works.

To conclude, I would like to stress the need to accelerate international cooperation on software innovation. Software will be a cornerstone in tackling the challenges of a sustainable future. Because of the complexity of the new systems we want to design, and the need to agree on the data semantics, an international approach is mandatory. I am confident ITEA will foster this international collaborative research.

I wish you a good read of this rich ITEA Magazine.

Jean-François Lavignon

Focus on Spain

Competitiveness through collaboration

The Centre for Technological Development and Innovation (CDTI) in Spain is a public business entity, under the auspices of the Spanish Ministry of Science and Innovation. Its goal is to promote innovation and technological development among Spanish companies, channelling requests for help and support to RD&I projects of Spanish companies at both national and international level. Here, Juana Sánchez Pérez of the Technology Cooperation Deputy Directorate explains how the CDTI contributes to improving the technological level of Spanish companies.

"We facilitate this improvement in various ways. Firstly, through technical-economic evaluation and public funding for innovation by way of subsidies or partially reimbursable funding of R&D projects developed by companies. Secondly, through management and promotion of Spanish participation in international technological cooperation programmes long with the promotion of the international transfer of business technology and support services for technological innovation. On top of this, we provide support for the creation and consolidation of technology-based companies."

Automation as a strategy
The Spanish business landscape is basically made up of small and medium-sized companies and, in particular, of micro-SMEs, companies with less than 10 employees. "The intelligent use of ICT constitutes an effective tool to improve the productivity and competitiveness of companies in a sustainable way, promote their growth and innovation, assist in their international expansion and contribute to the improvement of employment from both a quantitative and qualitative perspective," Juana explains. "Automation has become a strategic factor in the transformation of the production model and the economic recovery of Spain after the pandemic."

Committed to ICT
The ICT sector has been one of the fastest growing sectors in Spain over the last decade and has become a mature sector where prestigious companies lead projects in international markets. "Not only does the software sector in Spain reveal a very diverse landscape," Juana says, "but it is highly segmented with many SMEs struggling to stay in the market in a year that was quite complicated by COVID-19. But our commitment to the ICT sector is important. High connectivity and a qualified workforce in a diverse environment such as the EU make our country a good choice for ICT-based business projects. Consequently, the CDTI grants financial aid and facilitates access to third parties for the implementation of both national and international research and development projects. It also provides support to companies to develop in terms of international cooperation, for which it offers aid to innovation and technology transfer projects, its external network and multilateral cooperation projects, like Eureka and Iberoeka, as well as bilateral relations with Japan, China, South Korea, India, Brazil or Morocco, among others."

Technology boost
According to the large Spanish ICT business associations, the forthcoming regulations and investment will allow the definitive boost of new technologies, such as artificial intelligence, the cloud, cybersecurity, the advancement of quantum

ITEA provides strong support on improving the impact of each project, which is particularly important for us.

computing, 5G connectivity and the digitalisation of SMEs. In terms of digital transformation, the laws and decrees that are due to be approved in Spain will usher a change in business and social fabric in record time. "We see the relevant Spanish business associations coming together in highlighting specific technological trends, and the relevant investment projects that already exist in Spain in the new technologies mentioned earlier."

Aligned targets
"In the implementation of our internationalisation strategy for Spanish companies, Eureka is the main programme managed and financed by CDTI," Juana explains. "The Eureka Clusters Programme, in particular, is considered a very interesting option for our companies and it is well known among our communities. It offers the flexibility our companies need and it is aligned with our national priorities. The Eureka Clusters Programme offers, on the one hand, the expert guide from its Board to experienced companies and, on the other hand, the thoughtful and valuable support for those inexperienced companies.

ITEA, in particular, offers the additional support to our companies to stimulate the generation of RD&I project proposals where the whole value chain of the industry is involved. ITEA also provides strong support on improving the impact of each project, which is particularly important for us.
CDTI is very well aligned with the Eureka Clusters Programme. Both have common goals from the perspective of supporting companies to succeed with their international cooperative project ideas."

International collaboration is key
Juana champions the role of collaboration in aspects such as open innovation and globalisation. "It is clear that collaboration among all kinds of entities is needed to be competitive in today's market. The Eureka Cluster Programme environment has this collaborative calling and for the companies and research centres that

participate, there is a clear cooperative bi-lateral advantage. SMEs are able to take advantage of the tractor effect of the large industries – they provide access to large-scale projects and to global markets. In their turn, large industries benefit from the agility of SMEs to adapt to the continuous changes required from markets demands. Research organisations contribute by giving intelligence and best quality to those projects while companies accelerate the time to market for their project research. So, international projects in which collaboration is pivotal play a key role in the internationalisation strategy in Spain that is geared to improving the competitiveness of Spanish companies in attracting and participating in global markets."

More information
https://www.cdti.es

ACCURO

Coming back for more – the pull of ITEA

ACCURO Tecnologías de la Información is part of the altim® group, which has more than 20 years of experience in the market of new technologies. It was born out of a need to integrate projects of different typology to the SAP Core projects of altim® within the Middleware field. The goal of ACCURO is to create solutions characterised by innovation, creativity and quality that allow customers to improve their business processes. An important feature of the company is a social commitment to its environment and to values that are as valid for society as for the company: transparency, commitment and effort, and ensuring that the needs of customers are the needs of ACCURO.

Picking up the baton

Emilio Mulet, head of Digital Innovation at ACCURO and European Funding Associate Professor at ESADE Business School, is joined by colleague Irene Torrego Moreno, technical analyst, to outline the landscape in which ACCURO has recently been active, especially in an ITEA context. And it is here that Emilio begins. "In 2018, we embarked on our first publicly funded research project, which was POLDER. The idea to participate came about during the ITEA PO Days in Germany in 2017. It proved to be an odd participation because the promotor of the project, the Dutch research institute TNO, pulled out along with some other consortium partners due to funding issues and we found ourselves having to take responsibility for coordinating our very first ITEA project." POLDER, which recently underwent its final review, targeted

data reusability in the smart city. "So, we took up the baton and pushed ahead, supported by our Turkish, Finnish and Romanian consortium partners, and backed up by the ITEA organisation. Fortunately, we managed to involve several Spanish companies, and this ensured that we were able to fulfil the ambitions of the project. It was a tough task and a very good lesson for us."

Baptism of fire

An interesting development that Emilio alludes to is that during the POLDER project, the funding situation changed. "At the beginning, the Spanish funding was 50% but in 2019 this was reduced and replaced with funding plus loan. But having experienced the benefits of international cooperation, we feel it is still worth the investment since collaborative projects bring us a lot of knowledge and ideas that we would

otherwise not acquire on our own. Furthermore, the Technology Readiness Level (TRL) in ITEA is high. This is important for us because our innovation strategy is based on mid-term impact, two to three years, so that we can get the innovation to our clients. This is where ITEA and Eureka projects pay dividends for us." So, while ACCURO's introduction to the ITEA Community might be considered a baptism of fire, it has certainly proved a very positive one, judging from the success of POLDER and lessons learned.

Lessons learned

So, what are the lessons learned by ACCURO? "We learned about efficient support systems and IoT platforms, and this has become the pillar of our innovation strategy. The good thing about the project is that it is based on software in relation to hardware. It gave

For us the rewards of international collaboration in the ITEA Cluster are huge, much more than in other programmes. We keep coming back.

accuro
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us a lot of knowledge on hardware that we didn't have before. Now that we have gained expertise in this and in IoT platforms, we are able to build a bridge between hardware and software. This has brought about a massive change in our philosophy as a company because we didn't have a connection to hardware before." Not only this but also the very positive lessons learned translated to a desire to continue in more ITEA projects. One of which is that ACCURO is continuing as lead with the same partners as in POLDER. "We developed such a positive relationship with our consortium colleagues that it was almost a no-brainer to pool our resources in another project." This latest project aims to improve productivity with proactive maintenance, automated decisions and reduced downtimes, thereby cutting the planning process by some 60% and costs by 10%.

Coming back for more

"The original idea came from Türkiye," Emilio explains. "We have a great relationship now with our Turkish, Finnish and Portuguese partners. Along with Spain, we see a big commitment from these countries in ITEA projects. The Public Authority funding schemes seem to be well in place and you can see a bit of a shift in the axis in terms of country participation. For us the rewards of international collaboration in the ITEA Cluster are huge, much more than in other Clusters or programmes. We keep coming back."

At this point, Emilio's colleague, Irene, interjects. "The communication and coordination with ITEA is something we value greatly. Like the interim reviews where we discuss projects issues, get constructive comments and advice on how to improve, how to get more value from the cooperation and, very importantly, develop a project so that it reaches the market. These are all very useful, especially from a business perspective."

Strength in numbers

One point of concern for Emilio is the funding issue that seems to be affecting the participation of companies from certain countries. He cannot see a solution other than Eureka as a whole trying to exert its influence to help achieve some kind of compromise on public funding. "The big well known players of Eureka, like Germany and France, are less prominent nowadays. I know that German companies really want to participate but they come up against funding issues. That's a pity because they have so much to offer. On the other hand, the growing involvement of countries like South Korea and Canada in Eureka Clusters is a reason for optimism. I think it's a real gain getting these very mature economies on board, and I'm sure that we will reap the benefits from their involvement. They will make ITEA stronger as a ommunity, and us more competitive as a company."

More information
http://accuro.es

Success story

REVaMP²

REVaMP² enables profitable engineering of mass-customised products and services

More and more B2B and B2C products and services are obtaining leading market positions by becoming more software-intensive. You can think, for example, of cars and lawn mowers, which have completely transformed into cyber-physical systems that fulfil many more functions than they originally did. A big advantage of software-intensive systems and services is that they hold the key to mass customisation (which is almost a must nowadays) to create customer satisfaction, loyalty and trust. Software systems create and adapt to innovative market disruptions and customer desires far quicker and at lower costs than their less software-based competitors. However, they also raise new engineering challenges. In particular, they require more agile, round-trip engineering processes (that better leverage legacy assets) and more systematic and automated variability management. The first supplier to master this in a given market will hold a decisive competitive advantage.

Project start
November 2016

Project end
December 2019

Project leader
Andrey Sadovykh
Softeam, France

More information
https://www.revamp2-project.eu/

The ITEA project REVaMP², gathering 30 partners from Belgium, France, Germany, Spain and Sweden, has created the first comprehensive round-trip engineering automation platform and process to support extractive, bottom-up Product Line Approach adoption and maximise the reuse of legacy assets. An important innovation is a methodology to support Product Line Engineering, integrating the:
> **extraction** of a software-intensive product line and variability model from the legacy assets of implicitly related software system sets.
> multi-view **visualisation** of legacy assets, extracted variability models and product line assets.
> **verification** that a software-intensive product line satisfies a set of hard constraints such as safety restrictions.
> **refactoring** of a software-intensive product line to **optimise** soft constraints on the refactored assets and to **co-evolve** related assets such as software algorithms and the hardware architectures on which they run.

REVaMP² is therefore able to identify core functionalities and key variation points automatically. In doing so, it reinforces the shift from one-off product sale transactions towards service subscription packages.

Reducing time to market and manual effort

Promising technology results have already been seen by the consortium, including a reduction of Softeam's time to market for custom bundles from six weeks to three. Softeam has continued to work in product-line engineering research and established a collaboration with Volvo Construction Equipment for further joint work in this domain. This research is being continued in two research projects, MegaM@Rt and AIDOaRt. In addition, the sales of Softeam's Modelio product have had a steady annual growth of 35% for the last two years. The innovation resulting from the REVaMP² project has contributed to this success.

Project partner ABB uses parts of the REVaMP² tooling to ensure the source code quality of the frequency converter firmware. The tooling supports the development department in the continuous improvement and continuous development pipeline with automated checks regarding the software architecture to ensure that the customer features are correctly integrated in the firmware. Additionally, it reduces the manual effort in the development and maintenance of the firmware variants through automatic build script generation for the different firmware variants of ABB's frequency converters (ABB Drives).

New customers

As new types of software-intensive product line engineering spread across key economic sectors like manufacturing, transportation and healthcare, so too will the demand for toolchains like REVaMP². This has already resulted in 24 new or enhanced products, services and systems.

Siemens, for instance, has been able to fast-track the technology readiness level of product-line engineering support. Key results of REVaMP² are now integrated within the new Simcenter Studio product, released in 2021 as a stand-alone tool for early product design. Among these technology bricks are new solutions to compare product architectures and to integrate different modelling languages (including SysML v2 and the proprietary generative engineering language ACEL). The customer portfolio of the Simcenter product is rapidly increasing in the automotive and aerospace domain.

As part of REVaMP², MES has extended its static analysis tool MES M-XRAY with the detection and visualisation of architecture-relevant Simulink model components. New architectural analysis functionality allows the user to determine signal dependencies between selected model components. These enhancements have attracted customers from the automotive sector, including departments at an OEM and Tier 1 that were new to MES, and additional licences were sold.

REVaMP² will herald a new era of automatic development for variable products.

The Reuse Company has managed to integrate the whole REVaMP² project inside their commercial tool, SES ENGINEERING Studio: a software tool designed to orchestrate the development of all kinds of systems (hardware, hybrid, software). It allows interoperability between an unlimited number of existing systems engineering tools (requirements management, MBSE tools, simulation tools, risk management, RAMS management, MS Office, etc.). Thanks to the newly added REVaMP² component, they have sold licences of this tool to a European multinational aerospace company that was not included in the project consortium.

Together with Sirris, Macq worked on the ontology of assets and changed its development cycle into an ideation funnel process - a mechanism that allows the screening of a continuous stream of innovative ideas and prototypes for viability. Supported by new DevOps and testing teams, this resulted in a new series of smart mobility cameras connected to a now more modular smart mobility manager called M3. These cameras are used for speed control on routes and LEZ (Low Emision Zones). They increase road safety and improve particulate emissions in cities. Macq now has more product variants, which are easier to install. Currently, about 700 cameras of the new series have been sold to an increasing number of international customers.

In terms of human capital, 14 new positions were created across the consortium.

As REVaMP²'s results are domain-independent, dissemination will help the toolchain to spread to virtually any economic sector. In turn, this will herald a new era of automatic development for variable products, allowing organisations to affordably cater to niche markets and minorities in ways that were previously unimaginable.

Community Talk with **Jos van Sas**

The delights of being on the circle's edge

A pivotal year in Jos' career was 2002: not only did he join the Research & Innovation department of what is now Nokia Bell Labs, the innovation engine for Nokia, but he also took his seat on the ITEA Steering Group, where he still is proudly representing Nokia to this day and celebrates his 20 years of membership. A perfect opportunity to reflect on his business adventure and his path to ITEA.

A brief resumé: Although Josephus (Jos) van Sas was born in the Netherlands in 1964, at six months of age he moved with his parents to Belgium. Jos studied Electrical Engineering at the KU Leuven, gaining his PhD degree in 1992 following a four-year research project at the very large-scale integration (VLSI) System Design and Methodologies division of imec. During this period he gained a taste for collaborative research in the European Strategic Programme on Research in Information Technology (ESPRIT). In 1991 he joined Alcatel as a VLSI test engineer. In 2002 Jos continued his career with a step to Nokia Bell Labs, the innovation engine for Nokia. He is currently Director of External Affairs for Nokia Bell Labs Belgium and oversees the management and the coordination of R&D projects, playing a very active role in regional, national and European policy making on science, technology and innovation.

Broadening the scope

"Just a note to add that I also did an MBA after I began working at Alcatel. I did not learn a lot of management skills at university, and later I came to appreciate the management insight I acquired in my current position as Director of External Affairs where I am responsible for everything related to funded projects. My work takes place in a collaborative setting – with academia, customers, suppliers and so on. In fact, throughout the growth and change over the past two decades, I count myself fortunate to have had the opportunity to continue to develop my work in this field.

Looking back to when I was doing my PhD," Jos recalls, "I remember meeting some of the brilliant minds of Nokia Bell Labs and could not imagine that fifteen years later I would be part of that group. Six years ago my scope within Nokia Bell Labs broadened beyond the Belgian borders to take in collaboration with academia all over Europe. So, what I do today with respect to funding embraces the Nokia Bell Labs network worldwide. But despite this extra responsibility, as it were, I am still very much committed to my role in the ITEA Steering Group."

Casual coffee moments

Jos finds his role in ITEA very appealing "because it's bottom-up, industry driven and very flexible in the sense of bringing people together during events like the ITEA PO Days." Jos is disappointed he

was unable to make the ITEA PO Days in Helsinki this September due to the contraction of COVID within his family. "On the other hand, the COVID-19 'era' has also shown us how we can adapt. Meetings have been able to go ahead, albeit online, and goals have been achieved. This is true for our industry in general and of microelectronics in particular – and within ITEA. The collaborative spirit is still going strong although it's the casual moments – at dinner and the coffee machine – that are prominent by their absence. These are the moments when ideas are sometimes generated, and relationships cemented. It's no secret that, despite all the travel restriction gains for the environment and the wallet, we all miss these moments."

Changes are inevitable
Over the past 20 years Jos has seen many changes at ITEA, first and foremost in respect of the professionalisation that has taken place in the processes and procedures. "In the beginning the evaluation process, for example, was rather lightweight, with just a matter of six or seven

criteria and no more than a couple of A4s. With Philippe Letellier as Vice-chairman for an extended period came the development of a more rigorous and refined process. Another change I have witnessed," Jos says, "is the expansion of the 'family', with quite a lot of comings and goings. At least I have good company in Medur Sridharan who, like myself, has been around for more or less the same time. But every organisation needs fresh impetus, new visions and perspectives to maintain its dynamic. So, in that sense, change is a good thing. It provides a nice and necessary healthy internal balance. Then there's the funding, or rather the streamlining of the funding decisions. Not something that ITEA can really influence but it is worrying to see how certain countries and companies that were strong participants early on have become absentees due to a lack of public funding. Of course, two highly visible changes have taken place in recent years – the new Cluster Programme format and geographical expansion beyond Europe., like the Eureka Clusters AI Call and the

integration of project participants from Canada to South Korea. This expansion has led to real win-win situations, from both a cultural and technological perspective."

Serious hobby
It's certainly a much-changed landscape from 2002 and managing that complexity is a real challenge! But I can also say that I have had a lot of pleasure from ITEA in these two decades. Being on the edge of the corporate circle rather than inside it in my capacity as Director of External Affairs," Jos explains, "has given me the opportunity to interact with the 'outside world'. Going to other parties and players to see how they work and learn from them. 'Not invented here' is my motto. It brought me to ITEA in the first place and not only has it enriched me personally but my organisation, too. It also keeps me at the forefront of the latest state-of-the-art. I see my Steering Committee role as a serious hobby, borne out of desire not necessity." Long may it continue.

By and for end users

Vizelpas pushes predictive maintenance to the next level in the PIANiSM project

Predictive and prescriptive maintenance techniques can be used to achieve an end-to-end automated manufacturing process across markets as diverse as automotive and mining – but not without a sophisticated system encompassing new analytics techniques & algorithms, data identification & integration and modelling processes. And in the ITEA project PIANiSM (Predictive and Prescriptive Automation in Smart Manufacturing), Portuguese plastic film manufacturer Vizelpas has been working to make this a reality.

The perfect testbed
With 210 employees and 15,000 m² of space, including state-of-the-art industrial equipment and a fully equipped laboratory that monitors and supports industrial activity and product development, Vizelpas is an eminent specialist in the world of flexible films for the food and medical industries. This made it an ideal requirement provider for PIANiSM, for which it also served as a testbed for the developed technologies by lending part of its shopfloor to the testing and implementation of new technology. In doing so, it supplied production and equipment data for the development of the predictive maintenance algorithms and enhanced monitoring tools, providing manufacturing expertise and feedback as required – all with a high degree of interaction and strong spirit of collaboration within the consortium.

An invitation to join
For Vizelpas, this particular collaboration emerged from a long history of work with Portuguese manufacturing software development expert Sistrade in previous research projects. This close relationship is also underlined by the fact that Sistrade has served as Vizelpas' provider of production and maintenance systems for almost a decade. As PIANiSM's focus on the ambitious development of predictive maintenance and enhanced equipment monitoring solutions turned out to be highly aligned with Vizelpas' own needs and future roadmaps, accepting Sistrade's invitation to join the project was an easy decision.

Searching for actionable insights
In highly demanding market segments like food and medicine, these needs are largely twofold:

decreasing the equipment downtime and maintenance costs associated with production and improving the monitoring of equipment usage and operation with the aim to optimise production. In PIANiSM, the first step towards this was ensuring that Vizelpas could obtain the relevant data from their equipment. In spite of positive discussions with consortium partners and the involvement of Vizelpas' own production equipment providers to assess the possibilities, raw data from equipment proved insufficient. This needed to be further transformed into actionable insights in order to improve operations and maintenance decision-making.

Results at all levels

Such a result was achieved within the project via collaboration with Sistrade and Portuguese research institute ISEP, leading to a set of algorithms and tools that could provide predictive insights and reports on equipment usage and maintenance to improve Vizelpas' equipment awareness capabilities. A strong impact has since been felt at an operational level as the company has successfully improved both the mean time before failure (MTBF) and the time taken to repair equipment. Increasing the uptime of equipment means a greater ability to meet the demands of customers, with a knock-on reduction in maintenance costs and a smaller parts inventory. From a human perspective, this also allowed Vizelpas to divert human resources away from manual equipment control and maintenance to higher value tasks.

Increasing social capital

Of course, added value isn't just measured in tangible improvements to manufacturing and cost savings. By participating in a project with ITEA,

Vizelpas also highlights the opportunity to go beyond a one-to-one relationship with a partner and to take in contributions from the top level of R&D both nationally and internationally. Their involvement in PIANiSM allowed Vizelpas to apply and test solutions that were tailored to their own shopfloor while learning from partners with similar problems and contexts, thereby increasing their knowledge generation and integration in a manner which would be very difficult to accomplish alone. What's more, this proved possible in a notoriously difficult domain: while predictive maintenance is widely discussed by production companies, its implementation has seldom been satisfactory in the past.

Disrupting traditional maintenance

Beyond the immediate results of the project, Vizelpas also has high hopes for PIANiSM's impact on the wider world of manufacturing, where the introduction of predictive maintenance and equipment awareness approaches are key to improving sustainability – something that holds especially true for the plastic film industry in which high temperatures are a fact of life. But for Vizelpas and countless others in this field, the precise control of equipment conditions and the reduction of unforeseen downtimes mean less waste generation and decreased energy consumption. The subsequent decrease in carbon emissions is just one of many ways in which PIANiSM is disrupting the downsides to traditional maintenance and laying the foundation for a more positive future.

More information

https://itea4.org/project/pianism.html
https://vizelpas.pt/
Vizelpas UC video   →

SPEAR

A new approach to energy optimisation for industry

With the first global energy crisis ongoing, energy consumption and optimisation are very important concerns in today's life. This is true for households but definitely also for industrial players, as many of them are still using a lot of energy for their daily processes. However, in industrial plants, energy optimisation is impossible if there is no knowledge on how much energy is needed to perform a production process. And often, there is an unfortunate lack of energy measurement units integrated into real production systems.

By precisely calculating the energy consumption, industrial customers can save energy and thereby costs. Energy-intensive processes, for example, can be shifted to time windows where cheaper and sufficient energy is available. This plays a significant role in the use of renewable energies such as wind power or solar energy. To overcome this lack of energy consumption knowledge and to make energy optimisation truly accessible, a change is needed.

Flexible and highly generic optimisation platform
Luckily, the ITEA project SPEAR,

which successfully ran from 2017-2020 and gathered 22 partners from Germany, Portugal, Spain, Sweden and Türkiye, overcomes available energy optimisation challenges by means of a unique mechanism. Instead of using estimated or simplified models for simulation-based optimisation, the SPEAR solution makes use of real device-provided simulation models in order to produce highly accurate forecasts for the energy consumption of industrial production processes. The accuracy of these forecasts, together with the optimisation algorithms developed, enables a significant

reduction of energy consumption and costs.

SPEAR created a flexible and highly generic optimisation platform and did not focus on isolated industry sectors; a broad spectrum of application domains was supported, like production processes in common plants, production lines, buildings, hybrid drives, and wind turbine drive trains. The energy-specific optimisation of new and existing production plants during virtual commissioning and running production was also supported.

Through the smart selection of energy sources, the smart adaptation of process-relevant parameters and the reduction of power peaks, SPEAR has been able to reduce energy costs by roughly 10%

Project start
September 2017

Project end
September 2020

Project leader
Anton Georgiev Strahilov
EKS InTec GmbH, Germany

More information
https://spear-project.eu

Thanks to these great achievements, SPEAR received the Eureka Innovation Award for 'Best Sustainability Innovation' during the Eureka Global Innovation Summit in June 2022.

Digital twin and shadow
A central innovation of SPEAR is the mirroring of the energy consumption of the production plant by simulating extended behavioural models on low-cost hardware. This hardware is also used for embedded hardware-in-the-loop (HIL) simulations that run in parallel with the real plant so that the digital twin of a plant is extended with a digital shadow. This allows highly flexible and cost-effective approaches to be explored and implemented and the planning and execution of the production system to be optimised through accurate simulation of the production processes. This supports efforts such as Industry 4.0.

The project partners created digital models (called energy models) to represent the energy behaviour of each component in the production system, inputting real signals from the system's programmable logic controller (PLC) into a simulation environment in order to calculate its needs. The resulting energy profiles are linked to a model of the production system process to enable the relevant optimisation.

10% energy reduction
Energy optimisation is one of the grand challenges of today, so SPEAR's results must be placed within a larger context of both business and society. By helping companies to optimise their energy usage, SPEAR enables them to manage resources more effectively and increase their productivity in a sustainable manner. Through the smart selection of energy sources, the smart adaptation of process-relevant parameters and the reduction of power peaks, SPEAR has been able to reduce energy costs by roughly 10%.

Specifically, German SME project partner Reeb-Engineering has realised a service for simulation-based Automated Guided Vehicle (AGV) path planning while taking energy consumption into account. With the results of SPEAR and the experience gained in the field of virtual commissioning, Reeb-Engineering is able to already predict the energy consumption of an AGV during the development process of the vehicle. This prediction allows the optimisation of the battery size, the driving path, the charging time and ultimately the manufacturing and operating costs. After the completion of the project, they hired one new employee who is involved in this service. Furthermore, the knowledge gained in SPEAR has

opened up a completely new field of work in virtual commissioning for a wide range in industrial applications and thus a new business area that is becoming increasingly popular.

KANCA, one of the leading forging companies in Türkiye, has seen a decrease of 4 kWh/kg (8%) thanks to the project results and Atkas, a pioneer in the sector of air suspension system production, has improved its energy optimisation by 5%.

Swedish project partner and service provider ÅF has improved its service by being able to consider energy in the virtual commissioning of plants. This has provided ÅF with a unique selling point for its service over other competitors, allowing them to receive more orders, which in turn increases the value of their turnover.

Algoryx's AGX Dynamics simulation tool has been updated with a new module that can compute energy consumption. This has been used in several research projects that use AI together with the simulation software to create smart control and path planning, for which energy optimisation has been one of the objectives. The customers include users and manufacturers of different heavy machinery in areas like mining, forestry and construction - industries that have a lot of potential when it comes to reducing energy needs and lowering emissions.

Sensing & Control Systems (S&C), a Spanish SME, has integrated the SPEAR results into its proprietary commercial platform enControl™, extending it from smart homes to the industrial sector and incorporating novel functionalities and services created during project development for the management of ovens and other intensive energy-consuming machineries in related businesses. Thanks to this, S&C has three new industrial customers and was able to hire one additional staff member. S&C has also incorporated the Functional Mock-up Interface (FMI) industrial standard, which increased their reliability and reputation.

In addition to energy optimisation and business impact, several new employees and nine PhD students have been taken on across the consortium as a direct result of the SPEAR project.

Vital role in reducing CO_2 and the speed of climate change

SPEAR will allow companies of all sizes to reap such benefits by making its results available as free software prototypes. Further dissemination is taking place through the formation of two standards:

1. an interface description for optimisation algorithms based on the JSON data format and
2. an optimisation algorithm realised as a REST service.

In turn, this should allow for a greater uptake of renewable energies (such as solar and wind) which were previously difficult to optimise on a large scale due to their weather dependency. This gives SPEAR a vital role in reducing CO_2 emissions and slowing the speed of climate change throughout society as a whole.

Glancing back at the ITEA PO Days 2022 and Family reunion in Helsinki

Three days of familiar onsite inspiration and innovation

ITEA Call 2022 for project proposals was launched on 13 September 2022 in conjunction with the ITEA Project Outline Preparation Days (ITEA PO Days) in Helsinki on 13 and 14 September. After two years of meeting online, many were happy to finally reunite in real life. The Scandic Marina Congress Center in Helsinki provided a perfect backdrop to celebrate this occasion during the PO Days and the following ITEA Family reunion on 14 and 15 September.

Driving innovation face-to-face again

This year around 310 participants from 21 different countries registered for the online sessions of the ITEA PO Days and about 230 of them joined the event in person in Helsinki. After years of online conferences, many were happy to finally be back again and meet their possible collaboration partners face-to-face. It became clear that the companies and researchers attending not only represent the leading edge of software innovation, but they also form our thriving ITEA Community.

ITEA Chairwoman, Zeynep Sarılar, comments: "During the pandemic, we learnt many things such as the value of technology to keep seeing each other and the importance of physical meetings, especially with our families. Therefore, it was great to have the onsite ITEA PO Days and Family reunion in Helsinki this year to be able to meet and to collaborate in a physical environment."

most of the participants; 81% of the survey respondents indicated that it was a big success and another 18% felt that ITEA partly achieved in combining the best of both worlds, providing at the same time good suggestions to further improve for future events.

Mehrdad Saadatmand at RISE Research Institutes of Sweden expressed his view: "The ITEA PO Days, in general, serve as a great forum for representatives from various industries and market sectors as well as academic and research partners to come together, exchange ideas, and identify industrial research challenges and project topics that are of high impact. The ITEA PO Days 2022 event was of special importance since it was the first physical and in-person PO Days event after two years of having

with numerous very concrete projects in the pipeline.

Ramon Schiffelers, Public Private Partnerships Manager at ASML draws a positive conclusion from his premiere participation at the ITEA PO Days: "ITEA brought the best of the online and offline worlds together by providing an online event a few days before the PO Days in which most project ideas were pitched. Due to this there was more time available on the PO Days itself to brainstorm and to form consortia face-to-face. Together with one of our suppliers, we went to the PO Days equipped with (just) some ideas. At the end of the PO Days, there was a Project Outline, a consortium spanning six different countries, and lots of energy to turn it into a project proposal!".

Combining best of both worlds

For the first time, the ITEA PO Days were also partly online to combine the best of the online and physical PO Days. An online preparation session, 11 online country information sessions and an online project idea pitch session (with 34 pitches) were organised prior to the physical event in Helsinki. This optimised the time for networking and consortium building during the PO Days and opened up participation to a broader group of people that otherwise would not have been able to attend due to busy schedules or difficulties with travelling across the globe.

This combination of online and onsite sessions was highly appreciated by

it only online due to the pandemic. Thanks to the excellent organisation of the event by the ITEA Office, the PO Days 2022 enabled us to not only meet our old ITEA friends once again, but also establish new international collaborations and contacts."

Innovative powered Community presenting solutions for the future

In addition to the plenary sessions in Helsinki, there was plenty of time for interaction during the poster session – in which 32 project ideas were presented – and the many lively brainstorm and workgroup sessions to exchange, discuss and develop new ideas together. The group discussions resulted in 17 plenary project idea presentations

Public Authorities showing strong commitment

This year, a record number of ten representatives of the Public Authorities attended the event, showing their strong commitment to the ITEA PO Days. They combined their online country information session with a poster in a dedicated poster area at the event, informing participants about national priorities, eligibility criteria and funding outlook. Of course, participants were also able to discuss their first ideas for their project proposal one-on-one with the Public Authority representatives at the Scandic Marina, creating an early dialogue, which is very important to improve the chances for funding.

Mika Niskanen, Business Finland (Finland NCP for ITEA), shares his thoughts: *"The ITEA PO Days 2022 were my first experience of the PO Days. My expectations were to understand the character of the event, meet customers, meet my ITEA colleagues and hear about ITEA projects under preparation and finished projects. My own task related to ITEA projects is to work with evaluation and funding of national applications*

will work better together in the future. It was a pleasure to participate in the ITEA PO Days 2022."

Apart from initiating new innovative ideas, the PO Days 2022 also provided the opportunity to have a look at the great achievements of ITEA projects that were recently completed. On Thursday 15 September, during the ITEA Awards of Excellence ceremony, ITEA's four most outstanding software

(OT) exposes manufacturing systems to a growing number and diversity of threats. The ITEA project CyberFactory#1 has designed, developed, integrated and demonstrated a set of key enabling capabilities to foster the optimisation and resilience of the Factory of the Future (FoF). For these achievements, the CyberFactory#1 consortium was awarded the ITEA Award of Excellence 2022 for Business Impact!

> **IMPACT - making healthcare more efficient, accurate and cost-effective**
  Healthcare faces many challenges, including improving patient outcome and working more cost-effectively, while the demand is growing, staff capacity is declining, and new clinical and technological developments succeed each other quickly. The international collaborative ITEA project IMPACT has addressed several challenges by leveraging the power of data and building on the preceding award-winning ITEA projects MEDIATE and BENEFIT to move towards intelligence-based healthcare. Thanks to this innovative approach, IMPACT has won the 2022 ITEA Award of Excellence in the category 'Innovation' and was one of the three finalists for the 2022 Eureka Award 'Best Product and Service Innovation'.

and thus the PO Days event was an excellent opportunity to discuss the coming projects and to understand the results of finished projects. Definitely the most important dimension of the ITEA PO Days was to meet live with my ITEA colleagues who during the last two years have only been images on the screen. I enjoyed this possibility to learn more about my colleagues as persons and also to get to know the whole ITEA Community. We have worked well together before online and I think we

innovation projects – that finished between mid-2021 and mid-2022 - were celebrated for their impressive results. This year's award winners are:

> **CyberFactory#1 - fostering the optimisation and resilience of the Factory of the Future**
  To enable the Factory of the Future, optimisation must be reconciled with security. The growing integration of Information Technology (IT) into Operational Technology

> **OPTIMUM - offering greater efficiency, safety and usability in future smart factories**
  In today's factories, machines such as cranes are typically operated manually using heterogeneous

hardware. These are usually not interoperable and diverse control environments are in use; static machine configurations also make evolution hard to achieve. The ITEA project OPTIMUM enables machines of different kinds and from different manufacturers to communicate with each other and their operators, improving the worker's and equipment's safety. In recognition of this exceptional achievement, OPTIMUM received the Special ITEA Award of Excellence in all three nomination categories: Innovation, Standardisation and Business Impact.

› **PANORAMA - supporting the shift to open source**
In the automotive domain, many similar control units are used, but different organisations often use heterogeneous functional domains, hardware and teams. This complicates collaboration, while this is very important as many stakeholders are involved. The ITEA project PANORAMA has created an open-source meta-model and framework that promotes collaboration on software and hardware development using heterogenous tools and practices and without losing control of one's own data. The PANORAMA project received the 2022 ITEA Award of Excellence in the category 'Standardisation' for this great achievement.

ITEA congratulates the ITEA Award of Excellence winners for their impressive results contributing to a better society!

At the end of the PO days, there was a Project Outline, a consortium spanning six different countries, and lots of energy to turn it into a project proposal.

ITEA Family reunion
On the back of the ITEA PO Days, we celebrated the ITEA Community getting back together again during the ITEA Family reunion. The programme consisted of inspiring sessions with SME Stars and well-respected ITEA Family members, a keynote speech "Should innovation become maintenance?" by Sietske Rozie, Radiologist M.D. and the ITEA Awards of Excellence ceremony, combined with the opportunity to reunite for drinks, a dinner and a long-awaited chance to socialise.

Maria Rimini-Döring, of Robert Bosch and a member of the ITEA Steering Group attended the ITEA Family reunion: "The two-day Family reunion followed a proven "choreography" according to the motto "no future without a past". Wednesday was devoted to the history, the very special persons, traditions and values of ITEA which made and make up its strong spirit of collaboration and cohesion. This kind of "intensive care" we feel for each other, the projects and, I dare adding, the work as a whole creates the solid ground for the sparkling innovations

envisioned and awarded the next day. It was great to look from the stage into so many happy faces! I felt so proud and honoured to be part of this great ITEA family."

After two years online, we can definitely say the physical ITEA PO Days are back! It was inspiring to see the ITEA Community reunite, reinforcing the event as the must-attend event for a large international Community of large industry, SMEs, start-ups, academia and customer organisations to create innovative solutions and collaborate in funded projects focusing on software innovation. We look forward to meeting you all again next year!

The organisation of these PO Days was supported by Business Finland, the Finnish government organisation for innovation funding and trade, travel and investment promotion, for which we are very grateful.

More information and recordings & presentations
https://itea4.org/podays2022/index.html

KE-works

Where digitalisation and collaboration meet

Having started out in automation, Dutch SME KE-works has since come to focus on collaboration: how can the work processes of multiple engineers be aligned without becoming overwhelming? For co-founder Joost Schut, a paradigm shift is key. "You once had the option just to work as an engineer in a big company or move into consultancy and observe the whole thing from the outside. The challenge was to change the status quo, and that's where we started with KE-works."

SME in the spotlight

The difference of digitalisation

This story began in 2008, when Joost and 'partner in crime' Jochem Berends were PhD students at Delft University of Technology in the field of digitalisation, design and experts – in other words, the study of how humans can be involved in highly automated and digitalised design processes. "That was an issue at the time and still is," Joost begins. "But it really sparked something in me, so we started the company. The main focus is Europe with the Netherlands as the core market. Our largest segment is the construction industry because they lag behind in digitalisation and have a huge problem with data mobility and flexibility. We can make a big difference there."

Quality at the core

They do this via KE-chain, a platform for digital collaboration which can be used to optimise all business processes in a shared, real-time work environment with a particular focus on quality. "We're always in regulated sectors," explains Joost. "The quality of the end result is important not only for our specific client but also for *their* clients, which are semi-public organisations or have high regulations that require them to be very transparent. We believe

that quality should not be a side process but should be fully integrated into your operational process. With digitalisation, you can make that happen."

Transparency isn't the only driving force behind KE-works: current engineering processes typically generate high degrees of administration and grow more complex over time, creating a loop which companies find hard to break on their own. Once these same companies go digital, the entire concept of time or version management changes through access to real-time information. "One of the success stories is that we're able to integrate people working from anywhere, both inside and outside," Joost says. "Everybody is able to see each other's work as well, so you aren't stuck in your own silo with no idea what's going on around you! This enables a completely different way of collaborating."

Building blocks of success

As intended, this approach positions KE-works outside of the traditional status quo: neither a large engineering firm nor consultants, yet able to help push forward the state-of-the-art nonetheless. "As an SME, you need a different approach, which is to focus more on what's local and be more

flexible in order to fill in gaps left over by the bigger software suppliers," Joost continues. "What makes us unique is the flexibility in our environment, allowing different experts to share information and integrating this in one process which they're able to change themselves. They are in control; we just provide the blocks."

As a concrete example of this, Joost points to the Dutch Aerospace Laboratory which, among other things, performs tests to determine material properties for all kinds of clients. With the help of KE-works, they were able to digitally integrate the entire material testing process from project set-up to reporting. This includes the work of different experts, the data exchange with the physical test bench and the software models used for the post-processing of the data. The result is a streamlined and scalable process which is transparent for all stakeholders. Similar benefits have been felt by customers in a huge variety of domains, from underground infrastructure to aerospace, thanks to KE-works' tailorable approach to each individual company's needs.

Projects for smaller partners

As for KE-works' participation in ITEA, Joost sees similarities to its starting point within the university, where all technology developed is just beyond the curve and innovations must be connected to make an impact on digitalisation. Automation within digitalisation, for instance, has been a focus of KE-works throughout its existence and, while enormous progress has been made, implementation is still relatively limited in Europe.

To continue pushing forward this development, KE-works is sometimes involved in Horizon projects, although Joost emphasises that "ITEA is by far the most important for us because our focus is digitalisation. At a European level, we need strategic funding in areas we believe in or we will just be surpassed by the Americans or Chinese. At a more local level, we need to meet other companies with the same challenges and various solutions to build networks and experiment with what's feasible. You can bring those lessons learned into your products and increase your impact. Without publicly funded projects, I think that this is impossible unless you're very big. So, for SMEs such as us, the benefits of being involved in the ITEA Community and the projects cannot be underestimated."

Making new connections

At the moment, these benefits are being felt in DEFAINE, the latest in a long line of ITEA projects

that KE-works has contributed to. Many of these have focused on digital engineering and design processes, typically in the automotive, aerospace and medical sectors, and DEFAINE aims to create a design exploration framework that will use artificial intelligence and machine learning to enable improved solution designs in early project stages. Through contact with aerospace giants like GKN and Saab, KE-works has the opportunity to make the KE-chain platform even more flexible while developing connections with industrial partners that may one day be end-users.

Within DEFAINE, KE-works is also looking into how they can continue to enhance their services with new innovations, such as connecting different models in order to assess design properties or analysis results and include the data in one design iteration. "That's the current challenge we're facing and we see different ways to collect the information. The most pragmatic is the human, the expert. The second is to collect models and different analyses. The third is to connect sensor data. For us, the goal now is to create one collaboration platform with all those different data streams," concludes Joost. "And we practise what we preach! So, we're always open for collaboration." Like ITEA!

More information

https://ke-chain.com/

ITEA news

Calendar

Lightweight anomaly detection on resource-constrained water meters

More than 20% of fresh water is wasted every day due to leakages in building infrastructure. Most of these occur undetected and untreated. With the increasing risk of drought all over Europe and in many other regions worldwide, the timely detection of water leakages becomes a high priority. The Belgian SME Shayp offers an IoT device and cloud solution for automated leakage detection in residential and commercial buildings.

In order to improve their technology and bring the intelligence from the cloud directly into the building (on the edge), Shayp has joined forces with Sirris, an industry-driven research center, within the ITEA MIRAI project. Together, they are exploring lightweight compression approaches on Shayp's device, aiming at:
1. reducing the leakage detection time from 3-24 hours down to less than one hour,
2. increasing battery lifetime thanks to a 5-fold reduction in the number of sent messages, adding to its autonomy and their sustainable business goals, and
3. ensuring the privacy of the potentially personal nature (especially in the case of households) of the water consumption data.

The proposed approach was evaluated against artificial as well as real-world data from devices installed in different types of buildings. Initial results show high leakage detection accuracy as well as timely detection. This work was recently presented during FedCSIS 2022 (https://fedcsis.org/2022/).

MIRAI researches a general framework for distributed intelligent devices, in a smart, sustainable and privacy-sensitive way, supplementing the traditional scaling approach to the cloud with horizontal scaling amongst edge devices. In addition to Shayp's use case, the project focuses on four other cases on distributed renewable energy systems, continuous auto-configuration of industrial controllers, ensuring the safety of vulnerable road users, and secure internet provisioning.

More information
https://itea4.org/project/mirai.html

EUROPEAN BUSINESS SUMMIT 2022
Brussels, Belgium

16-17 NOV 2022

https://ebsummit.eu/

Smart City Expo World Congress 2022
Barcelona, Spain

15-17 NOV 2022

http://www.smartcityexpo.com

Swiss Innovation Forum 2022
Basel, Switzerland

23 NOV 2022

https://www.swiss-innovation.com

EFECS 2022
Amsterdam, the Netherlands

24-25 NOV 2022

https://efecs.eu/

Cyber Security & Cloud Expo Global
London, United Kingdom

1-2 DEC 2022

https://www.cybersecuritycloudexpo.com/global/

Deadline FPP submission ITEA Call 2022

13 FEB 2023

https://itea4.org/current-call.html

Promote your Smart city-related products and services to city representatives

For a few years now, ITEA has been reinforcing its customer orientation to ensure the project results are in line with the market demands. One of the initiatives we have set up for this, is the Customer Advisory Board on different domains of which the Smart City Advisory Board (SCAB) is one. The aim of the Smart City Advisory Board, consisting of representatives from municipalities from all over Europe, is to provide an opportunity to share immediate needs from city representatives with technology experts from the ITEA Community and to validate and shape potential Smart city products and services that are being developed in ITEA projects.

https://itea4.org/smart-city-advisory-board.html

Currently the SCAB exists of representatives of ten cities: Antwerp, Brno, Dortmund, Ghent, the Hague, Istanbul, Kassel/Nordhessen region, Stockholm, Tampere and Zaragoza. This list is being extended continuously.

SCAB portal
To facilitate the collaboration between the city representatives and the ITEA Community, we have built a SCAB portal, gathering the most important information that is useful for both parties e.g. tender information, news, solutions, projects and events. This portal is accessible via https://itea4.org/smart-city-advisory-board.html.

As (some of) the outcomes of the ITEA project(s) you are/were involved in can be relevant for cities, we invite you to have a look at the portal and share with us the information about your Smart city-related products and/or services that can be added in the e-Catalogue. A number of solutions can already be found in the portal.

The goal is not to be exhaustive on this portal, but to create a willingness to connect and to share the access points to more information and collaboration opportunities.

If you would like to submit your Smart city-related products and/or services or wish to receive more information, please contact **linda.van.den.borne@itea4.org.**

eureka

Eureka Clusters present at Global Tech Korea 2022

On 25 & 26 October, the Ministry of Trade, Industry and Energy (MOTIE) of the Republic of Korea and Korea Institute for Advancement of Technology (KIAT) hosted the Global Tech Korea 2022 in Seoul. The event programme consisted of four main parts, including keynotes, technology seminars & panel discussions, a regional forum and idea pitch & B2B sessions.

During the regional session of 26 October, a special seminar focusing on the Eureka Clusters was organised. The purpose of this seminar is to promote the Clusters to South Korean participants by giving them in-depth information on what the Clusters are and how to participate in their activities. Ultimately, it was an excellent opportunity to stimulate South Korean participation in the Clusters.

After a general Clusters' introduction, each Cluster presented its ecosystem and way of working. On behalf of ITEA, Vice-chairman Jean-François Lavignon informed the attendees about the opportunities to engage in ITEA.

"It was a pleasure to attend Global Tech Korea 2022 and to discuss societal and technological trends that could request new collaborative research projects with Korean organisations. We want to thank KIAT for this initiative and we are confident this event will foster Korean participation to ITEA projects," Jean-François concludes.

More information
http://gt-korea.co.kr/

Eureka Clusters Call dates

ITEA4	15 Nov 2022	Deadline Project Outline ITEA Call 2022	https://itea4.org/
	13 Feb 2023	Deadline Full Project Proposal ITEA Call 2022	
smart	30 Jan 2023	Deadline Project Outline SMART Call 6	https://www.smarteureka.com/
Xecs	23 Feb 2023	Deadline Project Outline 2022 Xecs Call	https://eureka-xecs.com/

Colophon

ITEA4

Σeureka

ITEA is the Eureka Cluster
on software innovation