

ITEA Magazine

March 2024 – Number 47

Advancing gender equality
in innovation

Country focus:

Austria

ITEA Success stories:
EMPHYSIS & PIANiSM



Contents

ITEA Magazine March 2024 – Number 47

03	Editorial Jan Jonker
04	Country focus: Austria Tapping into innovative potential and using new knowledge for market growth
10	ITEA Success story: PIANiSM Pioneering predictive maintenance for a smarter future in manufacturing
14	Advancing gender equality in innovation Insights for ITEA from Vinnova
18	ITEA Success story: EMPHYSIS Bridging the gap between digital simulation and embedded software with eFMI®
22	Community Talk Jennifer Overbury
24	SME in the spotlight icomatrix - Transforming neuroimaging with AI
26	ITEA Topical roadshow Your voice, your topics, inspiring the ITEA Community
27	Calendar Upcoming events
28	End-user happiness: Mad@Work AI-guided well-being app reduces stress in the workplace
29	ITEA News Secur-e-Health enhances patient experience, efficiency and costs
30	Eureka News Global Innovation Summit 2024 - Türkiye



ITEA is the Eureka Cluster
on software innovation



Dear ITEA Community,



The content of today's news is regularly connected with ITEA's domain of software innovation. For example, many examples of debates about AI are taking place on TV and social media or in the newspapers. Is it ethically sound, how do we set boundaries to all the application possibilities, can humans control technology or will it control them in the future? Whatever the answers and philosophical thoughts are, in the end we probably all agree that the technology is there to support human lives. Many of ITEA's challenges contribute to human's wellbeing and preserving our planet.

Smart Health is, of course, a very good example of how ITEA improves our lives. This edition includes various projects that led to higher efficacy and patient friendliness in the medical profession. Icometrix is a beautiful example of how neuro-imaging has been improved by AI, leading to better diagnosis and clinical decision-making, while Austrian IT-V Medizintechnik creates a huge benefit for patients by enabling precision radiation therapy against cancer. But it even goes beyond clinical applications: Mad@Work deals with the increasingly relevant topic of work stress and the digital solutions that help prevent it.

The Austrian country focus in this edition also touches the human aspect. While the Austrian FFG supports digitalisation via roadmaps in different areas, such as traditional industries, digital humanism remains key. In other words, the creation of technology solutions is a human process that needs to be generated by human interaction, like a fuel.

To benefit from the different ways that humans can contribute, diversity in project consortia is clearly very important. As an advocate for diversity and gender equality, Vinnova is a true frontrunner in this respect. Read how Vinnova created its own approach to increasing gender equality, female participation and inclusion in funded R&D projects and how well diversity matches with ITEA's bottom-up and 'family' approach in which every good idea is valued in a trusted environment.

Another great example is Jennifer Overbury, a contributor to gender equality who encourages women in projects and believes that technological innovation cannot be achieved only by a 'technological-minded focus'. There is always the challenge of balancing project goals with technology optimisation. Sometimes, an 'extra-technological view' is needed to keep technologists' feet on the ground instead of endlessly improving their ideas, which may end up as a castle in the air.

During last year's celebration of ITEA's 25th anniversary, we saw many groundbreaking innovations from the ITEA Community. Over these years, we saw that for all those innovations developed, it has always been people business. Whatever challenges and opportunities new technologies bring in the future, 'people business' will always remain a leading asset for ITEA.

Just like the Boss/Bruce Springsteen already sang in the 90s, just before the digital revolution of the internet started: "Share a little of that Human Touch".



Jan Jonker



Focus on Austria

Tapping into innovative potential and using new knowledge for market growth

The Austrian Research Promotion Agency (FFG) is the national funding agency for industrial research and development in Austria. Research, development and innovation are central drivers for economic, technological and social development, and about 59% of FFG funding goes to projects with a strong focus on digitalisation. Michael Walch manages European and international research programmes at FFG. He explains how FFG supports instruments like ITEA to boost progress in Austria on the premise that businesses that undertake research grow faster, achieve higher export rates and create more employment than those who don't. He is joined by Alexander Pogány of the Federal Ministry for Transport, Innovation and Technology (BMK).

Symbiosis between IT and industry

At its core, the IT industry in Austria comprises around 17,400 companies and achieves a production value of 20.8 billion euros as well as a direct and indirect turnover of 28.75 billion euros. This secures 181,000 high-quality jobs in Austria, as the value added per employee in the IT industry is higher on average than in the economy as a whole. Michael explains that “the symbiosis between IT and traditional industry is one of Austria’s strengths. My role within the department responsible for international programmes is to support companies, as well as research organisations to some extent, in international R&D activities. They can approach us and submit projects for funding. As National Project Coordinator for Eureka, and therefore Clusters like ITEA, I make sure they go through the whole process, evaluation and funding, getting support to ensure that everything runs smoothly. If there are problems, I react to these problems and suggest ways to go forward.”

Developing digitalisation competence

Austria has a lot of traditional sectors and with the emergence of digital technologies, also in the more traditional sectors, a major focus is to identify the added value that digital technologies can provide for these sectors, where there are many companies that can still benefit. Michael: “This is one of the initiatives we are keen to support. With the funding provided by FFG we are increasing the level of digitalisation within companies because there is good reason to believe that this creates added value. The IT industry in Austria is quite substantial in itself and there is always a certain buzz around the latest technologies like blockchain, augmented reality and artificial intelligence. As FFG we put on the table dedicated funding for software topics through various instruments like Competence Centres for Excellent Technologies where companies and research partners are focusing on application-oriented cutting-edge research.”

The merging of man and machine


“Austria has a very strong strategy and policy regarding digital technologies. There are many roadmaps on different topics, like quantum technologies, the space sector, 5G and more. We also support the strategies with concrete actions, like the competence centres I referred to earlier but also with different thematic funding programmes. We help execute these strategies on all the topics that seem relevant for competitive advantages, but we also have a focus on what we call digital humanism,” Michael explains. “I like to think that in Austria we put the human in the middle. We take a human-centred approach in many of our strategies and follow this through in concrete actions. I am convinced that this human-machine interface is



becoming increasingly prominent. We already notice it now with smartphones, as we have extended our brain through the smartphone to access a lot of information. So some of the knowledge is no longer in our brain, it is on our devices. And we have integrated that in our own intellect in a way, in our own processes, how we communicate. So yes, the machine, artificial intelligence and the digital world will continue to merge with how humans communicate, interact, think and work. Research funding can help ensure that this happens in a sustainable way.” Alexander adds that “we are also trying to create, with AI and digital technologies, a sort of ecosystem, one that contributes to industry, mobility, energy, circular economy and cities. This is our main focus area of the ministry. With digital technologies, we try to contribute to this mission.”

Bottom-up and thematic funding schemes

In general, the FFG also provides bottom-up funding to companies. “So if any company has an innovative idea in the software sector, they can get funding. One of the main FFG programmes is a bottom-up programme where everything is defined by the company, including the topic, budget and runtime. Of course, here we rely on the applicant when it comes to defining the project scope, but this offers a lot of freedom to the companies to submit projects on software innovation. Also, if they have international partners, they can join them in an ITEA project with this bottom-up funding scheme. The benefit in addition to getting access to the innovation ecosystem in the international software sector is that cross-border projects can be funded at a higher intensity. Our bottom-up funding programme is targeted at single-firm applicants, but if there are multiple organisations from Austria working on a project, they might want to take a look also at the thematic funding programmes of FFG. Different calls in the thematic funding programmes address important economic or social topics which will shape our future lives. Activities of Austrian companies, universities, R&D institutions are supported by Calls for projects in specific subject



The symbiosis between IT and traditional industry is one of Austria's strengths.

areas of ICT and digitalisation, interlinked with application fields and societal challenges. Through ITEA, submitted projects can also be embedded in transnational cooperation."

Promoting the options

While there is broad awareness in Austria of the national policies and priorities, FFG is hard at work to promote all the options that are available to companies. "We are planning to organise the next International B2B Software Days for the software sector in Austria in early 2025, a biannual event. Last year's edition (7th) also contained a slot for ITEA and can be seen as an example of activities that support international software innovation in Austria through ITEA. But," as Michael comments, "at the end of the day, it's up to the companies at some point to recognise the value of international R&D and follow up. A lot of companies rely on competence in the research sector, because it's not always easy for companies, especially for smaller and medium companies, to have a dedicated person doing in-depth research for the fundamental knowledge they need, so they rely on research organisations in projects. And it can also go the other way around, that research organisations create a spin-off or spin-out from the university that can also submit an application for funding at FFG. And that happens quite often actually."

Alexander is keen to point out that in bottom-up programmes, one of the criteria recently introduced is a sustainability criterion. Sustainability is a hot topic, Europe-wide in the large lighthouse projects and in Austria. "Projects have to address the Sustainable Development Goals. These would be the projects we are looking for."

Visibility, connections, network

Eureka Clusters and specifically ITEA are internationalisation instruments that support Austria's goals and priorities, Michael stresses. "If we have a partner from Austria and any other country like Germany, and they want to cooperate on R&D,

they need an instrument, they need a framework, they need a network. Eureka provides this opportunity. It provides this network, the legal framework and so on. We have to have a reliable instrument in place to enable this European and even global cooperation.

"The Clusters in particular create large or medium-sized projects. These projects have a lot of impact because they cover a broad value chain, the whole value chain even, and include big players and research organisations. Often there is a follow-up project. So it's really a good way to create a return on investment for the funding provided. In the software sector in particular, it's very important to have a standardisation because then you can roll out a solution more easily. Also for small and medium-sized enterprises, when they develop something in the software sector, if they use standards or if they define standards, then others can use their products, or they can use other products. This is an ecosystem. To create these standards, you have to have a certain mass in the consortium to move something, because otherwise you will be ignored by the international community. I think this is one of the added benefits of the ITEA Cluster. And you are in the forefront of R&D, knowing what is out there. In fact, sometimes the companies applying for an ITEA Cluster project do not even care about the funding. They just want to be in the consortium. Now that is very rare because companies really like funding. But there are cases where companies participate self-funded just to be in the consortium, be part of the ITEA Community to be noticed and also to influence certain things. They gain visibility, connections, network."

More information:

<https://www.ffg.at/>

IT-V Medizintechnik

Achieving a better position in international innovation

In Innsbruck, Austria, IT-V Medizintechnik began life under the name Innovative Technologie Völp. Today, the former name is reserved for their distribution arm, which oversees the provision of their innovative patient positioning systems across Europe and as far away as the USA, Australia and Japan. This international outlook helped them make the most of their first ITEA project, STARLIT, as CEO Markus Völp explains.



Open-minded cooperation

First, a trip down memory lane. "With a friend of mine, I was working for the Biological Centre for Radio-Oncology in Innsbruck and he had a patent on a machine for measuring oxygen in cancer cells," Markus recalls. "In 1997, he asked me to start a company to do these things. I didn't want to carry on with biology, so I started to develop patient positioning devices. I met some people from the University Hospital of Innsbruck to do this with, so IT-V was the result of a scientific cooperation. Since then, we have consistently been developing innovative

positioning devices and solutions for patient immobilisation and positioning in radio-oncology, treatment and CT scanning. We are also filing numerous patents for the medical high-tech sector. Our corporate philosophy is open mindedness when working with our highly-valued customers."

Positioning devices in the radiology field

In oncology – the branch of medicine devoted to cancer – linear accelerators (or LINACs) are often used to treat tumours; these LINACs customise high-energy X-rays or electrons to match

the tumour's shape while sparing the healthy surrounding tissue. Correct patient positioning is therefore crucial to avoiding incorrect treatment and undesirable side effects. In addition to this, patients must remain still throughout treatment and maintain the same position across many treatment sessions, regardless of how many are necessary. To ensure this, IT-V provides hardware, such as highly specialised site-specific devices with multiple reproducible settings, on which patients can lie. This ensures that patient movement is kept to the absolute minimum and enables the most

“The advantage is that you’re meeting people from all over Europe, which leads to better networking and, ultimately, more chances and opportunities.”

accurate treatment; it also includes other devices such as a mask system to prevent movement of the head.

“Worldwide, there are only four or five companies in the business of positioning devices in the radio-oncology field,” Markus notes. “And at the moment, there are only two big companies producing linear accelerators: Elekta and Varian. Back in the beginning, when we were starting with positioning devices for standard treatment, I was dealing with a company called Medical Intelligence. This company was developing positioning devices for stereotactic treatment, a very precise form of therapeutic radiation. Elekta acquired Medical Intelligence, so we began collaborating with Elekta and are now distributing our products globally via them. But we still maintain very strong collaboration with our clinical partners, not only with the University Hospital of Innsbruck but with partners like the LMU Munich and UMC Utrecht.”

A deeper dive

It was through this relationship with Elekta that IT-V came to be involved in STARLIT, an ITEA project that ran from 2017 to 2020. This combined cancer interventions and monitoring in real time to increase radiation accuracy and minimise unintended doses to

healthy tissue. One of STARLIT’s use-cases focused on MR-LINAC, a linear accelerator that combines magnetic resonance (MR) imaging with radiation therapy. Markus: “Elekta and Philips were the two main partners developing these MR-LINAC devices, which are primarily run by software. With traditional treatment, you typically only perform a CT scan at the beginning and sometimes during the treatment. The innovation in MR-LINAC is that during the treatment, you can visualise where the tumour is moving in real time.”

“Doing our part for the positioning devices was a unique chance for us to get a deeper dive into Elekta. We also met key people from the Netherlands Cancer Institute and other companies, so it was a very good collaboration for us. We gained much more knowledge about the MR field because before that we had positioning devices for traditional treatment and were a bit more CT-oriented. MR is becoming more prevalent in radio-oncology, replacing or adding to normal CT scans. STARLIT helped us a lot to gain more knowledge on this and now we have a new family of products for MR.”

Beyond the norm

Since its foundation, IT-V has been involved in publicly funded research

projects around every two or three years, but this experience with ITEA was quite unlike their previous participations. For a start, most Austrian projects are centred on a single company or a partnership between two, whereas STARLIT brought together 14 partners from Austria, Canada, the Netherlands and Sweden.

“The advantage is that you’re meeting people from all over Europe, which leads to better networking and, ultimately, more chances and opportunities. I think it’s a very good thing that this exists and is helping to bring people together. Plus, if I remember correctly, you receive better funding from the Austrian government if you’re involved in an ITEA project,” Markus smiles. “Of course, I am grateful for this money – we can afford things which we wouldn’t normally do if we didn’t have these publicly funded research projects. With this in mind, we can guarantee that our products will adapt to all the changing requirements in clinical practice and meet the highest standards of application, precision and increased efficiency during the treatment process.”

More information

<https://www.it-v.net/>

PIANiSM

Pioneering predictive maintenance for a smarter future in manufacturing



Predictive maintenance (PdM), using data-driven, proactive maintenance techniques designed to analyse the condition of equipment and helping to predict when maintenance should be performed, offers benefits across many fields, from manufacturing to mining and automotive. By predicting issues before they occur, companies avoid wasting time and money on repairs and downtime, allowing them to be more efficient throughout their operations. However, most of these solutions are domain- or problem-specific, with implementation costs and complexity serving as obstacles to uptake. To disrupt traditional maintenance processes, domains such as data science, machine learning, analytics, simulation and real-time processing must be combined in one system.

Success story



The ITEA project PIANiSM, uniting 14 partners from Canada, Portugal, Spain and Türkiye, aimed to merge predictive and prescriptive maintenance techniques to achieve an end-to-end automated manufacturing process and optimise end-to-end manufacturing value chains. In doing so, it identified and introduced missing analytics techniques and algorithms and introduced a new generation of data identification integration and modelling processes.

Unveiling the architectural marvel

PIANiSM's backbone lies in the developed architecture, a sophisticated framework comprising four layers for

data acquisition, data pre-processing, model development and applications. In the data acquisition layer, an equipment gateway gathers data from external sources such as industrial or sensing devices and stores it in a data lake or sends it through an online stream. Filtering, cleaning, quality checks, interpolation and aggregation occur in the data pre-processing layer, resulting in an organised data lake or stream. In the model development layer, feature engineering, partitioning, prediction data modelling and failure model deployment take place using techniques such as loss estimation, change detection and failure scoring/ prediction. Here, different models were developed

for the needs of different use-cases and are stored in a model database. Finally, the application layer allows for data exploration, containing a model editor, system configurator, data analytics application programming interface and the connection to user applications.

Using this architecture, PIANiSM's technical partners – KoçSistem, ERSTE, ISEP, Experis, Sistrade and Nimbeo – each developed separate solutions for exploitation. KoçSistem, for instance, has supplemented its existing big data platform, Platform 360, with a PdM module that uses techniques such as data mining and model management to produce predictive maintenance reports,

Project start
November 2018

Project end
June 2022

Project leader
Serkan Tosun
KocDigital Solutions Inc., Türkiye

More information
<https://itea4.org/project/pianism.html>

failure prediction and maintenance plans. A big automotive customer, which was already using Platform 360 before, purchased the PdM module after the PIANiSM project. Thanks to the updated Platform 360, the accuracy ratio of fault detection at this customer increased up to 84%, meaning the customer had information about these faults before they occurred and enabled the organisation to take the needed precautions in time.

Introducing a collaborative framework integrating data science, machine learning, and real-time processing within PIANiSM, Turkish SME ERSTE enhanced predictive maintenance in manufacturing. Leveraging insights from PIANiSM, ERSTE advanced further in other RD&I projects including ITEA project MACHINAIDE, and extended AutoML-powered solutions for streamlined equipment maintenance decisions.

Demonstrating versatility across industries

Since the most important focus of the PIANiSM project is the predictive maintenance concept, it was of great importance to have diverse data sets that include different countries and sectors. For this reason, the project involved nine different use-case partners.

One of these partners was Portuguese plastic film manufacturer Vizelpas, which supplied production and equipment data for the development of ISEP's predictive maintenance algorithms and enhanced Sistrade's monitoring tools, providing manufacturing expertise and feedback as required – all with a high degree of interaction and strong spirit of collaboration within the international consortium. This resulted in 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 between 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. The implementation success is more evident in the extrusion process, where the MTBF increased by 15.8%, and the mean time to repair (MTTR) decreased by 11%. In addition to this, the precise online control of equipment conditions and the reduction of unforeseen downtimes mean less waste generation and decreased energy consumption. Notably, Sistrade's monitoring tool integrates real-time warnings on equipment functioning, enabling the prompt action of Vizelpas operators when needed. From another perspective, 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.

Overall, PIANiSM has produced use-cases on ceramics, automotive, energy/refineries, durable consumer goods, piping, plastic film/flexible packaging and data networks and has successfully demonstrated its system prototypes in an operational environment (TRL 7).

Better prediction, costs savings and competitive advantage

Thanks in part to the project's wide scope, PIANiSM has been able to expand and improve on predictive maintenance services in a variety of ways. In terms of improvements, PIANiSM has worked with a world-leading automotive client on better prediction and has achieved an 80% success rate (versus a starting point of zero). These types of improvements have a knock-on effect for the efficiency of end-users: refinery operator Tüpraş, for example, has applied KoçSistem's technical outputs to its heater charge pumps, resulting in a decrease in mean time to repair by 3.59 days and a decrease in maintenance costs by USD 5,134 per failure. For companies that take up PIANiSM's results, the benefits are focused not only on the cost savings

PIANiSM's impact extends beyond industrial realms; it's about empowering businesses, transforming lives, and envisioning a future where manufacturing not only thrives but also sustains.



of decreased downtime and fewer repairs but also on the competitive advantage of faster turnarounds and the opportunity to open up new business models through the greater reliability that predictive maintenance offers. The latter is particularly significant for SMEs, which have traditionally been confined to reactive maintenance because of the former costs and difficulty of integrating PdM solutions.

PIANiSM partners are now in the process of offering these solutions to new and existing clients but have already shown early promise, such as KoçSistem's signing of a contract with the major automotive client to extend their machines worldwide. Over the next five years, the consortium anticipates a strong sales increase through the introduction of PIANiSM-related technologies (including roughly 100% sales growth for companies in manufacturing and 80% for IT and software), as well as a more than doubling of the international market

share in some sectors. For instance, the success of Vizelpas provided Sistrade with new ways to expand its market reach and to enhance its enterprise resource planning (ERP), with two more clients currently engaged in the development and evolution of the updated monitoring and maintenance modules of Sistrade.

In order to achieve these forecasts, strong dissemination has also taken place, including a paper on the project's architecture that was presented at the IEEE Industrial Electronics Society annual conference (IECON 2021) and customer workshops for both Platform 360 and the PdM module. Additionally, PIANiSM resulted in two PhD theses, one master's theses and course material for the ISEP engineering research institute. Currently, there are 40 students of the Master in Engineering and Artificial Intelligence and 15 students did a short course in Predictive Maintenance. Having successfully identified new needs in model development, such

as auto-encoder neural networks for anomaly detection, the partners will use these results as a springboard to further improve PdM and expand it to new domains in both the short and long term.

The human touch

Beyond the technical details lies a human narrative of empowerment and transformation. PIANiSM's impact extends beyond industrial realms; it's about empowering businesses, transforming lives, and envisioning a future where manufacturing not only thrives but also sustains. The collaborative spirit, the blend of expertise, and the dedication to innovation signify a shift in paradigms, where stakeholders don't just witness change but actively shape it.

Advancing gender equality in innovation

Insights for ITEA from Vinnova



As Sweden's innovation agency, Vinnova provides funding for research and innovation projects that benefit society and contribute to sustainable growth. This gives them a broad assignment, including the integration of gender-equal perspectives into research and innovation – a task that ITEA is keen to implement more in its own activities. To learn from their experience, ITEA Office Director Jan Jonker invited Susanne Liljeblad and Sophia Ivarsson of Vinnova for a discussion on (gender) equality, diversity and inclusiveness.

Understanding innovation

"Susanne and Sophia, welcome to this session on topics that are increasingly important to ITEA," begins Jan. "We would like to promote them by organising activities to get more insight, depth and opportunities that we can use to apply these topics. We're very happy that you were both able and willing to join us today."

On the subject of inclusiveness, Sophia and Susanne offer complementing expertise: Sophia has a background as a gender researcher and heads Vinnova's Gender, Diversity and Inclusion Strategy, while Susanne serves as a programme manager for Sweden's involvement with ITEA and other Eureka Clusters. Sophia kicks off proceedings with a short introduction on why gender equality matters to the innovation agency.

"Gender equality is crucial to social sustainability. It has its own goal in the Sustainable Development Goals, but it's also mainstreamed throughout them, which increases the chances of contributing to the SDGs in general. We also have six general Swedish gender equality goals that we – as a society and as the labour market, the government and the municipalities – have to deliver on, so it's more sustainable to integrate the gender dimension into the content of the research and innovation projects that we finance. We see that this increases the relevance of the projects. The Swedish innovation system consists mostly of men and male-dominated sectors and if we only focus on this, we narrow our understanding of innovation and where the innovation potential lies."

"I think that people are aware of the factors that Sophia explained but it's a structural problem that goes back to how we raise our children and biases that we have in our society," notes Susanne. "You see that boys and girls are equally interested in technical education and science when they are young, but at university, there are fewer women in technical studies. Also, when it comes to the workplace, it's important to show that you have successful women in tech and equal representation in boards and projects. When it comes to innovation projects, we want women to participate in order to get different perspectives and create better innovations!"

Who, what, how

Of course, these issues extend far beyond Sweden; the European research framework as a whole has shifted to place ever more emphasis on diversity and inclusion. Horizon Europe, for instance, has introduced a mandatory gender equality plan for all actors seeking funding and uses a project's gender balance as a ranking criterium. Sex and gender analyses of a project's content are also compulsory in applying for Horizon Europe funding and are assessed as part of their excellence criteria. "So, there are a lot of reasons why making the Swedish innovation system good

"If I look at ITEA and my experiences within the ITEA Steering Group specifically, the notion of equal rights, responsibilities and opportunities for both sexes is there. That's already a great achievement that is maybe not always as evident everywhere. You are bringing this topic to the agenda, and it creates extra awareness. Keep on doing that. You have a large reach, so you can pay some special attention to gender equality through your social media, through the website, but also through events like the PO Days and customer workshops. Keep up the good work!"

- Asli Tanriverdi, Director Public-Private Partnerships at Philips and member of the ITEA Steering Group



at working on these issues actually strengthens national competitiveness," continues Sophia. "When we got our governmental assignment on this, we started to benchmark the Swedish innovation system. 80% of public research and innovation finance in Sweden went to men and male-dominated branches, which meant that we were not taking our responsibility to contribute to innovative solutions that are beneficial for the larger population. We have therefore worked with three focus areas: the who, what and how."

1. Who is the team composed of with regard to gender balance and the distribution of power and influence?
2. What is the project's potential to increase gender equality?
3. How well have gender aspects been integrated into the project plan?

More concretely, the 'how' aims to ensure a 60/40 split in all assessment groups and a gender-aware assessment process. This seeks institutional change by ensuring that Vinnova itself is internally aligned with the gender goals that it requests of project teams. As for the 'what' element, a key change in the proposal template has been the introduction of a mandatory question on relevant sex and/or gender aspects to the project. If a consortium states that there are none, they must substantiate their answer.

Quantitative and qualitative

To demonstrate the impact of this change, Sophia turns to a project that was ongoing when the mandatory question was introduced. This aimed to address vibration injuries – the second most common work-related injury in Sweden – and the consortium initially assumed this to mainly affect male-dominated fields like construction. Upon facing the question when applying for funding in the project's second stage, the team subsequently discovered that vibration injuries are widespread in dentistry, a female-dominated profession in



▲ Jan Jonker

Sweden. As a result, they could identify new types of vibration injuries and address the problem more effectively, thereby increasing their market reach and benefiting a larger demographic.

Sophia: "We were the first to bring this as a mandatory question. Before this, around 2% of applicants acknowledged gender aspects that they would address. After we asked the question, this rose to around 35% answering 'yes'. Three years later, it's now about 56%. We can have a lot of discussions on that. Is it good? Is it actually true or are they just answering 'yes' to increase their chances of getting funding? That makes the qualitative aspect of assessing their motives very important."

"It could have been easy to just answer 'no, we don't have any gender impact' but just talking about it and getting a larger awareness can make you think in terms of a gender impact of the solution being created in an innovation project," Susanne says. "We have questions for this, but it's also important that we talk about it generally and indeed also educate the evaluators that assess the applications."

Stimulating, not forcing

Jan nods. "Indeed, by stimulating gender equality and having it as part of projects, it can have a snowball effect in awareness. I've been thinking about the fact that although the ITEA Community is very diverse, it is still mostly male-oriented. But there are some ingredients, like the international character and the bottom-up way of working, that should make it easier to start these processes. What do you think are some other aspects that could really improve the score of ITEA on diversity and gender equality? Do you see any

assets within our Community that you think could really reinforce the topic?"

"In my opinion, you should add equality as an assessment criterion," Susanne suggests. "And you should also make sure that you have more equal representation of men and women in the Board of ITEA, the Board Support Group and the different expert groups, because that's where it starts. If you have 100% men in a cyber security support group, you might lose important input from women. Also, it would be good if you talk about gender equality at events, as well as making sure you have a good mix of men and women on stage. For instance, at the PO Days, you could add a section about gender equality in your session about how to write a good project outline."

"It's a first step: educating people on why we should have this," agrees Jan. "Not forcing it on them exactly but explaining what's in it for them – what the good thing is about having gender-equal teams. Without it, you really miss out on opportunities to reach broader markets and get better innovations. Step by step, we can integrate this topic as a criterium or way of adding to the ranking of projects. I think it would be good to start with the positive parts and the gains that you get from it."

"I think there is a lot of partnership spirit in ITEA, and this is good as in general women like to work in a more partnership-framed work environment where it isn't just competition. This is also true for the idea of bottom-up projects that ITEA shares which is very attractive for women. Regarding diversity, we are in the Steering Group an international group with people from many, many countries also working in even different countries: this makes it even more interesting. It feels like a Rubik's cube with all the pieces in the right place. The mentoring that ITEA offers to the projects is also something that is definitely contributing a lot to diversity and to more women in science."



- Maria Rimini Doering, Senior Expert Coordinator of Publicly Funded Projects and member of the ITEA Steering Group

Changing behaviours

"In addition to that, I can say that the ITEA Community – which is often referred to as the ITEA family – has a very informal and welcoming culture," says Susanne. "And I would say that since you already have a focus on international cooperation and have included happiness as an objective, it's a warm and positive environment. In that sense, it's very inclusive. So, I think that you can add in training for assessors and strive to have a 60/40 balance in your groups with industry

representatives. Also, Swedish ITEA projects are already evaluated according to a variety of gender aspects: how well the team is composed regarding gender distribution, the distribution of power and influence between women and men, how well gender issues were integrated into the project plan, and the potential of the results to contribute to increased equality. For now, you may want to have a stepwise approach but, in the end, I think that you also should add gender aspects to the evaluation of all projects. When speaking to ITEA projects – for instance, when going to reviews – there's also often a high focus on the technical innovations and a bit less on the actual applications and the business use. I think that more women in the projects could also contribute to more of a focus on the applications and what the technical innovations are actually used for."

Sophia uses climate-related sustainability as an illustration of this. "The fact is that women are usually more invested in behavioural changes that are beneficial for the climate and the environment. We see, for example, in one of our programmes on sustainable mobility that environmental footprints are mostly made by men. When you put a gender lens on this, we see that if more women were involved in changing travel behaviour, we could achieve a large percentage of certain climate goals."

"And if you mention behavioural changes, you get into the field of social sustainability," notes Jan. "I think that it's also very interesting to review ITEA projects or innovation projects in general on their contribution to social innovation. This is something that we have started to take into account as well over the past years, next to the technical and economic results of innovation."

Eagerness to improve

In closing the conversation, Susanne and Sophia turn their attention to the steps that Vinnova takes when a field is simply too male-dominated to immediately build up gender-balanced groups. "If



▲ Susanne Liljeblad (L) and Sophia Ivarsson (R)

they say that they don't have any women in the workforce, we require them to come in with an action plan," explains Sophia. "During these years that they receive our money, we want them to have a plan on how to change this. We make them aware that they could maybe have a doctoral student from an underrepresented group or young researchers on the board, because these are ways that we can use the money to benefit beyond a very narrow, traditional group."

"Projects shouldn't settle for just a low number of women due to the fact that there's only 20% women in tech, for example. I would encourage projects to be more eager to not see it as a given that there are few women and instead make a stronger effort to find women with the right competences," Susanne concludes. "If you want to make a change, you should be striving to take the actions needed to do things differently."

"If you want to make a change, it should be ambitious," echoes Jan. "We've touched on quite a few topics here and there are some good takeaways from it. Thank you both very much. With a step-by-step approach, ITEA can really do something more on this topic. With these good ideas, we can show the Community that it can gain a lot by strengthening gender equality and diversity."

More information

<https://www.vinnova.se/>

<https://www.vinnova.se/en/m/equal-innovation/>



"From the start, we always had a feeling that everybody who joins ITEA, who is part of ITEA, should feel good and have equal opportunities. And I think we have always succeeded in that. And for me, the big evidence of this is that a lot of people in the Community talk about this ITEA family feeling. I'm sure that if gender equality was not in ITEA, if inclusion was not part of it, we would not have these remarks saying it's a family."

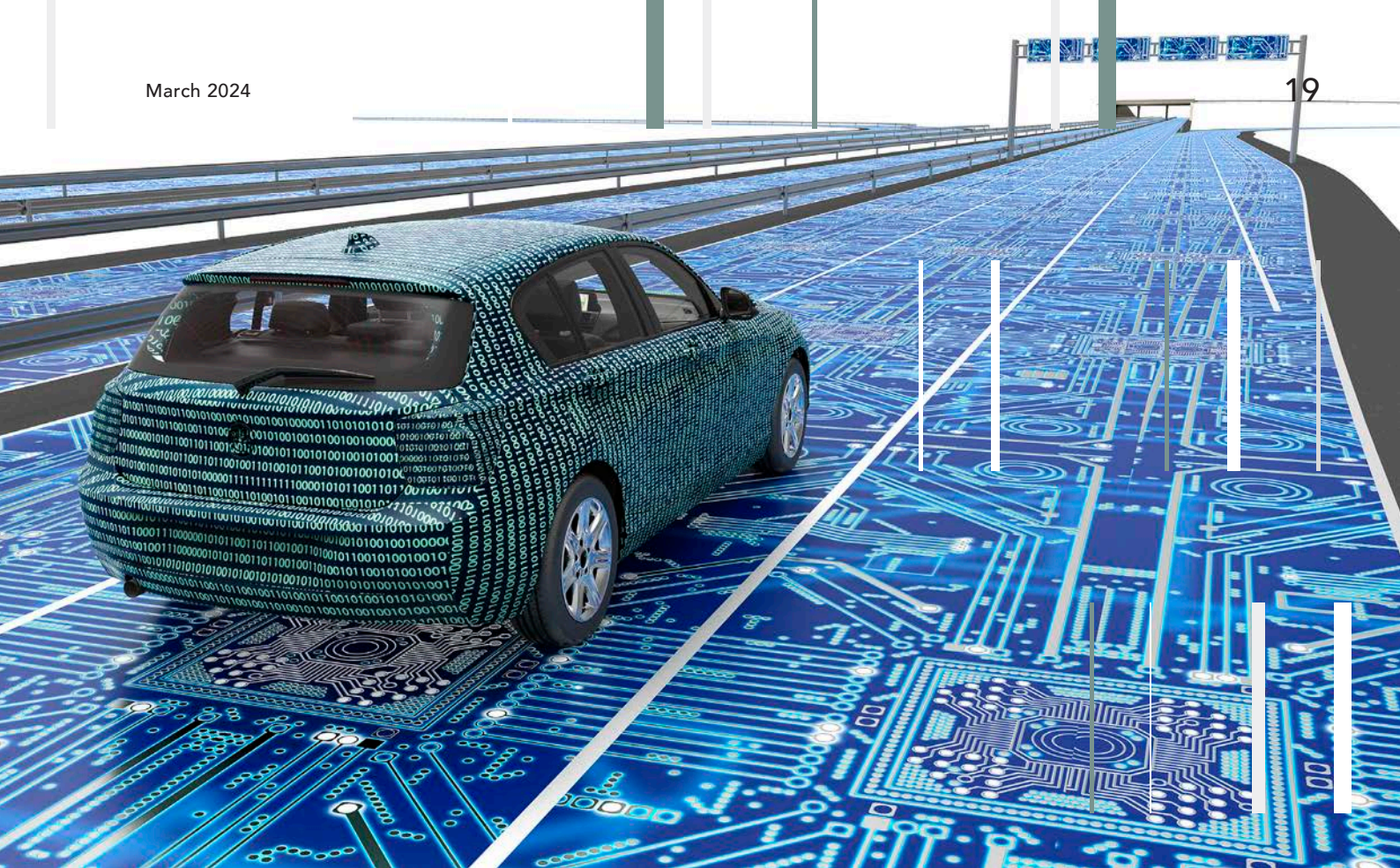
- Andy de Mets, Coordinator External R&D and Innovation Programmes at Barco and member of the ITEA Steering Group

EMPHYSIS

Bridging the gap between digital simulation and embedded software with eFMI®

Success story

In the realm of developing new functionalities, engineers often discover that their profound understanding of the physics governing their products falls short when it comes to crafting functions for embedded targets. This is due to the demanding certification requirements of safety-critical software and the diversity in embedded ecosystems and their harsh resource restrictions on real-time timings, available computational power and memory. While this might result in a never-to-be-realised excellent initial idea of operating and controlling their product in a much smarter way, at the same time it reveals the need for a link between the digital simulation of real-world physics and embedded software leveraging on such physics models.



The ITEA project EMPHYSIS, which stands for 'Embedded systems with physical models in the production code software', was set up to overcome this challenge. The project successfully ran from 2017 to 2021, uniting 26 partners from Belgium, Canada, France, Germany and Sweden. EMPHYSIS aimed to establish a new open standard laying the foundation to develop innovative tools, facilitating the realisation of model-based functions directly in embedded software with improved code efficiency. The project carried forward the highly successful Functional Mock-up Interface (FMI®) standard for model exchange and simulation and developed a new standard, the *Functional Mock-up Interface for embedded systems* (eFMI®).

Revolutionising control function development

eFMI emerges as an open standard, offering a systematic approach to developing advanced control functions tailored for safety-critical and real-time targets. For example, it enables a faster-than-real-time capable embedded virtual twin simulation from a drivetrain model in Modelica® that can be deployed on the car's embedded control unit (ECU) for error diagnostics, automatic gear switching, backlash reduction and other drive

experience improvements. At its core, eFMI serves as a standardised workspace – a common ground – for information exchange and collaboration among stakeholders and their tooling, working on different abstraction levels and viewpoints of a common cyber-physical product. The eFMI workflow empowers developers to model systems at a higher level of abstraction, starting with a reusable, high-level, component-oriented and physics equation-based model. eFMI tools automatically transform this into a solution suited for embedded software, enabling a wide variety of advanced model-based approaches for control and diagnosis. This includes the ability to solve differential equations describing a virtual twin of a cyber-physical system that can be used, for example, as a hardware sensor replacement (virtual sensor) or provide highly advanced real-time system diagnostics for optimised control, significantly reducing overall costs.

At the end of this article, you can find the 'Technical insights' for a full understanding of the EMPHYSIS project.

The main benefit of eFMI is to provide automated processes whereas the

current state-of-the-art still suffers from organisational and technology-space gaps. In particular, engineering communities can reuse and provision their existing physics model knowledge – potentially already at an early product design stage – to the embedded software development communities tasked with the implementation of advanced control functions for a common product. Assuming tools support eFMI, each community can leverage on its methods and well-established tooling, without fostering silos. In that context, eFMI is an enabler for cooperative development and knowledge exchange.

The main benefits are:

- Overcoming vendor lock-in thanks to eFMI being an open standard.
- Accelerated development time and reduced costs thanks to automated toolchains.
- Enhanced utilisation of domain experts and their tooling by providing well-defined plug-in points for the physics modelling and embedded domains.
- Facilitating new ways for OEM-supplier collaborations with complementary viewpoints and respective toolsets along the eFMI workflow.

Project start
September 2017

Project end
February 2021

Project leader
Oliver Lenord
Robert Bosch GmbH, Germany

More information
<https://emphysis.github.io/>

Outperforming use-cases

EMPHYSIS showcased its prowess through 11 industrial use-cases in the automotive domain, a Modelica open source library with 22 examples comprising about 40 real-time simulation configurations, and 13 tool prototypes supporting eFMI of which 6 have been commercially released in the meantime (see Figure 1). The 11 industrial use-cases comprised such advanced scenarios like a semi-active damping controller with a nonlinear inverse model and nonlinear Kalman filter (DLR, efs TechHub), a transmission model of the whole drivetrain as virtual sensor (Volvo Cars), a dual-clutch transmission diagnosis virtual sensor (Mercedes-Benz) and an advanced emergency braking system controller (Dassault Systèmes).

BOSCH further conducted an intensive performance assessment to compare eFMI solutions with state-of-the-art handcrafted solutions for six representative application scenarios: a simple PID speed controller, an inverse drivetrain model to reduce drivetrain vibrations, an air-flow control model that is stiff, a nonlinear slider crank model for optimised crank movement, a rectifier model for battery charging requiring very compact ODE representations, and

a thermal heat transfer model requiring automatic finding of a reduced order model for high-dimensional maps. Four of the six benchmark cases surpassed the handcrafted solutions and the top eFMUs requiring 9% less data memory on the targeted BOSCH MDG1 multicore ECU. Five benchmark cases excelled in ECU runtime performance, exceeding the state-of-the-art by an average of 26% for the best-performing eFMUs, with the highest speedup being 40%. Productivity gains were evident, with a reduction in development time for five cases averaging 90%, including a remarkable 93% for the PID controller, 92% for the drivetrain controller, and 88% for the slider crank controller. The versatility of eFMI was highlighted by the air system use case, where modelling time remained constant, but embedded implementation and validation efforts plummeted, resulting in a 52% overall increase in productivity.

These figures are backed by further, non-public industry assessments performed since the end of EMPHYSIS by third parties like the Institute of Vehicle Engineering (ivH) and others. The indicators of the assessments are auspicious: eFMI reduces the time and risk to market of embedded control software for complex cyber-physical systems, increases collaboration and knowledge exchange between physics-based engineering and embedded software domains, and increases productivity. The virtual sensor industrial demonstrators – like the drivetrain transmission model of Volvo Cars – are in particular disruptive technologies since such applications simply had not been considered feasible; the development effort and risk of errors in handwritten respective C production code solutions are unacceptable.

Continuous success

The results of the EMPHYSIS project were transferred to the Modelica Association Project eFMI (MAP eFMI) founded in 2021 under the umbrella of the non-profit Modelica Association to prepare them for open access standardisation and publication, and the organisation of a volunteer community promoting and developing eFMI. Eleven of the original EMPHYSIS project partners immediately joined

MAP eFMI, demonstrating their strong confidence in and commitment to the eFMI technology. Subsequent membership applications of Altair Engineering Inc., Institute of Vehicle Engineering CO LTD, Mercedes-Benz AG and Mitsubishi Electric Research Laboratories further validate the project's relevance across diverse domains. The project is open for membership applications to continue further expansion.

A major milestone has been the provisioning of a complete eFMI toolchain backed by first commercial tool releases available on the market and covering the whole eFMI workflow from physics modelling in Modelica to production code on dedicated embedded platforms. The respective tools and their interplay are shown in Figure 1. Most are already well-known and established tooling in the physics modelling or embedded software domain, giving professionals a chance to plug-and-play with eFMI. Being well-established implications:

- **A long history and reasonable user community:** Dymola for example is available since 1993, is a de-facto reference tool for physics-based system simulation using the Modelica language and accompanied by a significant ecosystem of commercial and open-source (third-party) libraries for all kinds of engineering disciplines like electrics, batteries, fluids, thermal & HVAC, mechanics, process modelling, automotive industry, aerospace industry, naval industry, building industry etc.
- **A high-level of industry standard compliance and ecosystem integration:** TargetLink for example integrates seamless with MathWorks® Simulink®/Stateflow® models, supports a plethora of embedded targets and ecosystems like the AUTOSAR Classic and Adaptive Platforms, is certified for ISO 26262, ISO 25119 and IEC 61508 and generates production code satisfying MISRA C:2012. Likewise, TPT satisfies ISO 26262 and supports testing of ECU software and embedded control systems in all development phases such as model-in-the-loop (MiL), software-in-

the-loop (SiL), processor-in-the-loop (PiL) and hardware-in-the-loop (HiL) in various embedded ecosystems and hardware, from the AUTOSAR Classic and Adaptive Platforms to dSPACE SCALEXIO etc.

A key enabler to achieve commercial releases has been the continued tool-vendor collaboration in MAP eFMI, whose crosscheck test suite is used to conduct extensive interoperability testing. MAP eFMI also maintains two supporting open-source tools for packaging and accessing eFMUs as well as ensuring compliance with the eFMI Standard: the eFMI Container Manager and the eFMI Compliance Checker.

Last, but not least, MAP eFMI has launched its official website <https://www.efmi-standard.org/>, offering insights into the upcoming standard drafts, eFMI technology overview, available tooling, documentation, introductory material, example eFMUs and project organisation. A comprehensive 2.5 hour tutorial describing the motivation for eFMI, introducing its container architecture and providing a hands-on training in Dymola, Software Production Engineering and TargetLink was presented at the 15th International Modelica Conference 2023, and is available online at YouTube (<http://tinyurl.com/fr35hxhv>).

Bridging the engineering and embedded software development domains

In essence, EMPHYSIS was a journey of innovation and collaboration that has paved the way for a transformative technology for embedded software, and MAP eFMI is set to carry the torch forward.

The major challenge of eFMI lies not in its technological capability or feasibility – which has been demonstrated by extensive assessments as explained in the highlighted section – but in its strength to bridge the engineering and embedded software development domains: such a bridge implies bringing communities together which requires respective organisational processes. Reorganisation and redistribution of

Technical insights

The general eFMI workflow

Figure 1 summarises the general eFMI workflow for the virtual drivetrain example – one of 11 industrial use-cases of EMPHYSIS – using tooling developed in the EMPHYSIS project and now commercially available.

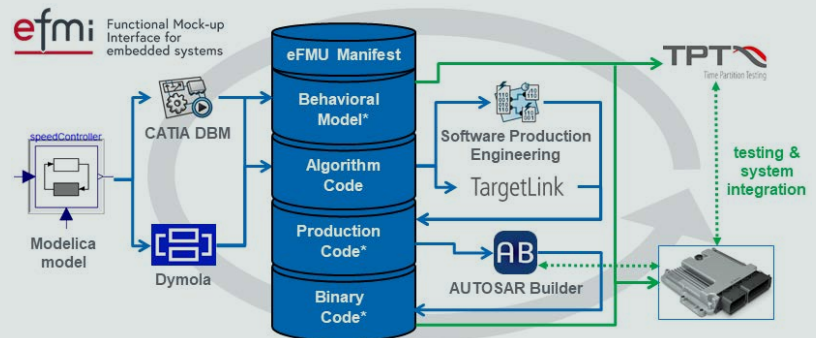


Figure 1: eFMI container architecture and workflow

The starting point is a physics equation-based Modelica model of the drivetrain, developed using the Dymola Modelica IDE (Dassault Systèmes). Besides the virtual design and verification via offline simulations, Dymola can generate a new eFMU (embedded Functional Mock-up Unit) with an algorithmic solution of the drivetrain model in an eFMI Algorithm Code container. Although deterministically computable, such algorithmic solutions are still of a high, target-independent abstraction level. Dedicated eFMI production code generators have to translate them to C code suited for the actual target platform. In the figure above, TargetLink (dSPACE) and Software Production Engineering (Dassault Systèmes) are used. The resulting C11 production code is added as an eFMI Production Code container to the eFMU. To integrate this production code into the system and deploy it on the target hardware, AUTOSAR Builder (Dassault Systèmes) adds required ©AUTOSAR Adaptive Platform code in an eFMI Binary Code container, ultimately provisioning the faster-than-real-time drivetrain simulation as an AUTOSAR component. Offline simulations of the original Modelica model in Dymola are further used to generate reference trajectories for software- and hardware-in-the-loop (SiL, HiL) tests, added as an eFMI Behavioral Model container to the eFMU. The final tests on the target hardware are conducted with the TPT (Synopsys) testing IDE. Note, that the eFMI Standard requires that each container, besides the actual implementation artefacts, provisions a dedicated manifest with meta-information like checksums and dependencies on other eFMU containers; an eFMU manifest lists all the containers.

The eFMU is a standardised workspace where different stakeholders and tools contribute towards a final solution by means of updating existing or adding further development containers derived from the results of higher abstraction levels along the chain from physics-based equations down to target specific binaries ready for deployment. The eFMI Standard thereby only defines “what” the representations and results of an abstraction level are, not the “how” to produce such; the actual magic is in the generating tools that can be well-established expert tools in their respective domain.

responsibilities to break silos in huge organisations is a sensitive social, political and bureaucratic subject.

Put simply: Investing in eFMI is a must to tackle the future challenges in embedded control.

Community Talk with Jennifer Overbury

Smart project management in a technical domain

There's more to ITEA than technology: as the leader of the ITEA project SMART, Jennifer Overbury recently demonstrated the balance that an experienced manager can provide between the overarching objectives and technical nitty gritty. "You know, technical minds can sometimes get down rabbit holes when there's cool technology. But we need to delicately steer that energy towards the project goals. Bringing that experience to the project can be a beneficial contribution – it doesn't have to be 100% technical."

Intelligent questions

That's not to say that Jennifer is non-technical. Having been interested in the physical world since childhood, she majored in Geography at the University of Calgary and joined geographic information systems (GIS) company Esri Canada in the 1980s. "GIS was a really new technology and, when I turned up at Esri Canada to be interviewed, it was a little bit embarrassing because the owner had to explain to me what GIS was and how it was going to change the technology world," Jennifer recalls. "I think I got hired on the basis of asking some intelligent questions and showing my sincere enthusiasm for anything geographic; there weren't a lot of GIS professionals floating around at the time."

Long overdue

Over time, Jennifer's role within the company shifted to managing

professional services engagements and, after 13 years, she opted to experience the client side of work at a large Canadian bank. There, she received formal project management training and attained her project management professional designation. The roots of her international project leadership ultimately go back to an assignment received during that first 13 years at Esri Canada.

"Back in 1993, Esri Canada participated in a GIS implementation project for a regional water agency in Cairo. I was very fortunate to be sent to Egypt and work for two weeks with local water engineers to help them deploy GIS on a mainframe with command line software that wasn't easy to teach or learn. I guess I was due to work on another project outside my home country – and then this ITEA one came along."

The Science of Where

The ITEA project in question was SMART, which brought together partners in Canada and the Netherlands to investigate dynamic traffic control and geospatial visualisation in cities. This appealed to Jennifer not only for its focus on GIS but for the demonstrable societal value. "I've lived in the large city of Toronto my whole life, so I was very interested in moving the dial towards solutions for congestion," she says. "And we geographers see everything through 'The Science of Where', which is actually an Esri slogan. Where is the traffic congestion? Where are the emergency vehicles being routed? Where is the transportation infrastructure? The problem set of the project made a lot of sense to me. I came to it not with technical wizardry but with years of project management experience. At the high level, that role is to orchestrate all the technical geniuses in their work. So,



"I'm all for encouraging women to get alongside the men in these big projects. If my story encourages even one other woman to lead an ITEA project, that would be another positive outcome of the project."

you clear the roadblocks, you help with the decisions, and you provide guidance to ensure all our efforts are aimed at the objectives and the goals of the project."

Kindness and patience

These skills were especially pertinent as Jennifer stepped into the project after the previous leader's retirement, requiring her to catch up on six months of progress while contending with a six-hour time difference and the COVID-19 lockdowns. With so much global uncertainty, the project cooperation agreement was still to be signed and one of Jennifer's first tasks was to focus the consortium on this unappealing administrative task so that the more enjoyable technical elements could take flight. "Among those consortium members, there were two former project leaders, Egbert and Egor, who stepped in to get me up to speed," Jennifer continues. "I also had a point person from the ITEA Office, Özgün, who has been a saviour. I quickly got the sense that this was going to be a project full of meaningful collaboration and that we would form a really fun and positive team."

"It was also interesting because I was the only woman on the project as well as the least technical. It was scary at first, but people were kind and generous

with their patience. I see and feel the equality in the workplace. However, women of a certain demographic may harbour reservations from previous decades. If you push that thinking aside and step into an ITEA leader role, I think you will find it incredibly rewarding and have a lot of fun too! I'm all for encouraging women to get alongside the men in these big projects. If my story encourages even one other woman to lead an ITEA project, that would be another positive outcome for the project."

Planting a seed

Once the project was in full swing, Jennifer's overriding emotion was excitement. Prior to SMART, she had never worked so closely in bridging the gap between research at universities and applications in industry. "At universities, leading-edge ideas and technology are in their infancy. In an ITEA project, we have to try and find out what gets a foothold in industry and push the envelope," Jennifer explains. "I'd never seen that in action. It's one of the most important features of these projects: a seed gets planted and, at the end, it's a walking, talking toddler – or at least a minimum viable product integrated with practical industry solutions. Having these unlikely

partners come together with so many different ideas and technologies is invaluable. Coming into the project, all the consortium members had their own successful businesses and solutions. But as Aristotle said, the whole is greater than the sum of its parts. And it couldn't have been truer for this SMART project."

Thinking, innovating, collaborating

"To me personally, it brought a huge sense of accomplishment to achieve a project of this magnitude and calibre and to be a part of such a special group of people and technologies is memorable. I feel like I contributed by helping everyone meet their goals with their technology," Jennifer smiles. "To ITEA I'd like to say: you are bold thinkers, innovators and collaborators – continue the trajectory, send it to the moon and keep doing what you are doing. Working with ITEA was nothing short of excellent: they want you to succeed and they're incredibly helpful. The support I received as a first-time ITEA project leader was just amazing. My closing thought is there's an uncommon camaraderie within the project that I'll keep with me until I'm in my rocking chair."

icometrix

Transforming neuroimaging with AI

How can you standardise care pathways for practitioners to offer more personalised healthcare to patients? In the field of neurological disorders, Belgian SME icometrix strives to achieve this through data-driven imaging supported by artificial intelligence. Senior researcher Diana Sima explains how these insights are being applied in their first ever ITEA project, HeKDisco.

Constant evolution

Founded in 2011 as a spin-off of two Belgian universities and academic hospitals, icometrix has often found itself at the intersection of industry and academia – not unlike Diana herself. “I’m originally from Romania but I did my PhD in Leuven in Numerical Linear Algebra and Computer Science with the application in magnetic resonance imaging and spectroscopy. At the end of my postdoc, I received a scholarship with icometrix. For two years, I was working in academia and the company at the same time, trying to valorise my computer programmes in the field of MRI. After this, it was a small step to stay on as a senior researcher.”

Such work on MRI is also part of the company’s own transformation from general medical image analysis to a focus on neuroimaging. Little by little, icometrix has become a global leader in providing imaging biomarkers for neurological diseases, with integration into over 100 clinical practices. “We developed the icobrain software to analyse brain scans of various neurological conditions and this tool assists radiologists and neurologists in their diagnosis and monitoring of their patients,” Diana continues. “It’s a complementary source of information besides what they obtain from clinical evaluations and other types of tests. Medical imaging is essential in this diagnosis process.”

Sensitive to subtlety

As a case in point, Diana mentions multiple sclerosis, a disease affecting nerve cells in the brain and spinal cord. MS patients typically receive a brain

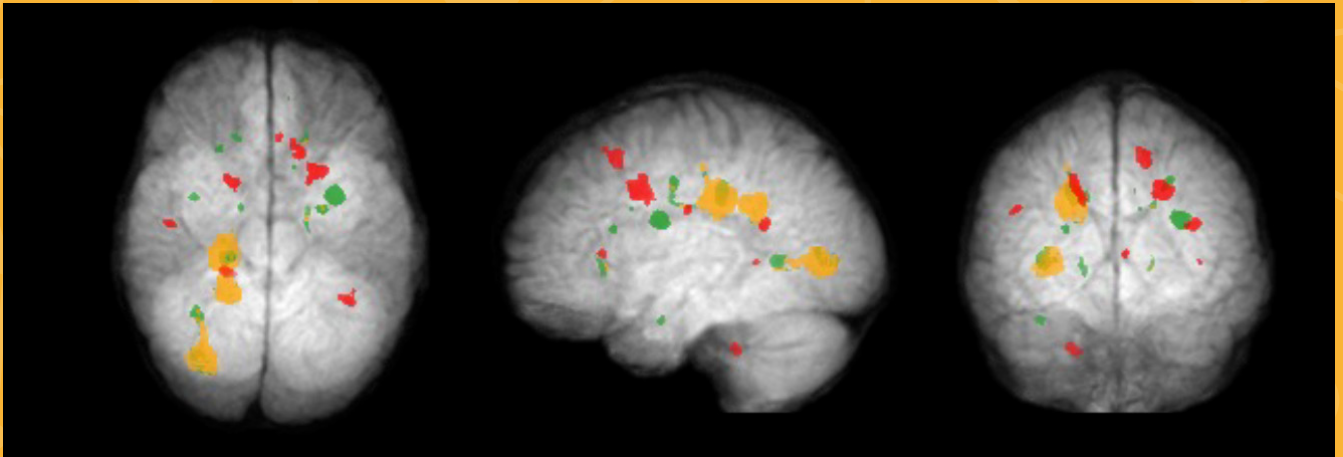
scan once per year, from which radiologists must detect subtle changes such as atrophy or lesions. Disease-modifying treatments can stall multiple sclerosis, but it is vital that patients receive the most appropriate treatment for their progression as early as possible. “This is where we come into play, because visual eyeballing is prone to error and subtle changes are difficult to assess, even by experienced radiologists,” says Diana. “Our software tool, based on AI, has more sensitivity and highlights these new lesions to the radiologist by comparing different scans.”

An extra pair of eyes

In response to concerns about the artificial replacement of humans, Diana emphasises that their software does not take decisions itself and that practitioners are always in the loop. icometrix’s aim has always been to help patients, which requires a shift from data-driven to value-driven care. In other words, access to data is only meaningful if the data is understandable and empowering for patients. By allowing practitioners to work in a more efficient, standardised manner without removing the human element of care, AI-based support leads to more accurate decision-making and better outcomes for those affected by neurological disease.

A common cause

Multiple sclerosis is a pertinent example as this forms icometrix’s use-case in HeKDisco, which brings together six partners across Belgium, Slovenia and Türkiye. Diana: “HeKDisco focuses on healthcare knowledge discovery and bringing data-



"Involvement in programmes like ITEA means projects at the cutting-edge level we want to pursue. We need collaboration to have a bigger impact."

driven evidence into clinical practice. Connecting hospitals with AI providers is also one of the goals in order to make the transfer of data, knowledge and tools more streamlined. While there are partners that deal with completely different applications, there are underlying similarities in that you need to bring different types of data together to generate predictive models that can describe patient trajectories for a particular disease."

Within this, icometrix is working to find salient biomarkers in medical images that have more prognostic value. The ambition is to achieve a greater understanding of why patients progress differently to one another. "Indeed, to have more personalised care, you need to know which patient has a more aggressive form of the disease. This kind of predictive tool has not yet been developed and we are in the beginning of this phase. This is one of the challenges in this project."

Contact through collaboration

Thanks to its origins in academia, icometrix has participated in many research and training networks, as well as projects. These positive experiences with collaboration were part of the pull to ITEA and Diana highlights the networking component as the most important benefit at the company level. "We need committed partners that can help provide validation studies, research, algorithms or even ideas when we brainstorm together. What is nice for us is that it opens up new collaborations. Since HeKDisco's coordinator is from Türkiye, there was a new opportunity with Istanbul University Hospital, which we were not yet in contact with."

Although she does concede that the funding structure involving national agencies caught her by surprise, Diana also recognises the advantages this can bring. "The funding allows us to invest in more risky topics that might otherwise not be an option. We have contract research where we execute projects from pharmaceutical companies that want to analyse brain scans, for instance. We provide that service, but then don't get to go beyond what's already the state-of-the-art. That's another main role we see for this project."

The cutting edge

HeKDisco will ultimately run until January 2025, but Diana sees a lot to be satisfied with in the meantime. "I was also thinking how much I like ITEA's online platform for project submission, deliverables, milestones and so on. In comparison with other platforms, it's much better designed – but, of course, ITEA being about innovative software probably means that's not surprising! Another thing I appreciate is that we had a project review meeting with several experts that took place online but was still well-organised with extensive feedback afterwards. With other types of projects, we sometimes submit deliverables and get no feedback. But here, it was positive, sufficient feedback for us to move forward. Involvement in programmes like ITEA means projects at the cutting-edge level we want to pursue. We need collaboration to have a bigger impact. In the end, patients find value-driven care meaningful and this is an idea we can spread within our collaborations."

More information

<https://icometrix.com/>

ITEA Topical roadshow

Your voice, your topics, inspiring the ITEA Community

This year ITEA will organise a new type of event called the 'ITEA Topical roadshow', a series of online sessions where you are in the lead!

As the ITEA Community consists of many bright and knowledgeable members, with a strong open collaboration spirit, we want to leverage this strength by organising a series of online sessions focused on topics that are relevant to create and run high-quality and impactful collaborative research projects.

The goal is to share knowledge, experience and best practices within the ITEA Community, and the ambition is to cover technical topics as well as managerial topics that will improve ITEA projects. By doing so, we want to help running projects and to inspire and encourage the creation of new projects on a solid basis.

Each webinar will cover a dedicated topic and will contain a brief introduction, some testimonials/presentations by experienced ITEA Community members and an open discussion with the attendees.

Engage and propose your preferred topics for future sessions!

As we want to organise ITEA Topical roadshow sessions that are most relevant for the ITEA Community, you can decide on the topics of the

future sessions. Just to give you an idea, some examples of other potential session topics could be:

- How to build trust in AI models?
- What are the relevant IT technologies to develop precision agriculture?
- How to manage Intellectual Property Rights in ITEA projects?
- Best practices for fostering gender equality and diversity in collaborative research projects.

It's up to you to decide.

So if you want to co-organise an ITEA Topical roadshow session with us, fill in the 'Application template' that you can find on <https://itea4.org/itea-topical-roadshow.html>.

You can take care of the content (with our support) and we will manage the registration process, provide a presentation platform, and promote the session via our channels.

We look forward to going on the road with you and create impactful sessions with and for the ITEA Community!

dshow

Join the first ITEA Topical Roadshow

Large Language Models
– from research to
business value creation

26 March 2024, Online
14:00 – 16:00 CET

Register for free via
<https://itea4.org/itea-topical-roadshow/large-language-models.html>



Calendar

20-21
MAR
2024

Sweden Innovation Days

Online event

<https://swedeninnovationdays.se/>

26
MAR
2024

ITEA Topical Roadshow - Large Language Models

Online event

<https://itea4.org/itea-topical-roadshow/large-language-models.html>

22- 26
APRIL
2024

Hannover Messe 2024

Hannover, Germany

<https://www.hannovermesse.de/en>

27-31
MAY
2024

17th IEEE International Conference on Software Testing, Verification and Validation (ICST)

Toronto, Canada

<https://conf.researchr.org/home/icst-2024>

29-30
MAY
2024

Forum Teratec 2024

Parc Floral, Paris

<https://www.forumteratec.com>

13-14
JUNE
2024

Eureka Global Innovation Summit

İstanbul, Türkiye

END
OF
JUNE

ITEA Smart Industry customer workshop

Ulm, Germany

SAVE THE DATE

10-12 September 2024

**ITEA PO Days
2024**

Antwerp, Belgium

Mad@Work

AI-guided well-being app reduces stress in the workplace



The growing global phenomenon of burnout and mental wellbeing at work have increasingly drawn attention over the past years. Stress may originate from too challenging work and from too boring work, from social problems, poor working conditions and various other reasons. When stress occurs, it decreases employee engagement and increases employee absenteeism and turnover. In the USA, job stress is estimated to cost \$300 billion a year, and 31% of new hires leave their jobs within the first six months, while experienced workers often retire early. In Europe, the cost of work-related depression is estimated to be €617 billion annually.

The use-case developed by ETRI and Neighbor System in the ITEA project Mad@Work offers workplace workers the WMind@Work app that analyses mental health information using physiological information and survey data using an AI-based method and provides mental wellbeing solutions to relieve stress. By monitoring metrics such as heart rate variability and integrating

multiple sensors at work, it provides personalised insights into stress levels and offers tailored solutions for stress relief. The app's intuitive interface seamlessly integrates into daily routines, ensuring easy access to mental health support. Moreover, its compatibility with existing support systems, including Employee Assistance Programmes, ensures comprehensive mental health care within the workplace ecosystem.

This solution brings multiple benefits to the personal well-being of workers contributing to giving personalised insights to workers, helping teams communicate efficiently, and showing how everyone in the organisation feels overall. It empowers HR to assess interventions effectively, leading to increased productivity and reduced healthcare costs. Overall, it presents significant opportunities for individuals, businesses, and society.

More information

<https://itea4.org/project/mad-work.html>

Secur-e-Health enhances patient experience, efficiency and costs

Sensitive health data is often kept in silos in a way that it cannot be efficiently leveraged for authorised medical research and data analysis purposes. In response to the critical need for fortified data security and enhanced patient care, the ITEA project Secur-e-Health has emerged as a groundbreaking and unprecedented initiative, uniting 25 leading companies across Canada, Finland, Germany, Portugal and the Netherlands.

The project aims to go beyond borders by integrating cutting-edge encryption and artificial intelligence into medical databases. It ensures secure data transfers and provides personalised insights to healthcare providers. As part of the project, innovative solutions were developed, including predictive risk assessment models, secure cross-organisational analysis platforms, decentralised clinical trial frameworks and decentralised predictive clinical decision support systems tailored to pediatric care, transforming traditional healthcare approaches.

The tangible outcomes of Secur-e-Health are already visible across the participating countries. Delving into one of the prominent use-cases within the consortium, the Canadian 'Siteless Clinical Trials' initiative reimagines traditional clinical studies via decentralised approaches, streamlining patient participation and enhancing data management. It implements novel secure biometric authentication protocols and emphasises patient consent, removing the need to visit the clinic or the hospital. This means that from the initial screening visit to the end of the follow-up period, patients can now engage in the study entirely remotely, enhancing their overall experience. Not only does this approach optimise patient inclusion across all regions of Quebec, Canada,



but it also accelerates recruitment objectives, consequently shortening the duration of clinical trials for the Montreal Heart Institute, the principal participant in this use-case.

Alongside enhancing the efficiency of studies, the elimination of in-person visits for biomarker collection and drug distribution also significantly reduces their associated costs. Moreover, by enabling Canada's biopharmaceutical companies to develop products with reduced funding, the initiative fosters the creation of substantial value for the companies involved and the country. The digital framework and flexible organisation for siteless clinical trials integrate standard electronic clinical trial tools with innovative technologies

such as video conferencing, patient-reported outcome tools, Internet of Things integration and drug compliance intelligent assistants, ensuring a seamless and efficient trial process for all stakeholders involved.

In conclusion, the Secur-e-Health project stands out for the diversity and scope of its initiatives, with over 13 use-cases

currently in progress. Each partner is deeply committed to this collective endeavour aimed at revolutionising modern medicine by integrating cutting-edge cybersecurity techniques. This exemplary partnership marks the beginning of a new era in which secure, personalised and innovative medicine becomes a tangible reality.

Together, we are reshaping the landscape of healthcare for generations to come.

More information

<https://itea4.org/project/secur-e-health.html>
www.linkedin.com/company/secur-e-health/

Eureka Global Innovation Summit 2024

Bridging Green and Digital Transformation
13-14 June 2024 | Istanbul



Türkiye assumes the Eureka Chairship for the third time from July 2023 to June 2024. With a focus on priorities such as 'Building a green and digital future' and 'Embracing global collaboration', the upcoming Eureka Global Innovation Summit (GIS) themed 'Bridging Green and Digital Transformation' presents an ideal opportunity to translate these goals into action.




Scheduled for 13-14 June 2024 in Istanbul, GIS 2024 aims to unite key players, industry representatives, and academics within the innovation ecosystem. As Clusters are impactful instruments of the Eureka network, with a strong community with expertise in green and digital transformation, ITEA and the other Eureka Clusters will contribute to the organisation of this event by sharing

knowledge through keynotes and panellists in several sessions and during the dedicated Eureka Clusters side-event.

During this two-day global event, several important topics will be addressed alongside Green and Digital Transformation. Artificial Intelligence, twin transition, data dynamics, urban innovation, and policies geared towards preparing for the digital future will all take centre stage.

We look forward to GIS 2024, anticipating fruitful exchanges with the entire Eureka network and collectively building a better future. Stay tuned for more details and registration information coming soon to your inbox!

Eureka Clusters Call dates

	22 April 2024	Submission deadline FPP - SMART Call 7	https://www.smarteureka.com/
	3 May 2024	Submission deadline PO for the CELTIC-NEXT Spring Call	https://www.celticnext.eu/
	18 April 2024	Submission deadline FPP - Xecs Call 3	https://eureka-xecs.com/

Colophon

An online version is available at <https://itea4.org/magazine.html>

Publisher:

ITEA Office - High Tech Campus 5 - 5656 AE Eindhoven,
The Netherlands

Editorial contributions and copywriting:

CPLS - Creative & Professional Language Specialists, Eindhoven,
The Netherlands

Design and creative lay-out:

Studio Kraft - Veldhoven, The Netherlands

With thanks to the interviewees, project participants, ITEA Office, ITEA Presidium and other ITEA-involved persons for any assistance and material provided in the production of this issue of the ITEA Magazine.

Submissions:

The ITEA Office is interested in receiving news or events linked to the ITEA programme, its projects or in general: R&D in the software innovation and Digital Transition domain.
Please submit your information to communications@itea4.org.

Subscription:

communications@itea4.org

©2024 ITEA Office

Permission to reproduce individual articles from ITEA Magazine for non-commercial purposes is granted, provided that ITEA Magazine is credited as the source.

Opinions expressed in the ITEA Magazine do not necessarily reflect those of the organisation.



<https://itea4.org>



ITEA is the Eureka Cluster
on software innovation