ITEA
The fast track
to software
innovation

A proven instrument ready
## to shape the future

25 years | ITEA 4
1998–2023

Contents

Foreword

To all ITEA Industrial Representatives and Public Authorities,

Innovation needs creativity and perseverance.

The challenges that confront us in our daily lives need innovative solutions. Sustainability, time-to-market and limited resources of the planet are only few of these challenges and all are applicable for each company, each organisation and each country.

These are problems of TODAY and they need to have impactful solutions NOW.

ITEA has been the fast track to software innovation for 25 years already, characterised by its bottom-up approach and agility. In software innovation, the rapidly changing environment demands flexibility and adaptability. In this way, ITEA is a unique innovation instrument in sensing the concepts of tomorrow and creating solutions based on the urgent needs of end users and society. Just to mention an example: virtualisation in industry, which started in an ITEA project as a creative idea, has now led to the Digital Twin concept. And ITEA's history is full of many other impactful results.

In these challenging days, we need innovation that can be applied as quickly as possible to the lives of people, so research projects need fast exploitation as well as the discovery of new concepts. ITEA projects have resulted in spin-off companies, global standardisation and fast exploitation in many markets.

Since 1998, ITEA has been fostering software innovation as an impactful and economic instrument. This report contains a number of examples of the impact that has been achieved since the beginning of ITEA and what can be expected in the near future for software innovation.

ITEA is celebrating its 25th anniversary this year and we would like to thank you for your continuous support and valuable input, enabling the ITEA Community to perform successfully over these past 25 years. With the continuous interest, commitment and creative ideas of the ITEA Community and with the trust and support of Public Authorities and Bodies, ITEA has become the fast track to software innovation.

Happy Anniversary!

Zeynep Sarılar, ITEA Chairwoman

Software innovation is an integral and essential part of our daily lives

01

Definition of software innovation in ITEA

In the 'ITEA dictionary', software innovation can have the following four meanings:

1. **The invention of a new way to compute something:** new algorithms or new processing concepts are software innovation. For example, the introduction of new artificial intelligence methods is software innovation.

2. **A new way to integrate existing software technologies:** there is a huge reservoir of software methods and just the idea to integrate some of them with a new objective is software innovation. For example, the combination of data models and physical models is a way to innovate even if you only use existing technologies.

3. **The introduction of software to enable an activity not yet using software:** this meaning is close to the concept of digital transformation, which represents the introduction of digital technologies in various processes or activities. For example, the introduction of existing image processing techniques in digital pathology is software innovation.

4. **Creation of new software tools and solutions for the design of complex objects/services:** the increasing complexity of the products we want to design (e.g., an aeroplane) or the infrastructures we must put in place (e.g., a smart electricity grid) requires new software solutions that will enable the design. As a complex system by itself, software design is also a domain requiring software innovation with new methods to efficiently develop high-quality software (software engineering, software creation simplification/automation, software for massively distributed systems).

The importance of software innovation

Economic impacts

Software innovation has been at the heart of the creation of internet giants like Google, Amazon, Meta and Microsoft, with new search engine and content management software and the adoption of new business models.

Software innovation is also the engine of the software market, with a value of around 700 billion euros per year[1], where the software providers for enterprises and consumers compete by translating new ideas into software.

But perhaps it is the role that software has taken in all industrial sectors that is most striking. In a car today, you have more than 100 million lines of software code and it will continue to expand. This is the same in almost every industrial sector, including the content industry, telecommunications, finance, buildings, health, energy and distribution. In all these industries, as soon as you want to innovate, this will go hand in hand with the development of new software and you cannot compete without excelling in software innovation. Digitalisation and software are fostering gains in productivity and reduction in environmental impact across industries.

Societal impacts

Software innovation is also central to helping solve our societal challenges: climate change, urbanisation, ageing population, pressure on healthcare, unemployment and scarcity of human resources, education, etc.

United Nations Sustainable Development Goals

If you analyse the 17 United Nations' sustainable development goals (SDGs), software innovation plays a direct role in achieving nine of these goals: Zero hunger, Good health & well-being, Quality education, Affordable & clean energy, Decent work & economic growth, Industry, innovation & infrastructure, Sustainable cities & communities, Responsible consumption & production and Climate action. Software innovation also plays an indirect role in at least five additional goals: No poverty, Clean water & sanitation, Life below water, Life on land and Peace, justice & strong institutions.

If software becomes more central in our lives, it will have a positive environmental impact as we will trade non-material goods with low impact instead of material goods with higher impact. Moreover software is key to optimising resource usage in many domains.

Software will also have a positive impact on the job market. Even if some jobs disappear, more jobs requiring a higher qualification will be created.

[1] *Source: https://www.statista.com/outlook/tmo/software/worldwide*

ITEA enables the pioneering of the software concepts of tomorrow

02

The difficulty in planning software innovation

Software innovation is difficult to plan. It can happen suddenly and from a software idea completely new activities can emerge. No one predicted the birth of Google or Facebook. Starting as just a new piece of software associated with a smart business model, quick adoption combined with the power of the network effect ended up with two Internet giants.

The same happens in more traditional industries, where software innovations often emerge without planning, just from a smart idea, unique developments and fast adoption. But when the idea is there, speed is a crucial success factor in its transformation to a product, process or service.

ITEA offers the freedom to create forerunner projects

Speed is a key benefit of ITEA's bottom-up approach and agile processes, as it enables ITEA project partners to be pioneers in software innovation. Thanks to its bottom-up approach, ITEA can create RD&I projects on any topic related to software innovation, based on the strong expertise of its visionary Community members. The agile processes allow ITEA projects to follow market and technology developments, translate these to groundbreaking or disruptive concepts and projects, learn from experiences and continuously steer towards practicable outcomes. Outcomes that often lead to rapid market introduction. In the past, these features led to innovations within important topics even before they became one of the new trends in the IT industry.

DIGITAL CINEMA
(2001–2003)

Revolutionising the market

The Digital Cinema project laid the very first basis in the transformation from analogue 35mm film in cinema to the digital technology shift that followed. This ITEA project started the wave of the new technology for cinema, going to digital, enabling the new generation of film distribution. Thanks to this, 3D movies in the cinemas became possible. In addition, movies can now be distributed at the same time at any location anywhere in the world, regardless of the cinema size. Moreover, it is now possible to go to cinemas and theatres for live events, for example, to see an opera performed in New York, displayed live in any other city of the world. The Digital Cinema project really revolutionised the market.

A worldwide modelling and simulation standard for the value chain of CPS Digital Twins

MODELISAR
(2008–2011)

Virtualisation by means of modelling and simulating the behaviour of cyber-physical systems (CPS) was used by manufacturing companies via proprietary software solutions before MODELISAR. In the MODELISAR project, Dassault Systèmes' knowledge on simulation combined with Daimler's and other manufacturers' knowledge on the end user requirements was brought together to a global standard called Functional Mock-up Interface (FMI). This now enables models from different industry actors and simulation environments to be shared conveniently. This new concept has enabled faster adaptation of CPS Digital Twins. FMI has benefited from a massive and viral worldwide adoption - it is currently supported by some 100 modelling, simulation, code generation and testing tools offered by more than 50 tool suppliers; we are now talking about the exchange and co-simulation of such Digital Twins. MODELISAR project leader, Patrick Chombart from Dassault Systèmes states that the "consortium had benefited from a strong mix of ITEA support and challenge to bring the emerging FMI standard to industrial impact." The FMI standard is now managed and developed as a Modelica Association Project (MAP) through the active participation of 16 companies.

MEDUSA
(2013–2015)

Early adaptors of the cloud

In MEDUSA, 13 partners from France and the Netherlands worked together to develop cloud-based radiological image analysis for the fast processing of large amounts of image data, years before this became a generally accepted solution.

The aim of the project was to develop a generic approach through which medical staff could collaboratively analyse patient data and decide on treatments. The key to MEDUSA's vision is a platform through which many different eHealth systems, including data management, visualisation and analysis, decision support and more, can be made available via the cloud. This allows previously incompatible systems to work together, provides virtual workspaces for medical staff to collaborate, and assures patient data privacy. Bringing medical staff, patient data and support software together in the cloud accelerates and improves medical decision making, which can save lives. For example, MEDUSA allows doctors to already know relevant medical history of a patient before the ambulance picks up that person, thanks to the secure transmission of relevant medical data linked to the person's eHealth identity. During the ambulance ride, moreover, the paramedic's initial investigations can be observed by live video. The operating theatre and team can be ready for the patient by the time of arrival.

ITEA mobilises the right ecosystems

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Ecosystems and software innovation

The promises of software innovation will only become reality if they are embedded in the right ecosystems. For example, the 'smart road' concept needs car suppliers, local authorities in charge of the roads and service providers to cooperate to develop safer, smoother and more environmentally friendly use of the roads.

ITEA is the place to build ecosystems

ITEA is an industry-led organisation that has an open and constantly evolving Community. ITEA enables organisations from different horizons to meet, exchange and set-up new research projects through various events, including technical workshops, customer workshops and brokerage events. It is also common practice in ITEA projects to have different industries working together on a similar information technology, with faster progress made possible through the exchange of experience.

Being part of a winning team

The development of vehicles has become increasingly complex, involving over 50 different suppliers – from different companies and geographical locations - who need to ensure that all components, parts and devices work together. In the ACOSAR project, 16 partners came together in order to accelerate development steps with new simulation technologies. The consortium's members operated on all levels of the automotive supply chain and included several international original equipment manufacturers (OEMs), suppliers, software tool and real-time system vendors, as well as research and academic partners. Because of its importance, even competitors and non-funded partners collaborated in this project. ACOSAR developed both a non-proprietary 'Distributed Co-simulation Protocol' (DCP) for real-time system integration and a corresponding integration methodology. In the final year of the project, the consortium members decided to pursue standardisation of the DCP with the Modelica Association. Since July 2018, the DCP has been developed as a Modelica Association Project (MAP) and is available as an open-access international standard.

A great success of collaborative spirit
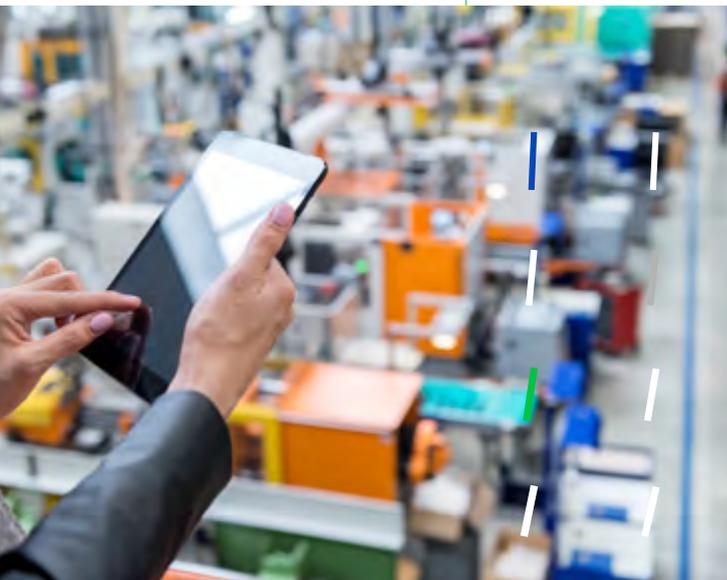
Engineering is the most time-consuming aspect of innovation and products are becoming increasingly complex. The ITEA project ENTOC, gathering 11 partners from Germany and Sweden, minimises the time and effort involved in engineering without compromising on reliability or integrity. The key value of ENTOC is the holistic approach to investing in a level of abstraction that allows the optimised design of production lines in a standardised way, allowing all the value chain stakeholders to join this effort in their own interest. The duration of the engineering process chain across all manufacturing domains can thus be reduced by up to 10% for the creation of virtual production models, leading to greater competitiveness. For all providers, ENTOC also safeguards intellectual property while boosting reputation: formalised descriptions are made for components, providing a quality guarantee for end users, and a black box set-up prevents the underlying functions from becoming public knowledge. Based on formalised descriptions of component models and various tools that support them, virtual commissioning is now also affordable for SMEs.

ITEA projects are aligned with end-user demands
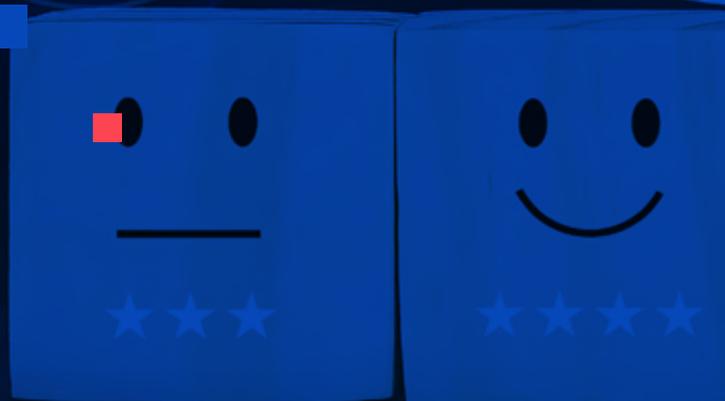
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The need to focus on real-world challenges

Today there are so many opportunities to apply information technologies that it is not that easy to choose the opportunities that will deliver the most important impact and benefits for end users. If you leave the decision to technology developers and researchers, they may choose directions that will not be aligned with the expectations and needs of end users, resulting in applications that will not be used.

ITEA's end-user orientation

To avoid this pitfall, ITEA has developed a customer orientation approach that contributes to aligning the projects to the real-world problems that really matter for end users. On a regular basis, ITEA organises customer workshops dedicated to listening to the real challenges and to fostering the creation of projects that address them. In addition, a Smart Cities Advisory Board and a Cyber Security Advisory Board have been established to get the view of the end users about the most important problems in these domains on which research projects should focus.

Fewer, shorter and less intrusive treatments for cancer patients

SoRTS
(2014–2016)

Cancer treatment can have a big impact on patients' lives. The goal of the ITEA project SoRTS was to develop a system of real-time systems to have the tumour in sight during radio treatment and to enable more precise cancer treatment, allowing for fewer, shorter and less intrusive treatments and enabling patients to go on with their daily lives. One of the key outcomes of SoRTS was the MR-LINAC (Magnetic Resonance Imaging - Linear Accelerator) system, commercially introduced as the Elekta Unity, designed to improve the targeting of tumour tissue while reducing exposure of healthy tissue to radiation. In 2020, this version of the MR-LINAC was already in use worldwide at more than 60 centres for patient treatment, and the order intake is increasing.

Unfortunately, the project leader himself needed radiation treatment, during the last year of the project. The traditional treatment would have involved 20 treatments in four weeks. However, the MR-LINAC treatment, based on the SoRTS project results, offered a treatment of five sessions in 20 days. This substantially reduced the burden of travelling to the hospital, and also the side effects, like fatigue, were much less. As less tissue is damaged, the recovery time in general is also much shorter. In fact, the project leader was even able to work about half of the time in these 20 days, instead of being unable to work for four weeks.

Finally, there is also a significant benefit for hospitals. As fewer treatments are needed per patient, they can treat much more patients in the same amount of time.

Ensuring safety in tomorrow's smart cities

During the ITEA Smart Cities customer workshop of 2015, the participating cities clarified that one of their key challenges was the fragmentation of information into silo-oriented closed systems and organisation models. They needed solutions to overcome the silo effect to be able to improve their crisis management. Earthquakes were mentioned by the city of Istanbul as one of the focus points.

In ITEA 2 Call 3, launched in September 2015, seven partners from the Netherlands and Canada decided to address these challenges from the customer workshop in the PS-CRIMSON project, which ultimately became a winner of the 2020 ITEA Award of Excellence thanks to its exploitation and unique partnerships. The partners developed a unique 3D smart digital model that combines all of the gathered data on one common platform. With this platform, public safety and disaster management can be improved, as pilot projects in Eindhoven and Vancouver have shown. Thanks to the 3D smart model of Esri Canada, developed within PS-CRIMSON, city representatives can now see the effects of an earthquake down to the level of interior units in the damaged buildings and the different levels of flooding that would follow. PS-CRIMSON project partners won a tender for Smart City Hilversum, which is now being deployed to create insights on traffic and in addition, project partner ViNotion has sold PS-CRIMSON results to other cities, including Amsterdam, 's-Hertogenbosch and Bruges.

Junkkari brings predictive maintenance to unchartered domains

SMART-PDM project partner Junkkari Oy from Finland designs, markets and manufactures machines for sowing, transportation and forestry. Junkkari has a fundamental principle of listening to the experiences of the customer and they understood the need for real-time monitoring possibilities when predictive maintenance – the capacity to determine the condition of machinery while in service – was uncommon in the farming industry. A reliance on visual observation and simple alarm systems would result in big downtimes if a machine ran until it failed. Given the short length of the sowing season, such an approach is needlessly risky.

As a whole, the SMART-PDM project aimed to acquire manufacturing data to provide diagnosis and prognosis information while improving the financial feasibility of the underlying technology. Within this, Junkkari became the owner of two use cases, for seed drilling and woodchippers, and developed the idea of using operators' mobile phones as gateways. Monitoring can now take place in real time thanks to data preprocessing in cloud services, which will also help the further development of precision farming.

ITEA embraces the global dimension of todays' challenges

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The international nature of Information Technologies

In its essence, the IT field is very international. In the digital world, the concept of boundaries is not the same and the market is transnational. In most cases, the development of solutions should be envisioned at international rather than national level.

ITEA is a strong player in the global landscape

As a Eureka Cluster, ITEA benefits from a very international coverage with opportunities to set up cooperation involving several continents: Africa, North America, South America, Asia and Europe. ITEA has demonstrated the importance and impact of research projects involving North America, Asia and Europe.

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Connecting the Netherlands and South Korea with only 0.3-second delay

MOS2S
(2016–2020)

One of the key successes of MOS2S was the ability to create strong international cooperation, with national demonstrations led by the Netherlands, South Korea and Belgium in 2017, 2018 and 2019 respectively. In those demonstrations, almost all of project partners worked together to reach the ambitious targets of the project. For example, thanks to the collaboration of TNO, the Johan Cruijff ArenA, SURFnet and the Korean Electronics and Telecommunications Research Institute (ETRI), for the first time in the world, a football match in the Johan Cruijff ArenA was broadcast in real time with only a 0.3-second delay from the pitch in Amsterdam to a viewing area in South Korea. Combining new Ultra-Wide Vision technology with a super-fast data connection enabled a crowd of South Koreans to experience the live event in an unparalleled way. This new technology makes it possible for people on the other side of the world to experience live events in real time as if they are at the event itself in person. The results of several demonstrations led to multiple commercial products and services.

PARTNER
(2017–2020)

Three continents collaborating for better care worldwide

Worldwide, over 40 million people suffer from heart failure. A global challenge requires a global solution, so one of PARTNER's primary achievements was to bring together 20 partners from four countries – Belgium, Canada, South Korea and the Netherlands – on three continents. In addition to providing a wider reach, such collaboration has clear commercial opportunities for the consortium. Thanks to the international collaboration the project partners were able to realise a final demonstrator with contributions from all the partners contained in the workflow of one patient, starting from an emergency admission to the hospital followed by multidisciplinary team diagnosis and personalised treatment, resulting in a rehabilitation at home. In this final demonstrator, the partners were able to interconnect multiple EMR solutions, create AI-driven dashboards, validate several patient portal solutions, and perform remote assessments of the patients being rehabilitated at home. The project also resulted in multiple commercial products and services as well as the continuation of research activities amongst multiple international partners.
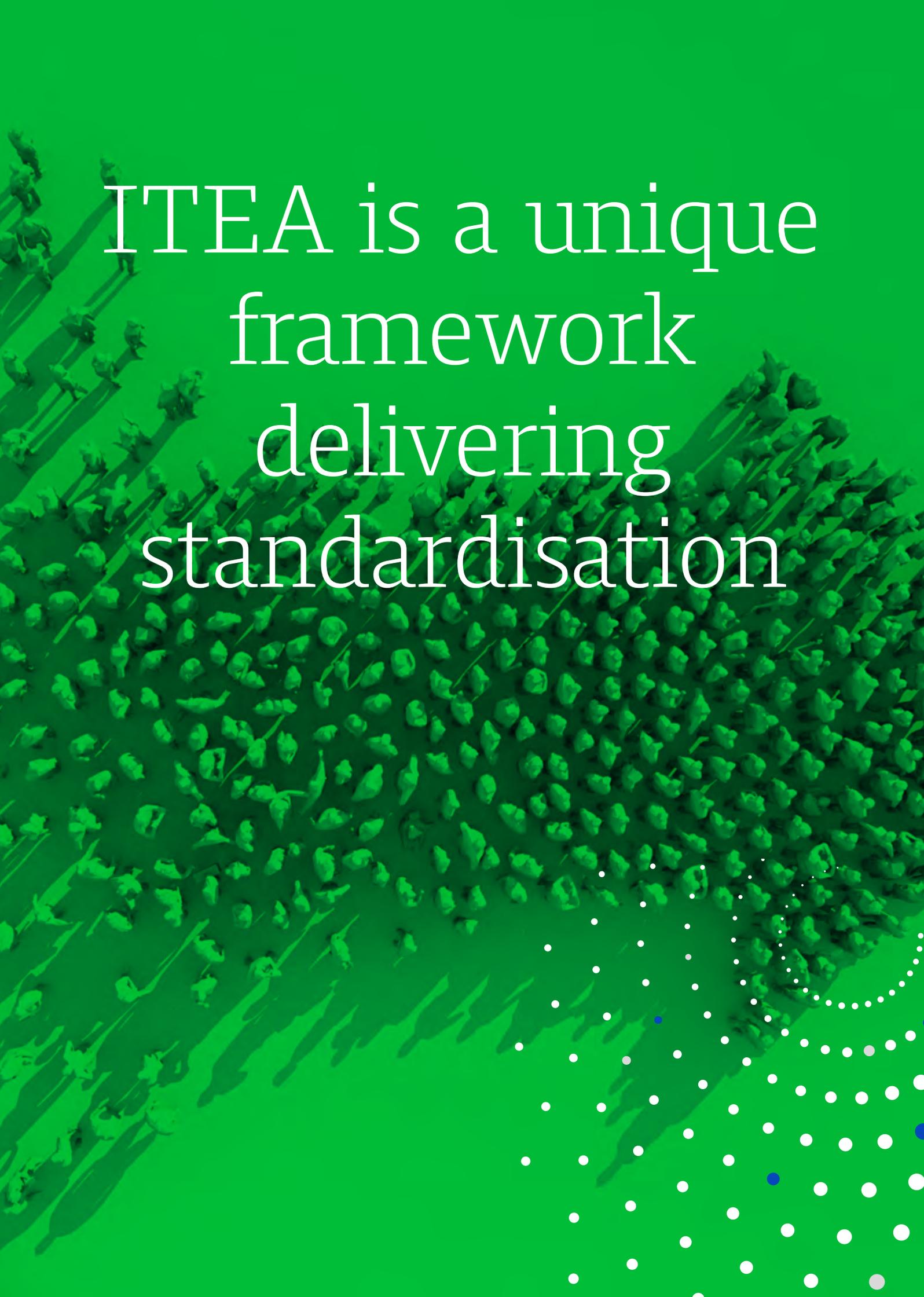
ITEA is a unique framework delivering standardisation

06

Why standards help industry to progress

Sometimes standardisation is the opposite of innovation. However, in the IT domain most of the time, the two go together, mainly because the exchange of data or information is central. If you do not agree on the interface, you cannot exchange anything, and your innovation will have a very limited scope. Building new standards gives a competitive edge to the company leading this effort.

ITEA encourages standardisation activities

The ITEA project monitoring and coaching process emphasises the value of standardisation activities. Whenever relevant, the project consortium is asked to translate its progress into new standards or contribute to existing standards. As ITEA projects are often large and built with several partners from different industrial sectors, it is easier for these projects to be successful in reaching standardisation bodies and creating new standards. Many successful (worldwide) standards have been delivered through ITEA.

Ensuring interoperability of card payments across Europe and beyond

EPAS
(2006–2008)

EPAS has paved the way to a series of universal ISO standardised specifications for European card payments free of royalty and charges. Ultimately, this has been extended worldwide with the endorsement of the EPAS specifications (CAPE) as a global ISO 20022 message standard. ISO 20022 is today the reference in the standardisation in finance. Instant payment solutions are being developed today based on ISO 20022 credit transfer standards which may, in the future, facilitate the development of hybrid card and credit transfer payment solutions.

SAFE
(2011–2014)

Sustaining automotive safety standards and standardisation

SAFE was an essential part of the jigsaw in establishing ISO 26262, a worldwide standard and one of the most important in the automotive industry. SAFE enabled the automotive industry to comply effectively with this standard, which is mandatory for all OEMs and suppliers. This ITEA project realised the first incorporation of ISO 26262 in a standardised Architecture Description Language (ADL) while the SAFE guidelines provide an interpretation of the standard to the market. Thanks to the project, Continental established the ISO 26262 compliance in two major domains, namely the safety critical domains of powertrains and chassis brake systems. These domains represent 40% of Continental's product share and thanks to the SAFE project, Continental was able to keep its leading role in these domains.

Standardisation of the simulation chain

When designing complex systems like a factory, car, aircraft or train, a first step is to simulate different design options using software simulation tools, some of which will help to optimise the structure of the future system, some its aerodynamics, some its acoustics, etc. This results in a simulation workflow involving multiple simulation software. The VMAP project created the world's first simulation software workflow interface standard, which is vendor-neutral, free of charge and completely open to any interested party. Input/output routines have also been provided for easy implementation.

Thanks to the participation of industry leaders and some simulation software providers, the project developed a new standard that has been adopted by other companies outside the consortium. As a result, Philips boosted the innovation speed of highly complex parts by almost 50%. "ITEA has been a unique funding instrument to set up this standard-oriented project," said project leader Professor Klaus Wolf of Fraunhofer SCAI. "With its industry focus, ITEA helped to gather the right consortium and encouraged us to work on the standardisation of the results. We have now created an association that will continue the standardisation effort to the benefit of the industry and the simulation software community."

Investments in ITEA have high ROI

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In ITEA, we aim to create societal and economic impact as the Return On Investment (ROI) for both industries and Public Authorities.

The investment of Public Authorities, from public taxes, needs to create impact for the people of the country and, preferably, even globally. The investment of industry needs to create economic impact for the project partners and beyond, for other players in the ecosystem and value chain. Economic impact can take the form of creating revenues for the company, increasing the number of employees and/or setting up a new business line, partnerships or a spin-off company.

ITEA projects have a proven track record of results and a high ratio of ROI, making ITEA a strong instrument for creating value for money. In addition to the country-related impact, there are several examples including general business impact. ITEA currently has 325 completed, running and labelled projects with a total budget of more than €3.7 billion, involving over 35,000 person years from 37 countries. This section contains information related to the ROI of ITEA projects for a set of countries with strong participation in ITEA, with two highlights of figures and data that are illustrative for the impact within the given country. The number of funded partners provides an idea of the possible multiplier effect of these outcomes. Each country has many more results that can be found on our website and in ITEA's Impact stream: https://itea4.org/impact-stream.html.

Belgium

Belgium has been supporting ITEA since the start of ITEA in 1998 and there are currently 121 (labelled, running or completed) ITEA projects with Belgian participation. These projects have a total budget of €228 million, invested by Public Authorities and industry, and 350 funded partners. Below are examples of the societal and economic impact of ITEA projects with Belgian participation, including employee and revenue increase, new business models and solutions:

> The projects Flex4Apps and MOS2S have supported the very fast growth of participating Belgian SMEs Kiswe and Datastories, allowing them to increase, up to tripling, the number of employees.

> The projects Reflexion, C³PO, FUSE-IT and M2MGrids have supported large companies Barco, Niko and Nokia. Barco was able to create new business models and sell solutions that were both estimated at €20 million thanks to Reflexion and C³PO, and FUSE-IT has supported Niko in achieving double-digit growth during the last five years. From its work in the M2MGirds project, Nokia has successfully established a commercial venture around energy orchestration, supporting an important paradigm shift going on in the renewables-driven smart grid. The full R&D team of this venture is based in Belgium.

Canada

Since 2014, Canada has been contributing to ITEA projects with strong SMEs and there are currently 30 (labelled, running or completed) ITEA projects with Canadian participation. These projects have a total budget of €47 million, invested by Public Authorities and industry, and 64 funded partners. The market impact assessment input from only five Canadian SMEs shows that:

> These Canadian SMEs created eight new products, five new services and seven new processes and almost €1.3 million as fast exploitation and revenue exceeding €25 million is expected in the five years after project completion.

> SME Convergent was able to access a new market and Esri Canada decided to allocate resources after participation in ITEA and become the first Canadian Board member of ITEA.

Finland

Finland has participated in ITEA since the first Call as well, with Finnish participation in 121 (labelled, running or completed) ITEA projects and a total project budget of €466 million, invested by Public Authorities and industry, and 538 funded partners. Both SMEs and large industry have created clear business impact:

> For Tracker, the estimated commercialisation impact of the M2MGrids project including device and related services sales was about €3 million in 2020.

> ACCELERATE partner Bittium grew significantly and evolved to a clearly more product- and innovation-driven company than previously, with a net sales increase of ~16% between 2018 and 2019 while Ericsson has been using the knowledge and relations resulting from APPSTACLE for its software R&D transformation to open-source software. A separate Ericsson-owned open-source software development company has been established in Finland, which is one of its first subsidiaries.

France

France, a very strong supporter of ITEA 1 and ITEA 2, is again showing interest in ITEA 4. In total, there have been 146 ITEA projects (one of which is still running) with French participation, with a total project budget of €934 million, invested by Public Authorities and industry, and 814 funded partners. Thanks to participation in ITEA projects, several large industry partners were able to either award multimillion-euro contracts or possibly save multimillion euros:

> After the completion of FUSE-IT, Airbus CyberSecurity was awarded a multimillion-euro contract with an important gas transportation company while ADAX is known to have directly contributed to €7 million of the €33 million turnover recorded by Cassidian Cybersecurity SAS (now Airbus Defence and Space) in 2014 and led to the recruitment of six engineers.

> During the CAP project, the French La Poste Group examined fraud on franking marks. These control mechanisms may enable several million euros to be recovered while for EDF, which uses MODRIO results regarding the modelling of requirements to automate the Failure Modes, Effects and Criticality Analysis of safety critical systems, the expected gains are estimated to be around 30% of the cost of large projects.
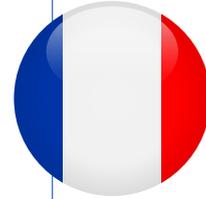
Germany

Germany has also supported ITEA throughout its entire lifetime of 25 years and there are currently 98 (labelled, running or completed) ITEA projects with German participation, with a total project budget of €445 million, invested by Public Authorities and industry, and almost 650 funded partners. Large industry is well represented in these projects and their participation has contributed to improve their processes:

> ACOSAR allowed a prominent German sports car manufacturer to save over 13,000 developer days corresponding to a value of around five to seven million euros and MODRIO partner Knorr-Bremse developed a new braking system that allows hardware tests, which are generally very resource consuming, to be reduced by 30%.

> Bosch now routinely uses the methods developed in ASSUME for large software products with more than two million lines of code. Furthermore, the methods and tools are being applied in several other business units of Bosch, which can now use formal methods efficiently in real projects.

The Netherlands

The Netherlands has provided steady and strong support to ITEA since its start. There are currently 131 (labelled, running or completed) ITEA projects with Dutch participation, with a total project budget of €698 million, invested by Public Authorities and industry, and almost 540 funded partners. Both SMEs and large industry have benefited from the opportunities that have been offered and created:

> In Reflexion, Canon Production Printing developed an incredible maturity on the full digital loop, improving its mean time to repair for all new machines by 50%, while Philips boosted liver tumour detection accuracy by 26% in the BENEFIT project and thanks to participation in SoRTS will sell 50-100 systems in Europe in a new market, meaning an addition of more than 5% tto the MRI market of €4.5 bilion (in 2017).

> After the MoSHCA project, Evalan experienced a growth rate of 100% each year between 2016 and 2018. This growth is reflected in all metrics – employees, turnover, profitability etc. During that period Evalan added 40 FTEs to its payroll.
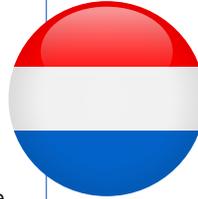
Spain

Spain has also been supporting ITEA since 1998. There are currently 169 (labelled, running or completed) ITEA projects with Spanish participation, with a total project budget of €342 million, invested by Public Authorities and industries, and 667 funded partners. Large industry, SMEs and universities are all well represented and creating impact:

> After completion of IMPONET, Indra's iSPEED platform was implemented and used by Elektro from Brazil for the monitoring and control of the entire distribution network, which comprises more than 170,000 transformers and serves more than 2.4 million customers in a rural and urban hybrid environment. Indra hired roughly thirty new analysts/programmers because of all these new business developments.

> SPEAR project partner Sensing & Control Systems has three new industrial customers and was able to hire one additional employee while for Mondragon University, company requests for projects have increased yearly after completion of the ACCELERATE project. Often those projects are adopted by the company as solutions to their needs and about 15-20% of the students end up working there.

Sweden

Sweden is another country that has supported ITEA already for 25 years. There are currently 63 (labelled, running or completed) ITEA projects with Swedish participation, with a total project budget of €125 million, invested by Public Authorities and industry, and 277 funded partners. Swedish research institutes often take the lead in ITEA projects, and partly thanks to the good knowledge transfer the industry partners have created strong benefits and business impact:

> SCALARE has enabled Husqvarna to make the digital transition, with its team of 4-5 software developers expanding to more than 200 people and enabling a 50% shorter time-to-market. Vattenfall used the MODRIO results to optimise the start-up of conventional power plants, with an estimated yearly gain of €850k per plant and the ATAC results helped Bombardier Transportation reduce the verification effort for software parts with a safety impact by 80%.

> For Elekta, the results from the SoRTS project represent an order opportunity of over USD 700 million until 2019.

Türkiye

Türkiye is one of the biggest supporters of ITEA and has been active since 2004. There are currently 126 (labelled, running or completed) ITEA projects with Turkish participation, with a total project budget of €104 million, invested by Public Authorities and industry, and about 450 funded partners. Both Turkish industry partners and SMEs have created remarkable impact in ITEA projects:

> C³PO allowed Mantis to develop new solutions, pushing up its annual revenue by almost 15% while Netcad developed Netigma and Netcad Digital Universe, which are marketed and sold in Türkiye and in the Middle East region, yielding in a revenue increase of 30%. Netigma is used extensively by local authorities (1000+ municipalities).

> BOR Software grew from two people at the start of BaaS to 15 people working in BaaS-based IoT products and services with an estimated income at around €1.5 million for the period 2017-2020. Spin-off companies IOTIQ GmbH and ERSTE Software Ltd were recently founded under the guidance of BOR, inspired by the knowledge gained in BaaS and its IoT focus.

Cross-border impact

ITEA is one of the main Eureka instruments, and its international character is one of its most prominent features. Although supported at the national level, the results and impact of ITEA projects go beyond national borders. In some cases, they even have a global impact. Below are a few examples. The ITEA Impact stream shows many more: https://itea4.org/impact-stream.html.

OPEES
(2009–2012)

Both a pioneer and a catalyst

OPEES stood at the inception of two important trends: open collaboration with open source in industry and open-source tools for model-based systems engineering (MBSE). Neither of these trends was well developed in 2009, but more than a decade later, and with acceleration through the OPEES project, we benefit from both good open source MBSE tools and many open collaboration initiatives in industry. OPEES was both a pioneer and a catalyst in this evolution.

Currently, there are not only thousands of users of the MBSE tool Capella on hundreds of projects inside Thales, but also more than a hundred companies worldwide using it, including European organisations such as the European Space Agency, Ariane Group, Rolls Royce and Siemens, which rely on Capella in their System Modelling Workbench product. It also supports an ecosystem of European SMEs, like Obeo and Artal, that sell packaged products, support and expertise on top of Capella not only in Europe, but also in North America and in China.

Striking commercial successes

Since 2017, about €48 million in revenue has been reported in direct relation to the FUSE-IT project results. The most striking commercial successes include:

> 17 system integration operation contracts in the field of smart building management and optimisation.

> 25 contracts won in the field of critical infrastructure protection against cyber and physical threats.

> The successful market introduction of a start-up company delivering SaaS platform services for enhanced the control and management of sensitive building information. The project has led to the acceptance of four patents.

ASSUME
(2015–2018)

Strongly improving engineering tools in the mobility domain
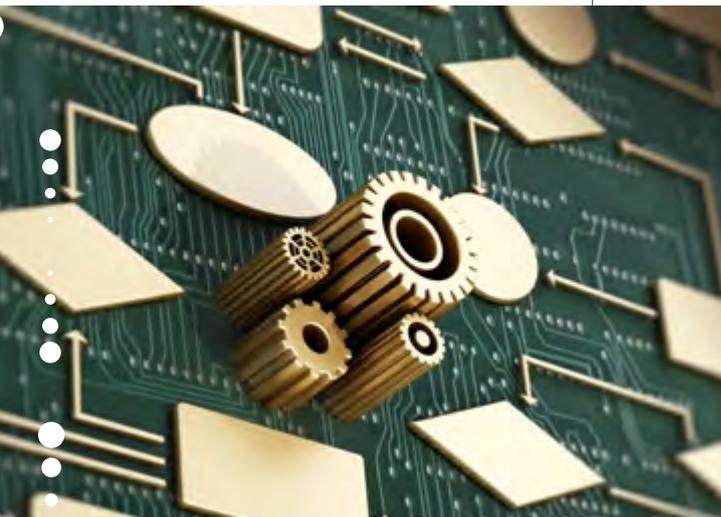
The ITEA project ASSUME has enabled the use of the project results among different tools including:

> A 50% increase in the (run-time) performance of analysis tools.

> A 60% reduction of spurious warnings in analysis tools for single cores.

> An almost 100% reduction of error classes in single core analysis.

> An 80% or more success rate of traceability of run-time errors back to the model level.

> A 40% cut in effort to inspect run-time errors in a typical industrial setting.

APPSTACLE
(2016–2019)

Unifying technology

In November 2019, APPSTACLE launched the first release of the Eclipse KUKSA platform that unifies the technologies across the vehicle, IoT, cloud and security domains to provide an open-source ecosystem to developers which addresses the challenges of the electrified and connected vehicle era. KUKSA shows large companies that there is more to be gained from sharing data than from protecting it within proprietary solutions. As more vehicles become connected, more applications and services will emerge. Companies can therefore enhance the business domain while increasing the size of their own share.

Slowing the speed of climate change

SPEAR
(2017- 2020)

The SPEAR project allows 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.

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%.

Conclusion: Invest in ITEA

08

The growing importance of software in all aspects of life urges each and every industry to be at the forefront of software innovation. Therefore, it is essential to invest efforts and means to foster software innovation to maintain a strong industrial ecosystem in the Eureka countries, providing sustainable solutions for the challenges of society and the economy.

As an industry-led Community supported by Public Authorities, ITEA focuses on aligning with end-user requirements and boosting impactful project results. ITEA offers its strong and knowledgeable Community flexible, agile and fast processes to move software innovation to the next level with a high-quality ISO 9001 certified infrastructure. Each year we see significant interest and commitment from industry, creating high-quality projects that can flourish with the right support. Thanks to these unique features and the direct involvement of industrial experts in all stages of its projects, ITEA has created, and will continue to create, business and societal impact for many different challenges.

Investing more in ITEA means investing more in cross-border opportunities for sustainable growth within countries, their industries and ecosystems. This investment has proven to be exceptionally impactful over the last 25 years. The ITEA promise is to foster future software innovation with a high return on investment.

ITEA is ready to shape the future to keep industries and societies future-proof.

ITEA – The fast track to software innovation

Glossary

3D	Three-dimensional
ADL	Architecture Description Language
AI	Artificial Intelligence
CAPE	Card Payment Exchanges
CO$_2$	Carbon Dioxide
CPS	Cyber-Physical Systems
DCP	Distributed Co-simulation Protocol
e.g.	Exempli gratia / for example
eHealth	Electronic Health
EMR	Electronic Medical Record
etc.	Et cetera / and the rest
FMI	Functional Mock-up Interface
FTEs	Full-Time Equivalent
IoT	Internet of Things
ISO	International Organization for Standardization
IT	Information Technology
MAP	Modelica Association Project
MBSE	Model-Based Systems Engineering
mm	Millimeter
MRI	Magnetic Resonance Imaging
MR-LINAC	Magnetic Resonance Imaging - Linear Accelerator
OEMs	Original Equipment Manufacturers
RD&I	Research, Development and Innovation
ROI	Return On Investment
SaaS	Software as a Service
SDGs	Sustainable Development Goals
SMEs	Small and Medium-sized Enterprises
USD	United States Dollar

Sources:

https://www.statista.com/outlook/tmo/software/worldwide

25 years

ITEA4

1998 – 2023

https://itea4.org

Σeureka

ITEA is the Eureka Cluster
on software innovation