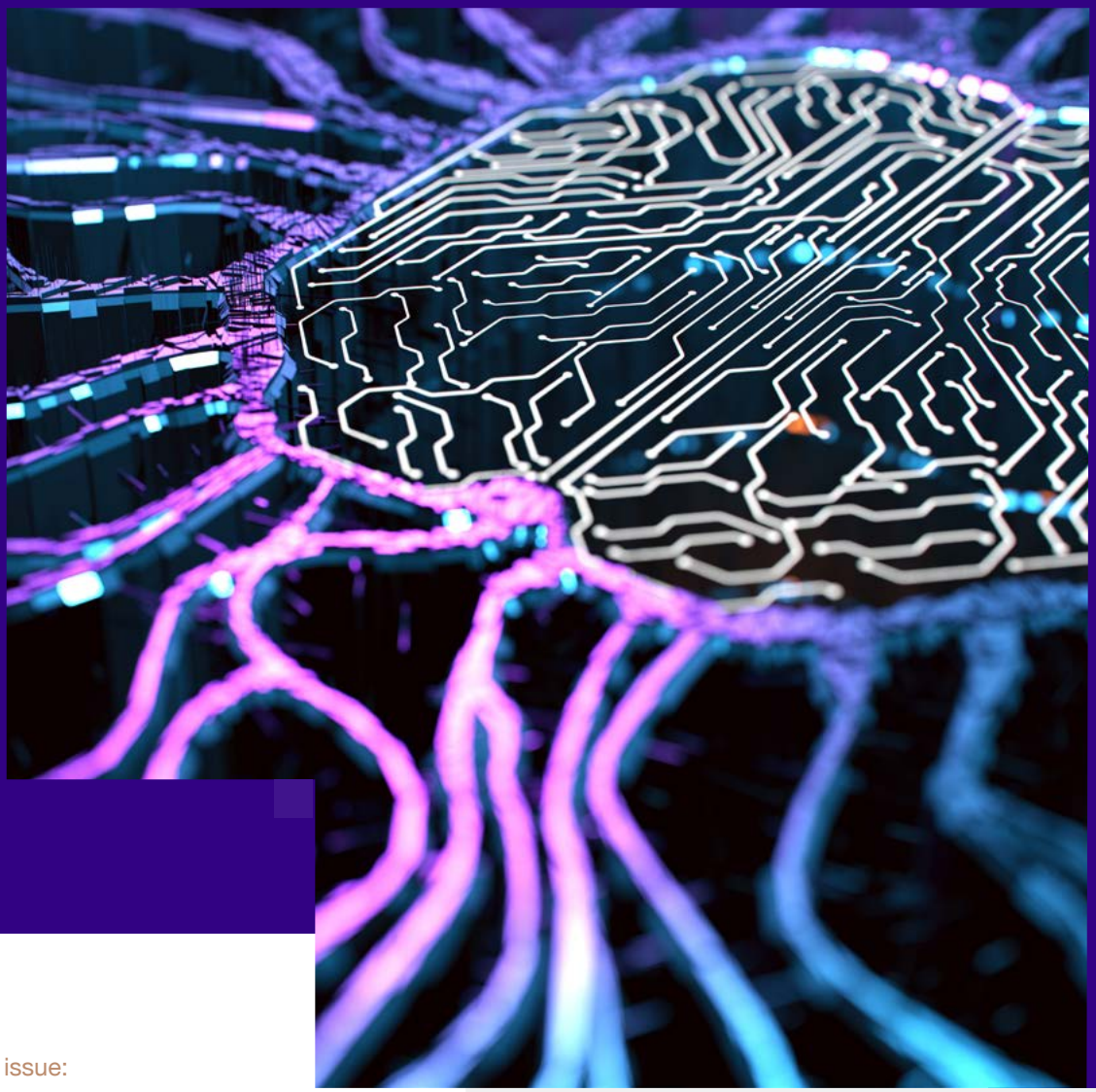
Inside magazine



April 2022 — Issue 02

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Inside
Industry Association

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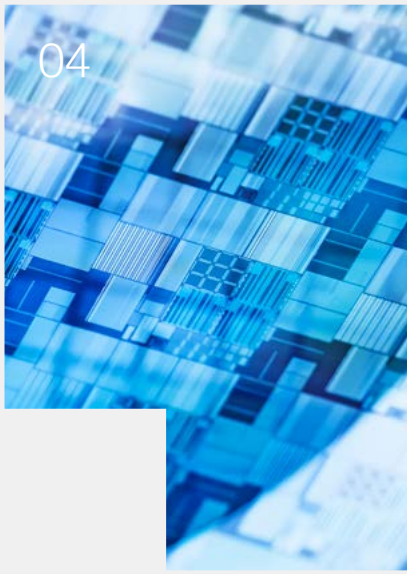


Dear reader,

The recent transition from ARTEMIS to Inside Industry Association has brought a refined focus and a new strategy that prioritises Intelligent Digital Systems, ecosystem collaboration along the value chain and the need for sustainability and shared research. As members of this community, you have a vital part to play in meeting challenges such as the ongoing chip shortage, but also in grasping opportunities like the increased competitiveness and resilience offered by the Chips Act. These are just some of the themes addressed in our messages to the Inside community, in which I answer questions on the role of Inside and its members in the development of the ECS domain.

This edition of the magazine also contains an introduction to three new members of the Inside Board, which is helping to guide us towards our vision of a green and autonomous Europe. Among other things, these Board members assist us in updating the ECS-SRIA, which has recently entered its fifth iteration. An overview of the changes, including an even greater emphasis on technological synergies, can be found in 'Interdisciplinary, synergic and comprehensive: introducing the ECS-SRIA 2022'.

Other highlights in this magazine include a deep dive into the Health.E Lighthouse, in which initiators Mart Graef and Ronald Dekker discuss the need for open technology platforms in the medical domain and look back on their recent symposium. In terms of projects, SC3 and AFarCloud are in the spotlight. For the former, Thomas Gutt, Hans Ehm and Anna Laktionova of Infineon Technologies share their successes in creating a 'lingua franca' for semiconductor supply chains. In the latter, Professors Gianluigi Ferrari and José-Fernán Martínez-Ortega talk us through the smart farming domain, including their results in artificial intelligence, drone analysis and more.

Last but not least, Inside understands that interdisciplinarity is key to achieving our goals as no one party is capable of creating a truly innovative digitisation solution. This is emphasised in our article on creating intelligent systems together, in which Michael Karner (InSecTT), Philippe Gougeon (CPS4EU) and Jerker Delsing (Arrowhead Tools) outline the role that interdisciplinary collaboration has played in their projects.

I wish you a good read and hope to see many of you at the Brokerage Event in Brussels on 3-4 May.

Paolo Azzoni

The importance of the software stack for future chips

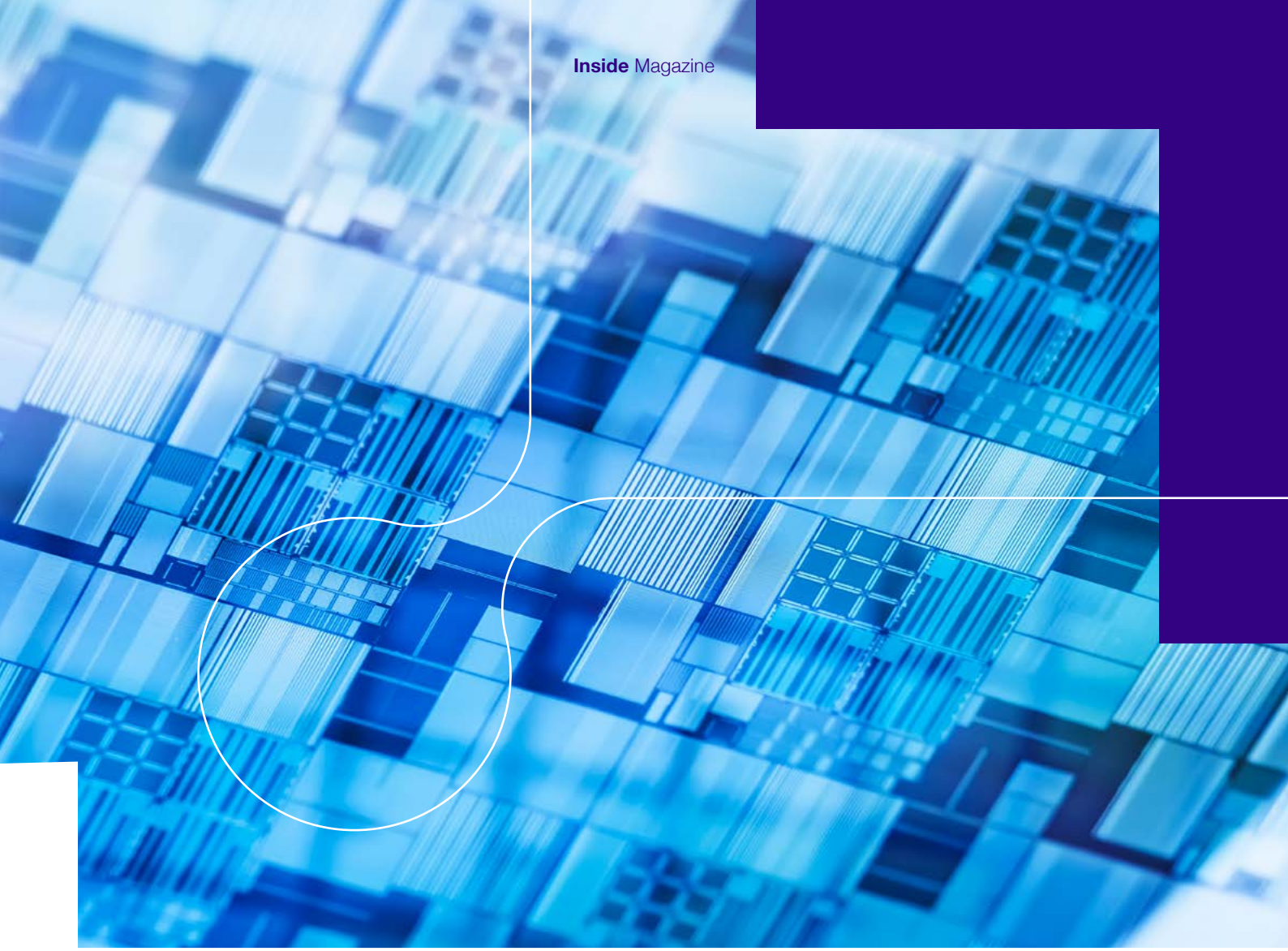
Paolo Azzoni

Hardware/software full stack strategic advantage

A new hardware baseline intended to strengthen European strategic autonomy in the semiconductor market is fundamental (especially in sectors such as edge AI) but represents only the first enabling step of a more solid and forward-looking strategy aimed at this market consolidation and strengthening. The sole availability of European hardware platforms does not ensure the concrete possibility of reaching 20% of the global semiconductor market; only the availability of full stacks supporting the new hardware baseline can allow the market to really take off and concretely support vertical application. This is a lesson we learned 15 years ago (“bare metal doesn’t sell”), which is even more relevant today with the proliferation of hardware platforms in terms of both providers and technology domains (15 years ago, we were mainly focusing on PC or PC-equivalent hardware).

In a recent interview with Intel's CEO Pat Gelsinger, he stated that “if you want your hardware to succeed, you have to put software first.”[1] He is convinced that it is today necessary to work with a broader ecosystem of independent software vendors and to work more closely than before. But, on the other hand, your own software could bring new revenue streams: "One of the things that I've learned in my 11-year 'vacation' [at VMware and EMC] is delivering silicon that isn't supported by software is a bug," he said. "We have to deliver the software capabilities, and then we have to empower it, accelerate it, make it more secure with hardware underneath it. And to me, this is the big bit flip that I need to drive at Intel."

Many other brands are following the same strategy: Nvidia, for example, began to aggressively promote its CUDA platform, whereas other companies relied on various



open or proprietary standards like OpenCL, Vulkan, Metal or OpenAI to speed up performance-hungry workloads with proprietary hardware.

The availability of the full stack is a key enabler of the ECS value chain up to the applications (both in Europe and globally) and serves as a critical element in enabling the multiplying factor in revenue streams across the entire value chain, as highlighted by the Advancy report.[2] And this is particularly true for mega-trendsetters such as AI and HPC (embedded HPC, in the case of our community).

The issue of existing and open stacks

Moreover, to achieve a real and solid strategic autonomy, Europe cannot depend on third-party stacks which hide the customer lock-in issue. Companies like Apple and Nvidia created their own software ecosystems, but their intention is to consolidate/increase the customer base, strengthen the customer lock-in, impose their 'standard', etc.

It is also important to support existing and future open stacks. This is another way to activate the multiplying factor that increases revenues across the entire ECS value chain, from semiconductors up to the application.

Unfortunately, part of the new European hardware baseline will introduce completely new approaches to computing that cannot be supported by existing computing models and related stacks, therefore requiring completely new stacks.

Stack HW/SW timeline dependency and importance for strategic autonomy

Timewise, the design and development of the stack must proceed in parallel with the design and development of the European hardware baseline. Designing and developing a stack two to three years after the availability of the hardware baseline will introduce a critical delay that will prevent the practical usage of the hardware baseline itself at the crucial moment when it would be ready to be launched on the market. The entire hardware and software stack must be designed and developed as a single entity from the beginning.

"if you want your hardware to succeed, you have to put software first."

Again, this is a lesson already learned, which is particularly relevant today because the ECS product lifecycle has been significantly reduced (from five to seven years in the PC era to two or three years in the IoT, embedded computing and AI era).

What is covered by the HW/SW stack?
The concept of a HW/SW stack that we are considering is covered in full in the ECS-SRIA 2021 and 2022 (structurally covered!) and includes, for example:

- the hardware platform
- the firmware layer
- the operating system support
- the virtualisation support
- the support for distributed computing
- middlewares
- development methods, tools and libraries
- standard development kits (SDKs)

Engineering support and stack automation engineering
Generally speaking, the stack must include engineering support, which is crucial to providing all of the tools to effectively, efficiently and securely exploit the resources, capabilities and functionalities of the new hardware baseline. And this is particularly true for domains such as neuromorphic computing, where engineering tools are completely missing and we cannot rely on the existing expertise and background.

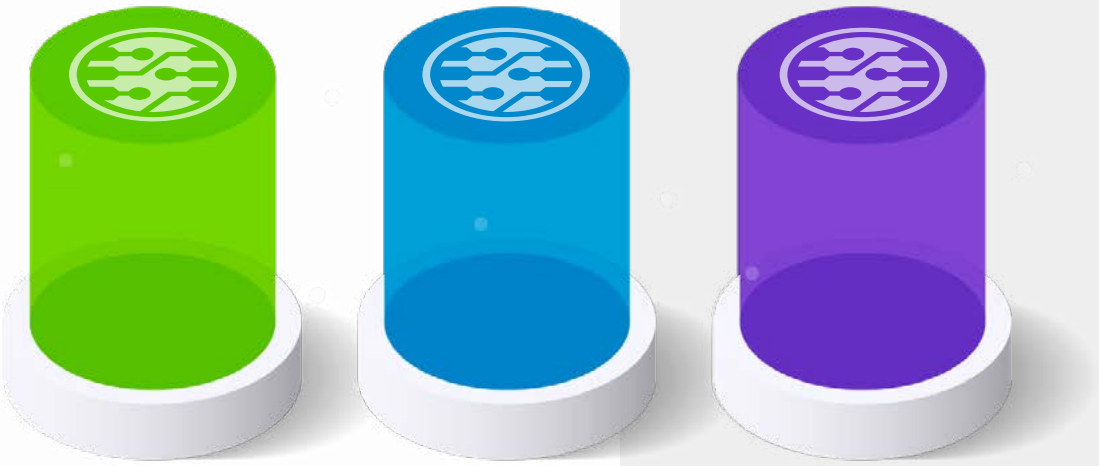
Moreover, the software stack should be developed automatically: this is a crucial aspect to follow the pace of current technology trends and to support the increasing number of hardware platforms. It was indeed already difficult to build a stack in the PC era, and this difficulty has certainly increased in the last decade due to the higher complexity and heterogeneity of ECS. This has a negative impact on stack availability, development costs, quality of developed applications, etc. Also, the ubiquitous presence of software in products, services, operations and management calls for the next industry transformation: the automation of software development! For our industry, acquiring a leading position in the automation of labour-intensive software development represents a crucial element to a competitive, sustainable and autonomous Europe.

For our industry, acquiring a leading position in the automation of labour-intensive software development represents a crucial element to a competitive, sustainable and autonomous Europe.

[1] https://www.crn.com/news/components-peripherals/intel-ceo-pat-gelsinger-the-silicon-man-with-the-software-plan

[2] Embedded Intelligence: Trends and Challenges. A Study by Advancy, Commissioned By Artemis Industry Association. https://www.inside-association.eu/publications

The Chips Act: three pillars for semiconductor EU strategic autonomy



Paolo Azzoni

Jean-Luc di Paola Galloni

The European Commission has recently proposed a set of measures to ensure the EU's security of supply, resilience, technological leadership and autonomy in semiconductor technologies and applications in order to prevent, prepare, anticipate and respond to future crises and supply chain disruption. The European Chips Act is intended to strengthen Europe's competitiveness and resilience, contributing to the achievement of the digital and green transitions and ensuring the solidity and sustainability of key European vertical domains and associated value chains. The Chips Act is expected to mobilise 43 billion euros of public and private investments, focusing on three pillars: (i) the Chips for Europe Initiative, (ii) a new framework to ensure security of supply and (iii) a mechanism to monitor the semiconductor supply chain.

(i) The Chips for Europe Initiative will extend the existing Key Digital Technologies Joint Undertaking to strengthen existing R&D&I, including the deployment of advanced semiconductor tools, pilot lines for prototyping, testing & experimentation, staff training and the development of a comprehensive understanding of the semiconductor ecosystem and the EU application value chains relying on it.

(ii) The new framework to ensure security of supply and enhance innovation capacities covers the needs of advanced nodes and energy-efficient chips on the basis of new frontier technologies that will be developed in the next five to ten years. This pillar will also be supported by a Chips Fund to facilitate the inclusion and development of start-ups and a dedicated equity investment facility under InvestEU to support SMEs in their market expansion.

(iii) Finally, the mechanism to monitor the semiconductor supply chain will be based on the coordination between the Member States and the Commission and is expected to estimate demand/offer and anticipate future shortages. The monitoring activities will rely on key intelligence from companies in order to map weaknesses & bottlenecks in the supply chain and will allow for the assessment & anticipation of future crises and the identification of the required corrective actions.

The Chips Act is currently under discussion in the European Council and Parliament and is intended to be approved by the end of 2022. Inside will keep you informed on the further updates in future editions of the magazine.

Experience from across Europe

Meet the new Inside Board members

Guido Stephan

Ronald Begeer

Mikel Lorente

As part of the industry association's management core, the Inside Board plays a decision-making and support role in steering our ambitions towards competitive and sustainable solutions to Europe's ECS challenges. What is their vision for the future? And how do they intend to take us there? Three new members of the Board – Guido Stephan, Ronald Begeer and Mikel Lorente – introduce themselves and what they hope to contribute to Inside.

Guido Stephan: speaking two technical languages

"I was born in the former GDR when we had the Iron Curtain in Europe," begins Guido Stephan. "The first five years of my professional life were spent in East Germany as a project manager and software developer for a project that dealt with remote control of power stations. After German reunification, it became obvious to me that it would be good to see 'the other society' and move to western Germany, so I joined Bosch."

Having graduated from the Technical University of Dresden as an engineer of Communication Technology and Computer Science, Guido has spent the intervening years at the intersection of automation and communication. After working on the first generation of digital cordless phones at Bosch, he eventually arrived at Siemens and now serves as the Senior Principle Key Expert for Industrial Digitalisation. When Siemens was first invited to participate in Inside, Guido admits to feeling sceptical: the association seemed to be more focused on robotics than automation. But through a better understanding of embedded intelligence, he now feels that Siemens can deliver much more powerful products to their customers.

"The combination of industrial applications and products with communication technologies really grabbed me," Guido continues. "This is not only a question of how to connect devices to the cloud but also of how to build devices which are able to interconnect and interact with each other without a cloud connection. I intend to help the Board with this perspective. I'm not experienced in making silicon, but I can say what the requirements are for industrial-grade silicon, for example. Siemens is a system house in a sense that we deliver industrial devices, tools, systems and solutions in many application fields. I can bring requirements for real-time behaviour and industrial IT security. And for automation and communication, I'm familiar with processes and procedures for product development but can also combine this with the latest scientific developments in these two arenas."

The ability to speak two technical 'languages' is a vital skill, as those involved solely in

communication or automation frequently struggle to recognise commonalties and touch points which could benefit European industry. And, as Guido notes, his experience of living in two very different societies has given him an enriched perspective on current global challenges, such as the need to improve Europe's resilience in semiconductor technologies and applications under the Chips Act. "We have to act at a global level from a position of independence – whatever this means," says Guido. "I'm eager to see how this will be combined with the fact that we're living in a globalised world. Every region has to come up with a certain kind of independence, but I believe that we also need beneficial relations with the other parts of world."

"My hope is that a strong Europe will contribute to bringing peace to the world in the future. And I hope that Inside finds its way in its new set-up and becomes part of how Europe understands what it can do better than any other area. This closes the circle to my personal life: as I said, I started my professional career in the former GDR. It was a totally different world and we don't want it back. One way to prevent this is if every part of society can be part of a strong economy. Inside is making sure that in the next 20 to 30 years, this can happen in Europe."

Ronald Begeer: taking charge of destiny

Like Guido, Ronald Begeer's career began in the mid-eighties: after starting out as a software manager at Royal Philips Electronics and spending a later period at NXP Semiconductors, he moved to the Embedded Systems Innovation (ESI) Group – part of the Dutch Organisation for Applied Technologies (TNO) – in 2019. As Deputy Research Manager, he's now responsible for research, roadmapping and competences. "Part of my job is continuing our contribution to the SRIA and also helping with the transfer from ECSEL to KDT," explains Ronald. "Having quite some experience in the European network helped me to be elected to the Board, and I strongly think that cooperation at a European level will help Europe to become stronger in the world."

It was at Philips that Ronald first encountered Inside, then known as ARTEMIS, and began contributing to both projects and roadmaps. "I also organised all of the European projects related to ARTEMIS within Philips," he continues. "We had tens of projects running in parallel. And, at TNO, I am also often a project partner. I think that my long industrial background is important to being a Board member, but so is being able to bridge the gap between academia and industry. Inside is an interesting environment for such partnerships and a good platform for sharing and speeding up innovation."

As support for Dutch industry is the main task of ESI, Ronald views participation in Inside as a two-way street through which the Netherlands and Europe can connect their policy roadmaps for mutual economic and societal benefits. And given the tripartite nature of the KDT programme, he also emphasises the opportunity for good relations between the Dutch government, the European Commission and other Public Authorities.

"We're a small country, not a threat to the bigger ones, so we can play a good role here," Ronald smiles. "We managed to get a lot of joint innovation and new knowledge from European projects into both industry and ESI. By contributing to the Research & Innovation Agenda, we could also steer the direction in a way that is needed in Dutch industry. But, as Board members, part of our vision is that we should also do this for the industrial community in Europe, not just for ourselves."

Looking to the future, Ronald sees both opportunities and uncertainties for Intelligent Digital Systems, especially in activities that complement the Chips Act. Even so, he's confident that Inside can rise to the challenge. "Digitalisation will play a major role in the future of European industry," he concludes. "Intelligent Digital Systems will also contribute to societal challenges, including indirectly. For vehicles, it's obvious: replacing fuel-based motors with electronic motors. For European sovereignty, it's important to know the vulnerabilities of all the connected digital systems. What we've learned is that it's not just an IT responsibility but that the entire stack of software should be safe if we want to protect our sovereignty. It's a tough job! But Europe can position itself to stay in charge of its own destiny."

Mikel Lorente: expertise from an automotive heritage

Despite making up only around 5% of Spain's population, the Basque Country has an outsized influence on its industrial capacity: this autonomous region is home to around half of Spanish automotive component companies and is responsible for nearly 50% of the automotive supply chain revenues. As CTO of ACICAE-Basque Country Automotive Cluster and AIC-Automotive Intelligence Center, Mikel Lorente is now bringing his expertise from this European hub to the Board of Inside.

"AIC is a European open innovation centre for the mobility sector, working as a unique partner for companies to improve their competitiveness through cooperation. 30 companies from ten different countries and 1000 highly qualified professionals are based at the centre," Mikel explains. "In order to encourage and consolidate cooperation, companies locate their innovation, training, R&D or industrial development activities at the AIC facilities. They work independently but also in coordination in order to come up with projects of common interest in a broad range of areas, such as electrification, manufacturing, system integration and digitisation, among others."
Such collaboration provides benefits at all levels, from the company up to the continent, and AIC has been complementing this with active participation in many initiatives and projects over the years. In the mobility sector, a number of their key stakeholders are members of Inside, so joining the association represented a clear opportunity to Mikel. "AIC is indeed located in the Basque Country, a region with a long-established automotive heritage and one of the leading industrial regions in Europe, but we work at global level," he says. "For the past year, we have been participating in European platforms such as ERTRAC and 2ZERO, among others. As Intelligent Digital Systems are key within the automotive industry, we considered it important to become part of the Inside community as a Board member."

In doing so, AIC is focusing on strategic areas for the future of mobility, particularly the digital transformation of this sector. This can only be done with the support of a strong community of key players along the supply chain, which is what Inside can offer. "At AIC, we promote and develop high added value cooperation projects at a global level," Mikel continues. "These help key players, such as OEMs and Tier 1s, to reduce their time to market, thereby minimising efforts and risks. With the help of key sectors and organisations, we can shape the future of the community on a larger scale with the ambition to support the strong competitiveness and autonomy of European technology, products and processes with highly qualified professionals."

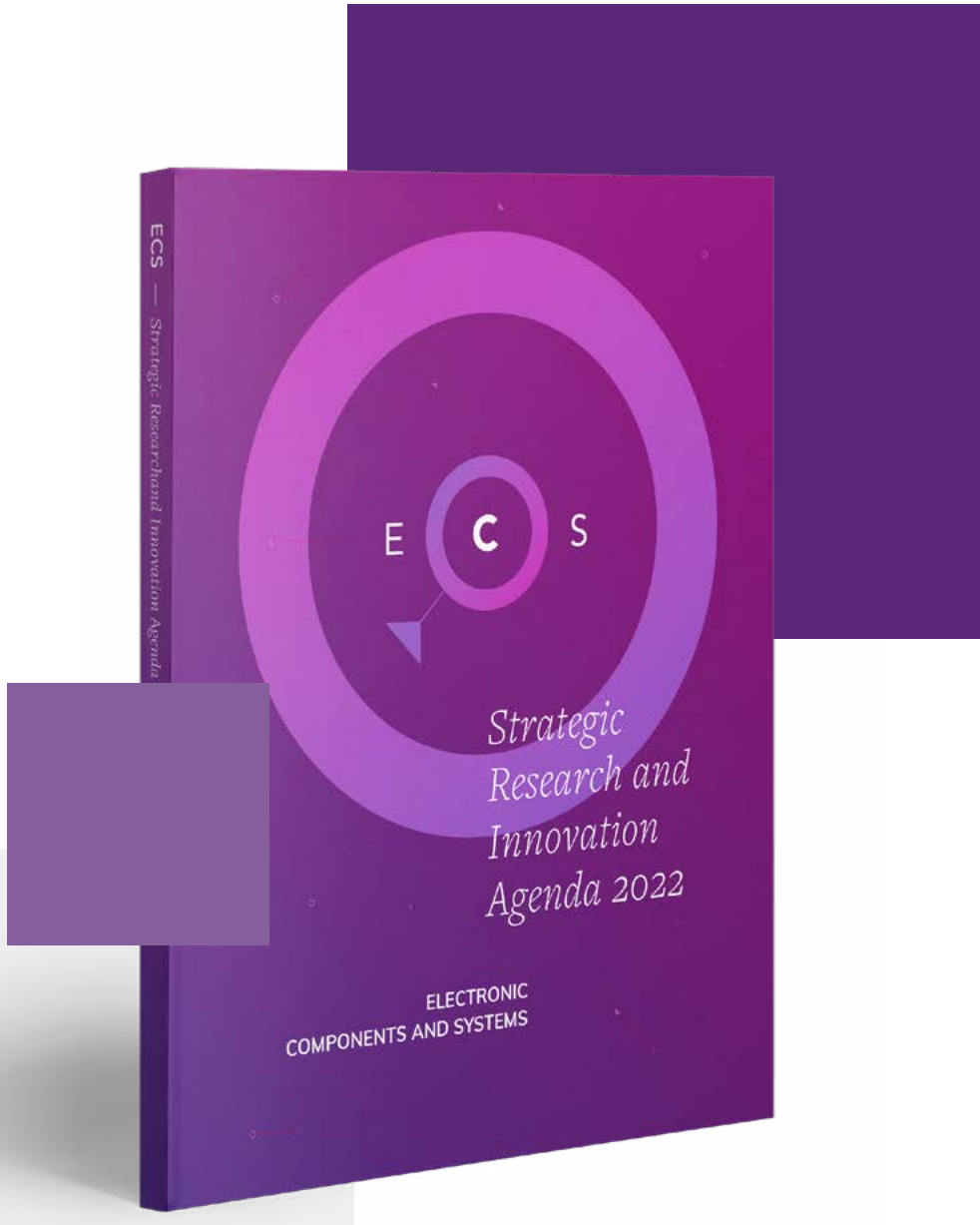
By bringing the specific perspective of the automotive sector and reinforcing the strategic agenda with a market-oriented approach, Mikel's ultimate goal is for Inside to become ***the*** reference platform for Embedded Systems, Cyber-Physical Systems and Intelligent Digital Systems at a European level. And with the support of organisations like AIC, this is becoming an increasingly tangible means of boosting the impact of European industry.

Interdisciplinary, synergic and comprehensive

Introducing the ECS-SRIA 2022

Paolo Azzoni

The Electronic Components and Systems (ECS) Strategic Research and Innovation Agenda (SRIA) is an open, living document, edited by the ECS Community, which describes the major challenges and priorities for ECS and ECS-based applications and identifies the research, design and innovation efforts required to address these challenges and priorities. The document addresses the entire ECS value chain, including materials, manufacturing processes, semiconductors, micro & nano electronic components, smart sensors, integrated devices, edge AI, embedded software, complete systems, systems of systems and vertical applications. It also covers the design methods and tools required to support the entire ECS engineering cycle. Industrial competitiveness, value creation, societal goals, trustworthiness creation, support for sustainability & green objectives and strategic advantages for Europe represent key targets which guide the editing of the ECS-SRIA and inspire the ECS community vision.



The ECS-SRIA is not a policy document: this is funding programme agnostic and covers a timeframe of 10-15 years. The ECS-SRIA is the reference document for the Key Digital Technologies (KDT) SRIA and for the EUREKA Clusters (e.g. Xecs), but it can also inspire other EU programmes. The ECS-SRIA is edited every year by the three Industry Associations that are active in the area of ECS – AENEAS, EPOSS and Inside Industry Association (formerly ARTEMIS-IA) – with a team composed of more than 300 experts from the industrial and scientific community.

The current version can be download at the following address:

https://ecscollaborationtool.eu/news-overview/news-ecs-sria-2022.html

The fifth edition of the ECS-SRIA may be the most interdisciplinary and synergic update yet: through an analysis of foundational technology layers, cross-sectional technologies and key application areas, the ECS-SRIA identifies challenges and pathways to unleashing the full potential of intelligent and autonomous ECS-based systems for the key EU application domains (mobility, energy, digital industry, healthcare & wellbeing, agrifood & natural resources and digital society). By covering the entire value chain and providing a systemic perspective on technology and innovation which is strongly linked to the European Commission Strategic Targets, this document can serve as a solid and comprehensive basis for a truly European digital era.

Interdisciplinarity and synergies

Today, technology is built on wide-reaching relations and mergers that create more than the sum of their parts: technology domains are not silos. These have been highlighted more than ever before in the revamped approach to the ECS-SRIA, which aims at ensuring that the results of interdisciplinary research and innovation combine and interact to generate systems and system of systems. This provides a systemic perspective that allows for concrete inspiration on complete solutions for vertical applications.

By highlighting the synergies between its chapters, the document emphasises how silos between technologies, companies, countries and domains form one of the main obstacles to achieving the European Commission's short, mid and long-term strategic priorities. Indeed, the strength of the ECS-SRIA lies in its interdisciplinarity and the opportunities that this provides for technological cross-fertilisation and reuse in new areas. Synergies and interconnections characterise the entire ECS-SRIA:

- Hierarchical dependencies between technologies
- Technologies enabling new technologies, solutions and applications
- Architectures harmonising the composition of modules, devices, systems and entire solutions
- Requirements from vertical application which inspire new technologies and technologies which inspire new vertical applications
- Cross-vertical applications, etc.

Intelligent Digital Systems are one example of interdisciplinarity and synergies between different technology domains, as these are enabled by new chips that support AI.

Intelligent Digital Systems are one example of interdisciplinarity and synergies between different technology domains, as these are enabled by new chips that support AI (requiring new materials, technologies and processes for chips design, development & manufacturing, new low-power solution for the edge, etc.). In turn, these enable the possibility of conceiving new intelligent embedded software (capable of analysing data and extracting valuable knowledge and actionable information on the edge), empowering connected devices that can cooperate in forming systems and systems of systems which can eventually enable/support vertical applications (such as automated driving) and inspire new interoperable cross-verticals (e.g. mobility management in smart cities).

To further remark on the ECS-SRIA's interdisciplinarity and highlight the synergies that make document navigation so effective, the ECS-SRIA now includes a global outline, chapter cross-references and a keyword index, allowing for straightforward analyses of the intersections between foundational technology layers and cross-sectional technologies.

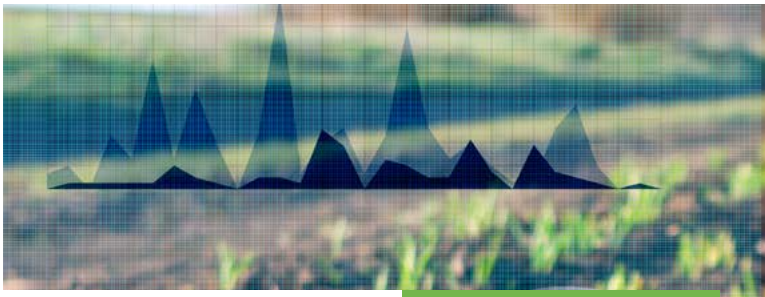
In addition to its greater cohesiveness, the ECS-SRIA 2022 features an extended scope that now incorporates quantum technologies, integrated photonics, flexible electronics and open-source hardware. Moreover, an increased spotlight has been given to edge computing and artificial intelligence, focusing specifically on their convergence process towards embedded intelligence, also known as edge AI – a key focus area for Inside Industry Association. These updates have been developed in collaboration with the ECS community and the European Commission, both of which provided a large amount of input in six thematic workshops organised by the three associations in 2021. Following the same approach to updating this living document, the ECS-SRIA 2023 will prepare for the challenges and opportunities of the Chips Act by looking towards the frontier semiconductor technologies and promising open hardware architectures (e.g. RISC-V), software technologies & engineering tools required to ensure a real impact for EU research and innovation in the ECS domain and its applications.

Find out more at Brokerage 2022

The ECS-SRIA would not be possible without frequent meetings and networking between the three associations, not least of all at the annual Brokerage Event. This will next take place on 3-4 May 2022 at Hotel Le Plaza in Brussels and will feature a further introduction to the ECS-SRIA by Inside Secretary General Paolo Azzoni. This year's Brokerage also celebrates the kick-off of the KDT Joint Undertaking and will facilitate the creation of project proposals for its second call, for which the ECS-SRIA forms a crucial underpinning. Interested parties are invited to register on the website of the ECS Collaboration Tool, a networking platform for project ideas and potential partners. After more than two years of online events, we look forward to returning to face-to-face gatherings and anticipate a successful Brokerage that takes us a step closer to the wide-reaching ambitions of the ECS-SRIA 2022.

From smart agricultural systems to intelligent digital systems

Successes of the AFarCloud project



Growing urbanisation, decreasing productivity and higher costs are all major obstacles to modern agriculture. How can these factors by mitigated by individual farms while they continue to keep tabs on animal and plant health? The ECSEL project AFarCloud has developed a solution: a distributed platform for autonomous farming which enables real-time integration and cooperation between cyber-physical systems. Professor José-Fernán Martínez-Ortega of Universidad Politécnica de Madrid and Professor Gianluigi Ferrari of the University of Parma discuss their results and future plans in the smart farming domain.

José-Fernán Martínez-Ortega

Gianluigi Ferrari

Cooperation on cows and crops

As the project coordinator, José-Fernán – or J.F. to those who know him – was responsible for juggling 60 partners across 13 countries, including SMEs, large industry, universities, research centres and end-users. "It was a very interesting exercise for me – and very challenging," he admits. "We're technicians, so seeing the farmer's perspective is quite difficult! Of course, they know all the cows and crops. But, as technicians, we take care of how technology can really help farms. The idea was to create a special system for intelligent cooperation and AFarCloud is able to bring the power of autonomy to this."

As an acronym for 'Aggregate Farming in the Cloud', it's no surprise that AFarCloud incorporates a huge array of innovations: (semi-)autonomous ground vehicles that carry out missions in the field, artificial intelligence for quick decision-making, drone analysis of crops and cattle to detect sickness or abnormal behaviour, blockchain for traceability and cybersecurity for both data and systems, to name just a few. Tying this all together is a semantic middleware that integrates heterogenous protocols to vastly increase connectivity, which was Gianluigi's main focus in the project.

"I got involved in AFarCloud through the Brokerage Event in 2017," he begins. "It was interesting to me because I'm coordinating the Internet of Things Lab, and J.F. was very open to potential inclusion in the project proposal. From my point of view, the semantic middleware is the key achievement of the project as this intermediate layer allows data to be collected in a highly heterogenous sense. You can collect it with literally any kind of connectivity – WiFi, Bluetooth, Zigbee, anything you can think of. The idea is that you can collect data, normalise it in a common AFarCloud format and then expose this on top of the middleware layer, which makes AFarCloud flexible and coherent with the focus of Inside on intelligent digital systems."

Common control and characterisation

Naturally, one of the main technical challenges for the project was to manage all of the different technologies for characterising the environment within one ecosystem. "We created the concept of the farm as a service, so farmers can add services to AFarCloud according to their own requirements," explains José-Fernán. "But how do you collect all of the information in the environment and detect that something is wrong? Autonomy is a huge part of many things. Using sensors and actuators, the system is able to say, for example, that 30% more fertiliser is needed in a particular part of a field."

By offering a platform through which heterogeneous devices and vehicles can autonomously combine their capabilities, AFarCloud aims to make farming robots accessible to more users and provides farmers with a means to reduce labour costs and increase efficiency. These benefits are heightened by the new opportunities that the semantic middleware offers in communication between farms, such as data analytics on commonalities that were previously unrecognised. Milk and meat production, for instance, appear to be relatively dissimilar but actually share common needs in grass control and nutrition. In turn, such insights could provide a pathway to new business models and revenue streams – even for small to medium-sized farms.

"An important achievement for me was the fact that we were able to embed intelligence into IoT devices and at the edge," notes Gianluigi. "Instead of sending a lot of information to the cloud, the approach that emerged was to embed intelligence locally, extract the most important information and then send just that information to the cloud. This makes a system really scalable, which is another big result for AFarCloud."

Capabilities across countries

While all ECSEL projects bring together partners from across Europe, AFarCloud had the unique challenge of needing to be equally applicable

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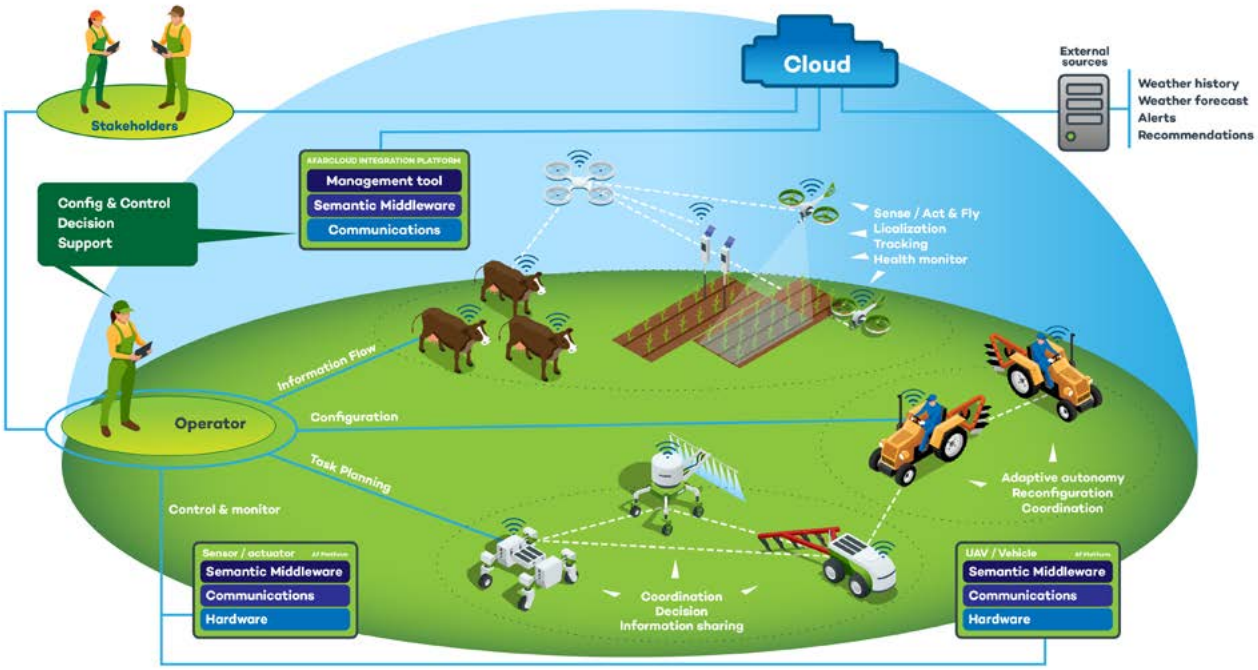


in all *climates* of Europe. To this end, eight local demonstrators were established in which groups of nearby partners could collaborate to develop technologies and services in the Czech Republic, Italy, Latvia, Spain and Sweden. Three holistic demonstrators in Italy, Finland and Spain – one at the end of each year of the project – then combined all of the technologies developed locally in order to test and validate the project's effectiveness on issues such as reducing the use of antibiotics and managing livestock behaviour in farms of varying sizes and weather conditions.

As a member of Inside's Scientific Council, Gianluigi is well-aware of the wider implications of such collaboration, which Inside seeks to facilitate in order to strengthen European competitiveness, self-sufficiency and sustainability as a whole. "I found the fact that there were so many partners spread around Europe very interesting because we had different perspectives and each partner had particular problems," he continues. "For example, northern countries had the problem of crops freezing. But we had IoT nodes with sensing capabilities on a farm in Italy and we were able to move these to a farm in Finland, get connected and collect data as if we were still in Italy. From a Scientific Council perspective, AFarCloud showed that you can take a smart agricultural system and reinterpret it as an intelligent digital system."

"This was a multicultural project and, of course, this is good as some of the impact is to improve European industry at different levels," adds José-Fernán. "Another thing is environmental protection: the reduction of agrochemicals in farming activities is good for the final product and contributes to biodiversity protection. AFarCloud showed plenty of promise for precision farming, so the fact that we then brought in many other things was a big deal. As a project coordinator, it was a headache! But the important thing was that we had good partners who were committed to the project, so it was very successful."

"This was a multicultural project and, of course, this is good as some of the impact is to improve European industry at different levels."

Coordination for circularity

As for the future, most of the innovations are at TRL 5 and some have even reached TRL 7. With market uptake of the AFarCloud platform a tangible prospect in the coming years, the partners have already created value chains for the different stakeholders and generated various business models for farmers to help compensate their investments in the technology. Although the project came to a close in November 2021, José-Fernán and Gianluigi are far from done.

"We're already building on the results of AFarCloud for new developments," concludes Gianluigi. "A project proposal we just submitted to Horizon Europe is focused on circular agriculture and applying new concepts to the base we have, particularly to make smart agriculture services available to small and medium farms with limited economic resources. Perhaps the next project that J.F. can coordinate could be 'AFarEdge'."

"Why not?" smiles José-Fernán. "The future of the technology, especially for cyber-physical systems and autonomy, is the edge and making decisions there. The next step within the framework of Inside is to bring at least 80% of the system to the edge. I would like to create some new projects to generate more power and scalability for the system because I'm really proud of how AFarCloud can manage the precision farming process in a very efficient way."

CPS4EU, InSecTT and Arrowhead Tools

Understanding interdisciplinar in European projects

ity

‘Interdisciplinarity’ is defined by the Oxford Dictionary as “the quality or fact of involving different areas of knowledge or study.” This concept is particularly relevant to the creation of modern Intelligent Digital Systems, which is simply not possible without the involvement of parties from across the value network and Europe as a whole. What does interdisciplinarity mean in a practical context? And how are European projects implementing it? Three Inside members share their views and experiences.

Jerker Delsing

Michael Karner

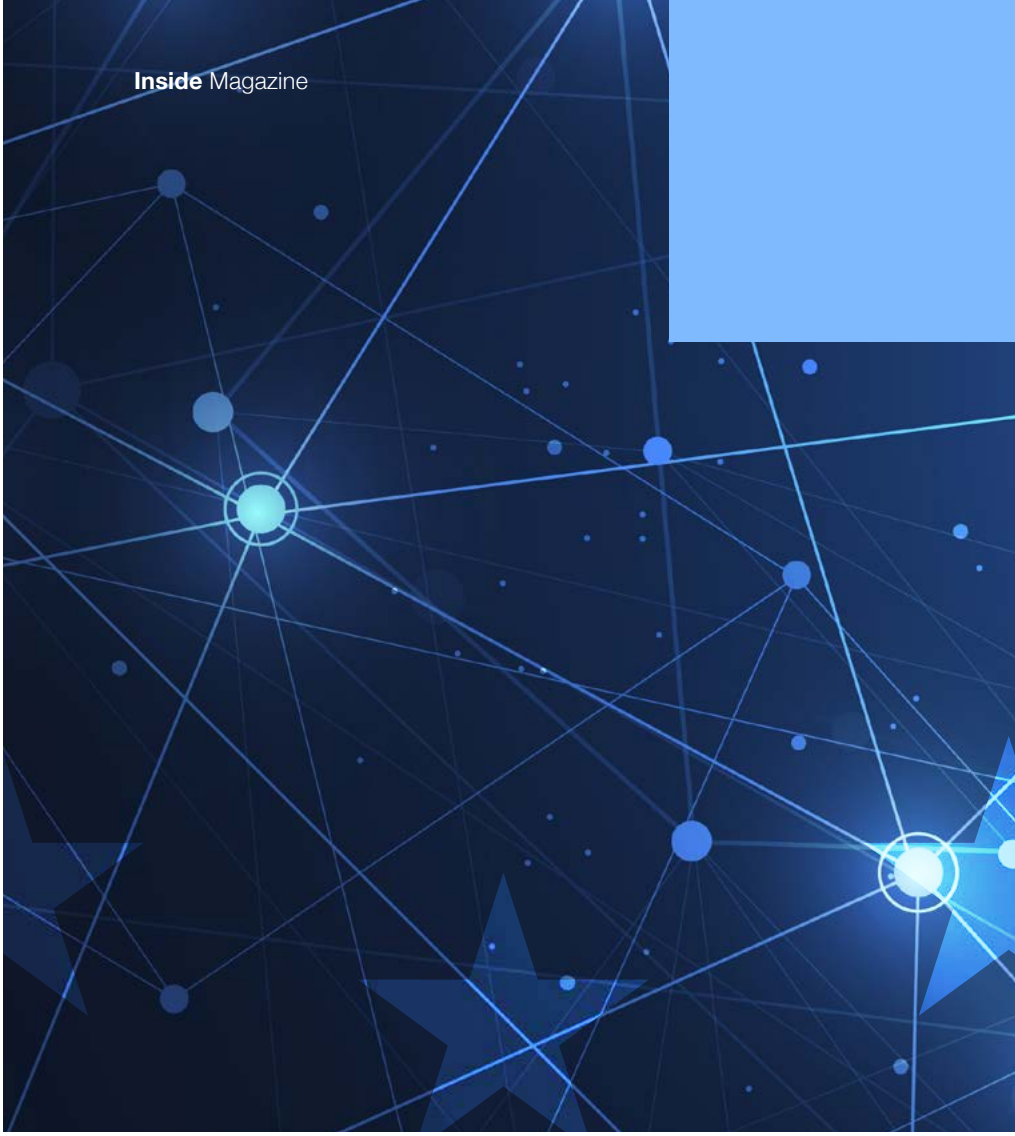
Philippe Gougeon

The dimensions of interdisciplinarity

Of course, interdisciplinarity can mean different things to different individuals – collaboration in academia, for instance, typically looks very different to cooperation between OEMs. Nonetheless, Jerker Delsing, Michael Karner and Philippe Gougeon see eye to eye on many of the nuances. “It’s kind of a funny word!” begins Jerker, Professor of Cyber-Physical Systems at Luleå University of Technology in Sweden. “If we are too far from each other, the journey becomes quite long. But with reasonable distance, there’s grounds for making something new. To me, interdisciplinarity means that when you meet people who have different views and backgrounds, your background can provide new light into their picture. To begin with, there might be one-way understanding. But if we can get a mutual understanding, things will really take off.”

“For me, interdisciplinarity essentially means looking beyond one’s own nose and leaving behind traditional ways of thinking that you may have inherited from your discipline,” says Michael Karner, Lead Researcher in Embedded Systems at Virtual Vehicle in Austria. “With communication across traditional borders, you’ll be able to achieve high-value results that would not have been possible by staying within your own discipline. The topic of interdisciplinary has many different dimensions but it often comes back to cooperation: accepting and understanding different perspectives, finding a common ground in communicating and developing a joint solution. If you think about it, it’s a bit like bringing together different electronic systems to form a system of systems. Of course, this could just be my bias as an engineer!”

“I agree with all these points already mentioned,” adds Philippe, Collaborative Project Director at Valeo Comfort and Driving Assistance. “An additional perspective is that one of the great benefits for a company like Valeo is working in large European projects and joining developments by companies or experts in other domains. They have a technical level which is already quite advanced. There is also a transversal dimension related to the technical level of microelectronics, hardware and software developers, system architects and people working in operations and recycling. There is a need to create a link between all



these technical activities. This is what we're targeting in my project and also in the way we develop new projects."

Something like a company

For Philippe, the project in question is CPS4EU, which brings together large and small companies and research centres to strengthen Europe's cyber-physical system value chain in terms of automotive, industry, energy distribution and use-cases for SMEs. As Valeo is currently moving into new mobility markets such as automated shuttles, robo-taxis and drones for delivery, CPS4EU focuses on the key enabling technologies of computing, connectivity, sensing and cooperative systems. In doing so, they've built up an ecosystem which is the full-time equivalent of 130 people for three years.

"It's like a small company with all the different competencies and products that we will use to develop our complex cyber-physical systems," explains Philippe. "We have small companies working on things like sensors or components to perform AI calculations. We also have the providers of the use-cases. Cyber-physical systems are quite complex, so we can no longer perform all-vertical development by ourselves. We need to work in a new network using pre-developed, pre-validated and pre-integrated subsystems. This is the purpose of our project. On top of that, we have mostly academics – but also some SMEs – working on tools to develop and orchestrate all of these new cyber-physical systems."

As an example of interdisciplinarity within the project, Philippe is spoilt for choice between any of the 16 use-cases. "For example, there's a lot of cameras on current vehicles and there will be even more in the future. With our colleagues from CEA, we've created a team to work on best-in-class deep neural algorithms to detect and classify objects in the surroundings of the car using pixel segmentation. Every pixel is classified as an object so that the algorithms can define their trajectory and apply steering, power or braking." This is complemented by a computing architecture which has been optimised for performance and power consumption when running this neural network software. The result is an example of technology which spans the entire chain from hardware to software, without which the emerging domain of automated driving would not be possible.

Challenging initial assumptions

Like CPS4EU, Michael views the InSecTT project as something of a small company, thanks in part to the improved organisation of European projects in general over recent years. This includes continuity between projects, as InSecTT extends the wireless connectivity and interoperability successes of the DEWI and SCOTT projects with the dimensions of trust and Artificial Intelligence (AI). As the project manager and coordinator of the predecessors, it was only natural that Michael take on this role again in InSecTT.

"There are two things I'd like to highlight on interdisciplinarity. On one hand, we are specifically working on trustable systems. What does it mean for a user to have trust in a system based on AI?" asks Michael. "For critical systems or systems that are deeply embedded in our lives (like health systems), the user needs full trust or it won't work. For this reason, InSecTT has psychologists working closely with the engineers to provide guidelines for the development of trustable AI systems. In the end, you need to make sure that the intended user of your AI-based IoT system understands how it makes decisions – that it's not just a simple black box – and that the AI 'understands' what the user wants and needs.

The second example of interdisciplinarity is an open innovation approach. We are doing open innovation within the consortium but, in the last phase of the project, we will also do it externally. Here, we are already seeing a great uptake of ideas from very different applications that the original developer did not even think of."

One such example is a cost-effective wireless IoT switch, which was developed in SCOTT and further enhanced in InSecTT. This was later identified as a good fit for the aviation industry, such as in detecting if seatbelts are fastened and lifejackets are in place. The key partner, TU Delft, subsequently won a prize from Airbus and have since launched a start-up based on this idea, despite it not originally being in their plan. The project will continue to build on such successes and uncover previously unforeseen applications as it enters its final year.

The importance of openness

As these projects show, a core theme of interdisciplinarity is the application of various disciplines to solve practical issues. The same is true of Arrowhead Tools, which looks into how internet technologies can be used to

create automation and digitalisation solutions. "What interests me a lot with this project," says Jerker, "is that we're working with real-world industrial and societal problems to which we can actually make a difference as a university. This is also gives me, my students and my colleagues concrete, realistic things to work with, not things that we dream up in an academic bubble."

With a large mix of 54 companies and 36 RTOs or universities, the project combines the perspectives of end-users, suppliers and knowledge providers in order to experimentally verify and validate common technology in 21 use-cases. Given the wide scope, from building management to teaching, the need to break out of technological silos is self-evident. "We have one project with a common technology that we cannot divide, not many sub-projects that work on their own," notes Jerker. "You can talk about interdisciplinarity in science and research, but here we see it in the overall technological landscape. And this is also part of something much larger: open source, which is a lot of the common technology we deliver in Arrowhead Tools and which requires quite different thinking compared to proprietary technologies. Many companies are not yet experienced in utilising and making money out of this. This is another part of interdisciplinarity: how can we break with the old ways of doing things?"

The idea is clearly catching on throughout Europe, as Jerker has already given four two-hour webinars to other projects and standardisation bodies in the spring of 2022. "A number of companies are now selling results to the market," he continues. "Of course, they sometimes get questions that they cannot directly answer and they filter this back into the project and ecosystem." In the production line creation of bathrooms, for instance, Arrowhead Tools encountered a partner which was struggling with the translation of data from one of their architect systems into robots that produce certain parts. With an automation approach developed in the project, they've reduced the time taken to produce such parts from seven weeks down to a few days. This is expected to fall to just 90 seconds by the end of Arrowhead Tools. In short, an interdisciplinary perspective – in this case, considering automation over the traditional manual approach – can allow companies to become much more competitive.

> Interoperability will be absolutely mandatory if we want to push our CO_2 commitment to its maximum.

A tool for bigger things

As ECSEL-funded projects, CPS4EU, InSecTT and Arrowhead Tools form part of the long-term goals of both Inside and the European Commission on digital sovereignty and sustainability in Europe. With the world becoming increasingly connected, interdisciplinary communication is sure to play an important role in strengthening and safeguarding these values – but, as Jerker cautions, this will have its biggest impact when viewed as a tool rather than an objective. "When managers call for it, it doesn't help because interdisciplinarity requires people to truly understand and appreciate each other. That's the distance I spoke about previously. If the distance is too great, we can throw as many people into a room as we like and nothing will happen. But if we first find situations we might want to discuss, if we're both lucky and skilled in forming teams and explaining our expertise and if people are open, forward-looking and innovation-minded, interdisciplinarity will work."

"In ecosystems, you have people who are absolutely ready to play as a team and be open. You have to cherish them! But you also have experts who are very good at their technical work but are not great at thinking outside of it. These people do have a role to play in the technical details," Philippe stresses. "For me, there are still some open questions. Today, you have the open-source community and commercially available tools, but most are not completely interoperable. There is no magic tool doing everything from A to Z, so engineers spend a lot of time creating converters. Interoperability will be absolutely mandatory if we want to push our CO_2 commitment to its maximum. If we are not interoperable at every stage, we will not know our real footprint, so interdisciplinarity should be a trigger to make us more interoperable than we currently are."
"When working in projects or creating proposals, I often still have the feeling that there's some kind of silo thinking in the cooperation between different levels of the value chain, between disciplines and even between countries," agrees Michael. "But things are better than in the past and people are opening up to bring together different fields. We need to go on in this way and bring the ideas of others into our own domains, even if they might seem very unconventional at first glance. We can then unlock a great potential that is currently hidden between the different parts of the ECS value chain in Europe."

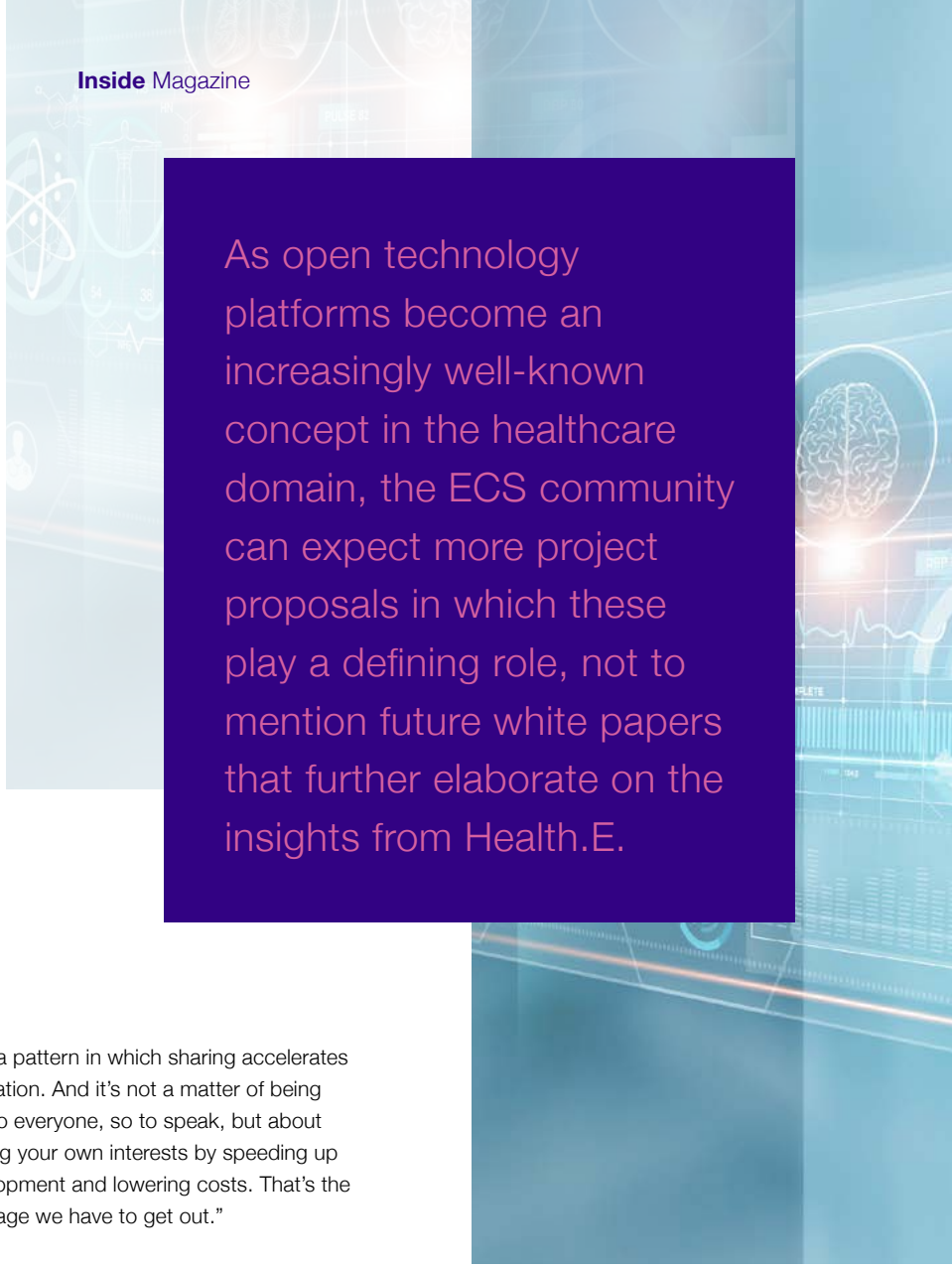
Lessons from the Health.E Lighthouse

The importance of open technology platforms

Ronald Dekker

Mart Graef

Originating in the ECSEL Joint Undertaking, the Health.E Lighthouse has been built on three main pillars: informing the ECS community of emerging medical devices, helping the medical domain to take advantage of open technology platforms, and gathering those who work on such platforms into a collection of European projects. As the Lighthouse draws to a close, initiators Ronald Dekker and Mart Graef look back on the lessons learned and future steps – as well as the joys of holding their first in-person event in over two years.



> As open technology platforms become an increasingly well-known concept in the healthcare domain, the ECS community can expect more project proposals in which these play a defining role, not to mention future white papers that further elaborate on the insights from Health.E.

From semiconductors to healthcare

Ronald and Mart go back a long way: having both started their careers at Philips in the eighties, Mart has since become the Strategic Programme Manager at Delft University of Technology while Ronald remains at Philips in the role of Senior Research Scientist. For the past ten years, they've also been organising large European projects for programmes such as ECSEL and PENTA, which is where the origins of Health.E lie.

"Six years ago, we were at an ECSEL event in Brussels where [Head of Programmes] Yves Gigase announced that something new would be organised: Lighthouses. The funny thing is that nobody had any idea what a Lighthouse is!" begins Ronald. "But I still remember that we said to each other that we would apply for one in the area of health. My motivation was a growing frustration that an enormous amount of research is going on in microfabricated and electronic medical devices, but that very little reaches the market. A main reason is that projects start with basic technology development, then have to build a system around it, then have to go to clinical validation and so on. But this technology development is very expensive. What Mart and I learned from our work in the semiconductor industry was how important it is to have open technology platforms."

These platforms can best be viewed as technology offerings which are available, for a commercial tariff, to multiple customers with various applications. The move from rigid and expensive point solutions to open platforms and standards has recently been seen in the automotive domain, but has its roots in the semiconductor industry some 30 years ago. Whereas Philips Semiconductors once manufactured everything themselves, they eventually ceased production of silicon wafers and photomasks on the basis that one or two companies can manage these more innovatively and sustainably at a higher volume. This concept has since pervaded the entire semiconductor industry but has yet to widely infiltrate the medical domain.

"The core is indeed the sharing of technologies," says Mart. "Open technology platforms only work if you have generic technologies that a number of parties can benefit from within the value chain. It may seem obvious, but this runs against the idea of many companies – especially in the medical world – that sharing know-how means giving away intellectual property. That's an obstacle we need to get over because we've already seen a pattern in which sharing accelerates innovation. And it's not a matter of being nice to everyone, so to speak, but about serving your own interests by speeding up development and lowering costs. That's the message we have to get out."

Aligning understanding

Over the years, this message has been shared by a variety of projects under the Health.E umbrella, starting with POSITION and its creation of open technology platforms for ultrasound and smart, minimally-invasive devices. Another cornerstone is Moore4Medical, which will run until May 2023 and demonstrates the feasibility and benefits of open technology platforms in emerging medical domains such as implantable devices and continuous monitoring. Using information from such projects and feedback from several workshops and panel discussions, Ronald and Mart have recently produced an analysis of how emerging medical domains can best be served by the ECS industry: the *Open Technology Platforms for Emerging Medical Domains* white paper.

"Content-wise, we had to find the right stakeholders," explains Mart. "Who should be involved and what are the medical domains? As presented in the white paper, we found 13 emerging domains. We could then look at the challenges related to open technology platforms for medical devices. This includes non-technical aspects, such as the Public Authorities' perspectives on how you run European projects and the right ways to spend money. One of the insights conveyed in the workshops was that the European Commission and other funding authorities tend to subsidise based on scientific excellence. But the hard part is actually making sure that your good idea ends up in a real product. This can be solved by bringing the community together, which is something that funding authorities should consider a responsibility."

This is just one of a number of recommendations identified in the white paper, which also analyses possible challenges in ownership and financing, ease of use and access, duplication and benchmarking, product lifecycle, data platforms, and regulations and certification. In spite of these potential obstacles, open technology platforms remain the fastest, most expedient

and most cost-effective means of stimulating innovation in healthcare – as long as all parties understand the need to share pre-competitive knowledge and expertise across the multidisciplinary value chain of technology providers.

"For me, a major challenge was to hold these workshops with 150 people online. What helped enormously was that we had excellent moderators who guided the conversation and brought structure," Ronald adds. "Something that struck me was that the definition of an open technology platform is not always clearly understood. Some in the medical domain still think it means that it's free! For me, it has a number of ingredients: a technology offering accompanied by a design manual with the building blocks you can use to make an application for a reasonable price. Companies that offer them also typically offer a prototyping service so that you can test the product before you buy a million of them. All of this is outlined in the white paper."

Like learning to drive

Having published the white paper in November 2021, what better time to present it than at the Health.E Lighthouse Symposium? *Implementing 'Moore For Medical': Innovation in Emerging Medical Devices* was held in a hybrid manner on 8-9 March 2022, making it the first event with a face-to-face component since the start of the pandemic. The gathering of more than 150 people at the High Tech Campus in Eindhoven, the Netherlands, was a major highlight for Ronald and Mart, who note that the event felt like both a liberation and a celebration of the community.

"One of the main takeaways for me was that the system works: if you bring together people from the technology side and the user side, you can see that the discussions offer a lot of added value for those involved. And they wouldn't meet these people in other contexts, so it's new things they discuss," says Mart. This was evident in the range of talks and activities at the symposium, ranging from an overview of currently available open technology platforms to a walking dinner at the Philips Museum. And, as Ronald points out, new terms such as 'organ-on-chip' will stick with participants long after more detailed information has faded from memory, helping to set the ball rolling on future ideas and projects.

Ronald: "For me, the Lighthouse was a movement to initiate a change in mindset that will help to realise concrete results. At the end of symposium, I said it's like getting your driving license. You start with theory: the pitfalls and what you can and can't do. That's the Lighthouse. We're now at the stage where we'll bring all our theory to practice, which is the execution of European projects aimed at developing open technology platforms. Even though the Lighthouse is at the end of its mandate, I hope that the message continues."

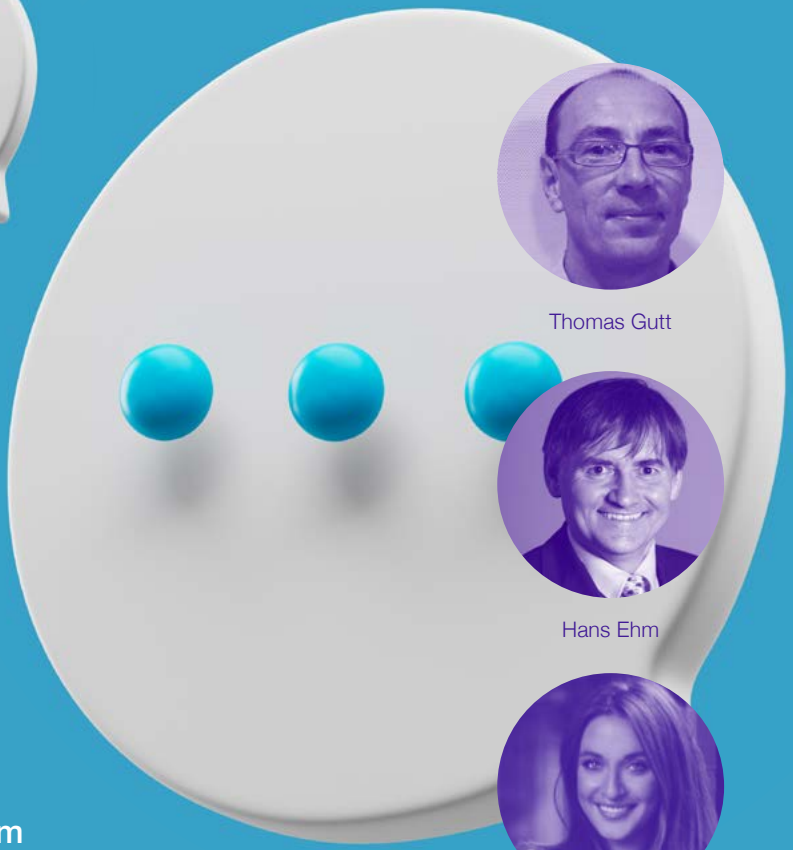
A growing awareness

Although the Lighthouse will come to a conclusion in April 2022, both Mart and Ronald are optimistic about the future. As open technology platforms become an increasingly well-known concept in the healthcare domain, the ECS community can expect more project proposals in which these play a defining role, not to mention future white papers that further elaborate on the insights from Health.E. A possible next step could be increased coordination between projects, such as using the technical outcomes from one project to inform the clinical validation of another. In turn, this can help to bring products closer to market. "As Mart said earlier, Public Authorities have an important role in actuating changes in how we work," says Ronald. "In the last white paper, we have clear recommendations for the Commission. I hope that they will take one or two of them up and that we see this reflected in the way that calls are organised in the future. After all, it was very gratifying for me to be in a European project and hear somebody say that open technology platforms should be part of it."

"Open technology platforms never used to be part of these discussions but now people see a benefit," agrees Mart. "So, the highlight is that this all works! Lessons learned in the microelectronics community can indeed be applied in the healthcare community. We shouldn't take that for granted. We set something in motion by using technology platforms as an accelerator of innovation, and this will continue even as the Lighthouse stops."

The SC3 project

A lingua franca for semiconductor supply chains



Thomas Gutt

Hans Ehm

Anna Laktionova

Emerging out of Europe's largest ever project in the field of digital industry, SC3 (Semantically Connected Semiconductor Supply Chains) envisions a common language to foster collaboration between humans and machines and further improve Europe's production supply chain management. With the project just over halfway towards completion, three colleagues from consortium leader Infineon Technologies reflect on the challenges and achievements so far.

Getting more out of data

As an ECSEL-funded Communication and Support Action project, SC3 aims to realise the full potential of Internet of Things (IoT) by seamlessly interconnecting devices and procedures across the semiconductor value chain. In doing so, it intends to build on the successes of predecessor project Productive4.0, which brought together 109 partners in 19 countries to improve the digitisation of European industry using electronics and ICT. Following the completion of Productive4.0 in April 2020, project leader Thomas Gutt turned his attention to SC3.

"A lot of results came out of Productive4.0, one of which was an ontology. We were searching for possibilities to drive this further, so we started to run this project," begins Thomas. "As Productive4.0 was the first project in the Productive4.e Lighthouse, we had a role to play in trying to bring together projects in our conferences. We were already very big but still, we were inviting other projects from the Lighthouse to lift this collaboration. There was even a joint workshop with the Arrowhead Tools project, where we tried to collaborate on a really technical level. We want to do all this in SC3 as well."

Like Thomas, Hans Ehm was closely involved in Productive4.0 as the leader of the work package on the ontology that now forms a

basis for SC3. Having been involved in supply chain innovation for 15 years, he's keen to see the project's results used for the better forecasting in the semiconductor domain.

"My own experience with industrial data spaces is that without a profound structure for data, we are not able to give AI and learning machines the know-how we have in our environments. They deliver results that are usually good, but they don't have the quality needed by experts. For that, we need a 'lingua franca' structure. This is already quite strong in the B2C [business-to-customer] environment and it emerged in the B2B [business-to-business] environment during Productive4.0. We now have the opportunity to use this ontology as a Digital Reference and make sure that we have access to data and can get more out of it."

A web of complexity

By the time that Productive4.0 evolved into SC3, this ontology was already highly advanced and can best be viewed as a web of connected classes that represent very different aspects of supply chains, such as sensors, external products that use chips, a single process on one machine in a production site or even the entirety of production itself. New classes are continuously being added to the project, presenting both a challenge in terms of complexity and an opportunity to interconnect far more devices than would be possible with alternative technologies.

"The biggest achievement is that our ontology still exists and is in the public domain," says Hans. "Everyone can use it and work on it. The Digital Reference is already a standard in the domain of semiconductors and supply chains containing semiconductors, but it needs to be updated in order to really live. In the project, we implemented a distributed ledger technology for this. In the past, the standard community would be so happy with a standard that they wouldn't be willing to make a lot of changes. But with blockchain, we have the possibility for both fast updates of the standard and immutability, including who has agreed to a change. SC3 has made the Digital Reference from Productive4.0 sustainable and, for me, that's the biggest result so far."

"There's also an important specific part to the project: the Generic Data Model," adds Thomas. "As part of the Digital Reference, this model can be used as a communication model within production. Semiconductor producers are very keen to withhold their data internally but, in this project, we are bringing together the European semiconductor know-how and building the infrastructure for intense collaboration with a European but also a global perspective. In terms of collaboration and its benefits for society, this is an important point. If you can reach the point when even competitors will be able to work together to create something new, this is good for the whole community."

Finding good in the bad

This emphasis on community has been a focal point of both Productive4.0 and SC3, with a great deal of attention devoted to reaching those beyond the confines of the consortium. "I also came to the project from Productive4.0, where I was responsible for communication and dissemination activities," says Anna Laktionova, Project Manager for Infineon Technologies. "In SC3, I am doing the same with a focus on social media. We try to show the project not only from a technical viewpoint but also to non-technical communities. It's also for universities and government people, so we try to bring all of their focuses together."

In terms of reach, Productive4.0 has proven a tough act to follow – in contrast to its forerunner, SC3 is built around a group of five partners in two countries, making external connections all the more important for technological uptake. With this in mind, Anna has already produced a large number of videos, blogs and interviews to compliment the wide array of technical papers and public reports available on the SC3 website. In an unexpected turn, the project has also seen a boost thanks to difficult conditions globally.

"In this project, we've been lucky in a way because things like COVID have highlighted the global chip shortage and the need for integrated data," explains Hans. "Whenever we have disruptions today, prospect theory dominates: when you have nothing in stock, you order twice as much as you need; if you have too much stock, you order nothing. This is the nature of humans, so we have many technical demands in our industries. We need a data infrastructure and Digital Reference – in other words, a semantic web for the semiconductor domain – to uncover truer demands at a more detailed level and reduce the chip shortage. We need outside networking to flourish and the world situation has helped us a lot by giving traction to this."

Of course, it hasn't all been plain sailing. As Thomas notes, the Communication and Support Action elements of the project have suffered somewhat due to all events moving online in the face of COVID-19. "Still, I think that the project is running well," he says. "Productive4.0 created results and we want to keep them alive, not just put them away and never use them, so it's really nice that we have the opportunity to follow this with funding from ECSEL, now KDT. We may be a smaller project, but we benefit from the results of the 109 partners from Productive4.0. As Hans says, this shows how important external collaboration is."

Keeping up the continuity

Although the SC3 project will only come to a close in September 2023, Thomas, Hans and Anna are already thinking about the next steps needed to both secure and expand the technology. "As I mentioned, we have different partners and it's sometimes difficult to explain things to the non-technical community. What are we doing? How do we promote this? How do we find potential customers?" asks Anna. "So, we need to build a network with people from different areas but who can still understand each other and what the benefits are for them and for Europe. One option which is helping us to keep the results visible is our social platform. Once the project finishes, we will still be promoting it in order to help new proposals or results. As with Productive4.0, our website will stay online for at least three years."

"The continuity from Productive4.0 to SC3 was a great achievement," agrees Hans. "Now is the time to think about where the 'home' of this Digital Reference and distributed ledger technology will be. One option is a funded project with a work package for this. We're still in the middle of the project, but it's already important to think about how we can get continuity with the next step. For me, a big change in mindset was going from providing an infrastructure for data sharing to providing an infrastructure for data sharing ***for truer demand***, which has given us much more focus than we had before. A solved global chip shortage situation would help the whole industry and the whole world, so whatever we can do for that is important."

"SC3 will definitely live on because it's important to both us and the community. On the technology side, we will further develop the ontology in other projects. It will become more valuable as more things become part of it, so we will follow up in the KDT calls and bring out proposals," Thomas concludes. "'Do you remember the chip shortage in 202X?' This is what we hope to hear in a couple of years if we have completely developed the ontology and are using it to regulate supply chains. That's our man on the moon: helping to solve this problem for almost the entire world."

Upcoming events

ISS Europe

Brussels, Belgium

30 May 2022

The Industry Strategy Symposium Europe - ISS Europe gathers executives and high-level experts to provide microelectronics market projections and insights into the latest economic and societal trends, geopolitics, and technologies shaped by the microelectronics industry.

HiPEAC 2022

Budapest, Hungary

20-22 Jun 2022

The HiPEAC conference is the premier European forum for experts in computer architecture, programming models, compilers and operating systems for embedded and general-purpose systems. The HiPEAC 2022 conference will take place in Budapest, Hungary.

SSI Conference 2022

Grenoble, France

26-28 Apr 2022

The conference will cover topics along the whole value chain starting from MEMS/ NEMS, photonics, microfluidics or printed technologies for sensor manufacturing up to complete smart systems with embedded intelligence and to different application scenarios.

Future Summits 2022

Antwerp, Belgium/Hybrid

17-18 May 2022

Fast-forward into the Tech Future and join Imec's flagship event on nanoelectronics advances & deeptech solutions. Learn how technology can strengthen societal challenges of the Covid-19 pandemic and accelerate the economy.

ITS European Congress 2022

Toulouse, France

30 May-01 Jun 2022

The ITS Congress represent the ultimate showcase of mobility services deployment and are the means for the ITS Community to keep pace with the incredible evolution of the industry.

Embedded World 2022

Nuremberg, Germany

21-23 Jun 2022

Discover the innovations of the embedded sector, meet experts and win new customers. embedded world offers the entire spectrum – from components, modules and complete systems to operating systems, hardware and software and services.

iPEAC CSW Spring 2022

Tampere, Finland

26-28 Apr 2022

Taking place in the innovation powerhouse of Tampere, Finland, this edition of Computing Systems Week focuses on the internet of things (IoT).

Joint European Workshop on Smart Systems Integration in Energy Applications

Tours, France

24-25 May 2022

EPoSS and Pôle S2E2 jointly bring together technical experts from both communities with the aim to establish a strategic cooperation in the field of Smart Systems Integration in energy applications.

IoT Week

Dublin, Ireland

20-23 Jun 2022

Discover the impact on Artificial Intelligence, blockchain, quantum computing, AR/VR, Robotics and new digital innovations. The future of IoT will be undoubtedly create positive evolution to all sectors of activity, improving the way we live and work.

EUREKA meets the atlantic

Lisbon, Portugal/Hybrid

29 Jun 2022

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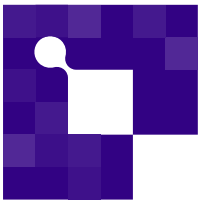
Submissions
The Inside Industry Association office is interested in receiving news or events in the field of Intelligent Digital Systems.

Please submit your information to info@Inside-association.eu



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