INSIDE
magazine

March 2025 — Issue 09

In this issue:

- **Securing the AI chips supply and value network**
- **Why a strategic EU based content should be preserved in the electronics value chain?**
- **The digital route to engineering efficiency**

INSIDE
Industry Association

In this issue

March 2025 — Issue 09

Dear reader,

The semiconductor industry is undergoing an era-defining transformation, shaped by technological breakthroughs, geopolitical tensions, and industrial shifts. As Europe strives to secure its role in the global technology landscape, the articles in this issue of INSIDE Magazine explore the critical themes that will define the continent's competitiveness, resilience, and innovation.

We begin by addressing the strategic necessity of securing the AI chip supply and value network. With AI driving an explosion in chip demand, Europe must develop a long-term vision that ensures access to advanced semiconductor technologies while reducing reliance on foreign suppliers. The geopolitical challenges surrounding semiconductor supply chains further complicate this task.

Building on this, we examine why Europe must preserve its strategic presence in the electronics value chain. The semiconductor ecosystem is deeply interconnected, and Europe must ensure its technologies remain indispensable within the global supply chain. The automotive sector serves as an example of why supply chain resilience is critical, especially as legacy trade frameworks give way to protectionist policies and evolving industrial dynamics.

Securing the future of Europe's semiconductor industry requires not only manufacturing capabilities but also innovation and engineering efficiency. A dedicated article on the digital transformation of engineering processes highlights how adopting automation and digital workflows can enhance efficiency and drive industrial competitiveness.

The role of collaborative research ecosystems is another central theme. The DTx CoLAB initiative showcases how cross-sector collaboration can foster innovation in digital transformation, bringing together academia, industry, and policymakers to address emerging technological challenges. A related discussion on Europe's chip design capabilities underscores the need for strategic investment in design expertise – a key factor in securing a competitive edge.

Looking at Europe's semiconductor supply chain, another article explores how Europe can shape and strengthen its role. As competition intensifies, reshoring efforts, supplier diversification, and regional alliances will be crucial in navigating the complexities of global trade dynamics.

A shift toward sustainable digital production is another defining challenge for the industry. The article on transforming the European steel industry illustrates the broader push for greener industrial practices, a topic that resonates with ongoing efforts to reduce the environmental impact of chip manufacturing.

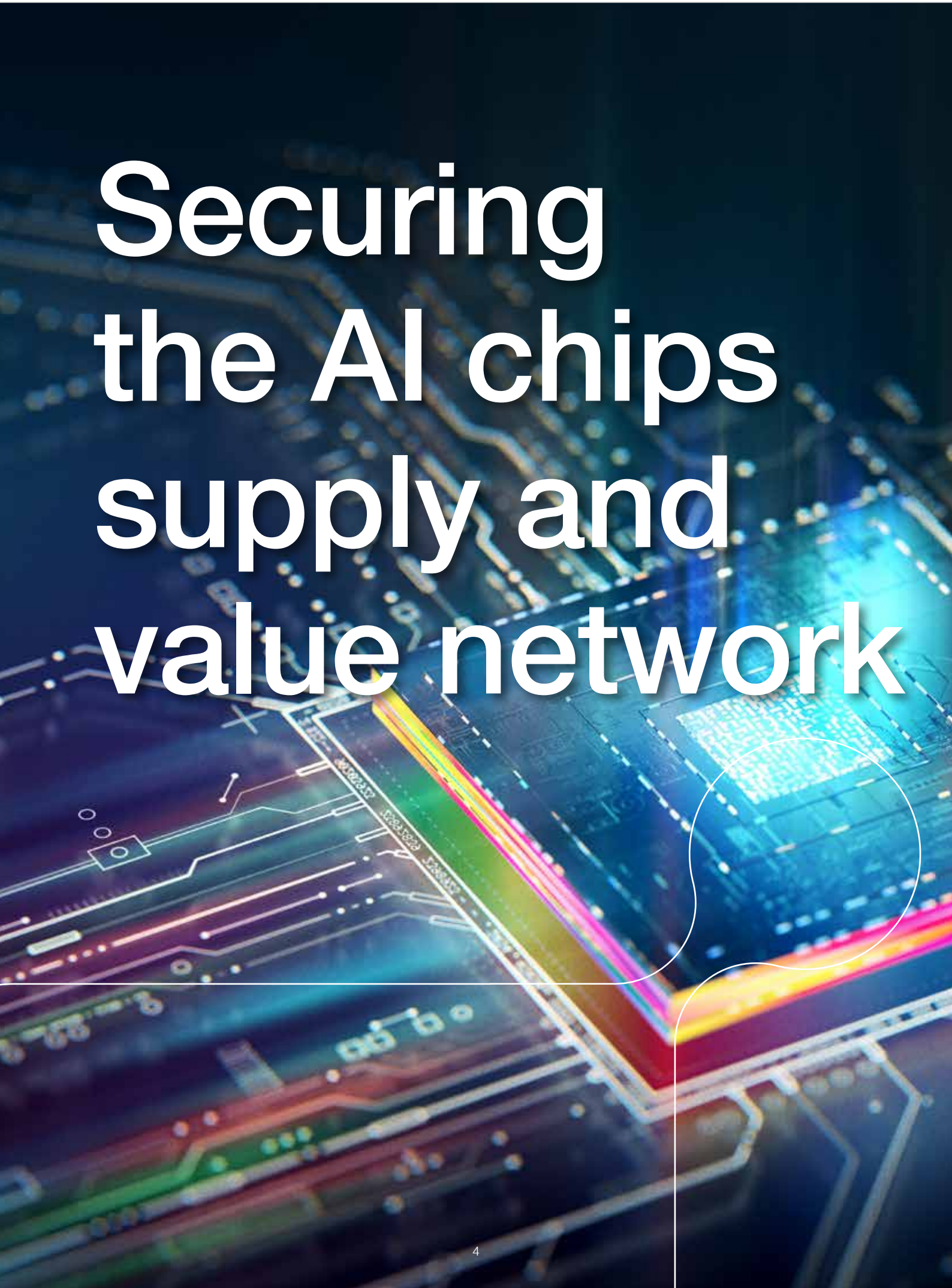
Collaboration remains at the heart of Europe's semiconductor ambitions. The INSIDE Thematic Workshops reflects this commitment by bringing together key stakeholders to discuss key technologies, innovation, cross-sectoral partnerships, technology roadmaps and tomorrow's research projects. The ECS Brokerage event is intended specifically to support our Members to build future innovation. Meanwhile, EFECS 2024 event provided a platform for industry leaders, researchers, and policymakers to shape a shared roadmap for Europe's technological future.

Taken together, these discussions highlight a common theme: Europe's ability to shape its digital future depends on strategic foresight, technological leadership, and collaborative action. The semiconductor industry and the technology stack it enables are not just another industrial sector; it is the backbone of Europe's competitiveness and sovereignty.

As we move forward, one thing is clear: Europe cannot afford to stand still. The time to act is now, by investing in research, strengthening supply chains, fostering innovation, and securing technological independence. With the right policies and industry collaboration, Europe can define its own path in the digital revolution.

Enjoy reading this issue of INSIDE Magazine!

Paolo Azzoni
Secretary General



Securing the AI chips supply and value network

Paolo Azzoni

Artificial intelligence is transforming industries, society, and economies, but its rapid expansion depends on one crucial element: microchips, which represent the backbone of AI systems, powering everything from large-scale AI models to everyday consumer devices. As technological advancements accelerate, ensuring a secure and reliable supply and value network of AI chips has become a strategic necessity for nations worldwide.

The semiconductor industry is a critical enabler of AI but also a highly concentrated, fragmented, and geopolitically sensitive sector. A few dominant companies control key stages of the supply chain, and the ongoing US-China tensions complemented by the emerging US-Europe frictions further complicate international trade. In this fragmented landscape, Europe plays a pivotal role, with its semiconductor suppliers holding competitive and sometimes monopolistic positions in various segments, including manufacturing equipment, chemicals, sensors, chips, power semiconductors, etc. While Asia leads in fabrication, European companies provide indispensable technology, materials, and expertise, creating a web of mutual dependence.

However, despite its technological strength, Europe faces significant challenges in securing its semiconductor future. The EU Chips Act, while a step forward, lacks a cohesive long-term strategy to ensure the resilience of Europe's semiconductor industry. Without a clear vision and stronger national efforts, European nations risk losing their influence in the global semiconductor market, a loss that could have far-reaching economic and geopolitical consequences.

> As AI chip demand surges, securing Europe's position in the global semiconductor value chain requires decisive action: a strategic, forward-looking policy to safeguard Europe's technological primacy, economic security, and industrial leadership.

The geopolitical panorama

The global semiconductor industry is at the center of a strategic and geopolitical battle, with major economic powers investing heavily in securing their position in this critical sector. To reduce reliance on foreign manufacturing and strengthen technological strategic autonomy, the European Union has introduced the European Chips Act[1], which is mobilising €43 billion in public and private funding aiming to increase its share of global chip production to 20% by 2030. However, this figure is modest compared for example to the $280 billion allocated by the United States under the CHIPS and Science Act (2022)[2], reflecting the financial disparity between the EU and larger economies.

The U.S. is not only investing in domestic chip production but is also explicitly countering China's ambitions in the semiconductor industry. Holding 12%[3] of the global semiconductor market, the U.S. has taken aggressive measures, including export restrictions on advanced chipmaking technologies, tightening controls on companies like Huawei, and blacklisting key Chinese semiconductor firms[4 5]. These restrictions have severely constrained China's ability to develop cutting-edge chips, pushing it to increase domestic investments, such as its recent $47 billion fund aimed at AI-grade semiconductor development[6].

China, despite these challenges, remains a dominant force in the legacy chip market, producing nearly 60%[7] of older-generation chips still widely used in consumer electronics and industrial applications. While

legacy chips do not directly contribute to the AI race, they offer China leverage over global supply chains. President Xi Jinping has explicitly stated[8] China's goal of increasing global dependence on Chinese supply chains, ensuring the country can retaliate against future trade restrictions and invest in alternative chip production technologies to bypass Western export controls and strengthen its semiconductor autonomy.

The EU's goal of producing 20% of the world's semiconductors by 2030 is part of its broader Digital Decade policy[9], which seeks to track and enhance Europe's technological capabilities. However, focusing on a percentage-based production target is not necessarily an effective policy strategy. Unlike commodities such as steel or energy, semiconductor production operates within highly specialized global value networks, where substitutability is low, and supplier relationships are deeply intertwined.

> Simply increasing domestic fabrication will not guarantee resilience, as European chipmakers will still depend on foreign suppliers for critical raw materials, advanced equipment, and manufacturing partnerships.

Europe must focus on long-term strategic policies rather than arbitrary production targets. Success in the semiconductor sector requires investment in the entire supply and value network, covering the entire technology stack, from materials, to equipment, foundational technologies, integrated systems, software, and applications, while fostering strong international partnerships that align with Europe's economic and security interests.

A global complex web

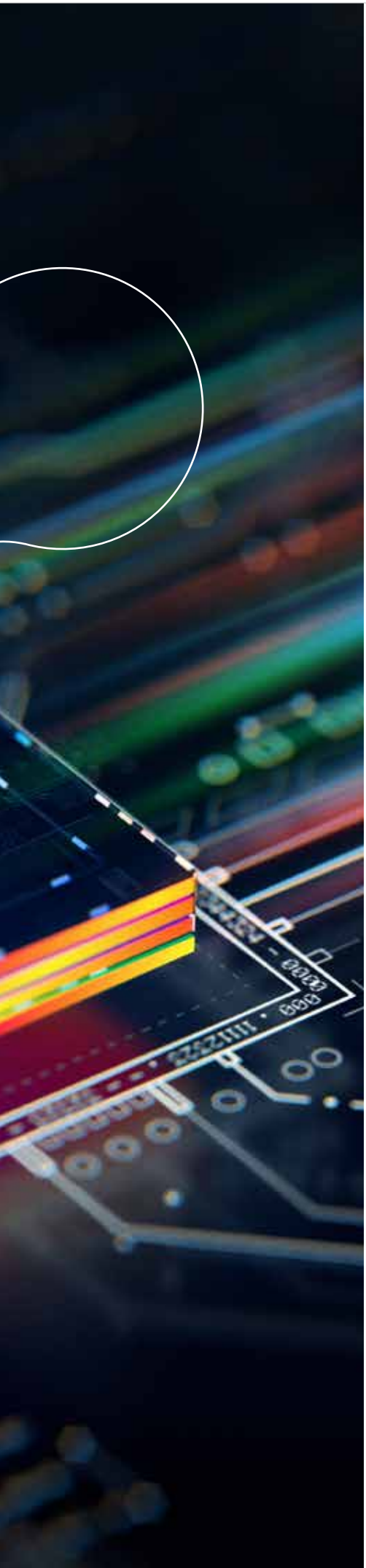
The semiconductor industry is an emblematic example of a highly intricate and globally interdependent ecosystem. Every microchip undergoes a multi-stage process spanning several countries, each specializing in a crucial aspect of production. From the extraction of raw silicon to advanced fabrication, assembly, and testing, no single country or region controls the entire semiconductor supply chain. Instead, a complex network of interdependencies governs the industry, making it vulnerable to disruptions at any stage. Moreover, this decentralized approach to production, while efficient, introduces multiple failure points, creating a delicate balance between supply, demand, and regulatory compliance.

Despite ambitions to expand local chip manufacturing, Europe will remain dependent on global semiconductor networks for several reasons. First, semiconductors are highly specialized and require dedicated manufacturing processes that are not interchangeable. A facility producing high-performance AI accelerators, for instance, cannot be repurposed to manufacture power semiconductors or memory chips. This means that even if Europe increases its share of global semiconductor production, it will still rely on foreign fabs for specific chip types. Additionally, chip designs are tied to specific manufacturing processes, creating strong long-term dependencies on existing foundries.

Second, modern electronics require a diverse range of chips, sourced from different parts of the world. A single missing component, such as a memory chip, a microcontroller, or even a simple voltage regulator, can halt production, as seen in supply chain disruptions affecting industries from automotive to consumer electronics. Expanding local production alone will not guarantee resilience, as supply security depends more on strategic supply chain management and diversified sourcing[10].

Finally, even if Europe expands its semiconductor manufacturing capacity, fabs will still depend on foreign suppliers for essential materials, such as wafers, chemicals, and specialized equipment, primarily from Japan and the United States. Moreover, after fabrication, most chips require assembly, testing, and packaging in Asia, where Europe has limited post-fabrication capabilities. Since current investment efforts focus mainly on front-end manufacturing, Europe will likely remain reliant on Asia for critical downstream processes.

Moreover, beyond logistical challenges, semiconductor manufacturers face growing regulatory scrutiny. Global trade policies now require companies to monitor not only



direct suppliers but also secondary and tertiary providers (Tier N suppliers), ensuring ethical labor practices and compliance with anti-corruption and sanction laws. Legislative frameworks such as the U.K.'s Modern Slavery Act[11], Germany's Due Diligence Act[12], and the USMCA Agreement[13] have forced firms to enhance oversight and take full responsibility for ethical sourcing and labor conditions throughout the supply chain. As these laws become more stringent, semiconductor firms must navigate compliance risks alongside operational challenges.

In addition, the concentration of expertise within a handful of key players further amplifies the fragility of the semiconductor supply network. Three companies, Cadence, Synopsys, and Mentor Graphics, control nearly 70%[14] of the electronic design automation (EDA) market, while Dutch giant ASML holds a dominant position in the global market of machines essential for cutting-edge chip production. Taiwan and South Korea dominate chip fabrication, with companies fiercely protecting their intellectual property to maintain a competitive edge. Once manufactured, AI-specific chips and GPUs are primarily designed and supplied by Nvidia in the U.S., cementing a concentrated structure that leaves the industry highly vulnerable to geopolitical shifts.

Recognizing these challenges, the European Union is making efforts to strengthen its semiconductor capabilities, aiming to secure access to raw materials, enhance domestic production, and reduce dependence on foreign suppliers. However, competing priorities, including climate policies and rapid shifts in industrial demand, geopolitics and trade rules raise concerns about whether these initiatives will be sufficient to establish true resilience in the sector.

The COVID-19 pandemic starkly exposed the vulnerabilities of this fragmented ecosystem. Lockdowns in 2020 disrupted production at a time when demand for electronics surged, creating widespread shortages that rippled across industries, from automotive manufacturing to consumer technology. These disruptions underscored the need for more resilient supply networks, capable of withstanding unforeseen crises.

AI is expected to become one of the most significant drivers of semiconductor demand in the coming decade, increasing tenfold between 2023 and 2033[15]. This growth further complicates an already strained supply and value network, making it imperative to address the structural weaknesses of the global semiconductor ecosystem to ensure that AI innovation does not outpace production capacity.

AI Chip Demand

The rapid adoption of AI across industries is driving unprecedented pressure on semiconductor supply chains, as AI-specific processors require more advanced fabrication techniques and specialized components. A 20%[16] surge in demand alone can disrupt the delicate balance of the semiconductor industry, and with AI adoption fueling a 31% growth in PC sales and a 15% increase in smartphone sales between 2023 and 2026, the supply-demand gap is widening.

Unlike traditional processors, AI chips rely on billions of transistors for parallel processing, machine learning, and neural network acceleration. This complexity requires cutting-edge fabrication facilities, which are already struggling to scale production. AI-enabled PCs, for instance, are expected to make up 43% of all shipments by the end of 2025[17], a major leap from just 17% in 2024. By 2026, AI-powered laptops will become the default choice for businesses, reinforcing the need for a resilient AI chip supply chain.

However, the semiconductor industry is not yet equipped to meet this surge. The sector depends on a handful of key players – NVIDIA, Apple, Samsung, Intel – who dominate the manufacturing of next-generation GPUs and high-bandwidth memory, essential for AI servers. TSMC currently produces all of the world's most advanced AI chips, supplying industry leaders like Apple and NVIDIA, a situation that creates a potential bottleneck.

> Jensen Huang, CEO of NVIDIA, has famously stated: "Basically, there is air – and TSMC", highlighting the industry's reliance on a single manufacturer.

The supply chain crisis is further exacerbated by shortages in specialized semiconductor equipment, particularly extreme ultraviolet lithography (EUV) machines, which are

produced exclusively by ASML. These machines are critical for manufacturing advanced AI chips, meaning any disruption in ASML's supply chain reverberates across the industry.

To mitigate risks, semiconductor companies are shifting from just-in-time to just-in-case inventory models, stockpiling critical components to avoid future shortages. AI chipmakers are also investing in new fabrication techniques, including 3D chip stacking and silicon photonics, which enhance performance while reducing reliance on the most advanced manufacturing nodes.

Governments have recognized the geopolitical significance of AI chip production and are prioritizing domestic semiconductor manufacturing (see e.g. the U.S. and E.U. CHIPS Acts), but these actions will not strongly support the manufacturing capacity in the short term, meaning AI-driven industries will continue facing supply constraints with concrete repercussions. Delays in acquiring AI hardware may stall innovation in AI-driven analytics, automation, and machine learning, slowing digital transformation initiatives. Companies must explore diverse sourcing strategies, strategic partnerships with key suppliers, and adaptive AI architectures that optimize performance across multiple processor types.

The AI chip race is one of high stakes and rapid evolution. While demand for AI processors presents massive economic opportunities, the fragility of the semiconductor supply chain remains a pressing concern. The coming years will be critical in determining whether the industry can adapt to AI's explosive growth or face yet another large-scale semiconductor crisis.

Dealing with export restrictions

The growing demand on AI chips has made semiconductor exports a key focus of geopolitical tensions. Recent U.S. export controls on advanced AI chips have raised concerns across the European Union, as they could hinder Europe's ability to train AI models and advance high-performance computing initiatives. The restrictions, which apply to 17 EU member states, limit access to high-end GPUs crucial for AI development, raising fears of a technological gap between favored and restricted nations.

The impact on European supercomputers is particularly concerning, as many of the EU's high-performance computing facilities depend on American chips, predominantly from Nvidia, AMD, and Intel. With some EU countries exempt from restrictions while others face limitations[18], this fragmented approach creates uncertainty for AI development across Europe. The European Commission has expressed its concern, emphasizing the need for the EU to remain a trusted economically of the U.S. rather than a security risk. Proposals for an EU-U.S. Critical Tech and Dual-Use Council have emerged as a potential mechanism to maintain a stable transatlantic semiconductor supply chain.

These export controls are part of a broader global trend aimed at securing sovereign technology sectors. The U.K., EU, and U.S. have introduced increasingly strict policies to regulate semiconductor exports, reflecting heightened national security concerns over emerging technologies. The compliance burden on chip manufacturers and AI firms has grown as companies must now navigate evolving regulations, vet supply chain partners, and ensure operational transparency to remain compliant with international trade laws.

To mitigate the risks posed by export restrictions, AI chip manufacturers are adopting new strategies. Firms are diversifying their supplier base, strengthening local procurement, and using predictive modeling to anticipate and prevent supply chain disruptions. Automated monitoring tools[19] now enable real-time risk assessments, helping companies detect potential compliance violations before they escalate. Additionally, semiconductor firms are integrating a "value at risk" model into their operational strategies, allowing them to quantify financial risks and prioritize areas of vulnerability.

Without a viable alternative to Nvidia's CUDA, Europe's AI ecosystem remains dependent on U.S. hardware, making software development a critical hurdle for achieving technological strategic autonomy.

Beyond short-term solutions, Europe must invest in developing its own AI chip ecosystem to reduce dependence on foreign suppliers. The restrictions serve as a wake-up call for policymakers to accelerate investment in European-designed processors, alternative semiconductor technologies, and advanced fabrication capabilities. Developing independent hardware and software ecosystems, such as moving away from Nvidia's proprietary CUDA platform, is crucial to ensuring long-term technological sovereignty.

As the global semiconductor landscape becomes more fragmented, Europe must strategically navigate its position to maintain access to critical AI chip technologies while strengthening its own supply chain. The next few years will determine whether Europe can secure its place in the AI-driven economy or remain at the mercy of geopolitical constraints.

The role of rare earths

Beyond fabrication and design, securing rare earth elements is another critical challenge for the semiconductor industry. These scarce heavy metals are essential for microchip production, and China dominates both their extraction and processing, producing 60%[20] of the world's rare earths and refining nearly 90%. This dominance provides China with a powerful geopolitical bargaining tool, as demonstrated in 2010 when it temporarily restricted rare earth exports to Japan amid a diplomatic dispute[21]. Such actions raise concerns that similar restrictions could be imposed on Europe and the U.S., further complicating their efforts to secure AI chip supply chains.

The EU is heavily dependent on China, sourcing 98%[22] of its rare earth imports from Chinese suppliers. To reduce this reliance, the Critical Raw Materials Act[23] aims to diversify Europe's supply sources, but its effectiveness remains uncertain. While Europe has signed agreements with Kazakhstan, Namibia, and other nations[24] to secure alternative supplies, these countries currently lack large-scale production capacity. Norway's recent discovery[25] of significant rare earth reserves could provide a more local source, yet ecological concerns and lengthy approval processes may delay their exploitation.

Indeed, environmental considerations further complicate rare earth extraction and chip manufacturing. Mining rare earths consumes large amounts of water and energy, generating substantial carbon emissions and posing risks of chemical contamination. Research indicates that if Europe meets its goal of producing 20% of the world's chips by 2030, the semiconductor industry's carbon footprint could increase eightfold, surpassing other heavy industries. AI itself is an energy-intensive field, with global data centers already consuming more electricity than entire nations, such as Italy.

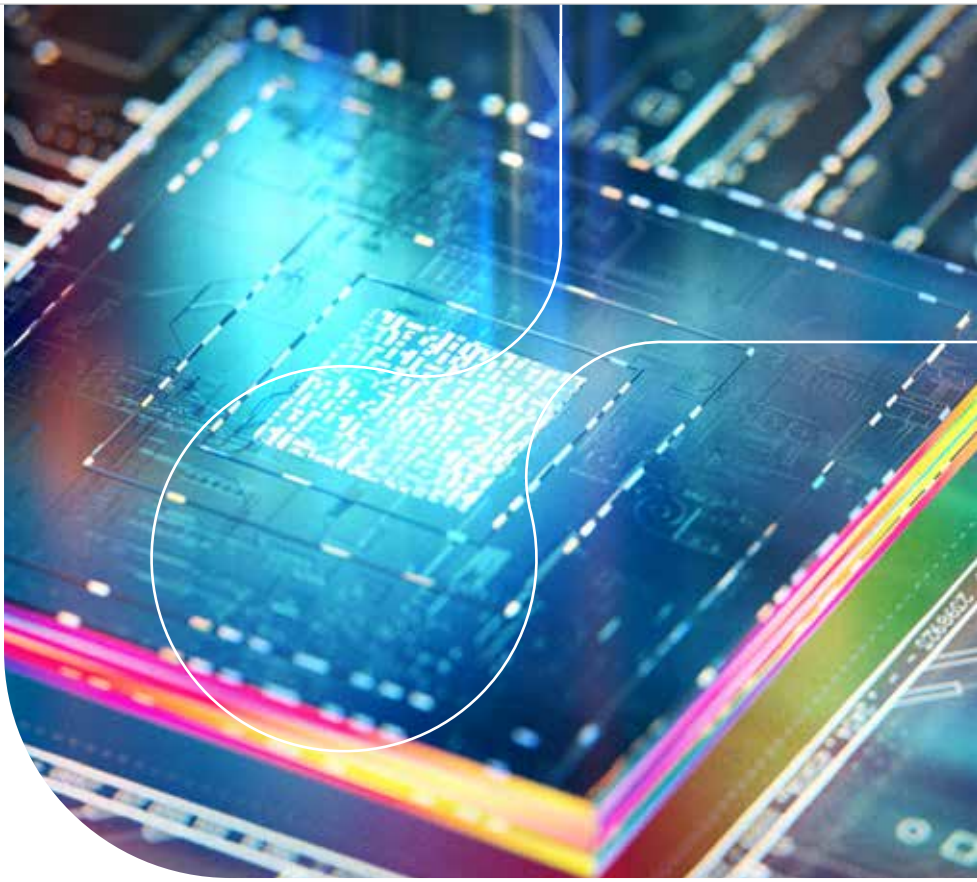
To balance technological ambitions with environmental sustainability, the EU is emphasizing greener manufacturing practices, integrating provisions for energy efficiency and resource conservation within the Chips Act. Additionally, chip recycling initiatives[26] - such as those led by IC Recovery[27] - could play a role in reducing waste and lowering costs by reclaiming chips for reuse. Aligning the Chips Act with the Circular Electronics Initiative could help the EU develop a more circular and sustainable semiconductor economy, while the Green Industrial Plan[28] may provide further support for achieving climate-friendly supply chain resilience.

However, the broader challenge remains: how to remain competitive with the U.S. and China while adhering to stricter environmental policies? As AI chip demand skyrockets, the EU must find a way to secure its rare earth supply, manage emissions, and maintain competitiveness, without jeopardizing its industrial future.

The necessity of a strategy

Despite its shortcomings, the EU Chips Act has been instrumental in bringing semiconductors to the forefront of European policy discussions. Prior to the Act, semiconductor supply chains and Europe's role in them were largely overlooked. The global chip shortages of 2020-21 exposed Europe's vulnerabilities, prompting policymakers to recognize the critical role of semiconductor technology in digital transformation, energy transition, and future industries. The Chips Act introduced initiatives such as strategic sector mapping, chip design support for SMEs, funding mechanisms, and competence centers across member states. However, while these measures address key challenges, they lack a clearly defined vision for Europe's long-term role in the semiconductor industry.

A fundamental flaw of the EU's strategy is the absence of well-defined success metrics. The Chips Act sets a 20% global production capacity target, but what will truly define its success? Will it be the emergence of



European semiconductor unicorns, expanded front-end manufacturing capacity, a surge in R&D talent, or an increase in market share for European suppliers? Without a precise policy objective, the risk remains that resources will be spread too thin, diluting the impact of investments. To ensure a lasting commitment from policymakers, Europe must clearly justify the strategic importance of its semiconductor industry and its indispensable role in global supply chains.

A comparison with U.S. and Japanese semiconductor policies highlights Europe's need for a more geopolitically anchored approach. The U.S. CHIPS and Science Act explicitly ties semiconductor investments to national security concerns, seeking to widen the technological gap with China. Strict provisions prevent companies receiving U.S. subsidies from expanding production in China or acquiring Chinese semiconductor equipment[29] [30]. The U.S. has framed its semiconductor strategy as a matter of economic and technological leadership, ensuring that every investment aligns with its broader industrial and defense interests.

Japan takes a different but equally strategic approach, focusing on "strategic indispensability", ensuring that Japanese firms remain critical players in the global semiconductor supply chain. For example, the state-backed acquisition of JSR, a leading supplier of photoresists, demonstrates Japan's commitment to securing long-term influence over key semiconductor materials. Rather than prioritizing domestic production capacity, Japan ensures that global chip manufacturers cannot function without Japanese technology. This strategy strengthens Japan's economic security by creating reverse dependencies, reducing the risk of being marginalized in global supply chains.

For the EU to establish a truly resilient and competitive semiconductor sector, it must adopt a more strategic perspective. Instead of fixating on production volume targets, policymakers should focus on securing Europe's role as an indispensable technology provider. This means strengthening reverse dependencies[31] by investing in areas where Europe already leads, such as semiconductor equipment, advanced materials, and specialized chip design. If the EU fails to define a clear and ambitious long-term strategy, its semiconductor efforts risk becoming a short-lived response rather than a sustained industrial transformation.

Conclusions

Semiconductors are the backbone of modern technology and, representing the epicenter of global technological and geopolitical competition, they are a strategic asset with direct implications for economic security and global influence. U.S. and China have recognized the geopolitical significance of semiconductors, embedding them into their long-term national security and economic strategies. Europe must do the same.

So far, many EU member states have provided substantial financial support to semiconductor projects but have lacked a cohesive, long-term strategic vision. Without a well-defined policy framework, Europe risks remaining reactive rather than proactive, allowing external forces – particularly U.S. export controls and trade policies[32] – to shape its semiconductor future. If EU is serious about securing its place in the global semiconductor landscape, it must build its own strategic vision and avoid outsourcing its policy direction to geopolitical competitors.

The Tenth Framework Program (FP10) presents a crucial opportunity to define Europe's long-term semiconductor strategy. However, this should not be an exercise in dismantling previous efforts but in renovating and reinforcing them. FP10 should build upon the EU Chips Act and existing research frameworks while addressing the new geopolitical, economic, and technological challenges emerging in the semiconductor space. To ensure a competitive and resilient semiconductor sector, FP10 should prioritize the following key objectives:

1. Enhancing strategic intelligence and policy coordination:
   - Member states must invest in understanding their domestic semiconductor ecosystems, mapping their strengths and weaknesses, and identifying where they hold geopolitical leverage.
   - FP10 should include dedicated funding for semiconductor policy research and economic security analysis, ensuring that Europe is not dependent on foreign factors in shaping its semiconductor future.
2. Reducing dependencies and strengthening reverse dependencies:
   - Instead of merely increasing its share of global chip production, Europe should focus on making global semiconductor supply chains dependent on European technology.
   - FP10 should expand investment in areas where Europe is already a leader, such as semiconductor manufacturing equipment, specialized chip design, and advanced materials.

3. Aligning economic security with industrial policy:
   - Europe cannot afford to have fragmented semiconductor policies across its member states. FP10 should promote better coordination between national governments and the European Commission to ensure a unified semiconductor strategy.
   - A stronger emphasis on geopolitical risk management is essential to avoid situations where foreign powers dictate the rules of engagement in European semiconductor trade.

If Europe fails to seize this moment, it risks being shaped by external pressures rather than shaping its own technological destiny. FP10 must be an evolution, not a rupture, a strategic renovation that strengthens Europe's position in the global semiconductor race while reinforcing its long-term economic security. The semiconductor industry is not just another sector; it is the foundation of Europe's future competitiveness, sovereignty, and resilience. FP10 must reflect this reality.

1 https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/european-chips-act_en
2 https://www.congress.gov/bill/117th-congress/house-bill/4346
3 https://lab.imedd.org/en/us-china-the-silent-war-on-microchips/
4 https://www.csis.org/analysis/updated-october-7-semiconductor-export-controls
5 https://www.federalregister.gov/documents/2020/08/20/2020-18213/addition-of-huawei-non-us-affiliates-to-the-entity-list-the-removal-of-temporary-general-license-and
6 https://www.cnbc.com/2024/05/29/china-will-focus-on-ai-in-its-new-chip-fund-amid-us-export-curbs-professor.html#:~:text=China%20has%20piled%20344%20billion,technology%20war%20with%20the%20U.S.
7 https://www.reuters.com/technology/us-eu-eye-chinese-legacy-chips-renewed-semiconductor-accord-2024-04-05/
8 https://interpret.csis.org/translations/major-issues-concerning-chinas-strategies-for-mid-to-long-term-economic-and-social-development/
9 https://digital-strategy.ec.europa.eu/en/policies/europes-digital-decade
10 Edwards Vacuum Innovation Hub. The Time is Now: Sustainable Semiconductor Manufacturing.
11 https://www.legislation.gov.uk/ukpga/2015/30/contents
12 https://www.bmas.de/EN/Europe-and-the-World/International/Supply-Chain-Act/supply-chain-act.html
13 https://ustr.gov/trade-agreements/free-trade-agreements/united-states-mexico-canada-agreement
14 https://www.csis.org/analysis/mapping-semiconductor-supply-chain-critical-role-indo-pacific-region
15 https://www.edge-ai-vision.com/the-alliance/
16 https://www.bain.com/insights/prepare-for-the-coming-ai-chip-shortage-tech-report-2024/
17 https://www.cio.inc/2025-year-ai-pcs-are-businesses-onboard-a-26528
18 https://bidenwhitehouse.archives.gov/briefing-room/statements-releases/2025/01/13/fact-sheet-ensuring-u-s-security-and-economic-strength-in-the-age-of-artificial-intelligence/
19 https://thenewstack.io/automating-context-in-structured-data-for-llms/
20 https://www.csis.org/analysis/what-chinas-ban-rare-earths-processing-technology-exports-means#:~:text=At%20present%20China%20produces%2060,given%20China%20a%20near%20monopoly.
21 https://cepr.org/voxeu/columns/revisiting-china-japan-rare-earths-dispute-2010#:~:text=In%202010%2C%20China%20halted%20exports,(New%20York%20Times%202023).
22 https://pie.net.pl/en/98-of-eu-demand-for-rare-earth-elements-is-met-by-china/
23 https://single-market-economy.ec.europa.eu/sectors/raw-materials/areas-specific-interest/critical-raw-materials/critical-raw-materials-act_en
24 https://www.euronews.com/green/2024/04/17/critical-raw-materials-how-the-eu-hopes-to-secure-a-key-element-of-the-energy-transition-f
25 https://www.cnbc.com/2024/06/11/norway-discovers-europes-largest-deposit-of-rare-earth-metals.html
26 https://www.chathamhouse.org/2022/01/solutions-resilient-semiconductor-supply-chains
27 https://resource-recycling.com/e-scrap/2023/02/01/new-firm-provides-chip-recovery-as-a-service/
29 https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/green-deal-industrial-plan_en
30 National Institute of Standards and Technology (NIST) (2023). CHIPS for America: Preventing the Improper Use of CHIPS Act Funding.
31 National Institute of Standards and Technology (NIST) (2023). CHIPS for America: CHIPS Incentives Program - Approach to National Security
32 Dr. Tim Rühlig (2024). DGAP Report: Reverse Dependency: Making Europe's Digital Technological Strengths Indispensable to China. https://dgap.org/en/research/publications/reverse-dependency-making-europes-digital-technological-strengths
33 Bloomberg (2024). US Floats Tougher Trade Rules to Rein In China Chip Industry.

Why a strategic EU based content should be preserved in the electronics value chain?

An illustration from the automotive sector: ensuring the EU automotive supply chain resilience - immediate remedy to level the playing field

Jean-Luc di Paola Galloni

The European automotive industry is undergoing a profound transformation, facing major challenges related to competitiveness, technological transitions, international relations due to the end of an era of peaceful global sourcing in a free trade world.
It is essential to acknowledge that the strategy adopted so far – primarily based on regulatory objectives without fully considering the intense global competition in new technologies is not sufficient to ensure a sustainable development of related industrial value chains in Europe. European companies are not competing only with Chinese or US ones but also with other states. And at the same time let's not forget that we need to preserve the positions of European players in China and in the US in those American and Asian markets.

The massive transformation the industry is facing has pushed a shift towards an integration based model, in which the automotive industry is now bound to partner with other sectors, without having the full ownership on all technology bricks (as it used to be in the past):

- The battery technology has emerged out of the automotive industry. And to become a real expert it takes at least a good decade to become a respected player in the field. That is how the Chinese have taken a clear advance and where the failure of Northvolt is so symbolic as a relatively late comer.
- The roadmap to automated & connected mobility is based on computing, telecom, software development, specific patent rules, etc. which have mostly been developed outside of the sector.
- Artificial Intelligence is an essential brick in the road of mastering the transformation for more efficiency, higher data integration and advanced functions of the cars (safety, automated car and beyond).

Despite the change in paradigm, the automotive industry still remains a unique catalyst of technological transformation and a volume / value based industry that has the potential to create growth opportunities from major upstream industries (semiconductor industry, telecom industry, software and data industry).

Does sovereignty matters and why?
Sovereignty is key to avoid high risk of traffic disruption and spy people in the cars or getting the future autonomous cars being controlled by a third party. These risks have been well identified by USA by issuing US ban ANPRM to protect US against remote control (Q4,2024). EU must have its own protection to avoid destruction of EU automotive ecosystems.

We see a major need to address the following technological transformations: SDV, AI, Data etc…

SDV (Software Defined Vehicles)

- Considering the collaborative approach within the European pre-competitive project on SDV, how this angle can be so relevant for Tier1s within their ecosystem with research providers and their OEM customers?

  No single company can develop and maintain a SDV stack alone. This has been the lesson learned from failures in this type of attempt.(including by large conglomerates). Many non competitive SW consume a lot of resources and a group of automotive Tier1s are supporting open source middleware EU initiative and SW market place as well as promoting open HW/SW API to reduce fragmentation and non-differentiating cost. It is a new

way of working with a collaborative mindset. Tier1s have strong automotive SW expertise to make this vision happen.

- The main challenge is the capability of EU ecosystems to transform rapidly into more collaborative ecosystems with win-win business models. Resources shall be dedicated to differentiated functions to bring a time to market and an automotive grade SW middleware (safe, secure, expected quality).
- Call for action: EU partners agree on the principle to have an open EU middleware. This working model is new and will not solve the time to market. If we continue at this pace, we can expect a production ready middleware not before 2035! There is a need of a joint development for a common EU middleware stack shaped in a product to accelerate development and be ready much earlier.

AI and its relevance for automotive Tier1s: learning scalability difficulties in foundations model is crucial.

- Acquiring and curating data is one of the challenges most AI system providers and developers face as very often there are difficulties in annotating large-scale qualitative data.
- AI models may lack stability, robustness, reliability and interpretability.
- The lack of methodological tools for the validation and certification of ML-based systems: more and more certifying organizations will take place in the market, with the ultimate goal of certifying and increasing trustworthiness of AI models.
- We will face more and more learning and scalability difficulties in foundation models.

Data is a key enabler for AI and digital services

- Why is it so relevant for Tier1s? Data is key for AI-based solutions and for the development of digital services. In China, data for AI are put in common databases enabling Chinese companies to go fast and develop cost-conscious attractive solutions. In Europe, each company keeps its data, limiting the potential of AI-based solutions. Regarding data for digital services, fair access to data to third parties and unpredictable pricing policy done by OEMs make the business models unclear.
- Call for action: On AI-based functions, Tier1s call for the creation of Europe data bases to compete with Chinese strategy. On data for digital services, we call for fair policy to access data and stable pricing policy to build sustainable business models. We think that putting all the stakeholders around the table to put in place the condition of success for the key stakeholders is the good way to go. Excessive regulation like in many other cases, is not the right answer.

Hardware and software need to be thought strategically together: this represents an important link between electronics value chain and automotive Tier1s.

- Why is this relevant for Tier1s? Tier1s are buying HW SoC to traditional silicon players. With the evolution of Chiplet and System-in-Package technologies, the Automotive industry has the opportunity to re-take control of its roadmap and its strategy. And it absolutely should since the competition is coming from above and beyond.

- The role of a Tier1 is changing as the manufacturing value chain changes. Yesterday's suppliers may become future competitors, and end manufacturer customers are also looking in this direction.
- What *challenges needed to be tackled* in the field of key technologies?
  Europe is still weak in High Processing Unit SoC that requires the latest silicon process. Automotive is among the few verticals which can generate the volume to support Europe's strategy in implementing the latest TSMC node in Europe.
  On the other hand, Europe is well positioned in power electronics, as well as in sensors and other detectors.

With this analysis, what elements could be a call for action, as the Strategic Dialogue on automotive (Feb, March 2025) has started and a plan with deliverables is more than necessary.

There is a need to reinforce the condition of sovereignty in Europe for overall connectivity through cloud, telecom and ensure their cybersecurity efficiency. In case of armed conflict, or even strong trade war tensions, the risk of disruption of global supply chains becomes pretty high. Europe will be massively impacted if urgent actions are not taken. It is urgent to put in place open ecosystems to enable EU companies to learn how to benefit from Chiplet and System-In-Package and a

go-to-market strategy to move from prototype to in-volume products in Europe.

It is also overall important that automotive sector becomes a pillar under EU digitalization, setting clear rules and promoting a business friendly environment in reducing the cost of doing business: there is a need to regulate access to data to create a thriving market for digital services, create a Single Market for Autonomous Vehicles and provide a certain investment climate bringing back the Standard Esssential Patents: a clear majority of member states and an overwhelming group of sectors do not consider withdrawing from the proposal supported by the previous Commission and the EU Parliament as a fine move labeled as part of the administrative project *Omnibus*.

With those considerations being made, as far as the near future of the Chips Joint Undertaking is concerned, this has some impact that are quite evident.

Because the role of Tier1s are changing as the technologies change, Tier1 are compelled to choose how to position themselves depending on the applications.

Hence it is important that the SDV initiative and RISC V funding schemes are secured in a sequential and efficient way in the years to come by all members of the tripartite in charge: the member States, the European Commission and the beneficiary parties (the community of the PMB: industry, semiconductors, tier1s, research providers and industry oriented RTOs, and all innovative SMEs/ start ups). This sector is so strategic as field application of the electronic value chain, that we cannot afford to reshuffle the cards every now and when, because of a lack of synergy and strategic solidarity. It is high time that each party involved and each country think beyond its own vision (we need to go beyond limited planning to the perimeter of a single country or a single beneficiary of the value chain). The 3 Associations (Aeneas, EPOSS and INSIDE) have made significant progress in their forward thinking, in their unity of vision for the benefit of the entire ecosystem of their members. Let's never forget that the future of one level of player in the value chain is linked to a strategic next one whether upstream or downstream (the Lab to Fab concept promoted as such is a clear illustration, beyond automotive).

Without reinforced protection, crucial manufacturing sites would turn into screwdriver factories with limited value creation and employment.

Automotive suppliers welcome statements by Commissioners Séjourné and Ribera to strengthen conditions for Europe's automotive industry. In particular the EU needs to adopt measures to enable a significant share of key technologies and components, researched, invented and manufactured within the European Union. Concretely we need to assess wisely which measure will most effectively protect EU content and value-add, whether through demand measures, production-related tax incentives, revised rules or the use of trade that safeguard EU industry against a distorted playing field.

Event

Foundations for Europe's future

Insights from the 2025 Brokerage Event

Josh Grindrod

On 18 and 19 February 2025, more than 500 attendees convened at Hotel La Plaza in Brussels, Belgium, for yet another highly anticipated ECS Brokerage Event. With hundreds more on the waiting list, the significance of electronic components and systems remains unequivocally clear across Europe. This annual event, organised by AENEAS, EPoSS and INSIDE Industry Association, serves as a vital platform for their communities to build consortia, develop proposals and shape roadmaps through face-to-face meetings, pitch presentations and parallel sessions.

In his opening address, Arian Zwegers, Head of the European Commission's Microelectronics and Photonics Unit, succinctly captured the essence of the gathering: "It's a sign of another great success for the industry associations that there are so many people interested in what the Chips Joint Undertaking is doing."

A Busy Year

As an open event, the Brokerage plays a pivotal role in transforming interest into active engagement, thereby enhancing the scope and visibility of Europe's electronic components and systems (ECS) landscape through new collaborations and partnerships. The impact is evident: in 2023, a remarkable 41% of participants in ECS R&I calls were newcomers, with small and medium-sized enterprises (SMEs) securing 23% of the total funding allocation. This level of engagement allows a diverse range of organisations to contribute to projects that, on average, yield 40 patents and 120 new innovations on the market each year.

The Brokerage also serves as a key moment to update the community on the progress made over the past year – progress that reflects significant achievements across the three pillars of the Chips Act. Under the *Chips for Europe* initiative, which focuses on infrastructure and capacity building, pilot line calls were swiftly established, resulting in joint agreements for five pilot lines. Moreover, the first call for quantum chips was launched in 2024. Competence centres have now been established in 25 countries, and the first project to advance the design platform's later stages has been selected. Regarding semiconductor supply security, the Commission has already approved five state aid applications for projects aimed at establishing manufacturing facilities within Europe, with more announcements expected soon.

Overview of upcoming calls and participation guidelines for 2025

Looking ahead, five calls are taking place this year. The *global calls according to the SRIA 2025* are split between research and innovation actions (RIAs), with a centre of gravity at TRLs 3-4, and innovation actions (IAs), which contribute to short or mid-term economic value creation in Europe at TRLs 5-8. The maximum JU budgets for these calls are €40 and €70 million respectively.

Among the IA calls are two focus topics: (1) *RISC-V automotive hardware platform*, aiming to develop in-vehicle demonstrators capable of PetaOPS computing taped-out on leading-edge processes, and (2) *AI-assisted methods and tools for software-defined vehicle (SDV) engineering automation*, including contributions to an open, extensible AI-assisted integrated platform. Together with an IA on *heterogeneous integration for high-performance automotive computing*, these calls total €120 million in budget. Finally, a coordination and support action (CSA) call with a budget of €1 million will boost R&I cooperation between the EU and Japan on semiconductors.

18 & 19 February
Brussels

As this latter call indicates, the Chips JU's focus on Europe does not equate to isolationism. However, there will often be legitimate security, defence or strategic autonomy concerns when dealing with cutting-edge intellectual property. As a result, the Brokerage Event introduced the concept of restricted calls, where, in addition to the standard eligibility conditions, participation may be further limited to legal entities established only in Member States or in specified associated or third countries. This will require the submission of an ownership control declaration alongside a proposal. Entities established in eligible countries but directly or indirectly controlled by a non-eligible country or entity must demonstrate that their participation will not negatively impact the Union's strategic assets, interests, autonomy, or security. Apart from the cooperation with Japan, all 2025 calls will be subject to these restrictions.

Showcasing innovation: ai and emerging projects

One area in which such strategic concerns are being felt is artificial intelligence, with the United States introducing AI diffusion rules in January that subject some 150 'Tier 2' countries to limitations on American-supplied AI chips. The division of EU members into separate tiers runs counter to the single market principle and will cause Tier 2 countries to struggle to develop dynamic ecosystems for AI development. The cap of 50,000 H100-equivalent GPUs, for instance, is far below the 100,000 required for the AI gigafactory concept to train large-scale models. The European Commission is thus developing a long-term strategy for AI chip hardware and software to reduce dependence on US supply.

This was a pertinent example to highlight at the Brokerage as around 40% of projects currently involve AI in some capacity. Nowhere was this more visible than in the project pitches, which saw 23 individuals present their ideas and possible consortia to an audience of hundreds. Across these pitches, AI was proposed in solutions ranging from drone-based nature monitoring, radio frequency fingerprinting and energy efficiency in buildings to privacy-preserving predictive healthcare and digital twins for semiconductor manufacturing. These were far from the only topics covered, which also included potential projects on hardware and software at all corners of the value chain.

On top of this, SMEs based in 11 countries presented themselves to prospective partners in a separate series of pitches. This mingling of networks – large, small, old and new – is how progress is made in Europe. With its openness to potential members, the Brokerage replenishes the community so that industry needs are reflected in investment, such as through the associations' votes in the Chips JU Governing Board. The associations also play a key role in shaping the Electronic Components and Systems Strategic Research and Innovation Agenda (ECS-SRIA), which guides all funded activities. As every project must align with this agenda, involvement in the Brokerage offers a direct channel to help set long-term research and innovation priorities.

From chips to healthcare services

For INSIDE Industry Association, one of the priorities in focus at this Brokerage was healthcare, which Secretary General Paolo Azzoni took the time to highlight in his part of the three associations' presentation.

ECS BROKERAGE EVENT 2025

"This is a critical sector for Europe because of the enormous costs of the healthcare system in all countries due to aging populations. The idea is to start an initiative that will focus on the concept of chips to services, so a holistic view of healthcare. This will be more inclusive and more personalised for the patient: a 360-degree-orientation towards a significant reduction of the costs of healthcare, but also an improvement of the quality of service at the same time."

On the second day of the Brokerage Event, this initiative was further explored in a dedicated face-to-face session, organised by the industry association. Participants were invited to collaboratively define a Focus Topic call for an ECS proposal based on digital health. In developing this initiative, the associations aim to drive the digitalisation of the healthcare pathway, beginning with the real-world needs of healthcare practitioners and ensuring that the ECS community contributes the appropriate semiconductor-based technologies to meet those needs.

The aim is to advance value-based healthcare, following the P4 model – predictive, participatory, personalised and preventative care – which seeks to reduce illness, accelerate recovery and optimise resource utilisation. This vision spans the entire value chain, from semiconductors to healthcare services, with the ultimate goal of scaling up digital health solutions.

Our digital future

Once again, the three associations, the Chips Joint Undertaking, and the ECS community can all look back on a fruitful Brokerage Event that has surely laid new foundations for Europe's digital future. In the meantime, AENEAS, EPoSS and INSIDE will continue to promote synergies across their networks, providing various springboards to make next year's Brokerage an even greater success.

"These synergies are extremely important because in the Chips Act and the Chips JU, we have projects and pilot lines that are producing results at different TRLs," noted Paolo Azzoni in his speech.

"We need to find a fit between these initiatives that connects them and maximises their impact. Certainly, these synergies are creating the path to the future, but we will continue to monitor the trends in the technology domains, in the markets, and, as we have seen recently, in how geopolitics is shaping the world. These are all elements affecting our future and the next framework programme. So, we will continue to organise workshops and events where we consult and collect input from the community. We will continue to build this ecosystem to ensure that we have experts providing state-of-the-art of technology in our domain – because everything comes from you , our Members."

Research Project Highlight

The digital route to engineering efficiency

Jerker Delsing

"We have an opportunity to actually engage and invest jointly in a better future for Europe."

A digital approach substantially reduces engineering costs and time for industrial automation. The Arrowhead Tools project has demonstrated this. The Arrowhead Tools project stands as a powerful testament to this shift. Its results are nothing short of groundbreaking, with savings on engineering costs and time spanning from 30% to a staggering 95%. On average, across all use cases, savings exceed 80%. The most susbtantial gains have been seen in process automation, tool interoperability, and data integration – proving that the future of automation is digital, efficient, and game-changing.

The research employed Eclipse Arrowhead, an open-source architecture for integrating microservices, as the primary framework for implementation. The study involved 28 industrial use cases spanning multiple domains, including automotive, semiconductor manufacturing, smart cities, healthcare and logistics. These cases were used to evaluate the potential efficiency gains from adopting a digital approach to industrial automation, establishing a baseline for engineering cost and time based on pre-existing processes and technologies to ascertain the efficiency gains.

Engineering tool chain interoperability

It became clear that digital adoption in industrial automation allows for greater flexibility, modularity and scalability. One of the key innovations in the Eclipse Arrowhead framework is the concept of Local Clouds, which allows different industrial stakeholders to maintain secure, real-time operations while integrating heterogeneous systems. This is a game-changer, especially in multi-owner environments where both security and real-time data processing are non-negotiable. Local Clouds make it possible to navigate complex ecosystems without compromising on speed or safety, redefining the standards for modern industrial automation.

A major goal of the research was to improve engineering tool chain interoperability. Over 150 engineering tools were analysed, with around 40 tools being integrated using Eclipse Arrowhead microservices, allowing seamless data exchange between different tools and engineers, eliminating manual data conversion and improving workflow automation. This improves collaboration between engineers, enabling teams to both reduce errors and eliminate redundant tasks and speed up development cycles. By unlocking full data interoperability and standardization, engineering costs take a sharp downward turn, driving a surge in automation and productivity. The result? A more competitive landscape across Europe. It's a domino effect: streamlined processes foster innovation, which in turn boosts efficiency, propelling industries forward. The message is clear – embracing these advances isn't just about cutting costs, it's about positioning Europe at the forefront of industrial competitiveness.

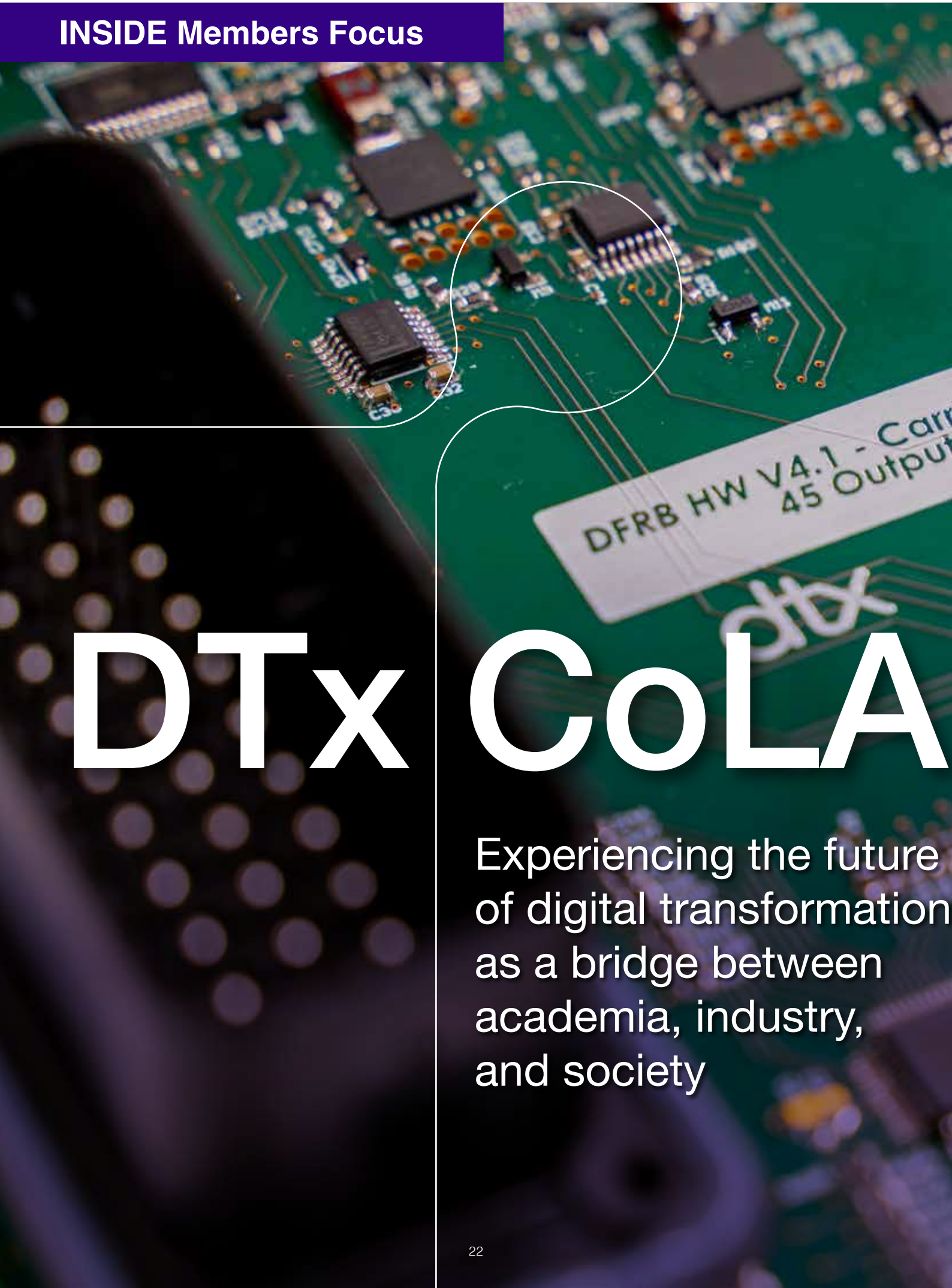
Not only is the digital route a viable and effective solution for enhancing industrial automation efficiency, it also paves the way for broader adoption in future smart manufacturing. The time has come to kick on and adopt this technology so that Europe gets the competitive edge it deserves and needs. Investment now ultimately means more output for less input. Readers are invited to explore the Arrowhead Tools website and see the short 90-second presentation of the results of Arrowhead Tools.

> "We have the technology, we have knowledge, but we actually need to start to exploit it and push it."

Key takeaways at a glance

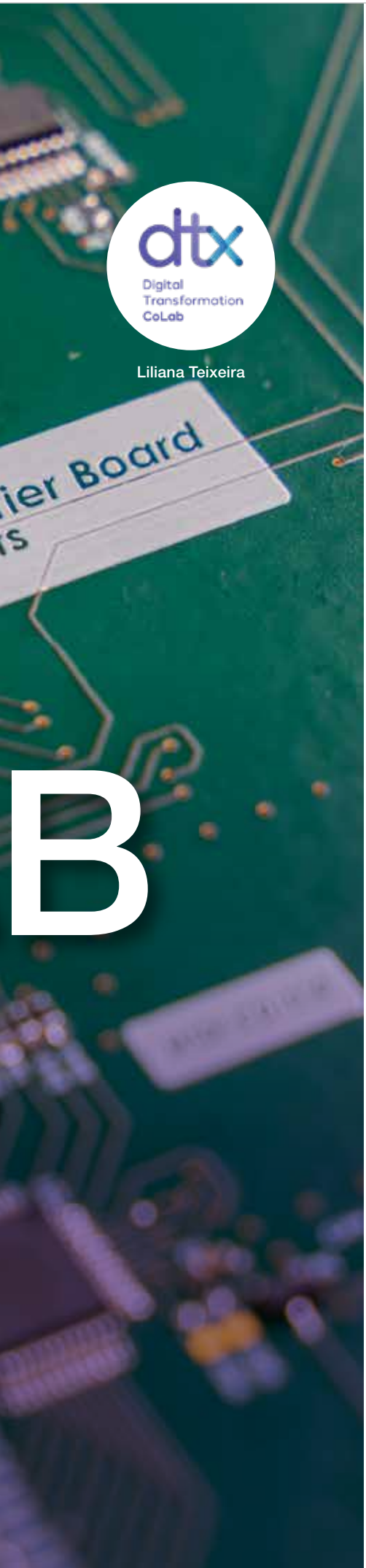
- Scalable and flexible engineering – The modular approach allows easy integration with existing systems while maintaining adaptability.
- Improved tool chain interoperability – The integration of digital microservices facilitates seamless data exchange, reducing manual efforts and improving collaboration.
- Significant efficiency gains – The average cost and time savings of 80% or more highlight the potential of digital automation at scale.
- Need for future improvements – Challenges related to full tool interoperability and real-time secure data exchange remain, requiring further development in standardisation and ontology-based data models.

INSIDE Members Focus



DTx CoLA

Experiencing the future of digital transformation as a bridge between academia, industry, and society



Established in 2018 and situated in Guimarães (Portugal) within the University of Minho research ecosystem, DTx - Digital Transformation CoLAB stands out as a driving force to unite academic research, technology, and industry expertise in pursuit of impactful transformation that creates economic and social value. Collaborative Laboratories (CoLABs) are entities of the Portuguese innovation ecosystem that push forward innovation by bridging research and industry, leveraging skilled employment in the development of value-added products and services that have a positive impact in society. As a CoLAB, DTx dedicates itself to the development of digital solutions and cyber-physical systems across a broad spectrum of industries, serving as a bridge between academia, industry, and society, working to create cutting-edge technologies that are as practical as they are pioneering.

DTx brings together a diverse and multidisciplinary team that works in a uniquely collaborative environment with an emphasis on experimentation, knowledge-sharing, and breakthrough solutions. Currently, DTx boasts a team of over 120 highly skilled and qualified professionals working across six technical areas:

- Data Science and Machine Learning
- Data and Application Engineering
- Computer Graphics and Vision
- Embedded and Edge Computing
- Functional and Sensitive Materials
- Ergonomics and Engineering Psychology

DTx carries out its applied research and innovation by designing and executing projects with its shareholders and following a structured and systematic approach based on best-practice project management methodologies. Below is an overview of these shareholders and their core areas of expertise:

Universities:

- **Universidade Católica Portuguesa** – A leading institution offering a broad range of academic programs and research initiatives.
- **Universidade de Évora** – Known for its multidisciplinary research and education excellence.
- **Universidade do Minho** – A reference in scientific research and innovation across multiple fields.

Companies:

- **Accenture** – A global leader in strategy, consulting, digital services, technology, and operations.
- **Bosch Car Multimedia Portugal, S.A.** – Innovating in automotive multimedia technologies.
- **Cachapuz – Weighing & Logistics Systems, Lda** – Providers of advanced weighing and logistics solutions.
- **Cegid** – Delivering cloud-based business management solutions in finance, HR, and retail.
- **Celoplás – Plásticos para a Indústria, S.A.** – Manufacturing high-quality plastic components for industrial applications.
- **dst group** – A major player in construction, engineering, and renewable energy.
- **IKEA Industry Portugal S.A.** – Part of IKEA's supply chain, focused on furniture and home accessories manufacturing.
- **INCM – Casa da Moeda** – Specializing in security printing, identity solutions, and digital transformation.
- **Mobileum** – Specializing in analytics solutions for telecommunications, security, and risk management.
- **NOS Inovação, S.A.** – A key provider of telecommunications and entertainment services.

- **Simoldes** – Leaders in mold design and production for the automotive sector.
- **TMG Automotive** – Innovating in automotive interior solutions, including coated fabrics and technical textiles.
- **SIBS** – Offering cutting-edge financial services and payment processing solutions.

Research Institutions & Innovation Centers:

- **International Iberian Nanotechnology Laboratory (INL)** – A pioneering international research center focused on nanotechnology and its applications.
- **CEiiA –** *Centre of Engineering and Product Development* – Specializing in innovative engineering solutions and product development.
- **CCG/ZGDV –** *Centre for Computer Graphics* – Driving research and development in computer graphics and information technology.
- **PIEP –** *Innovation in Polymer Engineering* – Advancing research and innovation in polymer engineering.

Each of these **shareholders** plays a fundamental role in fostering innovation and shaping the future of digital transformation. As an incubator for ideas and a proving ground for new digital strategies, DTx is also committed to nurturing talent and fostering the next generation of digital pioneers. Through collaboration with universities, DTx welcomes multiple MSc and PhD students, providing them with support and challenges to enrich their learning and research journey. The CoLAB also invests in developing the skills of its highly qualified workforce, ensuring that industry and society are equipped to face tomorrow's challenges.

DTx CoLAB in the context of Collaborative Laboratories

Collaborative Laboratories are true generators of innovation – creating new products, services and processes and taking research further in Portugal – and are supported by Portuguese governing agencies, such as the National Innovation Agency (ANI) and the Foundation for Science and Technology (FCT). They are geared towards the facilitation of companies' access to the intermediate space of the innovation system, thereby catalysing the creation of value-added products and services and boosting highly qualified employment.

DTx CoLAB is the largest Collaborative Laboratory in Portugal and lays the path of innovation alongside its shareholders; this

generates solid and sustainable growth while delivering value to society. To this end, DTx is a leading force behind its shareholder network and the entire CoLAB universe, having founded and chaired the Collaborative Laboratories Forum. This is a structure for dialogue and sharing between all CoLABs that promotes the maturation of the network and its representativeness to the government and innovation system authorities. Through this union of visions, strengths and complementary competences, it is possible to create and present innovative products and services to the market.

Success stories and projects underway

Driving innovation through applied research and industrial collaboration: the case of DTx

DTx's mission is to bridge the gap between cutting-edge research and industrial application. As a research and innovation institution, we actively engage in a variety of R&D&I projects, encompassing diverse objectives and funding mechanisms. Our activities focus on fostering technological and scientific advancement while ensuring the efficient transfer of knowledge and technology to our industrial shareholders. Through this approach, we aim to develop innovative products and processes that are not only highly impactful but also market ready.

DTx's strategy is rooted in the development of four distinct categories of R&D&I projects:

- **Prospective:** These projects address broad, multidisciplinary challenges, serving as incubators for innovative ideas and exploratory research. They aim to push the boundaries of current knowledge, identifying emerging trends and fostering long-term innovation strategies.
- **Specific:** These are targeted initiatives driven by the specific needs of industrial shareholders. Through applied research, DTx develops tailored solutions that directly address real-world challenges. This emphasises the translation of scientific knowledge into practical applications, ensuring that the findings are relevant and actionable for industry stakeholders.
- **Competitive:** Funded by national and European sources, including the Recovery and Resilience Plan (PRR) financed by the European Union through the NextGenerationEU fund, these projects enhance DTx's capacity to address strategic societal and industrial priorities. Competitive projects also strengthen their position in global innovation networks that amplify impact.
- **Direct:** These involve direct R&D&I services and consultations provided to shareholders or external clients. By integrating research expertise with industrial needs, these projects deliver bespoke solutions, facilitating immediate technological advancements and sustained partnerships.

The diversity and complementarity of these project categories empower DTx to deliver disruptive solutions that enhance

the competitiveness of their industrial collaborators. Whether through ground-breaking product innovations or transformative processes, their work creates substantial value for partners and, in many cases, accelerates market entry.

At the heart of DTx's success lies a deep commitment to applied research and industrial collaboration. Applied research focuses on solving practical problems by leveraging existing knowledge and developing it into usable applications. For DTx, this means aligning research objectives with the needs of industry, enabling the creation of technologies and methodologies that address real-world challenges.

Since its establishment, DTx has successfully completed over 35 collaborative innovation projects with shareholders, tackling complex problems through interdisciplinary approaches. Their expertise spans areas such as artificial intelligence, robotics, big data, computer graphics, and advanced automation. These projects exemplify an ability to deliver impactful solutions across diverse sectors.

Currently, DTx is an integral part of five Mobilising Agendas for Business Innovation under the PRR fund, with a funding portfolio of €16 million. An overview of the specified projects includes:

- **Be.Neutral**: Focuses on making Portugal a global leader in cyber-physical, carbon-neutral mobility products, developing and operating new mobility solutions.
- **r2uTechnologies:** Aims to enhance the modular construction sector by integrating solutions throughout the building lifecycle, from design to maintenance.
- **New Generation Storage:** Targets the creation of innovative products and services for the global battery and energy markets using advanced technologies.
- **INOV.AM:** Focuses on advancing additive manufacturing to boost Portugal's competitiveness in international markets.
- **Aero.Next:** Strengthens Portugal's position in the aerospace sector through innovation and the development of high-value products.

This involvement underscores DTx's role as a catalyst for large-scale innovation that drives economic recovery and resilience. Furthermore, DTx is a founding member of five Digital Innovation Hubs (DIHs), four of which hold the prestigious European Seal of Excellence and one of which receives direct EU funding (EDIH). These hubs position DTx as a leader in digital transformation across Europe.

Collaboration and networking

At its core, collaboration is the synergy that arises when individuals and institutions pool their expertise, perspectives and skills. Its importance cannot be overstated, particularly in the domain of research and innovation, as technological and scientific institutions are witnessing a paradigm shift: the challenges are increasingly complex, the scope is now global, and the domains are interdisciplinary. To achieve meaningful solutions, researchers and institutions need to put effort into collective intelligence and shared resources via partnerships that transcend departments, institutions and even national borders.
As a result, collaboration with national and international partners is a cornerstone of DTx's mission to promote innovation and excellence in research. These partnerships facilitate resource sharing in joint research projects through access to cutting-edge technologies, diverse expertise, and broader funding opportunities. These collaborations support knowledge and skill exchange programmes between DTx and its partners, enabling a multidisciplinary approach that enhances problem-solving and accelerates the development of impactful solutions. The current international network includes the following partners: Connected, Cooperative & Automated Mobility (CCAM), the European Factories of Future Research Association (EFFRA), the European Association of Smart Systems Integration (EPoSS), the Innovative Advanced Materials Initiative Association (IAM-I), and, of course, INSIDE Industry Association. By leveraging these collaborations, DTx not only strengthens its own institutional capabilities but also contributes to a wider goal of the scientific community: addressing complex challenges collectively.

Future vision and plans

With a portfolio that includes transformative projects already in motion, DTx is shaping a smarter, more connected, and more sustainable future. As part of its strategy for the coming years, it aims to expand its network of associates and to engage in European-scale projects, thus maximising its impact on society. In addition, DTx is committed to innovation and sustainable growth through strategic investments in advanced infrastructure. For example, as part of a long-term vision, they plan to develop state-of-the-art facilities to enhance operational capacity and efficiency in cutting-edge research and development.

As digital transformation reshapes the landscape, DTx is at the forefront. This role is encapsulated in our motto: *Experiencing the Future.*

Navigating computing continuum

Demand market insights, dynamics and opportunities

John Gole

Golboo Pourabdollahian

The computing continuum, encompassing Cloud, Edge, and IoT (Internet of Things), represents a seamless integration of computing resources across various layers, from centralized cloud data centers to decentralized edge devices and IoT sensors. This structure allows data to be processed closer to the source, enabling real-time analytics, reducing latency, and enhancing data security.

The computing continuum, encompassing Cloud, Edge, and IoT (Internet of Things), represents a seamless integration of computing resources across various layers, from centralized cloud data centers to decentralized edge devices and IoT sensors. This structure allows data to be processed closer to the source, enabling real-time analytics, reducing latency, and enhancing data security.

CEI solutions are comprised of many technology components. They require devices that include some amount of computing capabilities, as well as sensors that collect data from the physical world. Depending on requirements and resource availability, the device may analyse the data before sending it over a network connection to another device (a gateway or edge node). In some cases, the data may go straight to the cloud for analysis and storage, while in other cases, edge computing resources may be located closer to the device, potentially running applications, using analytical models, automating decisions and controlling actuators on remote devices.[1]

In the last few years, the market has started the adoption of cloud and IoT technologies and lately an adoption trend towards edge computing can be observed. Indeed, the European market for technologies and solutions in the cloud-edge-IoT computing continuum is emerging strongly. IDC estimates that European spending on CEI in 2024 will amount to hundreds of billions of euros, and the market will continue to grow at a double-digit growth rate to 2028. The overall spending forecast in CEI market in 2024 is around 385 bullion Euro with IoT holding the biggest part of spending of 209 billion Euro. The forecasts show a promising increase of edge computing spending with a compound annual growth rate of 14.1% to 2028 expecting the overall spending in edge to reach to 66.6 billion Euro[2].

While many CEI use cases operate effectively with just IoT devices and centralized cloud computing to do the processing and analysis; CEI has the potential to enable much more advanced use cases, such as automation of machinery, where there is a need to incorporate edge computing close to the sensors and machinery. When vehicles, machinery or other industrial systems will be automated, the data must be analysed in real time to activate control systems. Moreover, far greater volumes of data may be needed, such as several cameras that require video analytics, which may not be easily transported over the network or might incur exorbitant costs to do so. Thus, such solutions tend to utilize significant computing resources either on the device (such as on-board a vehicle) or elsewhere nearby at the edge of the network.

The results of a survey by Unlock-CEI project (part of EUCloudEdgeIoT initiative[3]) show that the current level of adoption of edge computing across sectors is lower than it is for cloud and IoT, with only 6% of respondents using it extensively. A larger share (23%) is, however, using it to a limited extent, and 30% of respondents said they plan to begin using it within the next 24 months. Thus, although edge is a newer category with lower adoption thus far, the market is quite interested in the technology and persuaded that it will need to deploy the technology in the future. These results suggest we can expect rapid adoption of edge computing over the next few years, though from past experience with such surveys, the share of companies claiming they plan to move ahead with investments in the future tends to overstate actual results.

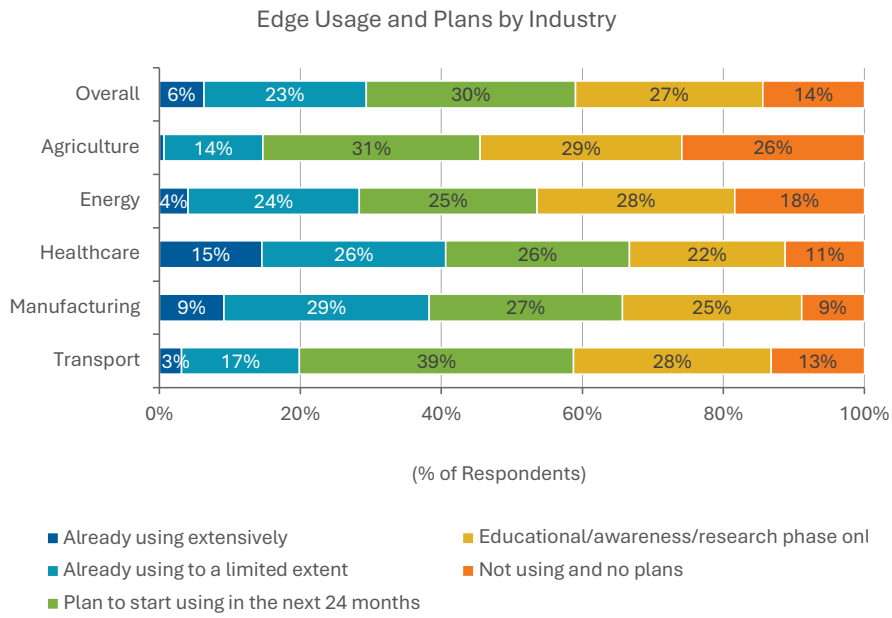
Intriguingly, there are significant differences in edge adoption among the different industries. The healthcare sector leads in reported adoption, followed by manufacturing. Agriculture lags the other industries. Yet a large share of all five industries anticipates a need to deploy edge in the future.

Companies are embracing the CEI continuum for a variety of reasons. Overall, the top benefit of edge cited by respondents was that it improves security and compliance, because data is not travelling across the network. Organizations can keep tighter control over their data by keeping it close. Reducing volumes of data sent across the network was the second benefit mentioned. Reducing data sent over the network has the benefits of reducing security risk (as noted in the top response), but it also can reduce network costs and storage costs, as well as potentially freeing the organization (as noted in the third-most common response) from concerns about network availability and reliability.

The top perceived benefits of edge differ across industries. In agriculture, they are mostly network-related, such as overcoming unreliable connectivity and reducing volume of data sent across the network. In energy, and transportation, the top concerns are about security. Manufacturers balance several benefits, while being the industry with the greatest interest in deploying AI analytics models. And in healthcare, the many benefits are ranked roughly evenly, but healthcare was the industry paying the closest attention to edge's ability to reduce costs.

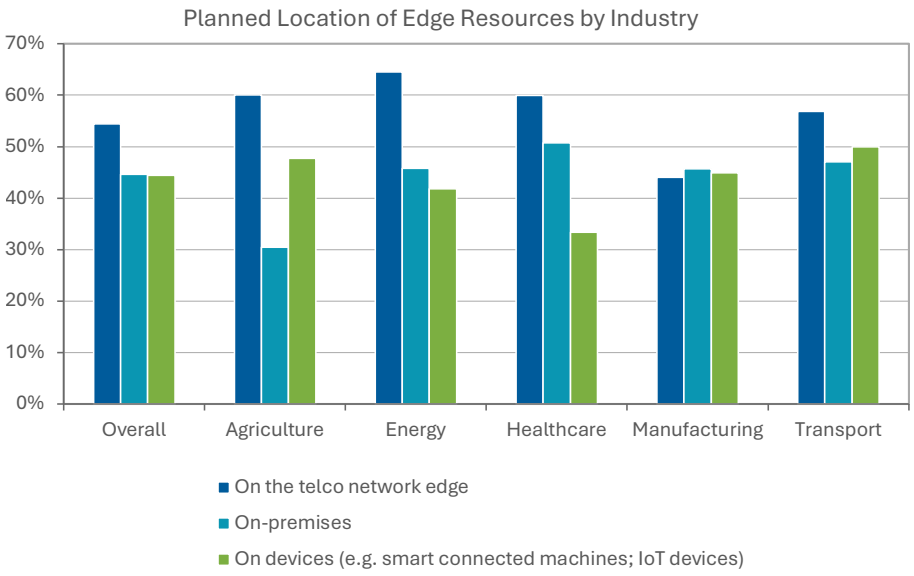
The choice of location of workload storage and analysis across the computing continuum depends upon specific requirements of each use-case and different benefits that the distribution of workloads in different locations of the continuum can bring forward. In practice, most use cases will require some combination of edge and cloud computing to handle various functions, and the amount of edge or cloud differs by use case.

Some use cases, such as those that are mobile and in remote locations, will require some compute on the device, with those devices connecting back to the cloud for aggregation and analysis. For example,



Question: Is your organization using or planning to use edge computing in the next 24 months? N=700 (Base: All respondents)

Figure 1: Edge Usage and Plans by Industry (Source: UNLOCK-CEI Survey, March 2023)



Question: Where do you expect to locate edge resources in the next two years? [Choose all that apply] n=500 (Base: Edge users or planners)

Figure 2: Planned Location of Edge Resources by Industry (Source: UNLOCK-CEI Survey, March 2023)

surveillance cameras may utilize compute on the device for image analysis to determine which data to send across the network. Similarly, autonomous vehicles will require significant processing power and analytics on the vehicle for real-time analysis and response, while still pushing large amounts of data back to the cloud for analysis. In other cases, such as in industrial operations and manufacturing, use cases can utilize edge computing close to or on-board the machinery to monitor, analyze and control systems, while still using cloud resources for other functions. This distribution of computing resources is reflected in survey results from the UNLOCK-CEI project, which showed that even within the edge resources, companies anticipated that resources would be located in multiple places, including being on-board the smart connected equipment, in nearby on-premises locations, or on the telco edge (see figure xx)

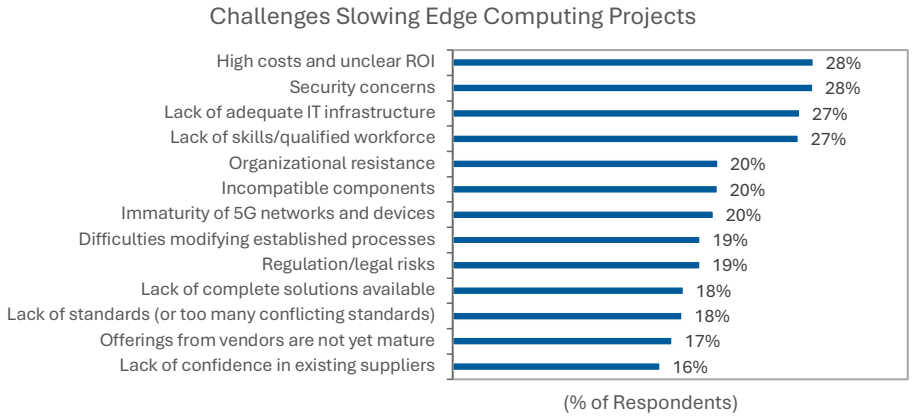
The overall impression is that there is a shift towards distributing the workload across the edge-cloud continuum in upcoming years. By distributing computing resources across the continuum, companies must contend with new challenges orchestrating the data, applications and analytics across those resources.

Despite the expected shift towards edge, there are still several challenges that hold back CEI adoption. The market is fragmented into many individual sub-markets, each addressing different use cases that have unique requirements, architectures and components. As a result, all of the individual use-case sub-markets are developing in parallel, greatly increasing the scale of the innovation that is required. Moreover, many of the use cases are evolving quickly to incorporate the latest technologies, such as 5G and AI, requiring still more research, development and investment.

As a result of this fragmented market that is living on the cutting edge at the intersection of many emergent technologies, CEI remains immature, and many solutions are very complex. That complexity is one of the greatest challenges holding back CEI adoption. It slows projects down, increases their costs and introduces new security vulnerabilities and requires many new skills.

Edge computing is a part of the larger CEI solution, but it presents its own key challenges that companies claim are holding back or slowing their edge computing projects. There are four top challenges that stand out: high costs and unclear ROI; security concerns; lack of adequate IT infrastructure and lack of adequate skills. These challenges are even more problematic for SMEs due to their limited resources for the adoption both from financial, technological and workforce perspectives. Indeed a comparison of the adoption of edge solutions across European companies highlights that only 15% of companies with 10 to 499 employees are currently using edge to a limited extent compared to 60% in companies with 500 to 1000+ employees.

Another important issue to consider about moving towards edge is the important role of key complementary technologies that will be deployed on top of the computing continuum. CEI solutions are emerging within the wider context of rapid technology innovation.



Question: What are the main challenges holding back or slowing Edge computing projects in your organization? [Choose up to 3] N=700 (Base: All respondents)

Figure 3: Edge Challenges (Source: UNLOCK-CEI Survey, March 2023)

They incorporate a wide range of other technologies, as appropriate for the individual use case.

In the survey, 5G was the most commonly-cited technology that plays an important role in CEI plans. Big data and analytics is another important technology category to indicate. Big data requires significant strategies and tools to manage the data from CEI solutions, analyse it, and make use of it. For several years, data management has leveraged a mix of classical analytics and (increasingly) artificial intelligence. Analytics and AI are required for a wide range of purposes, including pre-processing of data to reduce the volumes of data sent over the network, enabling computer vision, enabling real-time analysisand automating systems. Many use cases will require AI models be deployed at the edge. By bringing AI capabilities to the edge, devices can analyze and act on data locally, reducing the need for continuous cloud connectivity and minimizing latency. This is especially valuable for time-sensitive applications like autonomous vehicles, industrial automation, and healthcare monitoring, where real-time insights are critical. AI at the edge also enhances data privacy, as sensitive information can be processed and filtered on-site without being sent to centralized servers.In summary, to enable Europe's economies to fully benefit from the CEI continuum, a significant amount of innovation, standardization, skills development and investment will be required. Some of the areas requiring work include:

- Edge technologies, including edge management and orchestration tools, edge standards, and edge platforms for OEMs
- AI development, including data management and synthesis, model training and AI management across distributed edge infrastructure
- Skills development across the continuum and the many related technologies, such as edge, AI, 5G, robotics, etc.
- Standards development and harmonization across the many technology areas, including edge software, AI, and individual use cases
- Network innovation, including 5G SA deployments, network slicing, RedCap, ultra-low latency, private 5G, and Low Earth Orbiting (LEO) Non-Terrestrial Networks (NTN)
- Aid in commercializing and scaling CEI solution and technology businesses, making solutions efficient, repeatable and accessible to European enterprises and SMEs.

The CEI continuum will be a critical part of European infrastructure enabling the EU's competitiveness in the next several years. It is a challenging, fragmented field, requiring parallel development of a wide range of technologies and solutions serving the unique needs of many different industries and use cases. As such, it cannot be solved by a single company and solution, but rather it requires a robust dynamic ecosystem of companies, researchers, standards bodies, policy-makers and other stakeholders to collaborate and drive innovation.

Such a dynamic ecosystem is something that suits Europe's strengths in technology, education and policy. Taking the lead in CEI technologies requires Europe to put in significant work across the ecosystem including some aggressive competitiveness and entrepreneurship, as well as standards development, open-source software and supportive policies. Yet the huge interest in CEI solutions, large spending levels, and clear need for innovation present significant opportunities for European companies to take the lead and establish strong new lines of business serving the CEI market.

[1] https://zenodo.org/records/7821363

[2] IDC's Worldwide Cloud, Edge and IoT Spending Guides, May 2024

[3] https://eucloudedgeiot.eu/

INSIDE Members Focus

Unlocking the future of Industry 5.0 through Edge-to-Cloud Intelligence

Mauro Tortonesi

Paolo Azzoni

In this issue of the INSIDE magazine, I have the pleasure of interviewing Prof. Mauro Tortonesi, an esteemed researcher in the field of distributed computing, cloud-edge architectures, and Industry 5.0. With a distinguished career at the University of Ferrara, Prof. Tortonesi has contributed to the development of advanced computing paradigms that integrate cloud and edge technologies and has been deeply involved in European research projects, pushing forward innovations in the edge-to-cloud continuum, artificial intelligence, and software-defined infrastructures. His research focuses on optimizing computing infrastructures to enable seamless collaboration between centralized cloud platforms and decentralized edge nodes – an area that is increasingly vital for applications in autonomous systems, smart manufacturing, and industrial automation.

In this interview, we explore his vision on the future of edge computing, the challenges of Industry 5.0, and how edge-to-cloud integration is reshaping modern industrial paradigms.

Prof. Tortonesi could you give us an overview of your research group activities?

The BDCC | Big Data and Compute Continuum research group of the University of Ferrara, which I coordinate, focuses on large-scale, high-performance distributed processing of large amounts of data, adopting an innovative and holistic approach. The group explores creative methodologies to build flexible Big Data and MLOps platforms with broad applicability in different fields, such as the optimization of production processes in Industry 5.0. It also develops methodologies and tools for the management of IT services in the Compute Continuum, the unified and distributed ecosystem of resources between the edge and the cloud, adopting highly innovative approaches such as computational intelligence, reinforcement learning, value-of-information, and digital twin.

The group has a strong international vocation and has established structural scientific collaborations with prestigious institutions such as the Florida Institute for Human & Machine Cognition (IHMC), IBM TJ Watson Research Center, St. John's University, Ghent University, University of Manchester, Budapest University of Technology and Economics (BME), the United States Army Research Lab (ARL) and the NATO Communications and Information Agency (NCIA).

The group is involved in several research projects funded through public tenders, in collaboration with leading global manufacturing companies based in the Emilia-Romagna region, such as Carpigiani Group, Bonfiglioli Group, EMAG, MARPOSS and MEP.

What is your take on the Computing Continuum?

The Computing Continuum is an exciting concept that unifies computational, network, and storage resources across multiple layers of the technology stack, accessed through a largely homogeneous API. This results in a distributed computing environment where resources can be seamlessly allocated from edge devices to the cloud infrastructure. For service developers and providers, this model opens new possibilities, particularly for computationally and/or data intensive services like those based on machine learning.

What sets the Computing Continuum apart from previous models - such as Fog or CloudLets - is its emphasis on the homogeneous allocation and management of resources across the continuum. In fact, edge computing capabilities have been remarkably improving and enabled modern containerization and orchestration to be adopted as a fundamental building block across the entire continuum. Developers can thus leverage familiar and approachable cloud-native architectures and paradigms, and well-known and battle-tested platforms such as Kubernetes, to build adaptive IT services that support highly dynamic workloads spanning from the edge to the cloud.

The path to fully realizing the potential of the Compute Continuum, however, still faces important challenges. First, edge computing platforms are rapidly evolving beyond traditional general purpose CPUs. They are exploring highly innovative solutions – ranging from 3D processes to bio-inspired systems such as neuromorphic computing and cerebral organoids, as you so effectively illustrated in your presentations on edge AI at the EFECS 2024 event – to overcome the performance limitations of current architectures and processes and to better cater to AI-specific tasks. The integration of disruptive hardware platforms in the continuum could require the development of innovative interoperability methodologies and tools – even service and programming models. At the software level, there is the need to go beyond current platforms, designed for mostly homogeneous and single-tenant infrastructure, to consider highly federating and multi-cluster environment that present new issues from the efficient resource management perspective. This calls for smart next-generation orchestration solutions that enable the seamless deployment and continuous optimization of services to across various metrics like revenue, user satisfaction, and sustainability. Finally, the computing continuum approach disrupts the traditional single-tenant/silo model commonly used in edge and IoT applications, fostering strong resource sharing that offers substantial benefits in terms of time-to-market and cost efficiency but at the same time increasing cybersecurity challenges. To ensure a secure Compute Continuum, we must reconsider threat models and implement stricter cybersecurity policies.

These are indeed formidable obstacles. However, the opportunities are significant:

computing continuum approaches promise to improve significantly operational efficiency and to enable new applications in many domains, including Industry 5.0.

You have been engaging in the field of digital industry before the term 'Industry 4.0' emerged, giving you a unique perspective on the recent industrial revolutions. How do you see the role of the Computing Continuum in shaping this area?

Well, when the term "Industry 4.0" was first coined, the focus was largely on automation, the Internet of Things (IoT), and the integration of cyber-physical systems. As we've evolved toward Industry 5.0, however, there's a growing emphasis on human-centricity, sustainability, and resilience. At the same time, industrial applications are exhibiting an increasing amount of data generated by machines, that must be processed in a distributed fashion with dynamic workloads, and - of course - an increasing request of computationally intensive AI/ML tasks.

This shift requires us to rethink how we manage data and computational resources - this is where the concept of Computing Continuum plays a pivotal role. The Computing Continuum enables and facilitates the development of easily reconfigurable generic platforms, that allow to move away from solutions tailored to the particular use case - with their high costs and time-to-market. Furthermore, Federated Learning and MLOps solutions enable the development and exploitation of ad hoc AI services, e.g., fine tuned for a batch of machines, which is a perfect match for the mass customization nature of manufacturing in the EU.
More in general, the Computing Continuum enables a more flexible and adaptive environment for Industry 5.0. By seamlessly integrating resources from edge devices to the cloud, it supports real-time decision-making, dynamic reallocation of services, and the optimization of operational processes. The ability to manage computational, network, and storage resources across a distributed infrastructure is crucial for enabling the intelligent, sustainable, and efficient systems that are at the core of Industry 5.0.

With Computing Continuum, we are better equipped to address the increasing complexity of modern manufacturing, where data and machine learning applications are central. This integration allows for more efficient and sustainable production practices, helping industries align with global goals such as sustainability, reducing emissions, and enhancing worker safety. Ultimately, Computing Continuum provides the technological backbone that supports the advanced and complex digital ecosystems required for Industry 5.0, where human and machine collaboration is key to achieving the next phase of industrial evolution.

What is the relationship between the Computing Continuum and AI?

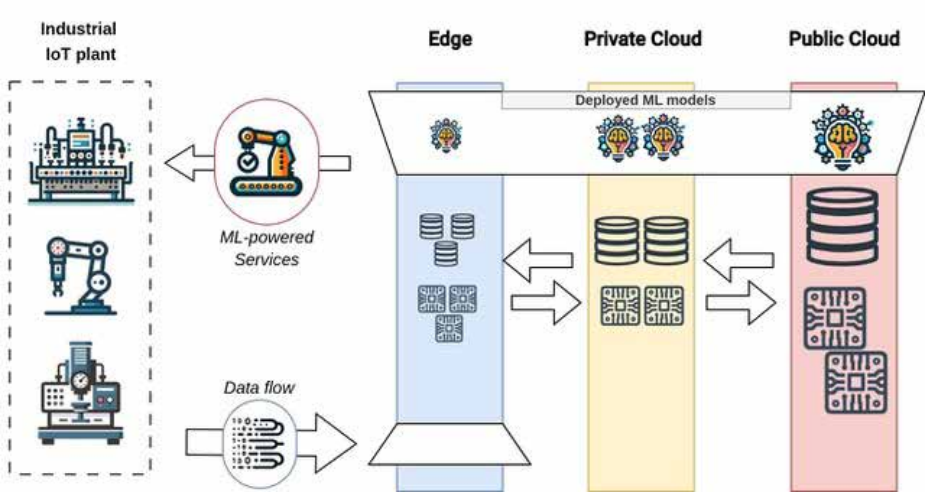
AI is undergoing rapid development and attracting significant attention. We can easily conceive that many of the IT services that will run on the Computing Continuum will leverage heavily on AI-based software components. This presents interesting opportunities to provide at the software platform level a set of functions of generic applicability that cater to AI service developers. In fact the development of new services could be significantly sped up if the Computing Continuum enabled the distributed and training of AI tasks, automated the migration of AI services across the Continuum, and allowed the development of disconnection resilient and/or privacy preserving variants for "high stakes" scenarios. As AI solutions keep increasing their maturity level, functions that support continual learning, explainable AI, and trustworthy AI also represent very interesting avenues of investigation to pursue. At the same time, modern AI methodologies and tools represent key enablers for the Computing Continuum. Despite the recent rethinking of the trend towards ever larger scales, Generative AI solutions such as Large Language Models (LLMs) keep improving at an astonishing pace. Their integration into full-fledged Agentic AI solutions, through fine-tuning and/or pairing with specialized knowledge bases, opens up a plethora of new applications. At the same time, Deep Reinforcement Learning (DRL) has emerged as an interesting solution to train relatively robust and flexible agents that can efficiently manage the resource requirements across rather large portions of the Computing Continuum, in a wide range of conditions – and even adapt to significant context and environment changes. These solutions are very interesting building blocks for the realization of a smart and autonomic platform for the computing continuum – with multi-agent architectures representing a particularly appealing avenue of research and exploration.

So, I believe that this raises the opportunity to co-design an adaptive distributed AI layer, that provides common functions for both inference and (continuous re)training tasks that service developers could leverage to reduce costs and time-to-market, and the heavily AI-based management functions underlying the Computing Continuum software infrastructure. However, this represents a major challenge, that will require a considerable amount of effort from both academia and the industry.

How do you bridge the gap between scientific research and real-world applications in the field of Industry 5.0?

I think this gap is narrower than ever: in industrial applications we are seeing an ever-decreasing time to market for AI-based features, and an ever increasing sophistication level of the adopted AI methodologies and tools. These trends suggest, and foster, the strengthening of the collaboration between industry and academia to address the issues of an ever more challenging manufacturing scenario.

This is something I have experienced first-hand working in many research projects with industrial partners. A very good example is the Teorema platform, that performs the



AI-based remote monitoring and control of 25,000 ice cream making machines from Carpigiani, a world leading company with 35% global market share located in Bologna, Italy. The next generation of Carpigiani ice cream making machines, about to hit the market in early 2025, will be AI-based to change the ice cream making processes in real time, avoinding waste in case of human mistakes in operating the machine. This is a feature that we were able to realize with a remarkably short development cycle, by creating a working group in which AI experts from our university closely interacted with Carpigiani engineers and biologists.

But to fill the gap it is also crucial to educate the next generation of professionals to build a widespread expertise in AI and Big Data processing and to allow manufacturing companies in the EU to tackle the challenging technical aspects of a data-centric innovation projects. Starting from AI/ML experts and Data Engineers with proficiency in Big Data platforms and MLOps.

As we look toward the future of Industry 5.0 and its intersection with global goals like the UN Agenda for Sustainable Development, how can Europe strengthen its role in driving innovation, particularly in areas like sustainable manufacturing, climate action, and digital transformation? And what role do initiatives like the Chips Joint Undertaking play in achieving these objectives?
The future of Industry 5.0 offers a unique opportunity to align technological innovation with global sustainability goals, as outlined in the UN Agenda for Sustainable Development. Europe, with its strong history of research, technological expertise, and regulatory frameworks, is in a prime position to lead this change, particularly by fostering a more resilient, competitive, and human-centered industrial ecosystem.

Initiatives like the Chips Joint Undertaking (Chips JU) play a critical role in this context, as they address Europe's need for strategic autonomy in semiconductor production but also enable the integration of cutting-edge technologies like AI, IoT, and the Compute Continuum into sustainable manufacturing processes. By focusing on key enablers such as AI-driven predictive analytics, energy optimization, and smart systems that can adapt in real-time, we can reduce the environmental impact of production and contribute to global climate goals (SDG 13).

Moreover, Industry 5.0 emphasizes the need for human-machine collaboration, helping to create more inclusive, safer, and fulfilling work environments (SDG 8). By fostering innovation through advanced manufacturing systems, we can build robust infrastructures that drive both economic growth and social equity. The integration of these technologies will empower industries to not only become more competitive but also play a pivotal role in addressing global challenges like climate change, resource efficiency, and public health.

Europe's continued investment in both advanced semiconductor technologies and sustainable, human-centered innovation in Industry 5.0 is essential. Through collaborations such as the Chips JU, we can create a solid foundation for meeting the global challenges outlined in the UN's Agenda for Sustainable Development, ultimately building a more resilient, sustainable, competitive and equitable future for all.

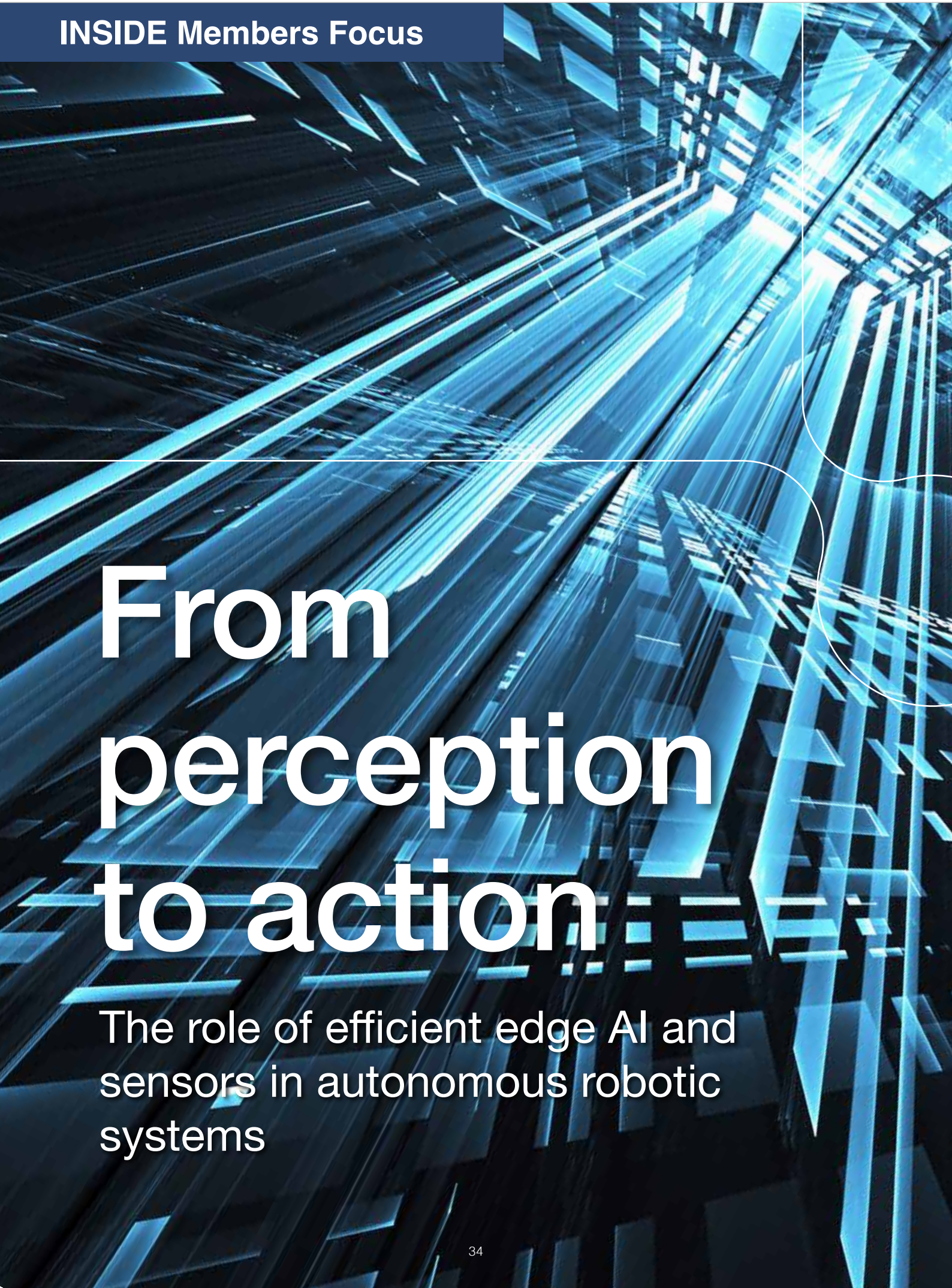
Edge-to-Cloud and Industry 5.0: intelligent and connected systems

As Prof. Mauro Tortonesi eloquently outlines in this interview, the edge-to-cloud continuum is more than just a technological evolution – it represents a fundamental shift in the way computing resources are managed and optimized. This paradigm enables industries to harness the power of both centralized cloud services and distributed edge computing, ensuring low-latency processing, energy efficiency, and greater resilience. His reflections highlight the need for intelligent workload orchestration and AI-driven automation to fully unlock the potential of cloud-edge infrastructures.

Moreover, in the era of Industry 5.0, where human-centric and sustainable technologies are gaining momentum, the convergence of AI, automation, and real-time data processing will play a decisive role in shaping the next wave of industrial advancements. Prof. Tortonesi's insights underscore that achieving seamless integration between cloud and edge requires not only technological innovation but also collaborative standardization efforts and robust security frameworks.

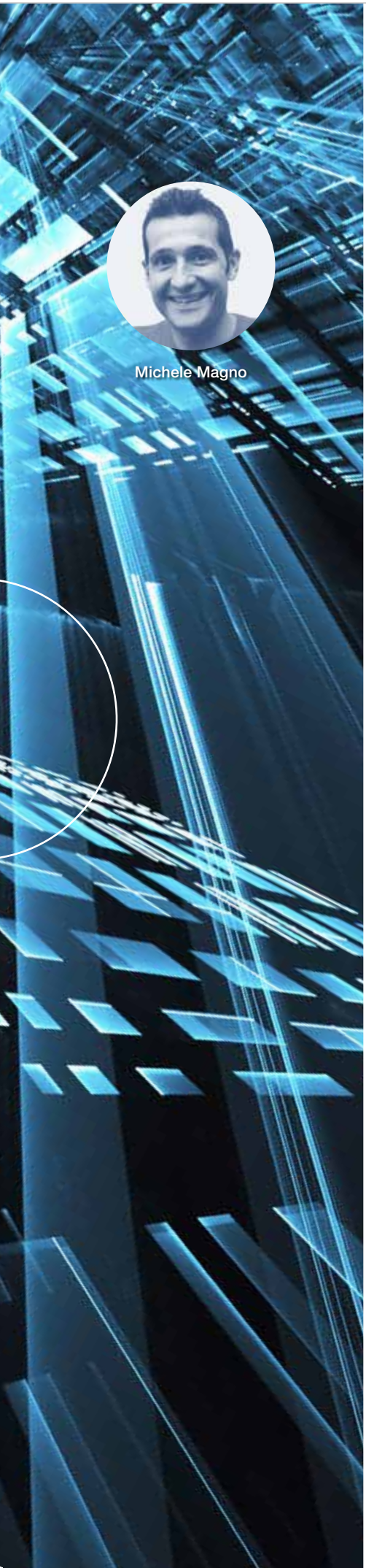
Ultimately, the future of digital infrastructure lies in dynamic, adaptive systems that can optimize computational workloads across distributed architectures. As the industry moves toward hyperconnected and intelligent ecosystems, research efforts like those of Prof. Tortonesi will continue to drive progress, ensuring that the edge-to-cloud continuum remains at the core of modern digital transformation.

INSIDE Members Focus



From perception to action

The role of efficient edge AI and sensors in autonomous robotic systems



Michele Magno

The integration of Artificial Intelligence (AI) into embedded processors, known as Edge AI, is revolutionizing robotics by enabling real-time decision-making and adaptation. Traditional robotics focused on predefined, repetitive tasks, but AI introduces intelligence, adaptability, and real-time optimization. This transformation is particularly evident in fields such as mobile robots, autonomous aerial systems (UASs), autonomous vehicles, and swarm robotics, where low-latency sensing and decision-making are critical to enhancing efficiency and autonomy.

A key enabler of this shift is the fusion of Edge AI with smart sensors, which allows robots to perceive and interact with their environments, including human collaborators. By processing sensor data directly on the device, Edge AI eliminates the latency associated with cloud computing, ensuring instant responses, improved reliability, and enhanced privacy. This is especially crucial in dynamic and resource-constrained applications, such as autonomous drones, industrial automation, and AI-enhanced manufacturing robotics. Research at ETH Zürich has demonstrated that efficient AI processing combined with low-power sensors significantly improves robotic intelligence and autonomy. This article explores several groundbreaking examples - ranging from nano-drones and FPGA-based UAV platforms to quadrupedal robots for assisted living and high-speed autonomous racing cars - all of which push the boundaries of low-latency AI processing.

Low-Latency Sensing in UAVs: The SwiftEagle Platform

One of the most compelling advancements in Edge AI for aerial robotics is SwiftEagle[1], an open-source, FPGA-based UAS designed for ultra-low-latency vision processing. SwiftEagle integrates dual RGB/DVS (Dynamic Vision Sensor) cameras on a multi-sensor subsystem and processes real-time vision data entirely onboard. Unlike conventional cameras, DVS sensors operate on an event-driven paradigm, transmitting only pixel changes rather than full frames. This allows SwiftEagle to achieve latencies below 210µs, even in the worst-case scenario, enabling real-time decision-making for high-speed UAV maneuvers. The FPGA architecture further optimizes processing efficiency, overcoming the computational bottlenecks of traditional embedded platforms. This system has critical implications for applications such as autonomous drone racing, industrial inspections, and search-and-rescue operations, where rapid reaction times define mission success. SwiftEagle demonstrates how hardware acceleration and neuromorphic sensing can drastically improve the speed and efficiency of aerial robotics.

Swarm Intelligence: Fully Onboard SLAM for Nano-Drone Mapping

Scaling up Edge AI beyond a single autonomous robot, researchers at ETH Zürich have developed a fully onboard SLAM (Simultaneous Localization and Mapping) system for nano-drone swarms. This system enables tiny 35g UAVs to collaboratively map environments using a distributed multi-agent approach - all without external infrastructure[2]. Each drone is equipped with four 64-pixel depth sensors that provide real-time obstacle avoidance and spatial mapping. Unlike traditional SLAM systems, which rely on powerful GPUs, these drones perform onboard processing using ARM Cortex-M microcontrollers with just 192kB of memory. A graph-based SLAM algorithm and iterative closest point (ICP) method allow the swarm to merge individual drone maps into a coherent 3D model, drastically improving efficiency and coverage. This research demonstrates how collaborative Edge AI processing in nano-drones can scale to larger robotic ecosystems, paving the way for autonomous reconnaissance, infrastructure monitoring, and disaster relief operations. The fully onboard nature of the system allows

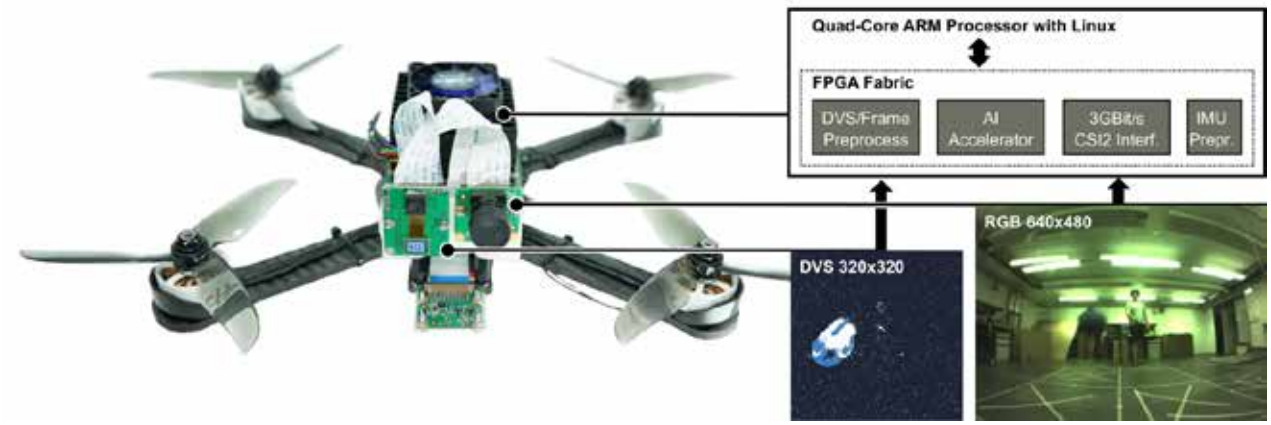


Fig 1: The SwiftEagle drone with custom electronics. A direct interface between the DVS, RGB and FPGA fabric allows low latency decison making, for example evasion of a ball. This allows faster reactions, but also frees up the high level processor for other tasks, such as long term path planning.

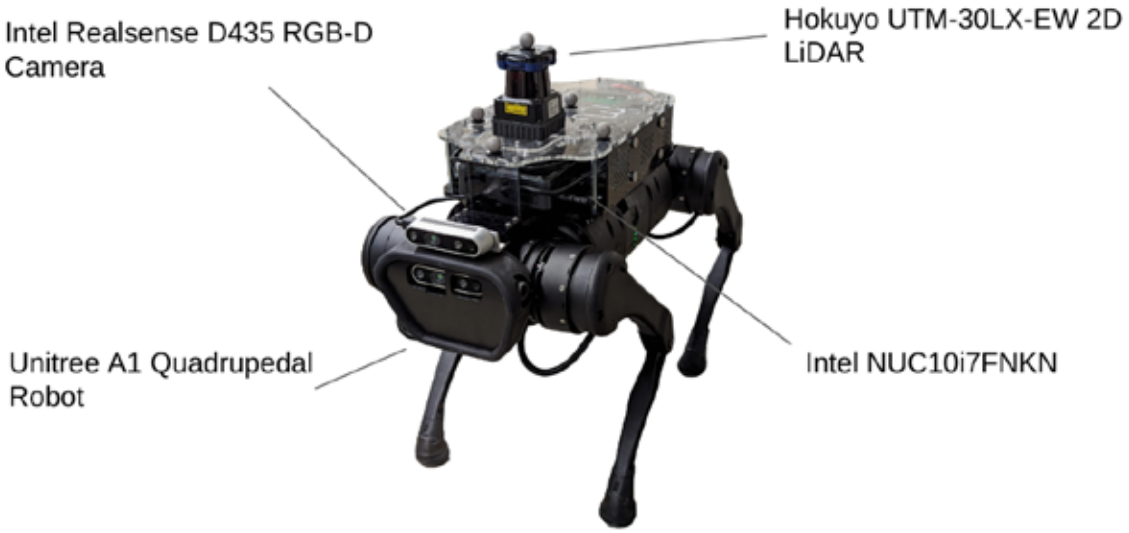


Fig 2: The autonomous robotic dog (from Unitree) equipped with the efficient multisensor intelligent backpack, designed by ETH for low-latency multi-sensor fusion perception and embedded control.

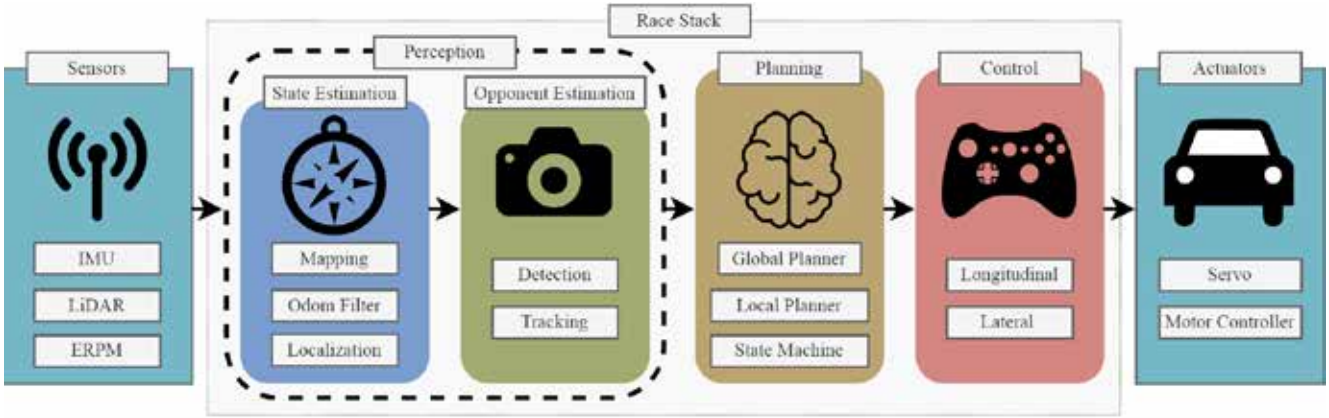


Fig3: System architecture of the ForzaETH Race Stack, illustrating the onboard algorithmic components responsible for perception, state estimation, planning, and control. The stack integrates real-time localization, opponent estimation, and high-speed motion control for autonomous racing.

Fig 4: The Autonomous car ForzaETH in a competition race.

these drones to operate in GPS-denied environments, making them highly versatile in unknown terrains.

Assistive Robotics: Gaze-Guided Quadrupeds for Enhanced Assisted Living

Edge AI is also reshaping human-robot interaction, particularly in assistive robotics. The Gaze-Guided Semi-Autonomous Quadruped combines eye-tracking technology with real-time robotic decision-making[3]. This system enables users with limited mobility to control a quadrupedal robot simply by looking at an object. Smart glasses track the user's gaze direction, which the robot processes in real time, allowing it to navigate and interact with objects autonomously. The system integrates low-latency multimodal perception using LiDAR, depth cameras, and an onboard AI processing unit, achieving an accuracy of less than 20 cm with a response time of ~200ms. This technology reduces the cognitive load on users, making robotic assistance more intuitive and effective in daily living environments. Such advancements in human-robot interaction promise a future where smart assistive robotics can seamlessly integrate into healthcare, rehabilitation, and home automation.

Autonomous Racing: The ForzaETH Race Stack for High-Speed Decision-Making

One of the most extreme testbeds for Edge AI and low-latency processing is autonomous racing. The ForzaETH Race Stack is a fully onboard AI racing system, designed for scaled autonomous head-to-head racing[4]. Built on commercial hardware, ForzaETH demonstrates how high-speed motion control, path planning, and state estimation can be achieved at over 10m/s while running real-time AI models onboard. The stack is designed to handle both time trials and head-to-head racing, making it an ideal platform for benchmarking robotic perception and control algorithms under extreme conditions. Autonomous racing demands instantaneous decision-making at high speeds, pushing the limits of embedded AI optimization. This research proves that autonomous vehicles can handle high-speed maneuvers without reliance on external computing resources, laying the groundwork for advancements in self-driving technologies.

Sensor Fusion for UAV Navigation: The Stargate System

Finally, the Stargate system introduces a multimodal sensor fusion approach for miniaturized UAV navigation[5]. Combining low-power depth sensors with grayscale cameras, this system enables nano-drones to autonomously detect and navigate through obstacles. Unlike conventional UAVs that rely on single-sensor perception, Stargate fuses data from tiny convolutional neural networks (CNNs) running on an ultra-low-power TinyML architecture, achieving real-time flight control with an accuracy of 91%. This hybrid approach dramatically improves obstacle avoidance, flight stability, and navigation performance, especially in challenging indoor environments.

Conclusion: The Future of Edge AI and Smart Sensors in Robotics

The synergy of AI, Edge Computing, and smart sensing is shaping the next generation of autonomous robotics – whether in aerial autonomy, intelligent manufacturing, assistive robotics, or high-speed racing. By pushing the limits of low-latency AI processing, power-efficient sensors, and real-time decision-making, these innovations enable faster, more efficient, and more autonomous robotic systems. As sensor technology and AI models continue to evolve, we can expect even more groundbreaking advancements – unlocking new possibilities across industry, logistics, healthcare, and beyond.

1 Vogt, Christian, Michael Jost, and Michele Magno. "SwiftEagle: An Advanced Open-Source, Miniaturized FPGA UAS Platform with Dual DVS/Frame Camera for Cutting-Edge Low-Latency Autonomous Algorithms." 2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS). IEEE, 2024.

2 Friess, C., Niculescu, V., Polonelli, T., Magno, M., & Benini, L. (2024). Fully onboard slam for distributed mapping with a swarm of nano-drones. IEEE Internet of Things Journal.

3 Joseph, P., Plozza, D., Pascarella, L., & Magno, M. (2024, July). Gaze-Guided Semi-Autonomous Quadruped Robot for Enhanced Assisted Living. In 2024 IEEE Sensors Applications Symposium (SAS) (pp. 1-6). IEEE.

4 Baumann, N., Ghignone, E., Kühne, J., Bastuck, N., Becker, J., Imholz, N., ... & Magno, M. (2024). ForzaETH Race Stack – Scaled Autonomous Head-to-Head Racing on Fully Commercial Off-the-Shelf Hardware. Journal of Field Robotics.

5 Kalenberg, Konstantin, et al. "Stargate: Multimodal sensor fusion for autonomous navigation on miniaturized uavs." IEEE Internet of Things Journal 11.12 (2024): 21372-21390.

INSIDE Members Focus

Strengthening Europe's chips design

The strategic role of Italy's CHIPS-IT Foundation

Prof. Alberto Sangiovanni Vincentelli

Carlo Reita

Cristina De Luca

Giorgio Dell'Erba

The semiconductor sector has long been one of the most geopolitically sensitive industries in an increasingly fragmented "global" economy. Operating behind the scenes, it drives cutting-edge innovations while playing a crucial role in sustaining the EU's economy and policies. Its strategic importance should have always been recognized, while frequently it was considered only through repeated cyclical crises that have now become structural challenges. As the driving force behind digital transformation, in every application domain, semiconductor design and manufacturing lie at the core of the entire economy. Chip design, along with its associated research and development, serves as a key pillar of our economy, continuously playing a vital role in enhancing technological capabilities and innovation.

The semiconductor sector has long been one of the most geopolitically sensitive industries in an increasingly fragmented "global" economy. Operating behind the scenes, it drives cutting-edge innovations while playing a crucial role in sustaining the EU's economy and policies. Its strategic importance should have always been recognized, while frequently it was considered only through repeated cyclical crises that have now become structural challenges. As the driving force behind digital transformation, in every application domain, semiconductor design and manufacturing lie at the core of the entire economy. Chip design, along with its associated research and development, serves as a key pillar of our economy, continuously playing a vital role in enhancing technological capabilities and innovation. Semiconductor companies are critical assets in the geopolitical and economic landscape, which are mainly concentrated in three regions: United States, East Asia (Taiwan, South Korea, Japan and China), and Europe. Each region has a distinct approach to R&D Chips Design, shaped by political and industrial policies, historical investments in the sector, academic excellence, and national security concerns. United States maintain dominance in semiconductor design through its advanced hubs, many of which are closely tied to universities and government-

Fig. 1 - The most relevant areas for semiconductors and chip design (Europe, East Asia and United States) with an highlight of the key players (source: DECISION Etudes & Conseil, SEMI)

backed programs, such as the CHIPS and Science Act that provides $ 280 billion in new funding to promote domestic research and production. East Asia trough Taiwan leads the world in advanced semiconductor fabrication trough TSMC, followed by major players in South Korea, such as Samsung and SK Hynix. China has been investing heavily both in semiconductor design, as demonstrated by the growth of companies like Huawei and HiSilicon, and semiconductor manufacturing, with an impact on global market despite US export restrictions.

Europe holds a strategic yet limited role in the semiconductor value chain, holding only 10% of the overall global value, excelling in specific areas such as equipment (36% of global market share) and materials (12%), while significantly lagging in wafer fabrication, where East Asia dominates with 56%, and in assembly, packaging, and testing, where it holds only 4%. In contrast, Europe maintains a stronger foothold in semiconductor design, accounting for 20% of the global share in EDA (Electronic Design Automation) and core IP. This positioning is crucial as the semiconductor market is projected to reach $1 trillion by 2030, with computing and data storage alone expected to grow from $224 billion in 2021 to $351 billion, and wireless communications from $172 billion to $280 billion. Meanwhile, the automotive electronics segment – highly relevant for Europe's industrial ecosystem – is forecasted to increase from $47 billion to $147 billion, reflecting a CAGR of 13–15%, the highest across all verticals. Given that IC design contributes up to 50% of the value added in the semiconductor supply chain and requires 53% of the industry's R&D investment, strengthening Europe's role in this domain would allow it to capture a larger share of this high-value sector. By focusing on IC design, Europe can leverage its engineering expertise and industrial base to play a pivotal role in reducing dependency on foreign foundries while spearheading innovation in critical technologies such as AI, automotive, and edge computing.[1 2]

Historically strong in equipment and embedded systems, Europe is trying to increase its capacity building and reinforce its position in semiconductors design trough initiatives like the European Chips Act. While the continent has traditionally led in automotive, industrial, and power semiconductors, new technologies and digitalization are challenging this leadership. Chip design stands as a critical pillar in this landscape. Design research centres will then be essential for future prosperity, as global competition intensifies. The Chips Act initiatives support the industrial investments in manufacturing and are instrumental to establish Pilot Lines for advanced research in five main areas (Advanced sub 2nm leading-edge systems on chip, Fully Depleted Silicon on Insulator technologies targeting 7nm, Advanced Packaging and Heterogeneous Integration, Advanced semiconductor devices based on Wide Bandgap materials, Advanced Photonic Integrated Circuits). Further, the EU launched a large Design Platform initiative and a network of national Competence Centers to increase and facilitate the access to circuit design.

Fig. 2 - The current map of some relevant research centers in Europe, along with the addition of the CHIPS-IT Foundation. (not intended to be exhaustive of all RTOs and academic institutions)

The Italian panorama

Italy plays a pivotal role in Europe's semiconductor ecosystem, with a strong presence in automotive, industrial automation, and consumer electronics, particularly in analog, power, and sensor devices. The Italian semiconductor market is valued at several billion euros, with a dominant player in STMicroelectronics (STM), a global leader in analog, mixed-signal, and power semiconductors, which reported $13.7 billion in revenues in 2024. STM has committed significant investments in silicon carbide (SiC) technologies, a key enabler for electric vehicles, renewable energy, and power electronics. Despite this, Italy lacks advanced-node foundries and a strong fabless industry, which are critical for high-performance computing and AI applications. To address this gap, Italy has allocated €4.15 billion through the National Microelectronics Fund (2022-2030) to support R&D, pilot lines, and first-of-a-kind semiconductor plants. Additionally, Italy has over 30 academic groups focused on semiconductor technologies, producing a steady pipeline of engineers and PhDs, though the country faces challenges in retaining talent due to strong competition from international markets. Given that the global semiconductor market is projected to exceed $1 trillion by 2030, Italy's industrial expertise and targeted investments position it as a key player in Europe's push for semiconductor autonomy.

Leveraging the opportunities presented by the EU Chips Act, Italy is actively strengthening supply chain security and resilience under Pillar 2, with two first-of-a-kind large-scale projects totaling over €8.2 billion in investments, consolidating national and European leadership in critical semiconductor segments.

First, the European Commission has approved a €2 billion Italian state aid package to support STMicroelectronics in constructing a €5 billion integrated Silicon Carbide (SiC) chip manufacturing plant in Catania, Sicily. This facility, expected to reach full operational capacity by 2032, will be the first in Europe to fully integrate the SiC supply chain, producing 200mm SiC wafers for electric vehicles, fast-charging stations, renewable energy systems, and industrial applications. This project is crucial for Europe's digital and energy transition, ensuring greater independence from Asian supply chains.

Second, the European Commission has approved a €1.3 billion Italian state aid measure to support Silicon Box, a Singapore-based company, in constructing a €3.2 billion advanced semiconductor packaging and testing facility in Novara, Piedmont. This state-of-the-art facility, which will create approximately 1,600 high-skilled jobs, is set to become Europe's most advanced semiconductor packaging plant. Using large-format panel-level processing, the plant will package chips at a scale 6 to 8 times larger than conventional wafer-level packaging, significantly boosting Europe's competitiveness in advanced semiconductor back-end processing. Construction will begin in late 2025, with production starting in 2028 and full capacity expected by 2033.

Fig. 3 - Map of Semiconductor Industry in Italy: A visualization of key semiconductor companies operating in Italy, including major players such as STMicroelectronics, Infineon, NXP, Micron, Tower Semiconductor, and Technoprobe, highlighting Italy's role in the global semiconductor supply chain.

These investments are aligned with the EU's strategic goal of producing 20% of the world's semiconductors by 2030, reducing reliance on external supply chains, and enhancing Europe's technological sovereignty in a rapidly growing market projected to surpass $1 trillion in value by the end of the decade. They also mark a significant effort in maintaining Italy's positioning as an essential player in Europe's semiconductor landscape, driving innovation, investment, and strategic autonomy in a rapidly evolving global market.

Moving forward, Italy will continue to play a pivotal role in advancing the objectives of the European Chips Act by promoting talent development, supporting industries and SMEs, and fostering strong partnerships within the Europe and internationally – ensuring a secure and competitive semiconductor R&D ecosystem in Europe [3].

In this context, the national research ecosystem plays a fundamental role for the development of the Italian semiconductor industry and its value chain, which have been impacted by the talent shortage, a critical challenge threatening the long-term sustainability of the semiconductor sector in Italy and Europe. The Italian research ecosystem benefits from several leading centers of excellence, supported by high-quality universities and strong industry collaborations[5]. However, further development and expansion are necessary to meet growing demands of experts and talents. On the human resources front, Italian universities offer high-level education, yet their capacity to prepare experts remains limited when compared to industry needs. Moreover, a significant brain drain persists, with graduates and Ph.D.s frequently moving to American and other foreign companies. To bridge this gap, it is essential to implement additional measures to promote the study of microelectronics and STEM across all educational levels, including high schools and technical institutes. Special attention should be given to encouraging female participation, developing a more inclusive and dynamic talent pipeline.

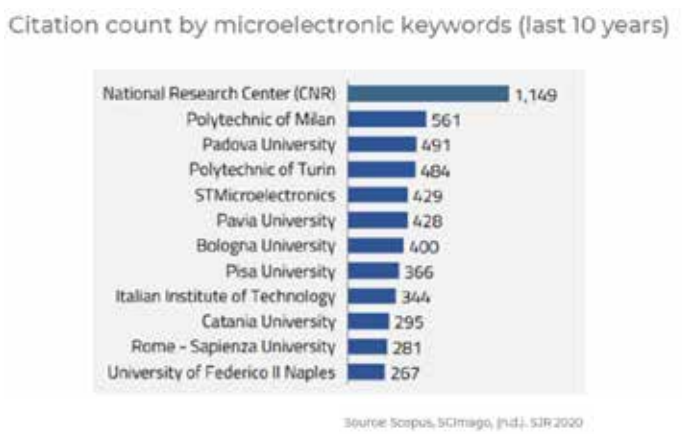


Fig. 4 - Reference[3]. Sources: Invitalia Report 2023 on data from Gartner 3Q21 Forecast, BCG; Scopus, SCImago, (n.d.). SJR 2020

In the frame of the Pillar 1 initiatives, Italy reinforced its commitment to semiconductor design and talent development with the establishment of the *"Chips-IT Foundation"*, a national centre for integrated circuit design. Chips-IT has been launched to drive research and development in semiconductor design, aligning with European research centres and industries to advance the European Chips Act's objectives. This initiative complements the Italian led consortium for the Wide Band Gap Pilot Line in Catania.

The Chips-IT Foundation

To coordinate efforts at the national level, the *Italian Center for Semiconductor Integrated Circuit Design*, which might also be referred to *Fondazione Chips-IT (Chips-IT Foundation)*, was established as a private-law foundation with long-term public funding. In December 2023, the Italian Government approved the foundation's regulations and statutes, appointing Professor Alberto Sangiovanni Vincentelli as President and Dr. Carlo Reita as CEO, starting August 1, 2024. The Foundation be fully operational by late 2025. Chips-IT will serve as the *"focal point"* of Italy's chip design activities and act as the key interface for the first pillar of the European Chips Act trough a *HUB-AND-SPOKE Structure*, maintaining and strengthening the centers that have already developed expertise in this field and the ecosystems that have formed

Fig. 5 - Some relevant data on Fondazione CHIPS-IT

Chips-IT stands at the forefront of Italy's semiconductor strategy, strengthening national and European capabilities in integrated circuit (IC) design. Established by the Ministero delle Imprese e del Made in Italy (MIMIT), which is also supervising authority, Ministero dell'Economia e delle Finanze (MEF), and Ministero dell'Università e della Ricerca (MUR), the foundation is a key pillar in Italy's efforts to enhance technological sovereignty and semiconductor innovation. As of 2025, Chips-IT is projected to have over 30 institutional and industrial members, advocates and supporters, consolidating a network of research centers, universities, and leading semiconductor companies. The foundation is already actively engaged in more than six national and EU-funded projects, reinforcing Italy's role in the European semiconductor ecosystem. With a budget exceeding €26 million for 2025, Chips-IT is set to expand its workforce to over 150 employees between 2025 and 2027, ensuring high-value job creation and expertise development in the highly strategic field of IC design. By fostering research, talent, and industry collaboration, Chips-IT is laying the groundwork for Italy's future as a center of excellence in microelectronics. A snapshot is reported in Figure 5.

The research efforts of Chips-IT will initially revolve around five research lines.

- Digital design and open hardware: focus on RISC-V and novel computing architectures
- RF-to-THz: focus on mmWave ICs, silicon phased arrays, ICs for wireline and optical
- Analog and Mixed Signal: definitive topic list still under definition
- Power electronics: definitive topic list still under definition
- Advanced chip packaging: 3D-ICs, SoC and Chiplets, SiP

around them. Moreover, to address Italy's and Europe's shortcomings in the fabless semiconductor sector, Chips-IT will contribute to the formation of innovative start-ups in the domain by providing an incubation infrastructure and collaborating with national and international specialised VC funds.

As clearly stated by its long name, the Foundation begun its journey with the clear mission of becoming a key player in the IC design research. Given the numbers, creating a dedicated research institution for IC design in Europe is a highly strategic move. IC design is where the majority of value in the semiconductor supply chain is generated, contributing 50% of total value added while requiring intensive R&D

investments (53%), making it a prime target for European technological sovereignty. Unlike manufacturing, which requires massive CAPEX investments – 64% of capital expenditures are concentrated in front-end fabrication – IC design is a more accessible and scalable domain where Europe already holds a competitive edge with 20% of the global EDA and IP market. Additionally, as sectors like automotive electronics (CAGR of 13–15%), computing, and wireless communication (CAGR of 8–10%) continue to expand, demand for advanced ICs is set to grow exponentially. A research institution dedicated to IC design will enable Italy to develop cutting-edge architectures tailored to its key industries, ensuring long-term competitiveness. Moreover, fostering a strong IC design ecosystem would not only drive innovation but also attract top talent, create high-value jobs, and strengthen Europe's semiconductor independence in the face of growing global competition.[2]

Fondazione Chips-IT is at the heart of Italy's strategy for advancing integrated circuit (IC) design and development, positioning the country as a key player in the global semiconductor landscape. Through its cutting-edge research activities, the foundation promotes the design and innovation of semiconductor technologies, addressing both industrial and strategic challenges. A core mission of Chips-IT is strengthening the professional training system in microelectronics, ensuring a steady pipeline of highly skilled engineers and researchers. By building a robust network of universities, research centers, and enterprises, the foundation fosters technology transfer, industrial collaboration, and knowledge exchange, accelerating innovation in the semiconductor sector.

Chips-IT is also committed to the development and optimization of technology transfer, ensuring that breakthrough research translates into industrial applications and market-ready solutions. A key component of this strategy is fostering the creation and growth of semiconductor startups, supporting entrepreneurship in fabless design, IP development, and advanced semiconductor solutions. The foundation plays an active role in connecting startups and innovators with risk capital, including business angels, venture capital firms, and strategic investors, helping to drive the growth of a competitive and sustainable semiconductor ecosystem in Italy and Europe.

Additionally, Chips-IT actively engages with international and national laboratories and centers of excellence, strengthening Italy's position in global semiconductor research. By contributing to international and EU programs, the foundation reinforces Europe's semiconductor competitiveness, supporting the EU's strategic efforts to build global partnerships with key semiconductor-producing regions. Through these initiatives, Fondazione Chips-IT plays a pivotal role in securing Europe's technological sovereignty, advancing high-impact research, and shaping the future of the semiconductor industry.

Chips-IT: shaping the future where talent meets technology

The CHIPS-IT Foundation is inspired by the need of an Italian contribution for fostering European technological strategic autonomy and innovation. As the semiconductor industry evolves to meet the demands of a rapidly digitalizing world, CHIPS-IT stands as a pivotal force in bridging expertise, research, and industrial progress.

The foundation's commitment to collaboration, education, and advanced research paves the way for a smarter tomorrow, where cutting-edge technology aligns seamlessly with human ingenuity. As Chips-IT continues to grow, it will serve as a catalyst for breakthroughs that redefine the intersection of talent and innovation, shaping a more intelligent, connected, and sustainable future.

References

1 Exploring New Regions : The Greenfield opportunities - McKinsey - https://www.mckinsey.com/industries/semiconductors/our-insights/exploring-new-regions-the-greenfield-opportunity-in-semiconductors

2 The Draghi report: In-depth analysis and recommendations - The Future of European Competitiveness – Part B – Semiconductors, European Commission, 2024

3 "L'INDUSTRIA GLOBALE DEI SEMICONDUTTORI E IL RUOLO DELL'ITALIA ", Maria Rita Pierleoni, Ministero dell'economia e delle Finanze, December 2023 - https://www.dt.mef.gov.it/export/sites/sitodt/modules/documenti_it/analisi_progammazione/note_tematiche/Nota-Tematica-n-3-2023.pdf

4 Semiconductor design and manufacturing: Achieving leading-edge capabilities – McKinsey - https://www.mckinsey.com/industries/industrials-and-electronics/our-insights/semiconductor-design-and-manufacturing-achieving-leading-edge-capabilities

5 Italian Trade Agency – Semiconductor - https://www.ice.it/en/invest/sectors/semiconductors

Research Project Highlight

SC4EU Project

Anna Lackner

Aurélien Dubois-Pham

Shaping semiconductor supply chains: SC4EU's true demand approach for unmatched resilience

SC4EU is a cutting-edge KDT-JU project dedicated to elevating semiconductor supply chain management across Europe. By introducing a groundbreaking true demand framework and its formal ontology – a comprehensive solution for demand information exchange accross the semiconductor supply chain – SC4EU fosters seamless collaboration, ensuring that even the most complex supply chains become resilient, agile, and transparent. Built on the foundation of high-quality, partner-shared data, the true demand approach enhances demand forecasting while safeguarding confidentiality through advanced anonymity and security protocols. SC4EU is setting a new standard for robust and flexible semiconductor production in Europe.

Organised by the Chips Joint Undertaking (JU), INSIDE, EPoSS and AENEAS, EFECS 2024 spotlighted Europe's unwavering commitment to achieving technological sovereignty and global competitiveness in the semiconductor industry.

Amidst this gathering, SC4EU made its mark by pioneering demand-driven semiconductor supply chains. At the project booth, groundbreaking solutions were unveiled that aim to address the complex challenges of the industry by moving beyond conventional forecasting. Instead, SC4EU showcased a new era of precision and resilience: data-driven demand prediction, enhanced production scheduling, and a semantic web-based Digital Reference Platform that redefines collaboration across the supply chain.

The positive reception from visitors and industry experts underscored the urgency and impact of their mission. Conversations at the booth reflected a shared recognition of the need to evolve from outdated, assumption-based systems to robust, knowledge-driven models that will enable Europe to thrive in an increasingly competitive global market.

Collaborative Innovation at Work

One of the highlights of EFECS 2024 was the synergy between SC4EU and other transformative projects, notably AIMS 5.0, a trailblazer in AI-enhanced manufacturing. Together, these initiatives showcased the power of European innovation to create an interconnected framework for industrial excellence. While SC4EU advances the supply chain's reliability and resilience, AIMS 5.0 leverages AI to redefine manufacturing efficiency.

These partnerships are part of a broader European strategy to fortify the continent's semiconductor industry. The collaborative efforts of Chips JU and the three Industry Associations in curating EFECS 2024 are part of a shared vision: to establish Europe as a global leader in semiconductor technology through innovation, unity, and strategic investments.

Breakthrough Achievements Unveiled

SC4EU's presence at EFECS was a platform to share tangible advancements.
Key highlights included:

- True Demand Approach: Transforming traditional forecasting into precise, data-driven demand predictions to reduce market volatility and enhance resource allocation.
- Digital Reference Platform: Introducing a universal language for the semiconductor ecosystem, fostering seamless communication and collaboration.
- Private Data-Sharing Programme: Showcasing how secure data exchange can optimise production scheduling and elevate industry-wide efficiency.
- Strategic Partnerships: Highlighting collaborations with Europe's leading semiconductor suppliers and manufacturers, emphasising the ripple effects of SC4EU's innovations on the industry.

Most importantly, these innovations are not merely theoretical; they represent actionable solutions that support Europe's semiconductor manufacturing capabilities and strengthen its competitive position in the global market.

The Road Ahead

EFECS 2024 served as a pivotal event for the industry, marking significant progress in Europe's semiconductor landscape. Over the course of two days, it fostered meaningful discussions, collaborations, and insights that signal a new chapter for the continental union. Initiatives such as SC4EU, along with the strategic contributions of Chips JU, INSIDE, EPoSS and AENEAS, are driving efforts to establish Europe as a leader in supply chain excellence and semiconductor innovation.

This effort is not solely about achieving key milestones but also about laying a robust foundation for a resilient and technologically independent Europe. By leveraging creativity, collaboration, and a commitment to innovation, Europe is working toward setting a global standard for semiconductor excellence.

The advancements and momentum seen at EFECS 2024 represent only the beginning. Collectively, these efforts are building a stronger, more connected European semiconductor ecosystem with the potential to inspire on a global scale.

Co-funded by the European Union

Chips JU

Research Project Highlight

Transforming the European steel industry

Jerker Delsing

Chris Horgan

The PRISMA project is an ambitious initiative aimed at transforming the European steel industry by addressing the key challenges in environmental reporting, promoting digital innovation, and aligning with global sustainability goals. PRISMA is poised to drive significant positive change in the steel industry by integrating digitalisation and sustainability, which will not only benefit manufacturers but also contribute to a more sustainable and transparent global supply chain for steel products. No more the 'dirty guy of Europe' but a 'champion for environmental change'.

Modernise and Standardise

Aligned with the European Green Deal and Twin Transition objectives, PRISMA seeks to make steel production more transparent, efficient and environmentally responsible by leveraging innovative technologies and industry-wide collaboration. The main goal is to modernise and standardise environmental reporting in the steel industry by introducing the UEDM (Unified Environmental Data Model) and an integrated digital ecosystem.

PRISMA seeks to address the main challenges in the steel industry – lack of standardised environmental reporting and a fragmented digital infrastructure – by introducing an integrated digital framework that standardises environmental reporting and streamlines data management across the steel sector. Current traditional steel production relies on complex processes with data silos, making it difficult to measure and optimise environmental performance.

Collaboration is key

PRISMA emphasises industry collaboration, regulatory alignment and phased implementation strategies. The effectiveness will be validated through multiple industrial pilot demonstrations, involving key steel manufacturers such as Celsa, Tata Steel, Ori Martin and ABS. These pilots will focus on:

- **Scrap Processing and Recycling:** Optimising resource use and minimising waste in the early stages of steel production.
- **Energy Efficiency Improvements:** Reducing emissions and enhancing sustainability through process optimisation.
- **End-to-End Digital Integration:** Demonstrating the benefits of a fully integrated digital reporting system across the steel value chain.

The involvement of industry giants means that PRISMA's solutions are not only theoretical but also practical and scalable for large-scale adoption.

New standard

The PRISMA project represents a significant step forward in the digitalisation and decarbonisation of the steel industry. This transformative initiative leverages digitalisation and standardisation (especially employing the results of the Arrowhead fPVN project – see box text) to enhance environmental sustainability in the steel industry, providing a robust framework for accurate environmental reporting, optimised manufacturing processes and industry-wide collaboration. With strong support from leading steel manufacturers and research institutions, PRISMA has the potential to set a new standard for green steel production in Europe and beyond.

Strengthening Industrial Interoperability Through Standardisation

Standardisation plays a crucial role in enabling automation, digitalisation and sustainable industrial transformation. Standardisation impacts everyone in industry by ensuring that technologies work together in a connected, digital world. The Arrowhead fPVN project (strengthening-industrial-interoperability-through-standardization/) actively contributes to international standardisation efforts to ensure that industrial systems can seamlessly exchange data, improve efficiency and enhance interoperability.

Participation in standardisation bodies ensures that the Arrowhead fPVN project aligns with the latest international best practices, fostering seamless industrial data integration across diverse platforms and stakeholders, reduced engineering effort and costs through standardised information exchange, and increased efficiency, reliability and sustainability in industrial operations as well as future-proof solutions that enhance digital transformation and Industry 4.0.

Event

INSIDE Thematic Workshops series

Aurélien Dubois-Pham

Building tomorrow's innovation Part II

In today's dynamic tech landscape, staying ahead demands continuous iteration, collaboration and innovation. Building on the strong foundation of our initial workshops, this second instalment of our initiative takes a deeper dive into co-creating brainstorming, evaluating progress and broadening our collective impact to shape the Europe's leadership in a tech-driven future.

Shape the future of technology: our collaborative journey

We are building a dynamic, open and transnational community united around transformative technologies to drive innovation and create meaningful impact. Through a blend of physical gatherings and enhanced digital collaboration, our workshops provide an inclusive platform for experts, innovators and contributors to connect, share insights, contribute to the ECS-SRIA and refine project proposals that align with societal needs and tackle global industrial challenges.

As we move into the next phase of this initiative, our focus intensifies on deepening engagement, fostering sustainable practices and addressing critical issues through cutting-edge research, development and innovation (RD&I). Ultimately, we aim to build consortia and project proposals that align with Europe's evolving priorities and bolster its competitiveness on the global stage.

Our newly introduced digital collaboration platform will enable seamless sharing of resources, progress tracking and a continuous exchange of ideas, complementing the momentum built during physical events.

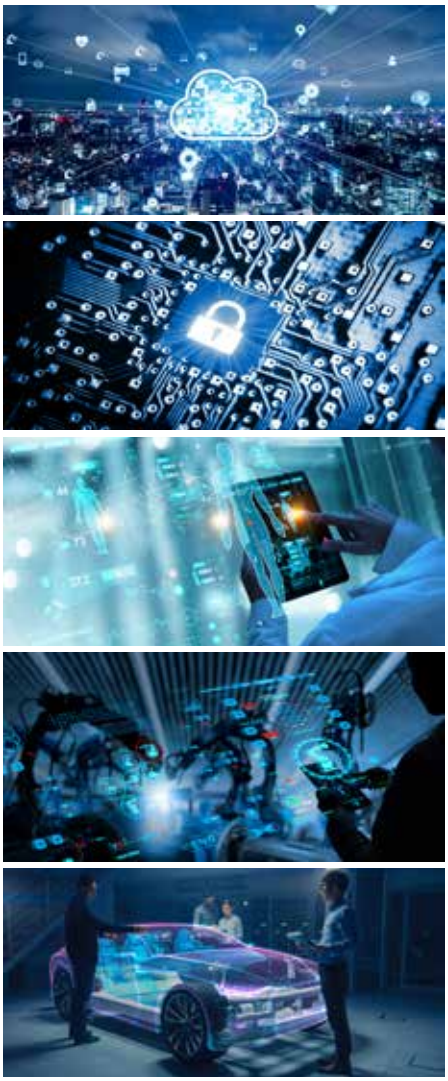
These workshops are more than discussions – they are action-driven sessions aimed at studying vital technology domains, identifying challenges and opportunities, and collaboratively drafting impactful project proposals.

Our technology focus areas include:

- Edge to Cloud Continuum
- ECS for Healthcare
- AI-Based Engineering Automation
- Safety and Security in System of Systems
- Digital vehicle of the future.

Progress so far

As mentioned in the previous issue of the INSIDE Magazine, the initiative started at the Budapest University of Technology and Economics (Hungary), where we set the tone for the series by defining objectives



and exploring key focus areas. This event provided a platform for open discussions, aligning participants on shared goals and priorities.

Then later on in the autumn of 2024 and in conjunction with the EDGE AI conference, our second workshop in Cagliari, Italy, offered an opportunity to reconnect and evaluate the progress made since Budapest. Participants leveraged the vibrant EEAI community to refine their ideas and integrate emerging trends into actionable strategies.

With the groundwork laid during our physical gatherings, online working groups have been instrumental in maintaining momentum. Regular teleconferences have allowed participants to collaborate flexibly, share insights and refine proposals, ensuring continuous progress between these physical events.

As we transition into the next phase of this workshop series, the focus shifts towards deeper engagement, implementation and preparation for the future. Below is an indication of what lies ahead.

What next?

Enhanced digital collaboration and call to action

To complement our physical gatherings, we're introducing an enhanced digital collaboration platform. This space will allow participants to share resources, track progress and maintain a dynamic exchange of ideas across the community, with a focus on impact

This initiative is not just about innovation but also about creating tangible impact. The second instalment will place greater emphasis addressing global challenges through cutting-edge RD&I by building taskforces to work on building consortia and project proposals or new Chips JU Focus Topic calls aligned with the new European Commission mantra 'enhance European competitiveness' and market reality while addressing real-world use cases. Moreover, the activities of the working groups established on the five focus areas will provide valuable feedback for the ECS-SRIA 2026, currently in preparation.

The momentum we've built so far is only the beginning. We invite all members of our community to stay actively engaged, contribute their expertise and take full advantage of the opportunities these workshops provide. Together, we can push the boundaries of technology and drive meaningful change.

Stay tuned for updates on the next physical workshop and the launch of our digital collaboration platform. Let's continue building the future – together.

Event

EFECS 2024

Driving innovation and shaping European competitiveness

Most historians believe that the older name for the Belgian city of Ghent, 'Ganda', is derived from the Celtic word 'ganda', which means 'confluence', so it was very appropriate that Ghent played host to EFECS 2025. This confluence, or coming together, of the community to explore the key topics shaping Europe's competitiveness in electronics and semiconductor technologies and their applications, provided the opportunity to renew friendships, catch up on both a personal and professional level, and foster collaboration. In all, the basis was laid for an inspirational two days as industry leaders, researchers and innovators showcased groundbreaking advancements and brightened up the grey skies overhead.

Opening address

To kick off the event, Jari Kinaret, Executive Director of Chips JU, emphasised the need in his opening address, to "bridge research, industry and policymakers, driving innovation along the entire value chain, from chip design to cutting-edge applications in mobility, energy, health and more." This, essentially, described the crux of this EFECS event. Furthermore, he pointed out to the fully packed auditorium that while Europe will continue to rely on the global semiconductor ecosystem, "we must build strengths, so others rely on us too."

Inspiring keynotes

These words provided a solid platform for Frédérique Le Grèves, President of STMicroelectronics France and EVP of Europe & France Public Affairs, to pick up the baton and deliver a compelling keynote speech in which she outlined a vision for Europe's semiconductor landscape. In spite of the turbulent geopolitical and macroeconomic backdrop, and all its constantly shifting variables, Le Grèves said that the crucial challenge for the semiconductor and related industries is to secure competitiveness through:

- **a long-term joint strategy** to strengthen Europe's semiconductor ecosystem
- **innovation-driven growth** to bridge competitive gaps and advance technological leadership, and
- prioritising **talent development and skill-building** to secure a brighter future.

In other words, it is vital for Europe to both protect and develop its assets. This message was subsequently underlined by Maria Christina Russo (Director Prosperity, European Commission, DG Research &

"Together, we can research, innovate, lead and deliver a sustainable, competitive and prosperous future for Europe."

Maria Cristina Russo (Director Prosperity, European Commission, DG Research & Innovation)

Innovation) in her keynote address in which she underscored the pivotal role of the strategic advancement of chips research and innovation (R&I) in shaping Europe's economic future prosperity. Not only did she highlight the foundation laid by the EU Chips Act but she also called for a strategic approach to:

- drive *innovation* in next-generation semiconductor technologies
- increase *investment* in skills development and green digital solutions, and
- reduce dependencies by strengthening Europe's technological *autonomy*.

Both these keynotes contained the same building blocks and emphasised the urgency of taking existing progress forward to ensure that Europe remains competitive on the global stage. So, against this background, the event focused on specifics, and here we consider three of the topics presented that are of particular relevance to the INSIDE community.

Automotive innovation

Andreas Eckel, Teamlead for Innovation Projects & Funding Management at TTTech, and Michael Paulweber, Dir.Research & Technology ITS, AVL List GesmbH, with more than 40 years of industry experience and leadership, brought insights to bear in next-gen mobility. They kicked off by presenting the current and future challenges faced by software-defined vehicles and ADAS/AD. And, of course, challenges require solutions, whether financial, technological, commercial or otherwise. In the EU funded FEDERATE project, coordinated by AVL, the aim is indeed "to collect and evaluate future trends, derive a common understanding (glossary), prepare and maintain a roadmap, help to create a vibrant SDV community in Europe and, furthermore, foster a European initiative and to orchestrate a strong open European collaborative community." Precisely the objective that will help to solve burning societal issues with respect to providing clean, affordable and safe mobility as well as contribute to the objectives of the European Green Deal and strengthen European chip and automotive software sovereignty. The need for action on the goals set out by the two keynote speakers, therefore, is well and truly embodied here.

ECS for health

At the intersection of electronics, components and systems (ECS), experts Juan A. Montiel-Nelson (University of Las Palmas de Gran Canaria), Dominique Goubier, and Olivier Horbowy (STMicroelectronics) showcased how ECS technologies are revolutionising healthcare delivery and diagnostics. Dominique Goubier outlined how Artificial Intelligence (AI) technology maturity will enable competences and insights in the healthcare domain and while economic value of the increased quality of life is hard to quantify at this stage, the potential is evident – in Sweden the direct economic value amounts to €690 m per annum. Juan A. Montiel-Nelson then explained how the H2TRAIN project addresses the enabling digital technologies in holistic health-lifestyle supported by artificial intelligence (AI) networks. The objective is to advance the available technologies (sensors, AI, edge-cloud continuum, etc) and integrate them smartly up to a higher TRL, for example, where there is a high technology demand for remote monitoring (home hospitalisation). With physiological signals pre-processed by AI on the edge in a number of advanced wearable devices and biosensors, and by digital twins in the cloud, health or sport experts can monitor the evolution of individuals. Very practical, very tangible. Finally, Olivier Horbowy, made the case for bridging innovation and care for real-world impact, whereby sustainability, value and trust are essential ingredients. Medical innovation requires the development and integration of advanced technologies – from chips to medical devices to platforms – to enhance healthcare delivery, diagnostics, treatment and patient outcomes.

Edge AI in focus

Edge AI is a rapidly growing field, one that symbolises the technology convergence of the Internet of Things (IoT), edge computing and AI, which allows processing data in real-time at the edge and brings several benefits like reduced latency, bandwidth requirements, power consumption and memory footprint while increasing security and data protection. Ovidiu Vermesan, Chief Scientist at SINTEF Digital, and Giulio Urlini, R&D Programme Manager at STMicroelectronics, steered this session that explored the intelligence revolution. With the Edge AI chips market projected to reach USD 25.3 billion by 2033, unsurprisingly the Chips JU Edge AI project (Edge AI Technologies for Optimised Performance Embedded Processing) is focused on developing new electronic components and systems, processing architectures, connectivity, software, algorithms and middleware through the combination of microelectronics, Edge AI, embedded systems and edge computing. All with the aim of connecting the future and driving the next wave of technological advancements for a better world.

Your network is your net worth

Of course, it was not all work and no play, as the lunchtime break allowed participants and visitors alike to take time to grab a bite and a bit of conversation, mingle with familiar and new faces, and visit the various project stands dotted around the ground floor area. The INSIDE stand drew members of the community as well as curious visitors to interact with both the office team and each other in a relaxing atmosphere. An example of the precious added value of personal relationships that lies at the heart of successful innovative technology.

Road to robust leadership

Time to get back to business as the afternoon session opened with Gustav Kalbe, acting Director of Enabling and Emerging Technologies at DG CNECT, European Commission, providing a comprehensive overview of Europe's current standing in the semiconductor sector and highlighting the critical steps needed to solidify its leadership.

A brief overview:

- **Implementation of the Chips for Europe Initiative** that aims to bolster Europe's semiconductor capabilities through targeted programs and collaborations.
- **Chips JU Pilot Lines** that offer users across the EU access to cutting-edge innovation, providing essential opportunities to test and adopt groundbreaking technologies.
- **Strategic Investments** to address weaknesses within the EU's semiconductor ecosystem and making informed decisions about where to allocate resources.
- **Collaboration for Success** to tackle the key challenges facing Europe. Enhanced cooperation among stakeholders is vital to achieve shared goals and build a robust semiconductor industry.

These steps were further expounded by a number of experts, and a panel discussion allowed an interactive consideration of the four pilot lines presented following Kalbe's introduction.

Chips for Europe Initiative: strengthening EU competitiveness

Following a short break, Ferdinand Bell, Head of Public Collaborative Programmes, NXP Semiconductors Germany GmbH, took time to talk about the **Important Project of Common European Interest (IPCEI): Microelectronics and Communication Technologies**, which can be regarded as complementary to R&D programmes like EFECS, Eureka, Chips JU or Horizon Europe. It involves First Industrial Deployment (FID) activities on top of R&D&I, and addresses critical key enabling technologies like microelectronics/communication, battery technologies, hydrogen and low-carbon industries. While it is funded by national authorities of the member states, approval from the EC is needed, as it is an exception to state-aid rules.

This €22 billion programme comprises €8 billion public funding and €14 billion private investments, with participation from 14 member states and 6 associated member states. With more than 56 direct participants, 30 associated partners and 600 indirect partners, this 'think big' initiative incorporates SPILLOVER activities that address partners beyond the conventional ecosystem across entire EC. The four work-streams correspond to the complementary technical objectives along the microelectronics value chain:

- **SENSE** addresses the *organs of perceptions* which generate the data to be processed.
- **THINK** addresses processors and memory as the *brain* of a computer.
- **COMMUNICATE** addresses the *strong nerve pathways* which network with the brain.
- **ACT** addresses the *body and muscles* of an electronic system.

This, Bell emphasised, is a 'team sport'. "IPCEIs strengthen important European value chains and contribute to political priorities of the European Union, such as the Green Deal and Digital Strategy, and its sovereignty." It is a clear statement of intent.

Food for thought

The day's final parallel session, comprising four workshops, stepped up the level of engagement. Among these workshop sessions was **EDGE AI** – organised by INSIDE's Paolo Azzoni and Inessa Seifert from VDI-VDE – which focused on pushing the boundaries of constraints and considered the current limitations of technology. Azzoni presented the three AI pillars, or main enablers of modern AI: new algorithms, data availability and computing power. He pulled no punches in his assertion that while efficient hardware is a must, unless it offers clear physical superiority, it is not enough for competitiveness. So, success lies in the ability to meet clients' computational needs effectively and seamlessly, minimising their

effort to build on hardware. What, then, are the emerging alternatives to the limitations we face. He suggested the following:

- Cerebral organoids: 3D structures grown from pluripotent stem cells in a lab, mimicking certain features of the human brain (e.g. cerebral cortex)
- Neuromorphic: analog HW solutions mimicking biological neural networks (SNN), event-driven rather than continuous data processing
- Photonics-based accelerators: integrated photonics using optical interference to compute in parallel, quickly and efficiently
- Quantum technologies: with the potential to revolutionise AI leveraging the unique properties of quantum mechanics for learning and prediction.

The other three workshops – Lab to Fab Accelerator on Advanced Packaging, Design Platform and Quantum Pilot Lines – ensured that at the end of the day, the participants and visitors had plenty of food for thought as their thoughts turned to food and the evening's social event cocktail and walking dinner.

Advancing Europe's Semiconductor Industry: alliances, challenges and investment opportunities

The second day saw a presentation of the Chips Ju Calls 2025 that brought to light significant advancements and challenges in the semiconductor industry, a key highlight of which was the presentation of the Alliance on Processors and Semiconductor Technologies, led by Silvana Muscella, ALLPROS.eu Project Coordinator and CEO of Trust-IT Services.

The Alliance connects stakeholders across Europe, from industry leaders to research organisations and associations, to address critical gaps in microchip production and foster growth and resilience. Muscella shared insights from working groups focused on skills development, supply chain resilience and PFAS challenges.

Deep tech

Additionally, Marco Ceccarelli, Programme Officer at DG CNECT, European Commission, presented the funding challenges confronting Europe's deep-tech sector and the Chips Fund's role in addressing these issues before underlining the potential of private equity investment in the semiconductor sector, emphasising the sector's pivotal role in driving digitalisation, the exciting growth opportunities within Europe's semiconductor industry, and the need for robust investment strategies to sustain this momentum.

Going greener

Furthermore, a discussion of the technologies shaping a more efficient and sustainable energy landscape explored the topics of Energy and Green Electronics with Erika Györvary, Lead of European Affairs at CSEM, and the future of Power Electronics with Jochen Koszescha, Senior Director at Infineon Technologies. They delved into sustainable innovations and the technologies driving a greener and more energy-efficient future.

Shaping the future

With a focus on the European Chips Academy, it was the turn to address the semiconductor talent gap and the most sought-after profiles. This was complemented by a presentation of the funding decisions for the 2024 Electronic Components and Systems (ECS) calls and the expected timeline for the 2025 calls, including quantum chip technology, and Competence Centre calls. These discussions explored the current political landscape and the future of Europe's competitiveness, with key insights drawn from the Mario Draghi Report.

Additionally, the introduction of the ECS Strategic Research and Innovation Agenda (ECS SRIA) served as a critical guide to accelerate Europe's digital transformation, reflecting European values, and laying the groundwork for the Chips JU ECS R&I Calls.

A Vision for the future

As Europe moves forward, the insights from these sessions serve as a roadmap for fostering innovation, reducing dependencies, and securing a competitive edge in the global semiconductor market. By investing in research, skills, and strategic collaborations, the European Union is laying the groundwork for a sustainable and prosperous future in advanced technologies.

Online version is available at Inside-association.eu

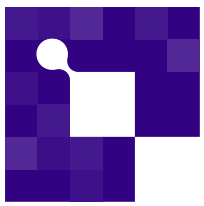
Publisher
INSIDE Industry Association
High Tech Campus 69-3
5656 AG Eindhoven, The Netherlands

Design and Creative lay-out
Studio Kraft – Veldhoven, the Netherlands

Acknowledgements
With thanks to the interviewees, project participants, INSIDE Industry Association office, the INSIDE Industry Association Presidium and other INSIDE Industry Association-involved persons for any assistance and material provided in the production of this issue of the INSIDE Magazine.

Contributions
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

INSIDE
Industry Association



INSIDE
Industry Association

INSIDE-association.eu