ALL PROS.EU

EU CHIP CHRONICLES

Education, Strategy and Sustainability

A look at recent events, upcoming initiatives and ongoing efforts in the European semiconductor sector

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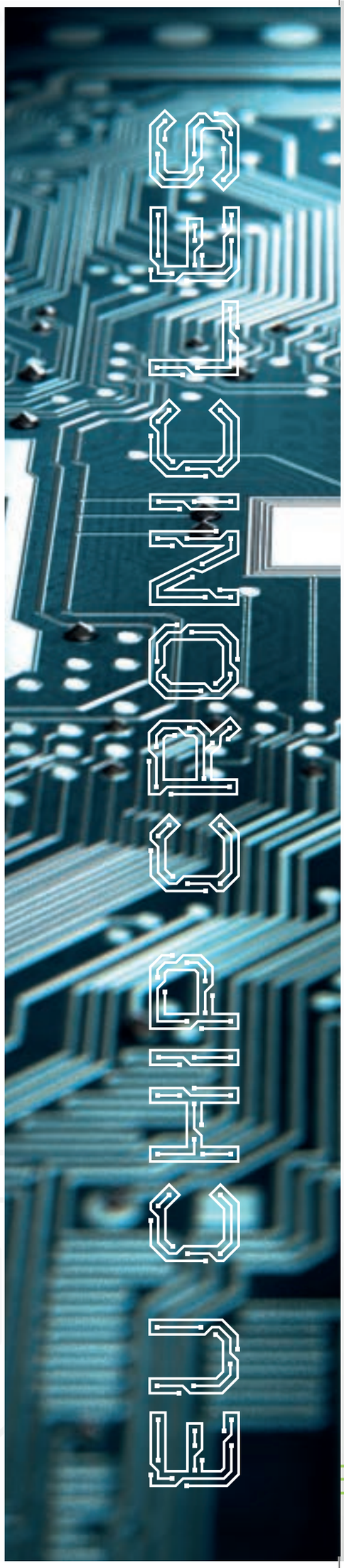
Table of Contents



Foreword

Welcome to the third issue of the **EU Chip Chronicles magazine**, the quarterly publication providing stimulating stories on the world of European semiconductors. This is brought to you by the ALLPROS.eu project, a coordination and support action funded by the European Commission Digital Europe Programme to enhance **Europe's digital sovereignty in the chips industry** through the consolidation of the community, and empowering it through the creation of a knowledge platform.

This release of this issue follows two momentous achievements for the ALLPROS.eu project: the release of the strategic Blueprint report in June, with which we open this issue, followed by the official launch of the Industrial Alliance on Processors and Semiconductor technologies in July. Considering the focus on immediate action and long-term success that underlies both of these, in this issue we take a look at events and practices that are relevant to the discussion of sustainability and strategy in the European semiconductor sector.

Following our article celebrating the publication of the Blueprint, we spotlight some best practices from the semiconductor industry: ECoVEM in the category of skills, Air Liquide for materials, chemicals, and equipment, and CEA-Leti for ATP (Assembly, Test, Packaging) in Europe and Partner collaboration. Given that these practices also come from different stakeholder groups and value chain positions, this presents a well-rounded view of how organisations in Europe are moving the industry forwards on multiple fronts.

Next, IDC's takeaways on the 2nd ALLPROS.eu Market Trends webinar summarises the conclusions for the semiconductor industry offered by speakers, including considerations for infrastructure, regulatory risks, overcoming "hype" and the need for investment associated with AI. From the key takeaways, IDC offers actionable recommendations for industry players facing the challenge of adapting to AI and GenAI.

Considering Europe within the global semiconductors context, White Research provides a comparative analysis of US and EU approaches to semiconductor strategy, focusing on manufacturing, supply chain security, financial support, and investment. The comparison is rounded off with a reflection of how strategies may be enacted and the potential impacts on industry, R&D and supply chains.

Finally, we include three articles centred around semiconductor education: some words from SEMI Europe on the importance of summer schools following the announcement of the ECS Summer School 2024 programme, a perspective from the GreenChips-EDU project on how approaches to microelectronics education can adapt to ensure the sustainability of the industry, and a selection of some of ProgeTiger's important qualities in being a successful ICT education programme that Education Estonia has implemented in schools.

I hope you will find this issue as interesting and timely as we do and hope you will enjoy this issue. If you would like to share some of your stories with us we would be happy to include them in our future editions.

Silvana Muscella
ALLPROS.eu Technical Coordinator

ALLPROS.eu Releases the Strategic Blueprint Report to Address the Skills Shortage in the Semiconductor Industry

By Valeriya Fetisova and Alexandra Burchill, ALLPROS.eu

On 19 June, 2024, ALLPROS.eu released the "Blueprint Report: Bridging the Skills Gap in the Semiconductor Industry." The Blueprint presents 7 strategic recommendations developed by the Thematic Working Group on Skills, to address the talent shortage and strengthen the European semiconductor ecosystem.

The increasing demand for skilled talent in the semiconductor industry has been a persistent challenge that has prompted governments, industry, and academia to take remediating measures to address the widening talent gap. However, as semiconductor manufacturing requires a wide range of specialised skills, this has proven a complex challenge that is difficult, if not impossible, to solve by unilateral means.

To bridge the efforts of the European industry, governments and academia, ALLPROS.eu launched the informal Thematic Working Group on Skills aimed at providing recommendations on how to tackle the talent gap considering the market needs. Based on a coordinated approach including stakeholders from across academia, industry, and policy, the TWG on Skills gathered leading organisations working on skills development in the semiconductor industry to collect best practices and key recommendations.

Thanks to the insights and analyses gathered by the TWG on Skills, ALLPROS.eu has developed the Blueprint Report, a joint document aimed at providing practical guidelines to address the talent shortage from multiple perspectives: industry, education, and government. The Blueprint provides a comprehensive overview of key trends, existing initiatives, and actionable recommendations to expand the talent pool in Europe's semiconductor sector.

An additional layer of significance has been added to the Blueprint Report, following the launch of the Industrial Alliance on Processors and Semiconductor Technologies by the European Commission on 9 July, 2024. The recommendations from the Blueprint now serve as an essential input to the Alliance's newly formed Working Group on Skills. This Working Group will base its future activities on the seven strategic recommendations outlined in the Blueprint, ensuring that the insights from the report guide ongoing efforts to address the skills gap.

Furthermore, the Blueprint Report has been presented to the European Semiconductor Board, highlighting its role in shaping future policies and initiatives aimed at bridging the skills gap. This underscores the importance of industry input in steering policy decisions and ensuring that the semiconductor sector's needs are met effectively.

Download the Blueprint Report to obtain a comprehensive overview of the key trends, existing initiatives, and recommendations to expand the talent pool for the semiconductor sector in Europe.

A selection of semiconductor Best Practices

by Ola Adach, OpenForum Europe

In this article, we present a curated selection of Best Practices from leading companies, projects, and consortia in the European semiconductor industry. These practices have been collected through extensive desk research and direct outreach to stakeholders across the sector. Our aim is to showcase exemplary initiatives and strategies that highlight the strengths and innovations within the European semiconductor landscape.

The best practices featured in the Best Practices encompass a wide range of actors from across the value chain. We have gathered insights from academia, associations and trade organisations, as well as from large enterprises and SMEs. Additionally, we have examined various consortia to provide a comprehensive view of collaborative efforts in this field. Each project and company has been selected not only for its individual merit but also for its contributions to addressing the challenges and opportunities in the semiconductor sector.

Our first set of published Best Practices highlights ECoVEM, Air Liquide, and CEA-Leti. We focused on ECoVEM's strategies on combatting the skills challenge, a topic that is also discussed in the ALLPROS.eu Blueprint Report, Air Liquide's industrial innovations and CEA-Leti's collaborations that help to advance ATP. By sharing these insights, we hope to foster a deeper understanding of effective strategies and encourage the adoption of these practices across the sector.

We will continue to release more Best Practices on a continuous basis – if you are interested in having your company presented here, feel free to reach out at ola@openforumeurope.org.

ECoVEM

Best practice category: Skills

Stakeholder group: Associations, trade organisations and consortia

Value chain position: Policy and funding

ECoVEM is empowering Europe's semiconductor workforce through tailored VET and skill excellence.

General information

European Cooperation platform of Vocational Excellence in Microelectronics (ECoVEM) brings together VET centres, polytechnics, industrial associations and social partners to revitalise skills in the microelectronics sector. The partners stem from Italy, Bulgaria, Germany, Cyprus, France and Spain. ECoVEM builds on and complements the strengths of national VET systems in countries with more advanced VET and supports the less advanced regions to achieve VET excellence.

ECoVEM is also tasked with countering several challenges which persist in vocational training, including digitalisation, AI, green technologies, gender equality and technology, as well as integration of migrants. The project implements innovative instructional approaches towards life-long capacity to self-regulate learning, hard skills and soft skills by using ecosystems-based theoretical models and performance support systems.

Activities and best practices

An analysis conducted by the ECoVEM partners identified the needs of the target audiences – students, trainers, future employers, practitioners,

VET centres and policymakers – in terms of the required education, missing skills, and job market vacancies. ECoVEM concluded that the occupations most needed on the European semiconductor market are ATP technicians and design/microelectronics engineers. The most desired skills include the know-how of design tools and backend technologies (like test-handling, verification technologies), and hands-on experience in manufacturing processes.

Thus, the ECoVEM platform offers courses amounting to 1250h of VET curricula and short courses, with the goal of implementing the best practices approach to vocation training developed by leading VET countries. The courses are arranged by type and seek to close those gaps, covering Design and manufacturing of printed circuit boards (PCBs), Fundamentals of microelectronics manufacturing, IC design, Key competences and transversal skills, Microelectronics for greener economy, Microelectronics packaging technologies, and System design. The system implements the 8-level European Qualifications Framework (EQF) and the European Credit System for Vocational Education and Training (ECVET) to streamline people's understanding of the comparative value of their degrees under different national systems.

By developing a more responsive and tailored VET, educational institutions can adjust to the fast changing needs of the labour market, while ECoVEM also provides its own Database of Best Practices which compile the most effective procedures in the areas of education, employability, innovation and VET, among others.

Challenges addressed with this practice

The practice of ECoVEM primarily addresses the challenges and needs within the semiconductor industry's skill development and workforce readiness. It revitalises skills in the semiconductor sector by bringing together various stakeholders and promoting know-how and excellence in the field.

Moreover, thanks to ECoVEM's broad market analysis, the project meets the industry and market needs by understanding the demand and providing the relevant education recommendations and training schemes for students and trainers alike. Importantly, ECoVEM takes into account advancements in AI and opportunities of green transition in its design of VET practices, ensuring that no workers are left behind. Finally, the project standardises and modernises education by developing universal, up-to-date curricula and implementing the EQF/ECVET frameworks for ease of comparison.

Air Liquide

Best practice category: Materials, chemicals, and equipment

Stakeholder group: Large enterprises

Value chain position: Materials and chemicals

Air Liquide is advancing global semiconductor production with advanced UHP gas solutions.

General information

Air Liquide (AL) is a French multinational company which is the second largest supplier of industrial gases by revenues (following Linde). It supplies industrial gases and services across industries including medical, chemical, and electronic manufacturers. Headquartered in Paris, it also has major sites in Tokyo, Houston, Newark, Delaware, Frankfurt, Shanghai and Dubai. The company's R&D primarily targets the creation of industrial gases, alongside gases used in semiconductors, healthcare, foods, and chemicals.

Ultra-high purity (UHP) gases like nitrogen, helium, hydrogen and argon are instrumental in the semiconductor industry and are used across the production process to ensure impurity control, etching, deposition and annealing, among others. Air Liquide is the #1 co-leading global provider of UHP specialty gases to the microelectronics industry, enabling sustainable innovation in Europe and beyond.

Activities and best practices

Air Liquide supplies the semiconductor industry with both UHP carrier gases and precursor molecules (specialty and advanced electronics materials), in addition to providing the equipment and services necessary for the safe and optimum handling and distribution of the products. Across the production line, AL's products contribute to the optimisation of semiconductors. A few of the company's cutting-edge products and services in the chip sector are highlighted below.

During chemical mechanical planarisation (CMP), wafers are smoothed and flattened through etching techniques that allow for achieving desired planarity of the wafer. Chemical etching – done using slurries – is a preferred method for removing excess material as it avoids introducing surface defects or flattening the surface, unlike mechanical etching. Air Liquide's slurries blending distribution systems like the FabChem series are modular and highly sophisticated slurry dispense platforms in the form of cabinets. This equipment offers high performance with user-friendly HMI and easy maintenance, along with a series of safety and emergency features.

Air Liquide offers a line of gas-handling equipment that ensures a continuous and high-reliability performance of fabs. The ALIM 2 gas cabinet is a fluid delivery system for specialty and inert gases that allows operators to safely manage the distribution of the most toxic, flammable, corrosive, pyrophoric, and oxidising gases. AL offers a dedicated team of experts that conduct the setup, training, and maintenance of the machine.

With FabStream gas delivery cabinets, manufacturers achieve a fully automatic distribution of gas that operates across gas applications, from low rates to over 3,000 slpm. Finally, its gas mixer series offers on-site gas generation and analysis equipment, for doping and forming gas mixtures alike. This highly automated and efficient solution allows for better reproducibility, stability and safety than cylinder-based supply.

Challenges addressed with this practice

Air Liquide addresses several challenges in the chip manufacturing process. Through its optimised and automated equipment, like the gas mixer series, AL ensures that the UHP gases are handled meticulously and according to high safety standards on site. By offering its support services for the setup, training, and maintenance of the equipment, AL addresses the need for specialised knowledge and support in handling and maintaining sophisticated gas delivery systems.

Moreover, ensuring the smoothness and planarity of wafers without surface defects remains challenging in semiconductor manufacturing. Air Liquide's sophisticated slurries blending distribution series offers precise chemical etching solutions. Overall, these practices by Air Liquide contribute to addressing challenges related to precision, safety, efficiency, and expertise within the European semiconductor manufacturing chain, ensuring smoother operations and fostering innovation within the industry.

CEA-Leti

Best practice categories: ATP in Europe and Partner collaboration

Stakeholder group: Research and academia

Value chain position: R&D

CEA-Leti is driving European ATP innovation through strategic collaborations in microelectronics.

General information

CEA-Leti is one of the leading institutes for applied research in microelectronics and nanotechnologies, focusing on applications for defence and security, low carbon energies, industry research, as well as physical and life sciences research. It is the technology research unit of CEA Tech, the French Atomic Energy and Alternative Energy Commission. Based in Grenoble (France) with offices in the Silicon Valley and Tokyo, CEA-Leti puts together 1,900 researchers with 250 active bilateral industrial partners who develop design, manufacturing and ATP solutions for 100, 200 and 300mm wafers.

Activities and best practices

In the ATP sphere, CEA-Leti offers on-wafer photonic integrated circuit (PIC) testing services. As a result of its research, thousands of dies can be measured in one day by leveraging 5 automatic probers compatible with 300 mm wafers, and 1 prober compatible with 200 mm wafers. Fully packaged PICs can also be tested on the dedicated testing benches at the institute.

As part of its broad research collaboration, CEA-Leti participates in multiple EU-funded projects, with those relevant to ATP advancement highlighted below.

Along with several other partners, CEA-Leti is part of the photonixFAB consortium, which aims to build a European photonics device value chain and initial industrial manufacturing capabilities. The project intends to develop scalable packaging and testing solutions in alignment with the PIC platform developments, in addition to enabling PDK-based design automation for the photonic platforms.

With the Partnership for Realisation and Validation of AI Hardware Leadership (PREVAIL), four European research institutes – CEA-Leti, IMEC, VTT and Fraunhofer-Gesellschaft – are collaborating to establish a multi-hub Test and Experimentation Facility (TEF) for edge AI hardware. As a multi-hub platform providing prototype chip fabrication capability in advanced technology to EU stakeholders for AI applications, PREVAIL will enable a trusted infrastructure in Europe where companies and research institutions will be able to fabricate early prototype samples based on innovative technologies and test them in real edge AI applications.

With the NEURO-BMI project, four European research institutes and medical companies are collaborating to develop an embedded neuroprosthetic, an innovative brain-spine interface technology for people with a spinal cord injury. One of the objectives of the project is the introduction of an auto-adaptive framework, which allows for calibrating the neuronal activity decoder in adaptive manner in real time during the neuroprosthetics' self-directed use using neural data.

In the REDFINCH project, partners from five Member States cooperated to build three fully-integrated, PIC-based, chemical sensor demonstrators. With CEA-Leti this took a new step towards cost reduction, extreme integration and mass deployment of such PA sensors with a miniaturised silicon PA-cell fabricated on standard CMOS tools. This new sub-centimeter PA cell built on a silicon platform has been designed, fabricated and characterised. Initially, the component was designed using a detailed physical model accounting for viscous and thermal losses and metamodel-based optimisation techniques.

Moreover, in November 2022, CEA-Leti and Intel provided a breakthrough for the future of die-to-wafer (D2W) bonding by optimising hybrid direct-bonding – a self-assembly process that has the potential to increase the alignment accuracy as well as fabrication throughput by several thousand dies per hour. Researchers focused on how chips are cleaned after they are cut – by increasing the speed of the costly cleaning strategy, they achieved a much higher throughput. Thus, the project led to the creation of a high-throughput industrial production process that is precise to under one micron and is currently being used in CEA-Leti cleanrooms.

Challenges addressed with this practice

CEA-Leti excels in highly specialised ATP processes, enabling high-throughput testing and packaging methods, particularly for emerging technologies like PICs. This deployment of technology in specialised areas, such as healthcare and biomedical interfaces, effectively bridges diverse areas of research. Through collaborations with partners in various projects, like the EU-funded photonixFAB. CEA-Leti fosters cooperative efforts that drive the advancement of the EU semiconductor value chain. CEA-Leti provides highly specialised ATP processes that allow for high-throughput testing and packaging methods, especially for emerging technologies like PICs.

Post-event takeaways from the 2nd ALLPROS.eu Market Trends webinar: The Impact of AI and GenAI on the Semiconductor Industry

By Luis Fernandes, IDC

Summary

The webinar hosted by IDC in the context of ALLPROS.eu discussed the impact of AI and GenAI in the semiconductor market, broadly around the world, but also specifically in the EU. The work developed by the EU in this topic needs to be accelerated, as skills and technologies are rapidly evolving.

To keep pace, EU organisations need to prioritise the development of programmes by investing in highly valuable streams of revenue for European industries, such as the Automotive industry. Challenges and opportunities need to be clearly identified for tactical investment.

Speakers highlighted the projections that the AI market will grow drastically over the next few years, and the need to develop solutions for workloads that can deliver business value. Lessons need to be learned where AI has been unsuccessful, and efforts should be made to tackle the challenges of this era and prepare for the next chapter, with investments that support AI workloads in the long run. These investments should support edge infrastructure, data centres with liquid cooling, and investment in Education for a highly skilled workforce.

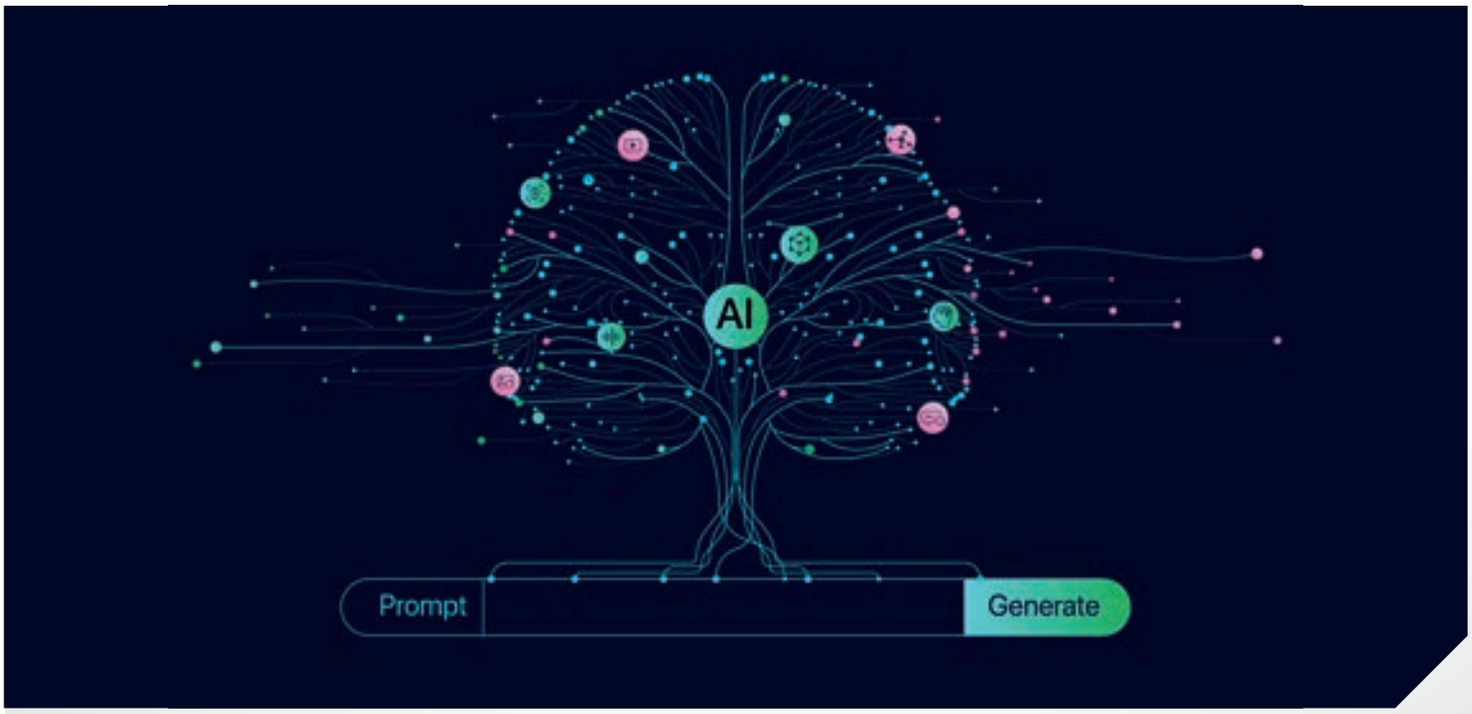
The webinar provided valuable insights into the current and future impact of AI in the semiconductor industry, emphasising the importance of long term strategic planning, skills development, and the creation of an ecosystem where Governments, Academia, Manufacturing industry and Service delivery all work together to develop a competitive and differentiator market.

Key Takeaways

- Europe lacks the structure for investment in up-and-coming technologies. It does not have the legacy of angel investors from the private sector like in the US, and it has much more constraint regulation for public investment than in China.
- The AI market is booming, but it will require on-premises infrastructure, since European companies prefer the use of private IT.
- It is hard for companies to navigate the hype of AI and find true business value in AI adoption.
- AI is highly complex, carrying risks and requiring substantial investments.

IDC's Recommendations

- A non-conventional approach to investment is required - Investing in R&D and specialised niche areas.
- Creation of an ecosystem that is self-sustained – States to provide strategic guidance, policies and investment, Academia to provide specialised resources, companies to create new products and solutions.
- Support the development of next generation data centres, designed for power intensive workloads, in the EU digital sovereignty space.
- Edge can be more fruitful, and use funding currently available to create them.
- Look for specific productised, pre-validated workloads, to be able to deploy them in a "path of less resistance" approach.
- Analyse where to deploy AI, looking not only at security and sovereignty, but also latency and power and investment where lacking.
- Look at both the AI engine as well as the data. Look to have it deployed in the right way, in the right place, with the adequate infrastructure.



Comparing the US and EU approaches to semiconductor strategy

by Konstantina Mataftsi and Lottie Boas, White Research

Introduction

The semiconductor industry is a cornerstone of technological advancement and economic security, prompting both the United States and the European Union to develop robust strategies to fortify their microelectronics ecosystems. The objective of this comparative analysis is to delve into the distinct approaches of the US and EU, underscoring their unique priorities in semiconductor manufacturing, supply chain security, and financial support mechanisms.

Despite their different focal points, both the US and EU share a common objective: to invigorate their semiconductor industries through substantial investments in R&D and by fostering collaboration among key stakeholders. However, by gaining a glimpse into the results of this analysis, it becomes clear that their methods diverge to some degree. For instance, the US strategy places a strong emphasis on enhancing domestic manufacturing capabilities and securing supply chains, whereas the EU strategy is geared towards bridging the gap between groundbreaking research and industrial application. The US approach is characterised by direct support for entrepreneurs and small businesses to accelerate the commercialisation of innovative technologies. In contrast, the EU strategy seeks to facilitate access to finance and investment opportunities for start-ups and SMEs through a variety of funding mechanisms.

These findings will be explored in greater detail throughout the document, providing an in-depth analysis of the specific programs and initiatives each region employs. This comprehensive analysis will shed light on how the US and EU plan to strengthen their semiconductor industries, reflecting their distinct strengths and stages of development within the global semiconductor value chain.

Differences between the US and EU approaches

Focus on Semiconductor Manufacturing and Supply Chain Security

- *The US strategy prioritises bolstering semiconductor manufacturing capabilities and supply chain security while the EU strategy focuses more on bridging the gap between research and industrial exploitation.*
- *The US strategy emphasises existing programs targeting supply chain security and modernisation, while the EU strategy focuses on establishing new initiatives to support technological capacity building and provide financial support for SMEs and start-ups.*
- *Both approaches aim to strengthen the semiconductor industry but differ in the specific programs and mechanisms employed to achieve their goals.*

US Strategy:

- The US National Strategy on Microelectronics Research places significant emphasis on supporting semiconductor manufacturing. Initiatives such as the CHIPS Acts and the establishment of new Manufacturing USA institutes highlight the importance of strengthening domestic semiconductor production capabilities.
- The strategy also prioritises supply chain security and resilience, evident through programs like the Trusted and Assured Microelectronics (T&AM) Program. These initiatives aim to address vulnerabilities in the semiconductor supply chain and ensure the resilience of critical defence systems.

EU Strategy:

- The European Chips Act primarily focuses on bridging the gap between research and industrial exploitation. While it acknowledges the importance of semiconductor manufacturing, its emphasis lies more on setting up a design platform, enhancing pilot lines, and building capacities for emerging technologies like quantum chips.
- The EU strategy does not have specific programs or initiatives dedicated to semiconductor manufacturing or supply chain security to the extent seen in the US strategy. Instead, it aims to foster innovation and industrialisation by supporting research and development efforts and providing infrastructure for experimentation and prototyping.

Financial Support and Investment Opportunities

While both strategies aim to support innovation and entrepreneurship, they employ different financial mechanisms to achieve their goals. The US strategy emphasises direct support to entrepreneurs and small businesses in the microelectronics sector through targeted programs and investments. In contrast, the EU strategy utilises the Chips Fund to provide easier access to finance and investment opportunities.

US Strategy:

- The US strategy includes targeted programs and investments aimed at supporting entrepreneurship, start-ups, and early-stage businesses in the microelectronics sector. Initiatives like the Innovation Corps (I-Corps) program and the NSTC investment fund are designed to facilitate access to funding and accelerate the transition of technologies from research to commercialisation.
- The emphasis is on providing direct support to entrepreneurs and small businesses, enabling them to access the resources and capital necessary for growth and development.

EU Strategy:

- The European Chips Act establishes the Chips Fund to facilitate access to debt financing and equity, particularly for start-ups, scale-ups, SMEs, and small mid-caps in the semiconductor value chain. The fund aims to provide easier access to finance and investment opportunities through blending facilities under the InvestEU Fund and via the European Innovation Council.

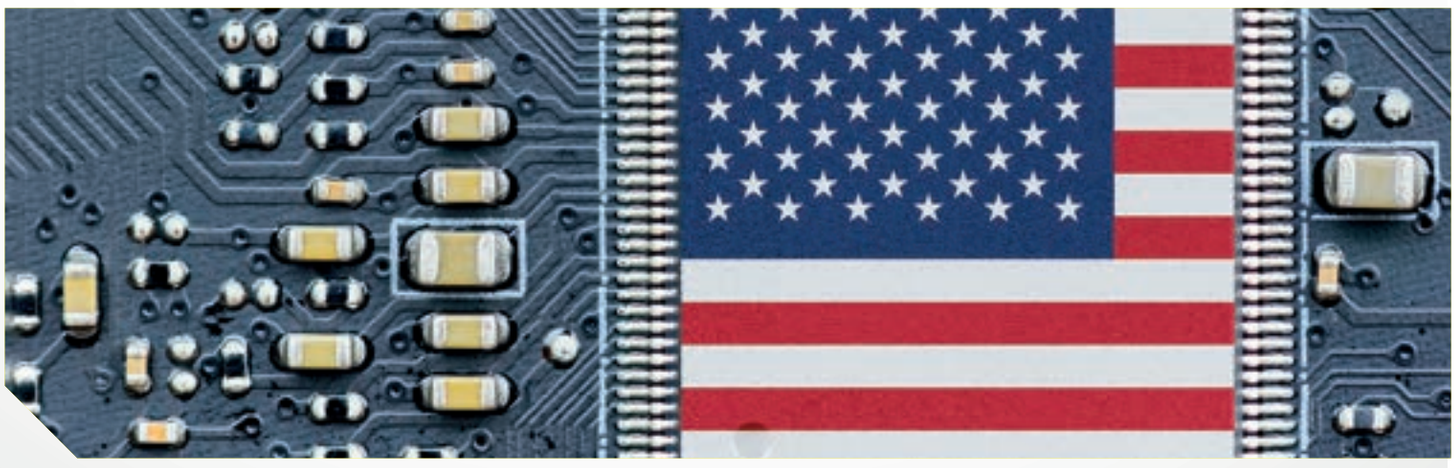
Summary

Both the US and EU have initiated comprehensive strategies to strengthen their microelectronics ecosystems, focusing on investment in research and development (R&D), collaboration among stakeholders, and support for entrepreneurship. The US National Strategy on Microelectronics Research emphasises bolstering semiconductor manufacturing capabilities, enhancing supply chain security, and accelerating technology transition through targeted programs like the CHIPS Acts and collaborations with industry and academia. In contrast, the European Chips Act aims to bridge the gap between research and industrial exploitation by setting up design platforms, enhancing pilot lines, and providing financial support through initiatives like the Chips Fund. While both strategies prioritise R&D investment and collaboration, they differ in their approaches to semiconductor manufacturing and financial mechanisms for supporting entrepreneurship.

One key difference lies in the focus on semiconductor manufacturing and supply chain security. The US strategy emphasises initiatives like the CHIPS Acts and the Trusted and Assured Microelectronics Program to strengthen domestic manufacturing capabilities and enhance supply chain resilience. In contrast, the EU strategy prioritises bridging the gap between research and industrial exploitation through initiatives like the Chips for Europe Initiative, with less emphasis on specific programs for semiconductor manufacturing and supply chain security. Additionally, the financial support and investment mechanisms differ, with the US strategy employing targeted programs and investments to support entrepreneurship, while the EU strategy utilises the Chips Fund to facilitate access to finance and investment opportunities.

Future Directions

Both the US and the EU have enacted legislation to bolster their semiconductor industries. While European officials have set funding targets and market objectives akin to those in the US, **the EU's semiconductor industry is currently at an earlier developmental stage**[1]. After all, the U.S.'s dominance in many parts of the semiconductor value chain—fabrication, assembly and testing—is well-established. Therefore, prioritising investments in manufacturing, as done in the US, may not yield the most optimal outcomes for European businesses. While Europe's semiconductor supply chain is less dominant, particularly in manufacturing, and has traditionally relied on imports from the US and Asia, **the EU has the opportunity to excel in another crucial aspect, the "advanced chip design"**. By following Israel's paradigm, Europe could emphasise research and development and choose intellectual property over manufacturing, minimising the effect of its limited domestic market, lean production infrastructure and a relatively small human workforce.



1 https://www.eetimes.eu/u-s-vs-eu-chips-act-same-name-different-game/

ECS Summer School 2024 programme announced

By Victoria Cummings, SEMI Europe

The European Chips Skills Academy (ECSA), has joined forces with AENEAS, EPoSS, and Inside to present the 2024 Edition of the ECS Summer School. This August, the school will open its doors to forty students from universities around Europe for an exciting week packed full of discovery and hands-on learning.

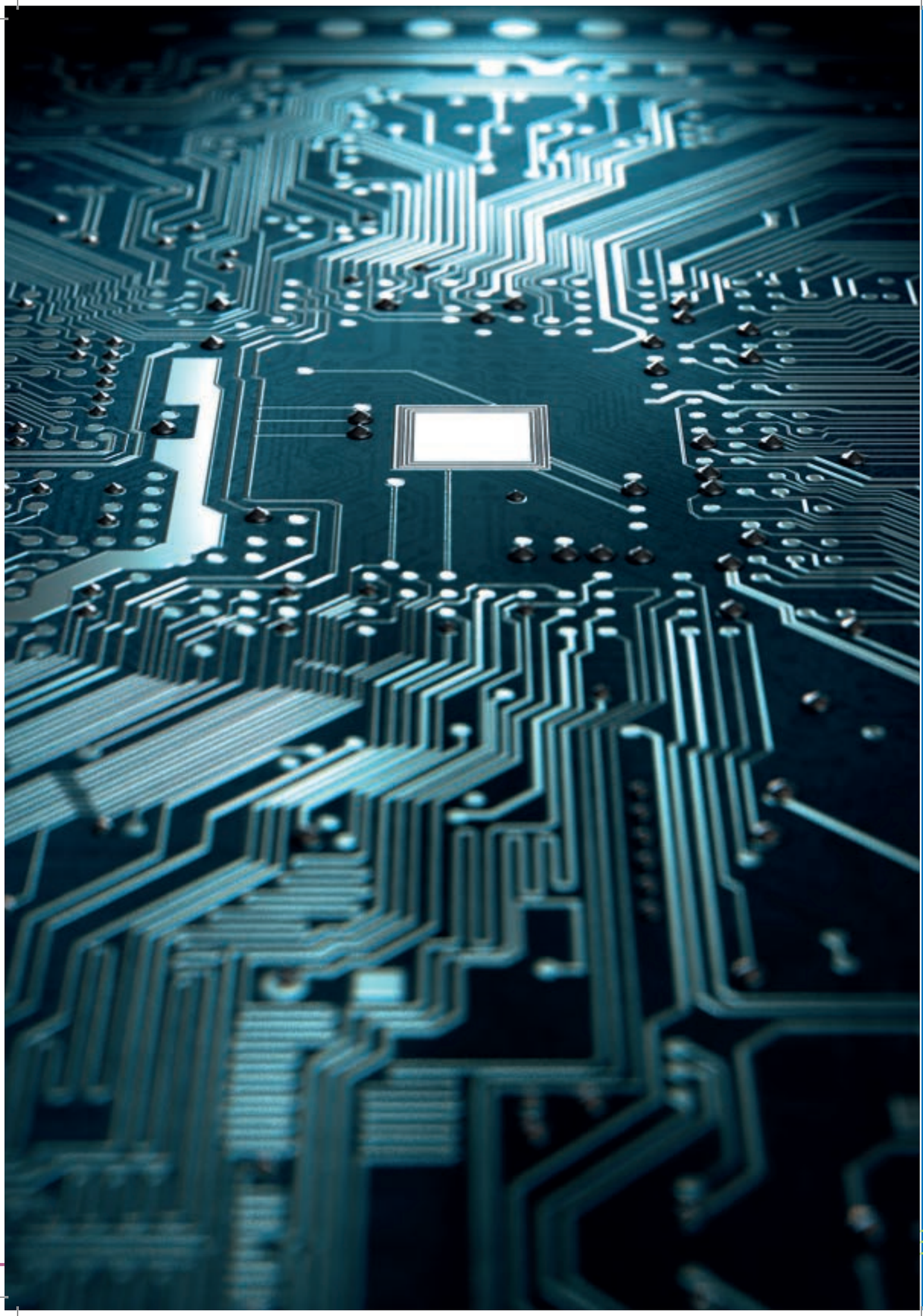
The week-long programme will give these dedicated undergraduates the opportunity to dive into the different possibilities offered in the microelectronics sector and introduce them to facets of the semiconductor sector they may have never encountered. Each day will be devoted to a unique theme: technology, design, integration, and systems; led by experts in the field. This year's edition will feature lectures and demos from ASML, Infineon, Arm, Bosch, and many more partners from both industry and education.

Summer Schools are an important piece of the puzzle to tackle the talent gap in the semiconductor sector. As part of the arsenal of activities aimed at encouraging young people to enter the microelectronics industry, these schools offer learners a bird's eye view of the various career paths that are available to them. By providing a broad-spectrum programme, the summer school both ensures that students will find a topic that suits their interest and expands their view of the various possibilities.

On top of the educational value, the ECS Summer School can also boast an enduring network for students. Students from the 2023 Edition of the Summer School have come together to become ECSA Student Ambassadors to promote the activities of the Academy and engage further with the microelectronics industry through Student Fora, interviews, and other pursuits.

ECS-SUMMER SCHOOL

TIME	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
	ARRIVAL	TECHNOLOGY	DESIGN	INTEGRATION	SYSTEMS	WRAP-UP
9:00		Setting the scene (P. Cogez, AENEAS)	Historical testimony (B. Murari)	MEMS technologies (F. Stammler, Bosch)	Introduction (P. Azzoni, Inside) AI and embedded intelligence (Y. Ghafourian, RSA)	Career testimonies
9:45		Moore's Law (F. List, ASML)		Packaging (M. Voitel, Fraunhofer IZM)	Lecture on Cyber Physical System of Systems (D. Serpanos, U Patras)	Group presentations
10:30		Coffee Break!			Poster session	Coffee Break
11:00		Digital Technologies incl. CMOS imagers (CEA-LETI, Y. Le Tiec)	Power ICdesign (A. Dabusti, Infineon)	Printed technologies (A. Krzyzanowska, DTI)	Hands-on session: Build your own weather station (P.Varga, BME)	Student feedback Graduation
11:50		Demo Session 1				Closing remarks (L. Altimime, SEMI Europe)
12:30		Lunch				
14:00		Towards Net-Zero emission (M. Östling, KTH)	RF design (R. Castello, U. Pavia)	Sensor networks for agrifood (M. Schlagmann, Infineon)	Hands-on session: embedded AI with ARM (M.Magno, ARM Education)	
14:45		More than Moore technologies (L. Rubaldo, Lynred)	Testimony on design company creation (R. Castello, U. Pavia)	Thermal issues or Photonics (J.Sousa & S.Dorrestein, CITC)		
15:30		Coffee Break!			Poster Session	
16:00		Quantum technologies (G. Elbaz, Quobly)	Digital design (P. Rolandi, ST Agrate)	Cybersecurity (M. Spanyik, VSB)	Hands-on session: Industry 4.0 & IoT (J. van Deventer, Eclipse Foundation)	
16:50		Demo Session 2				
18:00		Castle and village visit	Cocktail / debate AI: a cure or a curse? (P. Jaspers, TU Eindhoven)	Group Project	Visit and wine tasting	
19:00	Icebreaker & group project launch					
20:00	Dinner	Dinner	Free time	Dinner	Gala Dinner	



Microelectronics education for a sustainable tomorrow: A perspective from the GreenChips-EDU project

by GreenChips-EDU

GreenChips-EDU
Educate for a Sustainable Tomorrow

In recent decades, the microelectronics industry has profoundly transformed our world. Since Jack S. Kilby invented the microchip almost sixty years ago, this industry has experienced remarkable growth and innovation. Today, integrated circuits (ICs) containing billions of transistors are integral to nearly every electronic system, from automotive and industrial applications to consumer electronics, avionics, and space technologies. ICs drive technological advancements in areas such as smartphones, security systems, automated driving, smart manufacturing, and the Internet of Things. These components are crucial for shaping our future, providing the foundation for modern applications, and enhancing Europe's competitiveness and innovation.

To reinforce European leadership in semiconductor technologies and applications, the European Chips Act was enacted on September 21, 2023. This comprehensive set of measures aims to secure the EU's supply chain, enhance resilience, and establish technological leadership by boosting manufacturing within the EU, supporting the European design ecosystem, and fostering growth and innovation across the entire value chain. The European Commission's goal is to increase the EU's global market share in this sector to 20 percent by 2030.

Elevating the European microelectronics industry and supporting the operation of new semiconductor production facilities require a substantial number of skilled engineers and technicians. To address the current shortage of skilled workers, seven European universities have partnered with eight industry and research organisations in the EU-funded "GreenChips-EDU" project. Six of these universities are part of "Unite!", a strategic alliance of European technical universities. GreenChips-EDU aims to develop a joint European education program in electrical engineering and microelectronics to effectively train future specialists. Additionally, the project will establish higher education programs for industry professionals, offering a range of options from short, self-standing modules and microcredentials to MBA programs. To attract more young people to the field of microelectronics, the project emphasises digital content and interactive teaching formats, promoting a more sustainable development of microchips. Through these initiatives, the project aims to increase the number of individuals pursuing careers in the semiconductor industry.

Vision and concepts towards new degrees

The development of new degree programs will build upon the existing master's programs offered by the participating universities. These typically four-semester programs introduce students to essential

foundational courses at the beginning. As part of the project, these foundational courses will be converted to online formats whenever possible. As students advance in their studies, they will select from a variety of courses focusing on chips and applications, with an emphasis on sustainable production. To complete the degree, students must write a thesis on a “green electronics” topic. Additionally, they will be encouraged to participate in summer schools, hackathons, or makerspaces as part of the program.

Upon graduation, students will receive a master’s degree and, depending on their university program, may also earn an additional certificate or a specialisation in “green electronics”. Since six universities participate in the Unite! program, students will have the opportunity to enrol in and complete a double degree program during the project. The establishment of double-degree programs is envisioned to further bolster student mobility and cross-cultural academic experiences.

Building on existing master's programs allows the first student pilot cohort to begin as early as the second year of the project, facilitating the testing and fine-tuning of the approach.

Additionally, the GreenChips-EDU project plans to establish lifelong learning modules and an MBA for professionals working in the semiconductor industry. The first step is to organise a workshop with partners to identify the needs related to sustainability and energy efficiency in the industry. The partners aim at defining the skills and knowledge that could be provided by the project to fill this gap through tailored courses and an MBA. Most partner universities have established "Life Long Learning" departments that can efficiently handle roles in upskilling and reskilling. In addition to the highly modularized 5 ECTS modules offered in their master's programs, the plan includes offering shorter, digitally enhanced learning materials (microcredentials) to enhance knowledge in specific areas for both students and experienced professionals.

Content development strategies

A significant challenge will be adapting and implementing the content within a common platform, as most of the existing courses were already created and stored in the Learning Management Systems (LMS) of the partner universities. As a first step, the GreenChips-EDU consortium decided to use Unite!'s platform, Metacampus, to transfer courses and learning materials, enabling easy access for all Unite! students. In some cases, due to the difficulty of migrating all the content from one local platform to another, links will be provided in Metacampus to redirect students to the local LMS.

Since some of the content is based on on-site courses, it is planned to offer the possibility to follow some of the courses in hybrid mode (remote and on-site at the same time). This involves setting up the classroom and training the lecturers to effectively deliver their courses in digital format. These courses will be recorded and combined with the slide presentations to create digital versions. By using authoring tools such as Articulate Rise and Storyline, it is intended to create interactions, activities and assessments as a way to engage the students as they view the course. All types of scientific and academic events organised by partner universities related to sustainable electronics, such as seminars and workshops, are suitable for live streaming and recording for future reuse. In other cases, the goal is to create self-paced modules based on the existing content, so that students could complete the course on their own at any time. These courses were designed from zero by using the former tools that allow integrating interactive content based on multimedia elements (videos, images, animations, etc.). The advantage of these tools is that they offer the possibility to export content in SCORM format, which can be easily imported into any LMS.

Fostering mobility and industry engagement

One of the key objectives of the project is to attract skilled staff and support students to fulfil the goals of the European Chips Act. This involves implementing various activities such as staff exchanges, student mobility programs and scholarships. In addition to the existing programs such as Erasmus and the Unite! Partnership, the project aims to organise internships, Summer Schools, Learn-Repair-Cafés and Hackathons at diverse locations across Europe, with a special focus on Sustainable Electronics. The idea stems from the growing environmental awareness of students and the fact that the number of courses on Sustainable Electronics offered by engineering schools is still very limited. These interactive formats also provide an opportunity to introduce students to the realities of the industry, by working directly with industry partners. These multifaceted initiatives underscore the project's commitment to nurturing a diverse, inclusive, and globally connected educational ecosystem within the microelectronics field. The involvement of industry partners is essential in bridging the gap between academia and the semiconductor industry. By sharing state-of-the-art technologies, innovative processes, insights and market trends, industry experts can enrich the learning experience for students and contribute to the development of future skilled workforce.

ProgeTiger: Pioneering Technological Literacy in Estonia

An interview with Education Estonia by ALLPROS.eu on the successful ProgeTiger programme

By Alexandra Burchill, ALLPROS.eu

As highlighted in the ALLPROS.eu Blueprint report, the ProgeTiger programme launched in 2012 by Education Estonia aims primarily to develop school students' digital competence, technological literacy, and fundamental understanding of technology. The programme has targeted kindergartens and schools across Estonia, while also closely focusing on the skills of teachers to deliver technology education.

As of 2021, almost all Estonian general education schools (98%) and kindergartens (99%) had joined the programme, with partners from universities and industry involved in the programme's design. Moreover, as of 2022, 1 in 9 students in Estonia choose to study ICT at the bachelor's or applied higher education level of study, which rises to 1 in 7 among students who choose to pursue master's degrees. To better understand how the programme has been successful in providing effective technology education in Estonian schools, ALLPROS.eu interviewed Kirke Kasari, ProgeTiger programme manager, on the programme's structure and unique qualities. In this article, we take a closer look at a selection of the programme's distinctive qualities.

Interconnected activities

ProgeTiger's success lies in its interconnected activities. Over the years, ProgeTiger has developed a comprehensive curriculum, provided learning materials, conducted extensive teacher training, and established a robust network of mentors and educators. This network has crucially provided the support for the educators, who carry out the main activities of the programme, to educate and engage their students, while getting help from and sharing knowledge with colleagues.

The project's curriculum, developed with input from universities, the Ministry of Education, teachers, and the informatics teaching union, integrates multiple perspectives of education and technology expertise. The curriculum emphasises practical, real-life applications of technology, mirroring industry and academic environments. This approach also helps students and teachers develop essential "soft" skills such as teamwork and collaboration, which are vital in the STEM industry.

Strong Educational Network

ProgeTiger's outreach efforts have been instrumental in its widespread adoption. By encouraging schools and kindergartens to participate, the project has built a strong network of educators who actively use and contribute to the ProgeTiger materials. These networking activities are supported by regular events for students and teachers to participate in, showing off their classroom activities and the success and innovation of teachers as leaders.

Initially, the programme focussed on integrating modern technological equipment into the classroom, with some funding for schools to purchase this equipment. This enabled students to engage in creative, hands-on learning rather than being confined to theoretical knowledge. An important tool ensuring teacher's success in integrating this new equipment as a practical learning resource was the ProgeTiger portal, where teachers could both upload and access detailed teaching plans incorporating these technologies. In fact, creating accompanying teaching materials was a prerequisite for securing equipment funding. Meanwhile, this guaranteed the success of the portal through the spread of teachers' creatively designed lesson plans, supporting and inspiring other teachers from schools participating in ProgeTiger.

Flexibility and evolution

Although the programme has been widely implemented in various forms across Estonian schools, one of the challenges ProgeTiger has faced is the elective nature of informatics education in Estonia. For measuring the programme, this has made it difficult to standardise and collect comprehensive statistics on its impact, as there is no compulsory subject or material that must be taught as part of ProgeTiger.

However, the optionality of ProgeTiger also allowed for its successful qualities. Teachers are free to adapt the curriculum according to their constraints, learners' needs, and teaching strengths. Ultimately, this means that they deliver enjoyable, effective, relevant, and high-quality technology education for students. Additionally, positioning teachers as leaders in implementing the curriculum meant that the teachers' network emerged for promoting collaboration and sharing materials, knowledge, and experience. This network continues to sustain the programme by providing fundamental support to teachers.

Looking ahead, ProgeTiger aims to enhance ICT learning in later stages of education, paralleling the emphasis seen in vocational training. The project's ongoing long-term success is supported by Estonia's national educational strategy, which prioritises digital education and competence development. This strategic alignment ensures continual investment and innovation within the programme.

ALLPROS.eu Reports

The ALLPROS.eu project gathers key players in the industry, bringing forward ideas that can help address the challenges of the European semiconductor sector.

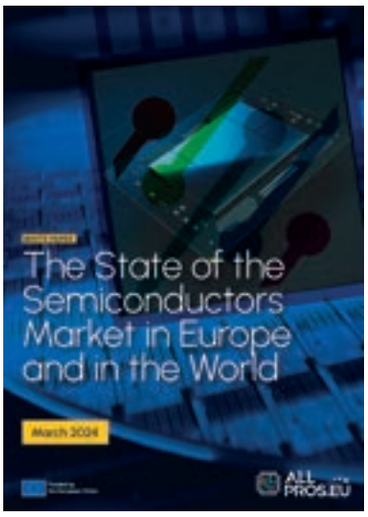
Have a look at some of the key reports you may have missed.

Find them all here: https://zenodo.org/communities/allpros-eu

The State Of The Semiconductors Market In Europe And In The World

Following the first Market Trends webinar organised by ALLPROS.eu on 29/01/2024, ALLPROS.eu released a white paper report, containing the insights on the state of the industry and the European Commission's semiconductor policy, and the explanation of the pivotal role of the Chips JU initiative in enhancing Europe's economic competitiveness. The report also captures the skill-related challenges faced by the semiconductor industry and the projects working to resolve them, with a focus on university-industry partnerships.

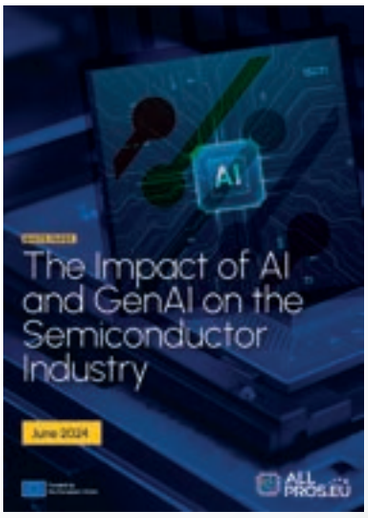
Learn more: https://zenodo.org/records/13148789



The impact of AI and GenAI on the semiconductor industry

The post-event report on Bridging the Skills Shortage The post-event white paper report on the second Market Trends webinar, organised by ALLPROS.eu on 04/06/2024, summarises the valuable insights from the event into the current and future impact of AI in the semiconductor industry. Among the key ideas are the importance of long term strategic planning, skills development, and the creation of an ecosystem where Governments, Academia, Manufacturing industry and Service delivery all work together to develop a competitive and differentiator market.

Learn more: https://zenodo.org/records/13148742



The EU Chips Chronicles is the quarterly magazine of the ALLPROS.eu project showcasing views and exemplary stories from across the European semiconductor community.

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