POST-EVENT REPORT

Bridging the skills shortage in the EU Semiconductor industry

Discuss the skills shortage affecting the EU semiconductor industry, explore its relationship with inclusion

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ACKNOWLEDGMENTS

The organisers of the Online Workshop on Competence Centres in Semiconductors held on 17 May 2023 would like to thank the representatives of the following European semiconductor industry organisations for their active participation and providing insights for this report:

- **AENEAS**

- **ASML**

- **EIT Digital**

- **EIT RawMaterials**

- **EPoSS**

- **EU STEM Coalition**

- **European Women's Association**

- **EuroTech Universities Alliance**

- **Fraunhofer Microelectronics Group**

- **Germany Federal Ministry of Education and Research, Unit for Electronics and Autonomous Driving**

- **ICOS**

- **INSIDE**

- **Intel Research and Development Ireland**

- **MELEXIS**

- **SEMI Europe**

- **SiPearl**

DISCLAIMER

EXECUTIVE SUMMARY

The webinar was organised with the purpose of bringing together industry experts and leaders, policymakers, academic leaders, and industry associations to provide insights on the link between gender inclusion and the skills shortage in the semiconductor field, which are summarised in this report. The event was held on the 17th of May 2023 from 14.00 to 16.30 CEST and attracted 70 participants. The webinar kicked off with a targeted introduction from the European Commission on their Gender Equality Strategy 2020-2025[1], followed by two panel discussions and presentations of already established initiatives that provide essential resources for skills development in Europe. Each main session was about 50 minutes long and involved up to 5 panellists who discussed how taking an inclusive approach to skills development will ultimately foster a more inclusive environment and culture within the European Semiconductor industry. It covered multiple areas of the microelectronics sector: insights and experiences from women industry leaders, trends and challenges identified by experts, and the harmonisation of current initiatives to promote skills.

AGENDA

14:00 > 14:10 - Introducing the current industry landscape and identifying links between inclusion and skills development

14:10 > 15:30 - Session 1: Exploring avenues to integrate inclusion into initiatives and projects promoting skills development

14:10 > 14:50 - 1.1: Current EU initiatives on promoting skills

14:50 > 15:30 - 1.2: Governments, Academia and Industry's perspective on driving Innovation through inclusion and skills building

15.30 > 15.40 - Stretch legs & Coffee Break

15:40 > 16:30 - Session 2: Benefits of prioritising inclusion toward addressing the skills gap

15:40 > 16:00 - 2.1: Industry Reflections & Results from the Women and Girls in STEM Forum

16:00 > 16.30 - 2.2: Panel Discussion: Benefits of prioritising inclusion toward addressing the skills gap

16:30 > 16.40 - Upcoming Calls, Closing remarks & Main Take-Aways

KEY TAKEAWAYS

- Bridging governments, academia & industry to align on the actions and implement programmes that meet the industry needs, while being inclusive.
- We should advance from the old educational model by integrating more experiments and innovation in the educational system
- Provide training and educational opportunities for undergraduate students to inspire them to pursue Master programmes in the field
- Industry, governments & academia have to align on long-term goals
- The key for sustainable partnership is to cooperate early in the policy design phase, not just aligning separate initiatives
- Harmonise education and increase students' mobility
- Instead of competing for talent, we should unite and collaborate to cultivate a robust, diverse, and motivated talent pool by fostering cooperative "umbrellas" of collaboration, allowing us to collectively achieve our shared goal
- Work together with industry & academia to offer scholarships across disciplines & especially in STEM or Engineering disciplines
- Attraction of STEM talents, in particular also girls, starts at the level of schools.Ccreative solutions and best practices such as exposing girls consistently throughout their educational career with successful female STEM role models, need to be shared between member states
- Need to collect and share data on inclusion in different countries, as this allows to compare the baseline and understand the needs
- Creating female STEM networks is important – alliances, partnerships, workshops, mentoring programs etc.

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1. Gender Equality Strategy (europa.eu)

Introduction: the current microelectronics industry landscape

The webinar commenced with a keynote speech by a representative of the European Commission, Lucilla Sioli, Director for "Artificial Intelligence and Digital Industry" at the Directorate-General CONNECT. The EC recognizes the importance of addressing the skills shortage in the digital field, specifically in microelectronics.

Together the Parliament and Council, reached a significant political agreement on the Chips Act for strengthening the semiconductor sector. As part of the 'Chips for European' initiative, **Competence Centres** will be established in each Member State (MS) where they will play an important role in managing skills development and connecting SMEs, universities, and other stakeholders, as well as offering training to raise workforce skills.

At the moment, efforts are being made to make **Europe an attractive place** for semiconductor investments. Several major companies have already made investments that will lead to a growing demand for skilled workers in both the manufacturing and design segments of the industry.

Member States play an important role in supporting skills development through targeted scholarships in STEM and engineering fields, while focusing on attracting more female talent. Several funding opportunities have already been published under the Digital Europe Programme and Erasmus+, supporting digital skills, gender inclusion, and sectoral operational skills.

A skilled workforce is vital to foster a thriving and resilient semiconductor ecosystem which requires efforts from large companies and especially small-medium enterprises (SMEs) to make labour more attractive. International cooperation mechanisms may be used to attract talent from non-European countries, although the focus remains on empowering youth and women in Europe.

*Keynote speech by Commissioner **Lucilla Sioli**, Director for "Artificial Intelligence and Digital Industry" at DG CONNECT, European Commission.*

Initiatives promoting Skills development & inclusion in the semiconductor industry

EU Stem Coalition

*Presented by **Beatrice Boots**,*
Director of the platform 'Talent for Technology'.

What should I know about the Talent for Technology platform?

The platform is a collaborative effort established by the Dutch government and multiple ministries, including Economic Affairs, Social Affairs, and Education. It operates as a public-private organisation, working closely with companies, industries, and schools to bridge the gap between the education system and the labour market. As part of the European STEM Coalition, a network of STEM platforms across different countries, its objective is to exchange best practices and facilitate the development of national strategies to attract girls to STEM fields. The platform follows a triple helix approach, fostering comprehensive cooperation between industry, education, and government for long-term solutions. Rather than creating new programs, it focuses on scaling up successful initiatives and proven concepts. Collaboration between sectors is encouraged to achieve quantitative goals, while innovation is stimulated, initiated, and connected within existing projects, involving industry participation. The platform embraces a bottom-up approach guided by top-down guidance, sharing open-source information and resources across countries. Recognizing the importance of a chain approach, it addresses critical points where students may lose interest in STEM subjects, starting from primary education to secondary and vocational education. Moreover, it promotes the involvement of vocational training and centres of excellence in STEM, aiming to provide diverse opportunities for women and ensure a balanced representation in the field.

Recommendations & other messages from the speaker

A key message conveyed is the necessity for long-term cooperation and a holistic approach involving various stakeholders to bridge the gap between education and the labour market. The importance of attracting more women to STEM fields is highlighted, along with the recommendation to share strategies for engaging and retaining girls in these fields. Overcoming insecurities among women about their possibilities in STEM is emphasised, suggesting the use of better communication methods, such as showcasing entrepreneurship, collaboration, and societal impact. Setting realistic goals and monitoring progress to increase women's involvement in the industry is considered fundamental. Collaboration between schools, government, and industry partners is deemed crucial, with a focus on leveraging existing partnerships and projects instead of creating new ones. Companies are advised to make their websites and communication materials more inclusive and appealing to women in order to attract them to STEM careers. The good practices from different countries, such as events, programs, and initiatives aimed at attracting girls to STEM, are highlighted as valuable examples to learn from and potentially join.

Initiatives promoting Skills development & inclusion in the semiconductor industry

EIT (d)academy

*Presented by **Salvatore Moccia**,*
Head of the Doctoral School EIT Digital.

What should I know about the EIT (d)academy?

The EIT (d)academy is an initiative powered by EIT Digital, an organisation co-funded by the EU that works to support and grow a pan-European open ecosystem of technological innovation, entrepreneurship, and learning. EIT Digital is an impact organisation with a multilateral and multi-stakeholder network that brings together academia, industry and research and innovation to support the development of a competitive digital Europe. EIT's vision for the future of learning is to shift from one-time, isolated learning to collaborative life-long learning, involving not just university students but also younger students and adults of all ages.

On the topic of skills and life-long learning, the EIT (d)Academy is developing a new platform to serve as a Digital Skills Passport with Personalized Learning and Development Recommendations. The platform will act as a bridge between professionals and both employment and learning opportunities, allowing users to build their skills profile and recommending courses (of all kinds, not only university programs) to fill in skills gaps and round out their capabilities. This will allow for a decentralised learning curriculum and promote an evolving digital skillset, in line with the principles of Circular Learning.

Recommendations & other messages from the speaker

The major challenges faced by Europe in the field of digital education revolve around the constant evolution of the field and the required skills. As the business models shift to Industry 5.0 and beyond, even students and employees that have completed a high-quality digital education more than a few years ago find themselves struggling to keep up with the changes. Though the EIT (d)Academy seeks to support the growth of digital skills, much more is required to engineer a collaborative ecosystem where the principles of Circular Learning are applied in full. For these purposes, the speaker put particular emphasis on the following aspects:

- *Academia needs to move past the old-school, compartmentalised models of learning, and focus on incorporating flexible models of learning and designing courses.*
- *On the other hand, industry and institutions need to start cooperating more closely with universities in order to support the evolution of their education models.*
- *Aside from technical skills, it's important to also support the development of tactical and power skills.*
- *Flexibility needs to become a central design element due to the rapid pace of industry and skills development.*

Initiatives promoting Skills development & inclusion in the semiconductor industry

PRESENTATION

ANEAS summer school
Summary of initiative/project

*Presented by **Enrico Sangiorgi**,*
Member of the AENEAS steering committee.

What should I know about the AENEAS Summer School?

The AENEAS Summer School is a joint initiative by AENEAS, EPoSS, and Inside to attract young talent to the ECS domain. The week-long school is aimed specifically at STEM students with one year left in their undergraduate programs, with the intention of inspiring them in the selection of a Master's program. The core objectives of the program are not only to incentivize students to become professionals in the ECS ecosystem but also to inform them of the vast, untapped potential of the field and the many opportunities both from a professional and from a societal standpoint.

The Summer School's curriculum will focus on four areas of the ECS domain: a technological overview of semiconductor manufacturing, the design of integrated circuits, the current digital systems environment, and integration models and goals. In this way, the Summer School will give students a glimpse into the world of microelectronics while also providing them with knowledge that will help them in their future academic and professional careers.

Recommendations & other messages from the speaker

While the Summer School's program is the result of the initiative of the three partners, it should be considered as part of a wider desire to accelerate the formation of digital skills that are crucial to the European project. The intent of the Summer School is also to be a testing ground for future initiatives, and particular interest will be given to the scalability of the School. In particular, an analysis of the Summer School's operations and impact will be made readily available to assist the planning and implementation of European Competence Centers.

EIT Girls Go Circular

*Presented by **Cornelia Crucean**,*
EIT Raw Materials.

What should I know about the EIT Girls Go Circular initiative and its flagship event the Women and girls in STEM forum?

Girls Go Circular (GGC) is an initiative coordinated by EIT RawMaterials with the support of EIT Community and the Directorate-General for Education, Youth, Sport and Culture (DG EAC). The GGC's mission is to equip at least 40,000 girls aged 14-19 across all EU Member States with digital and entrepreneurial skills through an online learning programme about the circular economy. The initiative contributes to the implementation of Action 13 of the Digital Education Action Plan - Encourage Women's Participation in STEM. In addition, GGC actively supports students affected by war in Ukraine.

Every year, GGC holds a flagship event, the Women and Girls in STEM Forum, which provides a space for high-level discussions to advance the EU agenda on gender equality. The Forum gathers researchers, policy-makers, and influential stakeholders in STEM and ICT. The outcomes of the discussions serve as the basis for a post-event policy brief that highlights major initiatives in STEM and ICT.

The next Women and Girls in STEM Forum is scheduled for **5 December 2023**.

Recommendations & other messages from the speaker

When it comes to closing the gender gap in STEM and ICT, there are several challenges to consider. Firstly, gender stereotypes affect girls' career choices starting from as early as primary and secondary school. Secondly, a persistent obstacle is the gender-biased organisational culture and processes in the labour market. Thirdly, there is insufficient support for female entrepreneurs across Europe. Finally, lack of exposure to female role models discourages girls from exploring career paths in STEM and ICT.
To address the mentioned challenges and accelerate gender inclusion in STEM, it is essential to:

- *Deconstruct gender stereotypes from early childhood years*
- *Connect STEM and ICT to concrete societal challenges*
- *Increase the visibility of female role models*
- *Encourage inclusive corporate culture and innovation ecosystems*
- *Provide a strong community support*

Initiatives promoting Skills development & inclusion in the semiconductor industry

Governments, academia and industry on driving innovation through inclusion and skills development
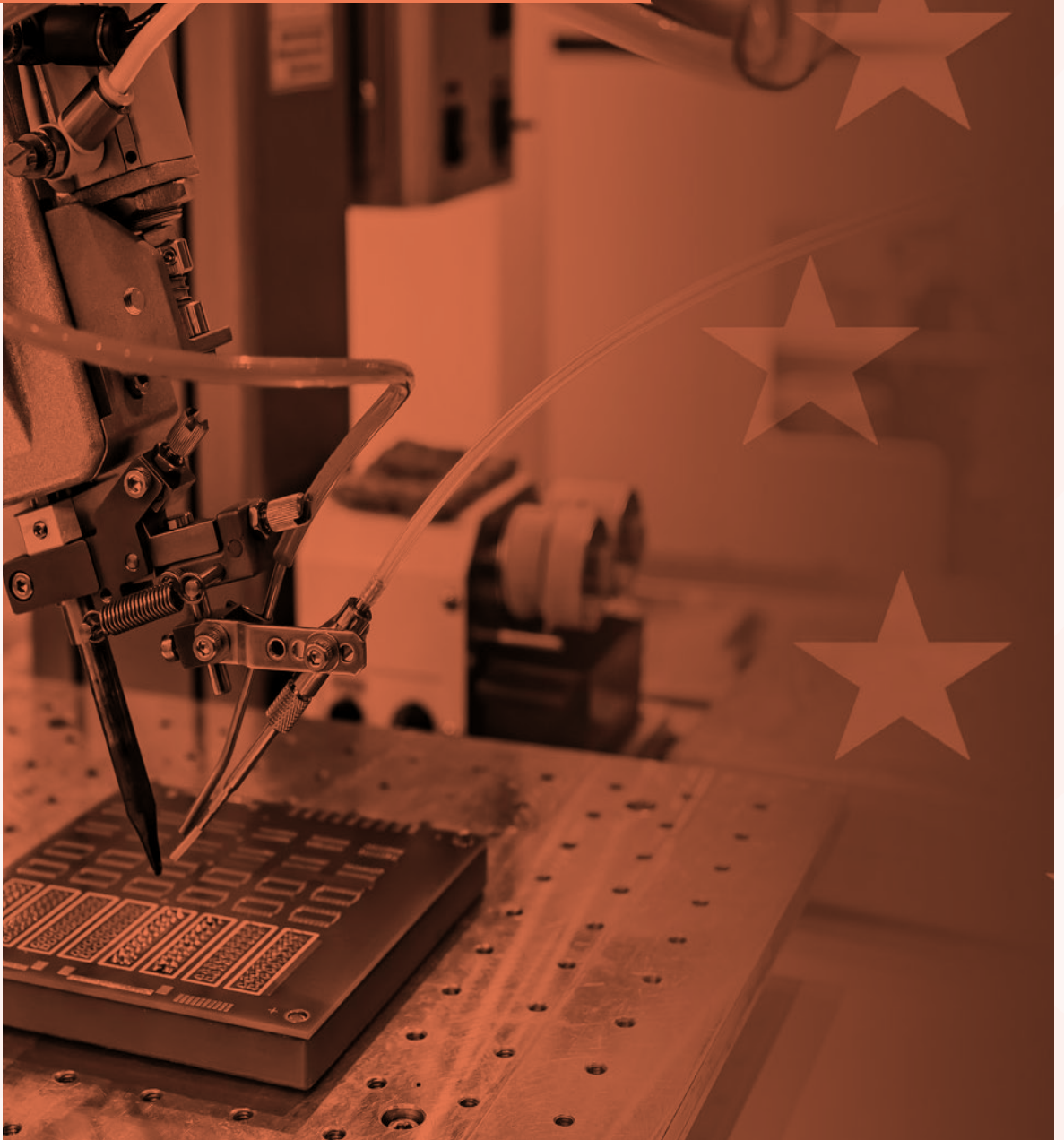
Governments, academia and industry on driving innovation through inclusion and skills development

In this panel discussion, five speakers from different organisations discussed the importance of collaboration between governments, academia, and industry in driving innovation and skills development in the semiconductor sector.

The speakers discuss a variety of topics, including the need for a unified approach to innovation, the importance of diversity and inclusion in the workforce that will be expanded in a later section in this report, and the role of government in supporting innovation. They also share examples of successful initiatives that have been implemented in Europe and around the world. The overall message of this section is that collaboration is essential to driving innovation and skills development in the semiconductor sector. By working together, governments, academia, and industry can create a strong and competitive European semiconductor industry that will benefit the entire economy.

Find below a more detailed overview of the discussion:

Aligning the goals of SMEs, governments, and academia for innovation and skills development

Anna Riverola highlights the differences between SMEs and larger organisations in terms of their relationship with governments and academia. The former cannot solely rely on funding and need to leverage other advantages when proposing collaborations, such as working in strategic sectors and having research centres in multiple countries. A market full of talented professionals capable of leading and implementing innovative projects is essential to promote innovation. To achieve this, the three involved actors - SMEs/startups, government, and academia - need to align their long-term goals for innovation and skills development since they are long-term endeavours. Simultaneously, alignment between national governments and the EU is necessary for the approval of projects that receive funding from the EU.

It is important for Governments to listen to the industry to understand its needs when it comes to the development of the semiconductor sector. SiPearl, for example, collaborates with other SMEs and large industries in providing feedback to the Spanish government, which in turn is expected to be utilised and aligned with academia. In terms of the lack of diversity and talent in the workforce, SiPearl's efforts involve establishing R&D sites in multiple countries. Language differences are viewed as an advantage, fostering an open mind and flexibility necessary for R&D and innovation. The speaker believes Gender diversity already needs to be addressed at the high school level to encourage more girls to choose technical degrees, especially in the semiconductor industry. However, SiPearl is dedicated to making women in R&D more visible by providing them with opportunities to be heard. They also mention close collaborations with universities in France, Spain, and Germany to further promote diversity in the sector.

Anna Riverola has an academic background in Satellite Remote Sensing, Geographic Information Systems (GIS), and Business Administration. Anna has over 17 years of professional experience in R&D Project Management within European programs, where she collaborated with a diverse range of organizations, including SMEs, large companies, R&D centers, universities, and NGOs. She currently holds the position of Spain Country Manager and Head of Research Programs at European level at SiPearl, a company born from the European Processor Initiative (EPI) in 2019.

Governments, academia and industry on driving innovation through inclusion and skills development

The importance of collaboration in talent development

Since the late 90s, collaborative efforts between the Irish government, academia, and industry have been addressing the future roadmap for the high-tech sector in the country, focusing on semiconductors and nanotechnology. The Science Foundation Ireland was established as a government agency to help monitor and distribute research funding in the country. As a result, Intel Ireland collaborated with universities and researchers by contributing resources to research centres, which in turn led to talent development and the hiring of researchers from universities.

Talent development is one of the pillars of Ireland's activity, involving collaboration between universities, faculties, and the government. An example is 'The Human Capital Initiative (HCI)', funded through a government levy on industry, enhancing learning opportunities for students, including undergraduates, postgraduates, and professional development. The initiative also aimed to foster engagement with industry and improve agility, with lessons learned from the pandemic.

Bernie Capraro, a representative of Intel, emphasises the need for technicians since they make up two-thirds of any factory workforce. He argues that collaboration rather than competition is required to create a large talent pool. The idea of an "umbrella" of opportunity is proposed to involve more students. Training centres should be provided in multiple locations, supported by the government and industry, aimed at producing both technicians and engineers.

Again, the importance of starting STEM education at the school level is emphasised, as well as the pivotal role of teachers in informing and inspiring students. The 'STEM teacher internship program' in Ireland is given as an example, allowing prospective teachers to work in high-tech companies for 12 weeks during their final summer vacation to provide practical experience and exposure to the industry.

Bernie Capraro, a 'Semiconductor veteran' of 33 years, has accumulated 26 years of professional experience at Intel Ireland in various capacities, including Fabrication Engineer, Researcher, and his current position, Talent Development Programme Manager for Ireland and the EU. During the past 20 years, he has specifically been focusing on research while simultaneously building strong relationships with Irish universities.

Sustainability of collaborations and skills development

ASML's representative, Yannick Treige, acknowledges the numerous initiatives already underway in the private sector, academia, and government, but emphasises the need to unify these efforts to drive sustainability and encourage a long term approach to skills development in the sector. Designing policies that build upon best practices and involve all stakeholders from the early stages of legislation, Treige argues, is the way sustainable solutions can be effectively pursued.

The importance of collaboration is illustrated through two examples involving ASML's partnerships with the University of Eindhoven and NCTU in Taiwan. In the former case, ASML provides guidance on curriculum design, facilitates exchanges, and contributes to teaching personnel. However, the latter example stands out as the Taiwanese government actively engages local academia and industry to identify needs and create policies that encourage collaboration.

The speaker suggests that Europe can adopt a similar collaborative model, particularly within the semiconductor sector, leveraging existing centres of excellence. By aligning government, industry, and academia, a shared understanding of needs and scaling opportunities can be achieved, leading to tailored policies that complement ongoing initiatives.

Yannick Treige is a Government Affairs Manager at ASML, a prominent technology company operating in the field of advanced lithography systems for the semiconductor industry. He specifically covers Germany, France, and Brussels, where he oversees skills and research and development (R&D) policy in those regions. At a broader level, he plays a role in fostering strategic partnerships between ASML, academic institutions, and governments.

Governments, academia and industry on driving innovation through inclusion and skills development

Governments, academia and industry on driving innovation through inclusion and skills development
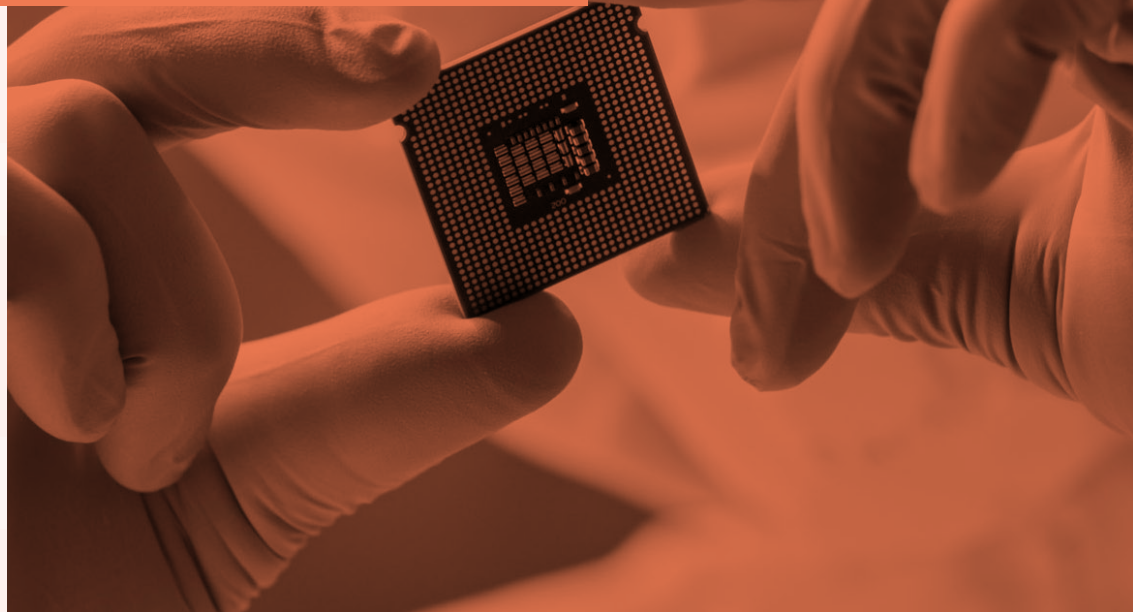
The research perspective & role of SiNANO in promoting innovation

Francis Ballestra represents the SiNANO Institute, which is the largest European network of competence centres. Launched 15 years ago, it has successfully integrated academia for long-term collaboration in research and innovation activities. The institute provides various training activities, including traditional university curricula, summer schools, and lifelong training. It uses the best practices of universities to facilitate knowledge sharing.

A key feature of SiNANO is its flexible research infrastructure with collaboration between industries in research, innovation, and training activities as a core focus. Additionally, SiNANO maintains strong connections with governmental bodies in the Member States, given that many European universities are public institutions. SiNANO's activities extend beyond national borders, aligning with the European international roadmap for promoting innovation.

To promote innovation, the network is involved in various initiatives such as the Erasmus+ project 'IDEM', aimed at attracting international students and increasing mobility across Europe. Other initiatives involve a diversity, equality and inclusion (DEI) plan which includes an annual networking event organised to support female researchers.

Francis Balestra is a Research Director in the field of microelectronics at the French National Centre of Scientific Research in Grenoble. He also leads European activities at the SiNANO Institute, encompassing more than 25 universities and research centers across 15 EU countries. In addition to that, he coordinates the ICOS project, aimed at supporting the European Semiconductor industry, and contributes to the development of start-ups within the Grenoble Alpes ecosystem, both at European and international levels.

The need for a skilled workforce in the semiconductor industry

The microelectronics industry is facing the same challenges as many other sectors and countries need to adapt accordingly. They should provide general education to create opportunities for children while tailoring curricula to specific industry needs, thereby producing a highly skilled and flexible workforce.

Roland Kreuppel, serving in the German Government, finds it encouraging to see investments in microelectronics such as 'SYPRO', encompassing fabs, equipment, and design. With a growing need for talent in the field, harmonising education and increasing student mobility can help tap into the European talent pool more effectively. However, the speaker acknowledges that competition for talent exists and that Europe should strive to compete in a friendly and collaborative manner as a European community.

Looking at Germany, for instance, the government is building a 'Microelectronics academy' with a distributed approach and partnerships with local ecosystems. The collaboration between academia, vocational training institutions, and industry is essential in addressing the specific needs of the microelectronics sector. By sharing best practices, identifying gaps, and creating targeted courses, they aim to enhance the quality of education and contribute to upskilling efforts.

Dr. Roland Krueppel ,a physicist and neuroscientist by training, brings his expertise to the German Federal Ministry of Education and Research as a civil servant. He is currently responsible for shaping strategy and overseeing European activities in the field of microelectronics R&D, with previous involvement in federal supercomputing activities and contributions to EuroHPC.

Governments, academia and industry on driving innovation through inclusion and skills development

Governments, academia and industry on driving innovation through inclusion and skills development

Main recommendations and takeaways

1. **Build collaborative ecosystems for skills development**
   collaboration between governments, academia, and industry is critical to fostering innovation and skills development in the semiconductor sector. Long-term goals need to be aligned between SMEs/Startups, government, and academia. Collaboration and feedback from industry are necessary for the development of the semiconductor sector.

2. **Promote talent development through collaboration**
   STEM Education should be emphasised at the school level, with curricula tailored to the specific needs of industry to develop a skilled and flexible workforce. Harmonising education and increasing student mobility can help to effectively leverage the European talent pool. Sharing best practices, identifying gaps, and creating targeted courses can improve the quality of education and contribute to skills development efforts in the microelectronics industry.

3. **Long-term vision and planning for sustainable solutions**
   Collaboration rather than competition is needed to create a sustainable, long-term approach to skills development in this sector. Flexibility in research infrastructure and knowledge sharing between industry and public institutions can foster innovation. Alignment of long-term goals between SMEs/Startups, government, and academia is necessary to foster innovation and skills development. Policies should be designed based on best practices and involve all stakeholders to promote sustainable solutions.

Skills development initiatives and inclusion in STEM

In this panel discussion, five speakers from different organisations discussed the importance of diversity and inclusion in the semiconductor sector. They also shared examples of successful initiatives that have been implemented in Europe and around the world.

The key message of the session was that diversity and inclusion are essential for the semiconductor sector to thrive. A diverse workforce brings a wider range of perspectives and experiences to the table, which can lead to better innovation and problem-solving. Additionally, a more inclusive workplace is more attractive to top talent, which can help the semiconductor sector attract and retain the best people. Find below a more detailed overview of the discussion:

Skills development initiatives and inclusion in STEM

Addressing the skills shortage in the semiconductor sector and other industries through diversity and inclusion

Françoise Chombar focused her talk on how diversity, equity and inclusion can address Europe's current semiconductor skills challenge. The combination of a lack of STEM talent within the EU combined with the structural lack of representation of women in STEM overall fuel this challenge. Françoise Chombar cited a number of troubling statistics particularly in the loss of women in the STEM pipeline which showed that transitions from educational level to another or from studies to the workforce see significant drops of women either taking a STEM specialisation or securing tech roles in companies. She highlighted that across various industries, only 23% of women graduates end up in tech roles compared to 44% for men. Women's graduation rate in STEM disciplines are steadily declining[2] (McKinsey).

Considering the current semiconductor talent pool challenge in Europe, Françoise Chombar believes that doubling the number of female STEM profiles is the best bet to solving Europe's talent shortage - a number which amounts to 4 million women.

To support her view that diversity, equity and inclusion (DEI) will help address the issue, she is convinced that having DEI is not only a catalyst for innovation but is also simply good business sense as diverse teams generate innovative ideas providing better products and services. It also contributes to a better business environment citing several studies that support ideas that diverse teams are smarter, faster and more effective, that companies with more women in leadership positions score financially better and that women score better in leadership skills. She also stated that society, in general, stands to benefit as she cites a strong correlation between a country's gender balance, competitive advantage, GDP and human development.

To encourage more females entering the STEM fields, it is essential to address gender biases from the very early stages of education[3] and parenting. Not only insufficient attention to inclusion can sabotage technological advancement, but it can also be an obstacle to attracting young and diverse talent[4]. As highlighted by Françoise Chombar, company leaders often overestimate the effectiveness of the programs they put in place, while underestimating the remaining challenges. Therefore, if companies fail to create an environment where women feel welcomed and supported and if leadership is not gender diverse, enterprises might lose the opportunity not only to attract skilled females, but also a much wider range of qualified young talent.

Finally, Françoise Chombar underlines the importance of diversifying the developers community[5] to tackle already existing data biases that exacerbate inequality and social injustice. The industry has a societal responsibility to design technologies that are meant to work for everyone and to achieve this it is key to involve women in leadership roles.

2. https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/women-in-tech-the-best-bet-to-solve-europes-talent-shortage

3. https://eenee.eu/en/resources/library/gender-gaps-in-education-evidence-and-policy-implications

4. https://web-assets.bcg.com/54/51/78c57631433cb5641c94af0d0234/bcg-untapping-the-true-potential-of-belgian-workforce-diversity-nov-2022.pdf

5. http://lcfi.ac.uk/projects/ai-narratives-and-justice/decolonising-ai

Francoise Chombar, MELEXIS is a Belgian businesswoman. She is the current chairwoman of the Board and former CEO, as well as one of the original founders of the semiconductor company Melexis. She is also a non-executive board member for semiconductor supplier Soitec and materials and recycling specialist Umicore, at Mediafin, a Belgian media group, and at Antwerp Management School, the best ranked eMBA school of the Benelux. She has a master's degree from Ghent University in Applied Languages Dutch-English-Spanish. Chombar is the president of the STEM Platform, an independent advisory body to the Flemish government on all matters STEM. She also promotes gender equality through mentoring and involvement in several organizations.

Leadership in education and industry for big and bold actions towards promoting inclusion

Tatiana Panteli recognizes the skills shortage in the semiconductor sector and other industries. The EuroTech Universities Alliance aims to design relevant programs to meet the industry's needs that simultaneously address societal needs, including diversity and inclusion.

To achieve this, it is crucial to establish diverse teams within universities that can design inclusive programs and academic curricula. A noteworthy example from the EuroTech Universities Alliance is the implementation of the '**Marie Curie fellowship**'. This initiative focuses on increasing the representation of women in academic positions by exclusively opening those positions to women applicants. As a result, there has been a significant rise in the number of women fulfilling academic roles. Additionally, it is important to address the lack of diversity in leadership positions within both educational institutions and the industry. The Alliance recognizes this need and is committed to appointing more female leaders within its universities.

The speaker also emphasises the significance of integrating Social Sciences into curricula to bring diverse perspectives to technology development. Promoting diversity and inclusion is not only essential for social goals but also for financial reasons. It is believed that diverse teams make better business decisions, leading to higher profitability and fostering innovation. Therefore, it is crucial to collect and share data on diversity and inclusion, despite the challenges involved, as it helps establish a baseline and track progress in these areas.

Tatiana Panteli, EuroTech Universities Alliance is Head of the Brussels Office at the EuroTech Universities Alliance, comprising 6 universities located in different regions. She equally serves as the chair of the EID working group within the alliance. Throughout her professional career, she has gained extensive experience in the fields of education, NGOs, and business, working both within the EU and beyond.

Skills development initiatives and inclusion in STEM

Benefits of prioritising inclusion toward addressing the skills gap
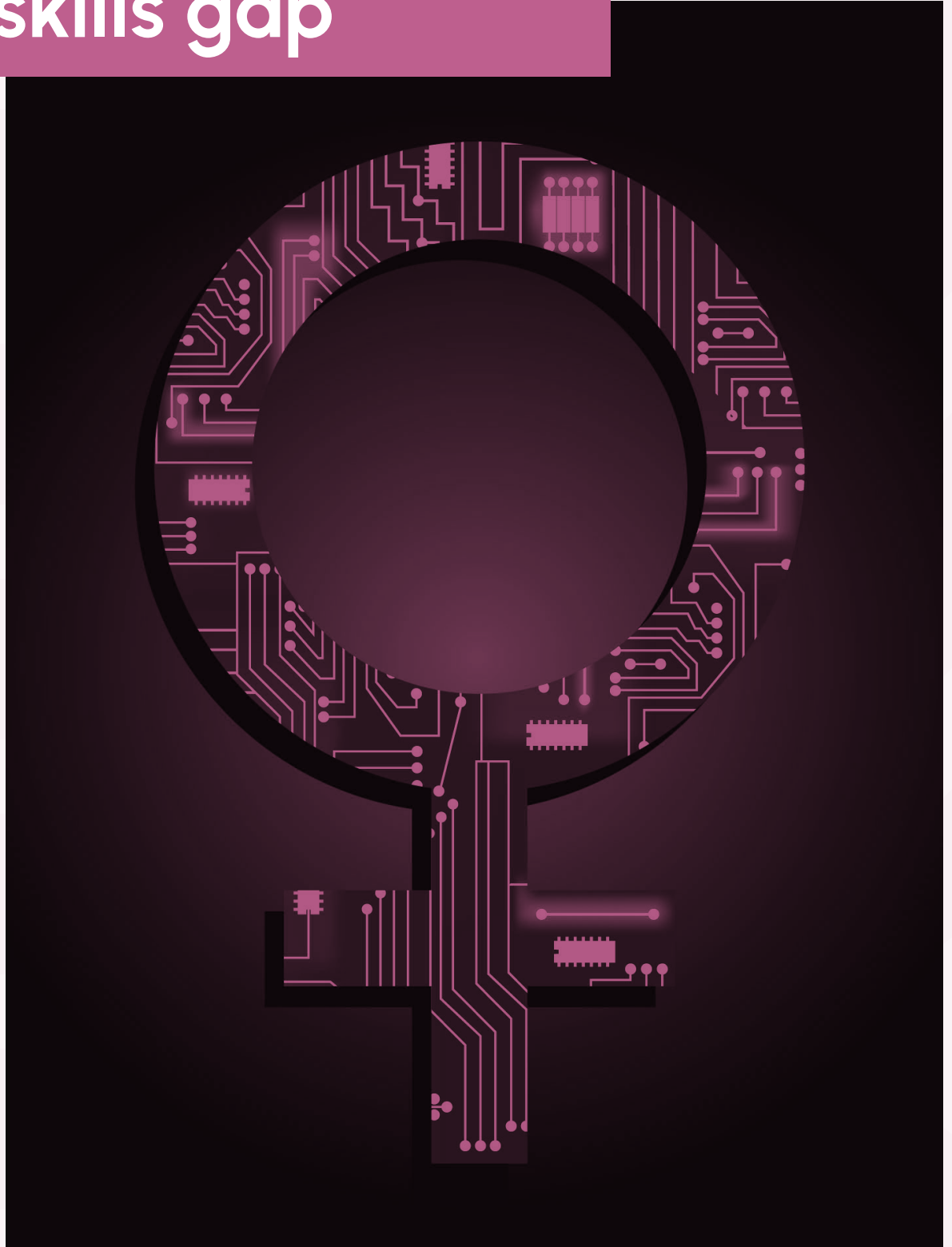
Benefits of prioritising inclusion toward addressing the skills gap

Promoting a culture of appreciation for diversity within businesses

Patrick Bressler underlined the importance of promoting a culture of appreciation for diversity within businesses. To achieve this, the Fraunhofer Institute implemented the 'Equally chances groups' to engage all different stakeholders in constructive discussions and create awareness of biases.

Another example is the Fraunhofer Institute's 'Microelectronics Academy', where engineers are trained to be open-minded in terms of diversity and inclusion through exercises that draw awareness to biases.

Ultimately, businesses must recognize that cultural change and technology transfer go hand in hand with people transfer. By training and equipping individuals with knowledge and awareness of diversity and equity issues, RTOs can facilitate the transfer of a positive and inclusive culture when engineers move on to business.

Patrick Bressler, Fraunhofer Microelectronics Group is a Managing Director at the Fraunhofer Microelectronics Group, a collective of 11 Fraunhofer Institutes. With his background as a trained physicist and a PhD in Semiconductor and surface physics, he plays a crucial role in the Research Fab Microelectronics Germany (FMD) Office. He is in charge of R&D in the field of micro- and nanoelectronics, as well as contributing to workforce development initiatives.

Benefits of prioritising inclusion toward addressing the skills gap

Women opening doors to other women

In terms of women's empowerment, Michaela Tudor emphasises the need for women to support one another since unity among them is not always common. Support and unity is key in a sector where gender biases remain too often implicit and women do nto have the chance to pursue the career they want to pursue. That's why the 'European Women's Association' successfully created a safe space to encourage women to pursue entrepreneurship. However, it remains challenging to find and hire women in STEM or convince investors to support women-owned businesses.

Through collaborative efforts, implicit biases should be challenged to create a more inclusive environment in companies, schools, and organisations. The 'European Women's Associations' sets out to do so by establishing alliances, partnerships networks, promoting role models and organising events and workshops open not only to women but also to girls.

Mihaela Tudor, European Women's Association *holds the position of Global Vice President at the European Women's Association, an ecosystem that supports the upskilling of young women and helps women leaders to upscale their businesses. She is also recognized as a serial entrepreneur in the technology sector and possesses extensive experience in public relations (PR) within the media industry.*

Evidence, training and communication three key strategies to promote diversity and Inclusion in the Semiconductor Industry

Christopher Frieling highlights the need for more evidence and examples specific to the microelectronics and semiconductor sector. The speaker notes that the semiconductor industry is unique in its working conditions, with many jobs requiring shift work or working in clean rooms. This can make it difficult for people with families to work in the industry. The speaker suggests that more research is needed to identify the specific challenges and bottlenecks faced by women and other underrepresented groups in the semiconductor industry.

From the perspective of the SEMI representative the importance of targeted training and recruitment should be emphasised. Training and recruitment programs should be tailored to the specific needs of the semiconductor industry. This includes training HR managers to develop job descriptions that are free of bias, and making diversity classes mandatory in engineering degrees. Mentorship programs should be created to help women and other underrepresented groups network and advance their careers.
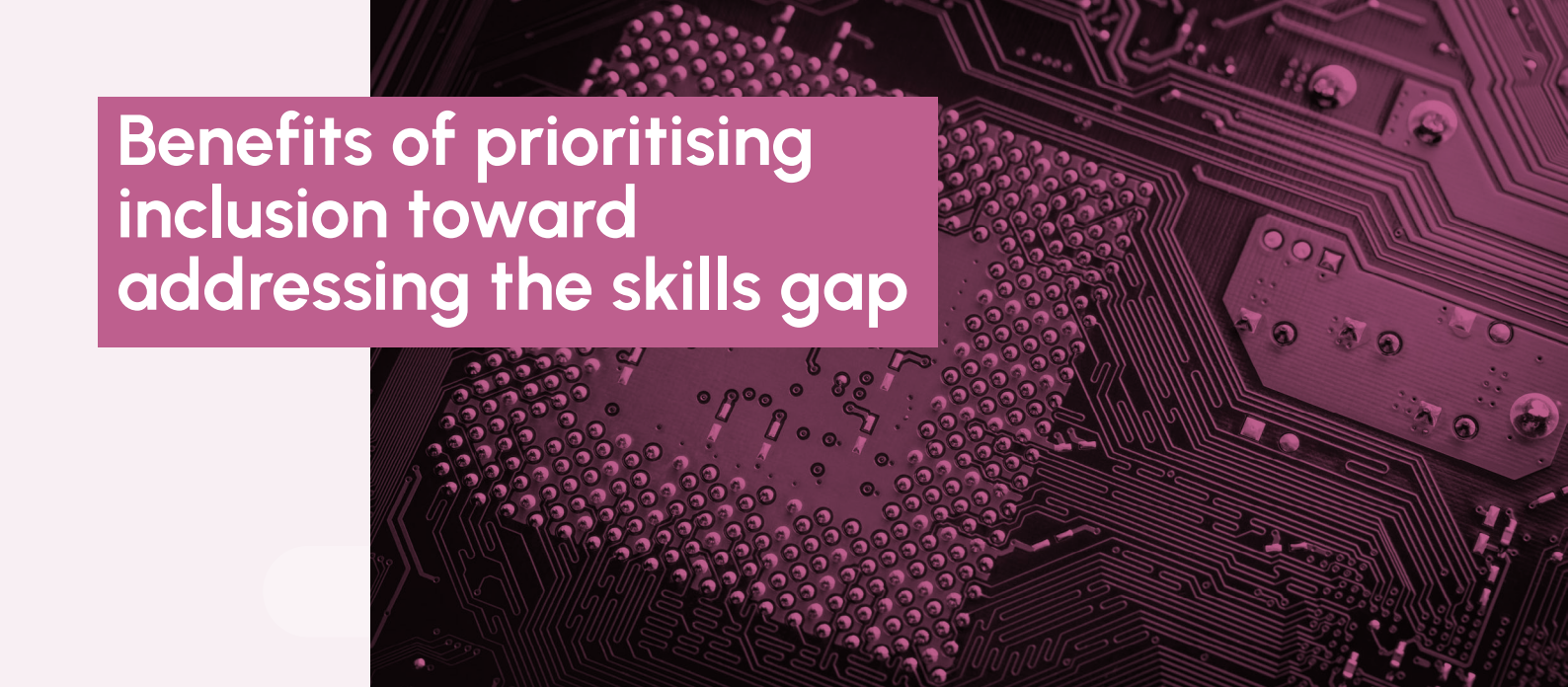
Christopher Frieling stresses the importance of communication and notes that communication is key to promoting diversity and inclusion in the semiconductor industry. This includes highlighting role models, creating ambassadors, and communicating the benefits of diversity to all employees. The speaker also suggests that companies should not only focus on gender diversity, but also on diversity in terms of age, race, and other factors.

In conclusion, the three strategies for promoting diversity & inclusion in the semiconductor sector revolve around more evidence, targeted training and recruitment, and effective communication.

Christopher Frieling SEMI Europe *is part of SEMI Europe, which manages the secretariat for the Pact for Skills for Microelectronics. He is also the coordinator of the Microelectronics Training Industry and Skills (METIS) initiative, as well as the European Chips Skills Academy. Notably, they have recently put forward a proposal for the establishment of a European chips diversity alliance.*

Benefits of prioritising inclusion toward addressing the skills gap

Benefits of prioritising inclusion toward addressing the skills gap

Main recommendations and takeaways

1. **Increase the percentage of women in STEM**
   Panellists stressed the importance of eliminating gender bias in the early stages of education and creating an environment where women feel welcome and supported. Efforts should focus on doubling the number of female STEM profiles to address the talent shortage in Europe.

2. **Diverse teams drive innovation and business success**
   Panellists emphasised that diversity, equality and inclusion (DEI) are not only catalysts for innovation, but also make good business sense. Diverse teams bring different perspectives and ideas, which leads to better products and services. Studies have shown that companies with more women in leadership positions perform better financially. It is critical to build diverse teams in universities and businesses to develop inclusive programs and curricula.

3. **Promote a culture of valuing diversity**
   Companies should strive to create a culture that values and appreciates diversity. This can be achieved through initiatives such as training programs that raise awareness of biases and promote open-mindedness. Cultural change and technology transfer go hand in hand with the transfer of people, and every individual should be equipped with knowledge and awareness of diversity and equality issues.

4. **Collaboration and communication are key**
   collaboration among various stakeholders, including governments, academia, and industry also known as the triple helix, is critical to promoting diversity and inclusion. Examples of successful initiatives and best practices should be shared to address specific challenges in the semiconductor sector. Effective communication, including the creation of role models and mentoring programs, helps build a diverse network and promotes inclusion.

5. **More evidence, targeted training, and communication**
   The semiconductor industry has unique challenges and working conditions that require specific strategies to promote diversity and inclusion. More research is needed to identify the specific challenges faced by underrepresented groups. Targeted training and recruitment programs should be developed, and communication efforts should go beyond gender diversity to include diversity in age, race, and other factors.
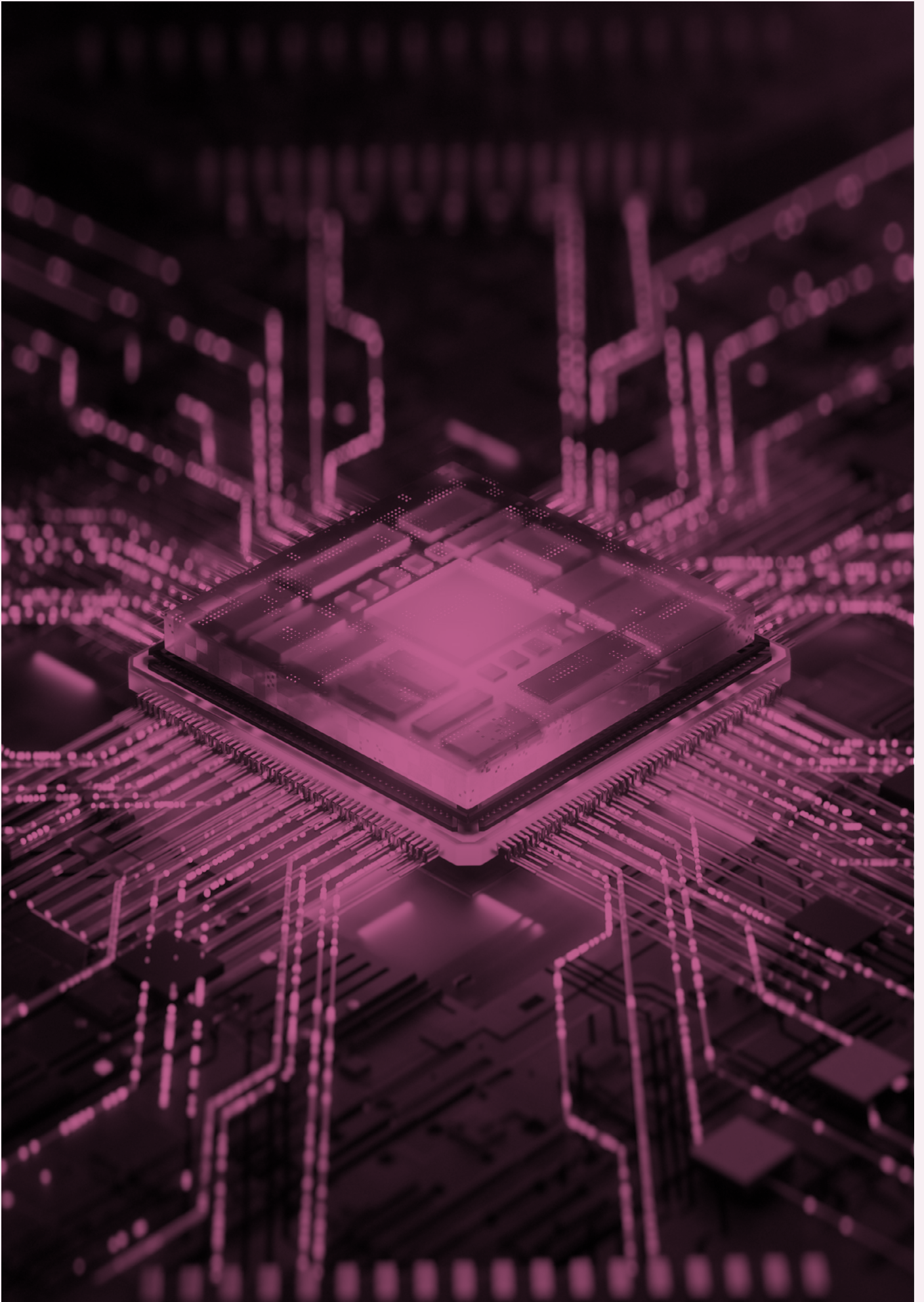
Conclusions

Overall, the event emphasised the importance of collaboration, diversity, and long-term planning in addressing skills development, gender inclusion, and sustainability challenges in the semiconductor industry. In particular speakers highlighted the **need for long-term cooperation** involving various stakeholders as necessary to bridge the gap between education and the labour market. **Collaboration between schools, government, academia, and industry** partners is crucial for innovation, skills development, and promoting diversity and inclusion.

Collaboration and sustainability, rather than competition, are key to skills development. Efforts should be made to **attract more women to STEM fields**. Strategies for engaging and retaining girls in STEM, overcoming insecurities among women, and showcasing entrepreneurship, collaboration, and societal impact are recommended. Sharing best practices and learning from successful initiatives in different countries is valuable.

Gender stereotypes, biased organisational culture, and lack of support for female entrepreneurs hinder gender inclusion in STEM. **Deconstructing stereotypes, connecting STEM to societal challenges, increasing the visibility of female role models, and promoting inclusive corporate culture and innovation ecosystems are essential.**

Creating a culture that values diversity, raising awareness of biases, and fostering collaboration and communication among stakeholders are crucial. Efforts should go beyond gender diversity to include age, race, and other factors.

The rapid evolution of the digital field requires a collaborative ecosystem and flexible learning models. **Academia should incorporate flexible approaches and course designs, while industry and institutions should closely cooperate with universities to support new education models**. STEM education should be emphasised at the school level, with curricula tailored to industry needs.

Harmonising education, increasing student mobility, and sharing best practices contribute to skills development. Targeted courses and programs are necessary to address specific challenges in the semiconductor industry.

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