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Position Paper

Towards an ambitious, value-adding, and realistic EU Chips Act

Observations and Recommendations by the German Electro and Digital Industry

Electro and Digital Industry Association

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Imprint

Towards an ambitious, value-adding,
and realistic EU Chips Act

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ZVEI e. V.
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June 2022

Content

1 Introductory Remarks

European Commission President Ursula von der Leyen announced during her 2021 State of the Union speech[1] on 15 September 2021 a new European Chips Act. Then on 08 February 2022, the European Commission unveiled its proposal for a "Regulation establishing a framework of measures for strengthening Europe's semiconductor ecosystem" (hereinafter: the "EU Chips Act")[2] alongside a Communication[3] and amendments to the Key Digital Technologies Joint Undertaking under Horizon Europe[4]. Currently the proposal is discussed in the European Parliament and the Council of the European Union.

To streamline the discussion and to enhance the understanding of the specific characteristics of the semiconductor industry on a global scale, ZVEI has issued in the past a Semiconductor strategy paper for Germany and Europe[5] in October 2021 and a paper on technological sovereignty, industrial resilience, and European competences in autumn 2020[6]. The present contribution reflects on the now proposed European Chips Act, analyses the current political and socio-economic framework conditions, and gives recommendations going beyond the current chips act proposal. While ZVEI welcomes the EU Chips Act proposal, the necessary actions have a much broader scope.

[1] https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_21_4701
[2] https://eur-lex.europa.eu/resource.html?uri=cellar:ca05000a-89d4-11ec-8c4001aa75ed71a1.0001.02/DOC_1&format=PDF
[3] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022DC0045&qid=1645701283635&from=EN
[4] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022PC0047&qid=1645701283635&from=EN
[5] https://www.zvei.org/fileadmin/user_upload/Presse_und_Medien/Publikationen/2021/November/Halbleiterindustrie_fuer_Deutschland_und_Europa/Semiconductor-Strategy-for-Germany-and-Europe.pdf
[6] https://www.zvei.org/en/press-media/publications/technological-sovereignty-industrial-resilience-and-european-competences

2 EU Chips Act

Looking back to the years 2020 and 2021 from a semiconductor perspective, the perception in Europe was dominated by two things – on the one hand a shortage in semiconductor supplies and on the other hand a clear political commitment from policy makers all over Europe to make semiconductors a core priority. Whereas the latter is a direct consequence from experiencing the first, it needs to be pointed out that there is no short-term political solution to the current supply situation. However, to avoid future risks and increase industrial resilience, now is the moment to take the necessary steps for mid-to-long term planning until 2030-2035.

Given this, the current European Union Commission proposal for a European Chips Act should be seen as an initiative to create the foundation for the semiconductor industry in Europe to increase its global competitiveness regarding research, development, design, and production of chips for the next decade. The Chips Act comes at the right time to integrate and align political and legislative initiatives that have been announced regarding increasing global market share[7], the commitment to act on the production of processors and semiconductor technologies[8] and the revised EU industrial strategy[9]. Now is the right time for Europe to act and become globally competitive for investments in semiconductor technologies. The Chips Act addresses necessary issues regarding strengthening Europe's competences in the microelectronics ecosystems and state aid for capacity building, while also introduces far-reaching and unprecedented market interventions which ZVEI deems to be not helpful.

ZVEI also believes that the EU semiconductor strategy needs to expand to all key framework conditions to enhance capacity in Europe, including energy prices, talent pool, proximity between raw material as well as component suppliers and chip makers. Furthermore, it is important to clarify the sources of the overall €43 billion sum that the Chips Act intends to mobilise. To date, the financial breakdown remains still vague. Already existing funding, e.g., for IPCEIs, should not be calculated as part of the Chips Act. Member States need to commit swiftly to co-finance the proposal.

[7] https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52021DC0118
[8] https://digital-strategy.ec.europa.eu/en/news/member-states-join-forces-european-initiative-processors-and-semiconductor-technologies
[9] https://ec.europa.eu/info/sites/default/files/communication-new-industrial-strategy.pdf

2.1 Pillar 1: Chips for Europe Initiative

ZVEI welcomes the Chips for Europe Initiative. Concerning the Initiative's operational objective of "building up advanced large-scale design capacities", the explicit mention of adopting open-source Reduced Instruction Set Computer (RISC-V) and neuromorphic architecture for artificial intelligence (AI) is much appreciated. Constructing an EU chip architecture ecosystem is key for EU's technology resilience. Nonetheless, it is necessary that the Chips for Europe Initiative is targeting European industry needs in an adequate manner. ZVEI calls on EU institutions to focus on IP design in EU's key verticals like mobility, industrial automation, telecommunication infrastructure (6G), health, consumer electronics as well as smart home and energy, keeping them in mind during budget negotiations for the Chips Joint Undertaking (Chips JU). The Chips JU should allow for innovations across a wide range of technologies since "leading edge" varies strongly based on the application, meaning that node shrinkage is simply not the only denominator for innovation. In short, innovation cannot be measured in nanometres alone.

Also, pilot lines should not be limited to predefined technologies, but open to projects across the whole ecosystem. We support the focus on pilot lines for new production capabilities, and urge it to embrace manufacturing, testing and experimentation of both advanced as well as mature technology nodes. Major industrial applications like automotive will need all spectrum of chips in the future. At the same time, we call for further clarifications from the Commission on the terms and conditions for the development and third-party access to the pilot lines, as well as on the characteristics of the EU virtual design platform, its software and hardware content and access mode(s) by third parties.

R&D&I programmes should take rapid market uptake into account. ZVEI believes that fast-track and/or ad hoc funding instruments are needed to address well-defined and impactful EU priorities. Moreover, ZVEI deems following an "R&D ecosystem" approach as consequential and proper; however, a balance between research & technology organisations (RTOs), universities, and industry must be ensured. Hence, research & development & innovation (R&D&I) programmes should take rapid commercialisation into account. ZVEI believes that fast-track and/or ad hoc funding instruments are needed to focus on a limited amount of well-defined EU priorities.

2.2 Asset optimization platform

Under the second pillar of the proposed regulation, the European Commission has introduced several concepts with well thought-out definitions. As the EU Chips Act is making its way through the ordinary legislative procedure, ZVEI is advocating for preserving these clarifications.

The definition of "'first-of-a-kind' in the Union" is one example for creating a global level playing field for investment in Europe. ZVEI welcomes that the scope is not restricted to certain technologies and/or node sizes, allowing for projects serving the EU economy's mid- and long-term demands, where "mature node sizes" are key for innovations in EU's key verticals. Particularly in the case of solutions that are not purely digital, such as sensors and actuators, it is not the technology node that counts, but the innovation that is optimally suited to the application.

However, it is necessary that state-aid under pillar 2 is not limited to specific facility types but is open to the whole microelectronics ecosystem. From processors and memory to power electronics, MEMS, analogue, and sensors – from equipment and materials, over front- and backend to test and packaging. Furthermore, it is also necessary to scale in specific technologies beyond the first approved "first of a kind facility", because it is highly unlikely that one facility alone will help Europe to reach the 20 percent goal of the EU Commission. Only this will develop the ecosystem in an accelerated manner, enhancing innovation and supply chain resilience. By focusing only on "'first-of-a-kind' in the Union" it will be unlikely to install sufficient production capacity (increase by ~5x) to achieve global market share of the EU of 20% by end of the decade.

Likewise, it is appropriate and good that the required evolution path towards the "next generation of chips" is not narrowly defined either. Thanks to the flexible approach, innovations may be envisaged not only in the digital area, but also for power – i.e., silicon carbide (SiC) and gallium nitride (GaN) – and analog / mixed signal integrated circuits. In addition, it remains possible to define next steps in close alignment with market needs, such as improving digital logic, MEMS, and memory design to address the increasing pervasiveness of AI, data, and connectivity. At the same time, the current limitation to two facility models (Open EU Foundry & Integrated Production Facility) together with the condition "next generation chips" does not allow projects of equipment manufacturers or packaging facilities to benefit from pillar 2.

ZVEI calls for further guidance from the Commission on how entities must determine the funding gap for state aid requests. We also need guidance on the level of evidence they need to produce to prove the counterfactual scenario, which corresponds to the situation where no Member State awards any state aid to the applicant. Such guidance should also clarify what is meant by "realistic assumptions" when it comes to quantifying specific aspects of the funding gap.

Finally, any initiative seeking to establish the certification of trusted, secure, and green chips should be based on market-driven international standards and foresee a strong involvement of industry in developing the standards. It is also vital to consider that the environmental performance and the cybersecurity of chips have different risk metrics. As a start, we suggest the EU to develop voluntary schemes that industry can adopt faster in the market.

2.3 Pillar 3: Supply Chain monitoring and crisis response

The definition of "crisis"" in pillar 3 is raising questions. It is important to understand that the current semiconductor shortage is not caused by a crisis in chip production due to production stops of semiconductor factories or disruptions in raw material supply but is a consequence of rising demand for semiconductors needed during the pandemic response, coupled with significant fluctuations in chip demand of important sectors such as automotive and industrial. It triggered a rippling supply-demand imbalance felt across the world. The current chip shortage, contrary to the Recital (1) of the Chips Act, is not a symptom of permanent and serious structural deficiencies in the Union's semiconductor value chain. In fact, the current shortage is a global phenomenon and cannot be solely attributed to one region's semiconductor ecosystem.

Confidentiality measures should not only apply to the business data that authorities handle as part of Pillar 3. We call on Parliament and Council to include in Art. 27 legal safeguards against any circumvention of technological protection measures (TPM) and use of confidential data contained in chips by malicious actors. Similar measures exist already for some other forms of intellectual property (IP), like copyright or trade secrets. Investments in state-of-the-art chip design rely on strong legal IP protection. Such safeguards would also significantly help in the fight against illicit products sold in the EU.

The proposed measures of the "toolbox" are not reflecting the complexity and uniqueness of the semiconductor supply chain, the requirements of the users as well as the manyfold reasons why a shortage may occur. The suggested, static measures – priority-rated orders and joint procurement of chips – will not be effective in preventing supply disruptions. Today, an average car comprises approx. 1,000, a smartphone ca. 160 different chips. For the most part, chips are not "off-the-shelf" or "one-size-fits-all" products. In addition, chip factories are not homogeneous and only able to manufacture a specific range of node sizes and transistor technologies. This means that Open EU Foundries and Integrated Production Facilities in the EU would only be able to manufacture and supply a very limited number of the chips required. "Just-in-time" supply chains of downstream sectors are increasing the risk of disruptions since they do not reflect the long lead times for chip production (4-6 months). The focus of a toolbox should shift to instruments that can effectively help chip users to enhance their security of business continuity. Therefore, Pillar 3 should be revised entirely.

If adopted as proposed, Pillar 3 of the EU Chips Act does not only introduce far-reaching and unprecedented market interventions, but ZVEI is also concerned whether such provisions may not negatively affect the EU's attractiveness for (domestic & foreign) private investments. It remains questionable how such measures could be enforced and practically implemented.

If set up as proposed, the European Semiconductor Board, with its wide-ranging competences, should institutionalise regular consultations with the semiconductor industry and other stakeholders to support transparent, balanced, and appropriate measures. There must be a more formal engagement of industrial players in this body. The Act should ringfence membership seats with voting rights in the sub-groups for businesses designing, supplying, or using chip-related products. That should include future members of the Industrial Alliance on Processors and Semiconductor Technologies. The Act will call the Board to play a technically demanding role in decision-making in matters

with a high degree of business complexity, like chip certification, technology deployment in the CJU and identification of shortage scenarios. Industry know-how cannot depend on ad hoc invitations as observers to the Board, as the proposal now envisages.

3 The European Chips Act in the wider Regulatory Landscape

It is evident that the European Chips Act cannot and will not stand alone. It will unfold its full potential only if embedded in wider regulatory landscape. This is especially the case because the Commission decided to propose the Chips Act as a Regulation. In the following chapters ZVEI gives additional observations and recommendations.

3.1 A new Impetus for a European Semiconductor Research Strategy

Europe has been and still is a region of world class R&D&I. The collaboration between academia and industry has for decades been the core of a well-established spirit of trustful, forward looking, and innovative pre-competitive research. Based on the presence of world class R&D entities like IMEC, CEA-LETI, Fraunhofer and others, embedded in strong R&D frameworks like KDT JU (successor of ECSEL-JU) and the future Chips-JU, the global leadership capacity of Europe in R&D&I is beyond any doubt.

Nevertheless, Europe needs to address the organization of semiconductor related R&D&I for the years to come. Semiconductor research must not happen in siloes but needs to be directed to fulfil the enabler function of semiconductors when it comes to addressing societal challenges. It is common ground that without innovation in the semiconductor sector the potential of sustainable mobility, smart cities, smart agriculture, smart energy etc. cannot be realized, thus i.e., threatening the aim to make Europe climate neutral by 2050 – this is the context of future research in the field of semiconductors.

Therefore, the European Union should concretely address the following:

- Whereas KDT and in future Chips-JU is to remain the focus point for semiconductor research in the Horizon Europe programme, future calls in other partnerships under Horizon Europe should have a semiconductor component were adequate. This counts especially for calls in the partnerships focusing on 5G, 6G, IoT, Robotics, Factory Automation, Mobility, Agriculture and Space.
- Better alignment between R&D funding on European, national, and regional level to create the best leverage from public resources.
- The geopolitical situation is dynamic, and so are market developments. To be able to swiftly react to new developments, Europe needs more agile and flexible "fast-track" RD&I funding instruments. These instruments must allow for short planning/approval times as well as competitive and ambitious funding rates.

3.2 Enhance Production Capacity in Europe

ZVEI fully supports the aim outlined by the European Commission to gain 20% of world production in value in cutting-edge and sustainable semiconductors by 2030. However, this aim requires closer assessment. Firstly, the term "cutting-edge" or often called "leading edge" needs to be analysed in the context of the European semiconductor ecosystem. Measures need to be oriented to serve the needs and demands of industries and citizens in Europe and to enable them to achieve the green and digital transformation of societies. In that regard, it is crucial to not exclusively link "leading edge" to node shrinkage (nodes smaller than 10nm). Whereas the need for Europe to accommodate and build up capacity in smaller nodes is undisputed and should be prepared in close alignment with EU lead markets, there is a continuous need for larger nodes, particularly in power electronics, analog, sensing and related applications indispensable for the functioning of electronic systems. Unlike in other industries, semiconductors are not characterized by a phase out or replacement of larger node chips by those of smaller nodes – the laws of physics require the presence of different nodes to cover all necessary functional parameters of an electronic application. "Leading edge" innovation also takes place along the whole value chain (production processes, materials, tools, etc.) and is not limited to the final product. The following figure clearly states that since the 1990ies no structural node has been vanished from the global market despite an accelerated development of smaller nodes. This is a development that is expected to continue and needs to be considered by all political decisions that are to be taken regarding enhancing production in Europe:

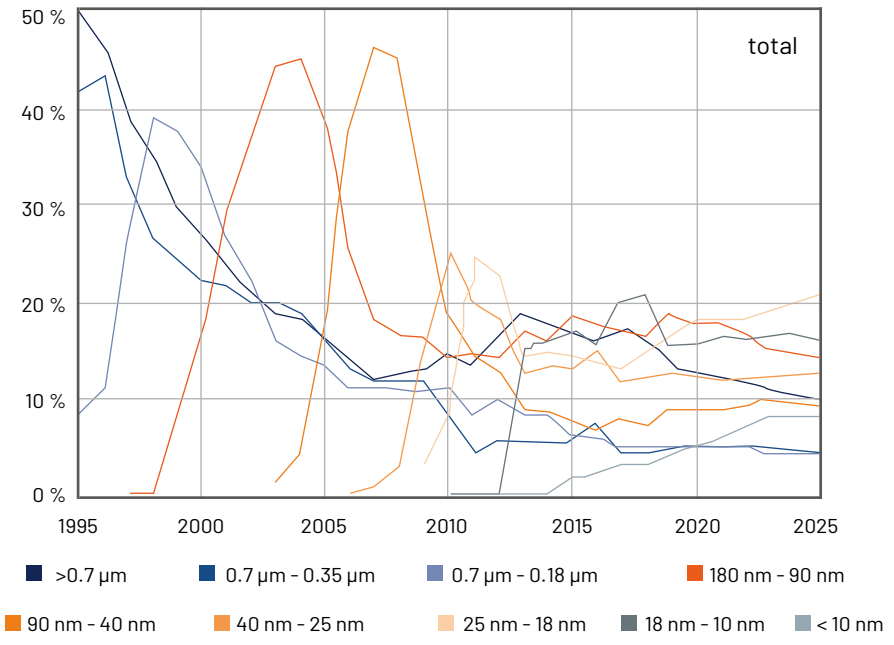

Figure 1
© ZVEI, WSTS

Another figure illustrates the current and future semiconductor content of a car – also here it is clearly visible that automotive applications will continue to require chips of larger nodes, the same counts for industrial applications. In general, each final application always needs a combination of different semiconductor technologies to function.

Example car

16 nm
Radar Processor
Gateway & Networking Processor

40 nm
Digital Processors,
Memory ...

65 – 350 nm
HV Analog Mixed signal
Motor Driver, LED, System
Bus, BMS, Sensors, MEMS, ...

> 1 µm
Power electronics
Powertrain Battery

960 960 semiconductors per car on average, of which approx. two thirds are 130 nm and larger

„Leading edge" is not just = 2 nm. Technology deployment for „Leading edge" is oriented to real demand in Europe

Figure 2
© ZVEI

In this context it is worthwhile to refer to the "Chapeau Text" that has been drafted by industry during the preparation of the new IPCEI on Microelectronics and Communication Technology:

"For some parts of the European value chain, such as compute power and memory, "More Moore" remains relevant and will progress to 2nm design and development, and to manufacturing in the next couple of years. In the coming decade, the scaled Si logic and memory technology roadmap will be pushed as far as possible and well beyond the 3 nm node, because of requirements posed by mobile applications and servers for high-performance computing, artificial intelligence and machine learning, autonomous driving, and electrified powertrain as well as 5G/6G communication equipment.

Therefore, the leading semiconductor manufacturers push the technology development in every part of the semiconductor manufacturing equipment sector to move forward in performance, reliability, cost, and efficiency starting from an already very demanding technological position. To enable this, the European technology suppliers across all sectors must invest into a wealth of highly innovative power technologies, manufacturing equipment, materials, and process technology concepts. This IPCEI contributes to leading-edge through activities in the areas of system and chip design, IP-generation, process development, as well as in semiconductor manufacturing equipment and materials building on existing European strength (EUV lithography, 3D integration, IC substrates, advanced packaging, photo masks, semiconductor materials, and test structures).

For other sectors within the semiconductor value chain "More than Moore" and "Beyond Moore" are forming the basis for highly relevant, leading-edge innovations including connections of different types of semiconductor technologies to very densely packed systems and wide band gap (WBG) materials. An increasing number of applications are based on these technological developments, utilising semiconductor technologies with use cases within automotive, communication technology, medical and other fields. Apart from that, Europe's key industries are in the early stages of a significant transformation towards a comprehensive electrification. This opens the unique opportunity to establish European stakeholders as leaders within this transition. This, however,

requires a stable supply of wide band gap semiconductors, to drive energy efficiency with the same or even higher performance. For this, the semiconductor industry needs a solid basis for developing the capability of scaling up manufacturing in areas of latest technologies and materials, where processes are still in early stages. On the other hand, key industries such as automotive, renewable energy, and health and life sciences, where RDI activities are vital for the currently ongoing change to a green and digital society, need a close exchange along the value chain.

Within these technologies, the key innovations cannot be measured in nanometres, but in the innovative use and integration of compound materials (SiC, GaN, GaAs, InP, 2-dimensional materials, advanced photonics, etc,) and additional differentiated features, such as switching frequency. In conjunction, these materials and features lead to best-in-class energy and material efficiency, high reliability and lifetime improvements, and security design. Advanced packaging solutions and the corresponding supply chains are required to deploy microelectronics innovations. In most of the European application domains, such as industrial electronics and control units for mobility applications, logic chips based on mature technology nodes are still the backbone of the European industry. Strengthening the European chip manufacturing in mature technology nodes will create new opportunities for the whole semiconductor ecosystem."

Based on this it is important to look at the different tools available and prerequisite to enhance production.

3.2.1 Continuation and Enhancement of IPCEI

The first Important Project of Common European Interest (IPCEI) on Microelectronics (2017-2022) was a huge success and established new facilities across Europe. The IPCEI has sustainably strengthened the presence of microelectronics in Europe. Not at least because of this first IPCEI, the European semiconductor industry holds or is currently striving for a very strong position in power semiconductors, sensors, and MEMS as well as analogue and mixed-signal semiconductor processes for applications primarily in industry and automotive.

The current work on starting the second IPCEI on Microelectronics and Communication Technologies is more intensive with up to 19 participating Member States and over 100 direct participating companies. We very much welcome the current scope to include needs across the whole value chain of the microelectronics ecosystem. However, the process to notify IPCEIs currently takes more than two years and the intense coordination process delays investments that are ready to start. For the semiconductor industry it is clear, that there must be a third IPCEI for Microelectronics for 2024 and beyond to reach the targets set up by the EU Commission until 2030. Preparations for the process should be improved. Most importantly Member States should very early on decide on their participation, so national processes do not delay the whole integrated project to move forward.

At the same time, IPCEIs have structural limits, which should be considered. Funding R&D and first industrial deployment linked to innovation beyond global state of the art will still be crucial in coming decades. To avoid supply shortages, increase resilience along the value chain and reach a certain share of global manufacturing requires a broader scope for funding. In 2021 the automotive industry did not stop their production processes, because of a lack of "beyond global state of the art technologies", but because of increasing demand for state-of-the-art technologies. If the requirements for an IPCEI remains as they currently are, new EU or State Aid schemes are needed.

3.2.2 New approaches to EU State Aid

Further to the necessary continuation and extension of IPCEI as a significant tool to enable Member States' support for further R&D and first industrial deployment, other tools need to be explored to ensure the take up of production capacity beyond IPCEI. In this context industry took well note of Commission Communication 2021/713 on new state aid measures for the semiconductor industry, which is also reflected in pillar 2 of the Chips Act proposal. This is a significant step towards establishing a regime for state aid that has the potential to support chip production in an unprecedented way and which will put the EU on a level playing field with other global regions. The Communication rightly claims to make the competition policy fit for new challenges. The aim to put Europe on the way of recovery by maintaining or gaining technology leadership, safeguarding technological sovereignty, and enabling the green and digital transition is a new challenge which requires such kind of new approach.

Semiconductors and its enhanced production in Europe play a crucial tool in this context. In concrete terms Europe should address the following:

- Develop state-aid terminology that is reflecting market needs, because there is no automatism that smaller nodes replace larger nodes. All nodes will continue to have their specific scope for technological application. This goes together with the important definition of "first-of-a-kind" in the EU Chips Act proposal, which addresses that innovation is not exclusively driven by chip design, but also includes improved production processes.
- Develop a common methodology to assess future node migration according to application and base support programs thereon.
- Based on such definition and oriented along the current and future needs of industry and consumers in Europe, establish specific funding mechanisms to foster enhancement of design and production of first-of-a-kind facilities across the whole microelectronics value-chain, allowing for funding rates that create a level playing field with other regions.
- To build a holistic production ecosystem, also investments in building up capacity in larger nodes must be able to benefit from this new state aid approach.

3.2.3 Address the Skills and Diversity Challenge

In late 2020 the European Commission has launched the "EU Pact for Skills[11]" and after one year more than 450 organizations in Europe have signed the pledge to re-skill more than 1.5 million people in Europe[12]. This is a huge success and clearly shows the need to put skills at the core of any deliberation to enhance chip production in Europe, especially since the semiconductor industry had been chosen to be one of the three verticals to be embedded in the Pact for Skills at its beginning. Europe, therefore, should build upon this and support the momentum that has been created in the skills area. In concrete terms, addressing the challenges the semiconductor industry in Europe faces when it comes to recruiting new talent or upskilling the existing workforce is key. The following needs to be pointed out"[13]:

- **Europe should foresee a stocktaking of the impact of the Pact for Skills to the semiconductor industry.**
- **Europe should enable the development and exchange of best practices between Member States and European Regions for a better inclusion of STEM subjects in the curricula of secondary schools and to establish a reference system for STEM using the already established "key competence framework"[13].**
- **Europe should foster to raise the attractivity of a career in the semiconductor industry for women, the BayFiD programme of the Bavarian State Government (albeit not limited to the semiconductor industry) could be made a role model for other European regions.**
- **The in the Chips Act foreseen establishment of European Competence Centre for Microelectronics is essential. This is needed to complement the well-established European academic research landscape with a similar structure to foster semiconductor related tertiary and academic education.**

3.3 A new Framework for International Collaboration and Partnership

Industry stakeholder have pointed out on several occasions[14] that the semiconductor industry is global in its nature and any attempt to work towards a regionalization of supply and value chains would be counterproductive and work in the detriment of societies[15]. Therefore, any political concept developed in and for Europe to enhance competitiveness, leadership and sovereignty must orient itself along the prerequisite of international collaboration. Such concept must not be guided by political myths but clearly built along the lines of economic prerequisites while considering the geopolitical situation. To illustrate the global nature of semiconductor production the following picture is helpful:

[11] https://ec.europa.eu/social/main.jsp?catId=1517&langId=en

[12] https://ec.europa.eu/social/main.jsp?langId=en&catId=1517&furtherNews=yes&newsId=10098

[13] With the Key Competence Framework the European Commission (operationally executed by the Joint Research Centre (JRC)) already developed DigComp 2.1 https://ec.europa.eu/jrc/en/digcomp , EntreComp https://ec.europa.eu/jrc/en/entrecomp and LifeComp https://ec.europa.eu/jrc/en/lifecomp but not yet a "STEMComp" framework, even it would be in the scope of the 8 defined competencies. Competence #3: Mathematical competence and competence in science, technology and engineering.

[14] Cf. Fn. 5 above

[15] Cf. - https://www.bcg.com/publications/2021/strengthening-the-global-semiconductor-supply-chain - seeking regional self-sufficiency for the US would amount to more than $ 400bn in government incentives and cost more than $ 1trn over ten years

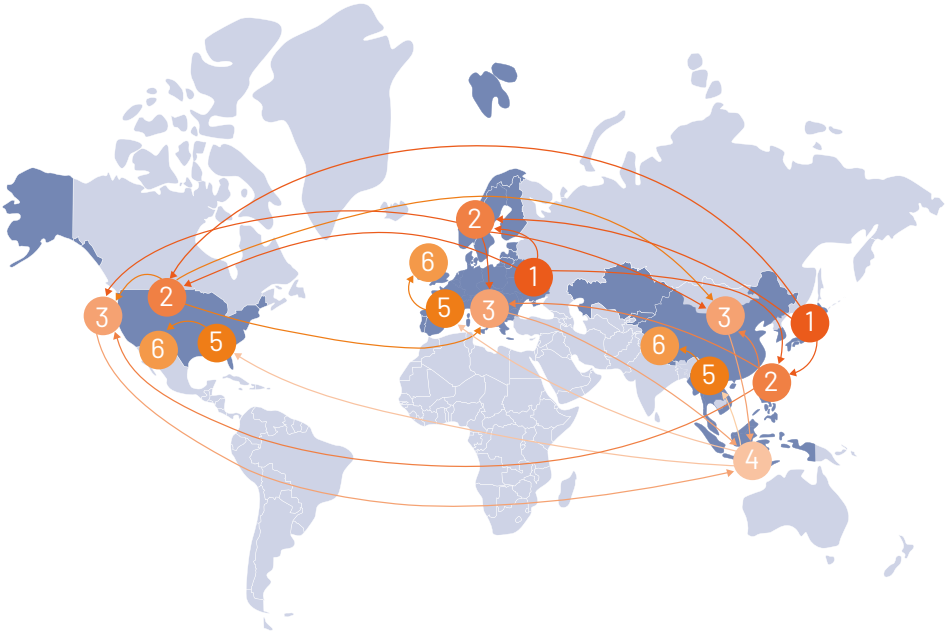

Figure 3
© ZVEI

Example

1. Semiconductor ingot cut into wafer
2. Bare wafer into fab wafer
3. Electrical function test of each die
4. Die are assembled, packaged and tested
5. Final Product shipped for inventory
6. Chip integrated into application by end-product manufacturer

3.3.1 The EU/US Trade and Technology Council

The EU/US Trade and Technology Council is a tremendous opportunity to align and to jointly develop concepts to keep technology leadership in a changing geopolitical context. It is positive to note that semiconductors have been included in the scope of this new forum[16] and figured prominently on the agenda of the first meeting in Pittsburgh, PA in September 2021. Whereas this is encouraging, the inclusion of semiconductors in the Pittsburgh Declaration is unfortunately one-dimensional and relates exclusively to issues around supply chain security and resilience. Although this is an important topic and merits careful consideration, TTC needs to exploit on the full potential when it comes to trans-Atlantic collaboration in the field of semiconductors. Therefore, Europe also needs to give orientation on transatlantic collaboration. The following should be addressed:

- **TTC needs to build and strengthen trans-Atlantic structures and framework programmes for common R&D&I activities; the Eureka programme could easily act as the appropriate framework for joint R&D&I collaboration.**
- **The US Chips Act, as well as the EU Chips Act must foresee provisions to facilitate and institutionalize trans-Atlantic collaboration, including collaboration in a more geopolitically balanced capacity building.**

[16] https://ec.europa.eu/commission/presscorner/detail/en/STATEMENT_21_4951

3.3.2 The Concept of "Supply Chain Resilience"

Albeit having received unprecedented public and political attention during the stretched semiconductor supply situation in 2021/22, the concept of optimizing the resilience of supply chains is by far not new to the semiconductor industry. The complexity of semiconductor production, the multitude of stakeholders involved and the cross-border dimension of production as well as the huge spectrum of clients of the industry put supply chain organization at the core of each single semiconductor manufacturer. Providing resilient supply chains is the responsibility each single manufacturer has towards its client base and is a core element of competitiveness[17].

Any politicization or similar political or regulatory interference in well-established supply chains needs to be put to a minimum unless its added value is proven by carrying out a thorough and profound impact assessment. To maintain and to improve supply chain resilience is the prerogative of stakeholders along the value chain, geographical and economic diversification of suppliers is a long proven and applied concept. Nevertheless, there is a dimension to supply chain resilience where European public attention can prove to be helpful, namely a functioning EU internal market for raw materials required for semiconductor production, predominately chemicals. A too restrictive framework for production and usage of chemical substances leads almost inevitably to limited choices of chemical substances to be exclusively sourced from outside the EU. Consequently, Europe needs to address the following:

- **Avoid a notion of regulatory interference in supply chains unless a clear added value can be established.**
- **Support the access to key raw materials available on the EU single market.**

Any notion with the ability to anticipate and respond to shortages must be measured against its upfront concrete added value and needs to be prepared, developed, and implemented with early involvement of all stakeholders along global value networks.

[17] https://www.zvei.org/en/press-media/publications/technological-sovereignty-industrial-resilience-and-european-competences

3.4 Towards an Improved Investment Framework in Europe

The key deliverable of a European Chips Act is the clear, direct, and timely setting of a foundation to improve investment conditions and attractivity in Europe for the next decade. Whereas several conditions regarding public funding have been addressed above already, a decisive parameter for Europe to be successful is to deliver its ability to solve the challenges outlined below.

3.4.1 Energy Supplies and Pricing

The production of semiconductors is energy intensive despite all successful past and ongoing efforts to decrease electricity consumption. Given this, energy pricing is a core factor to benchmark competitiveness of Europe to other regions. Therefore, it is crucial for policy makers to put emphasis on the need to supply chip manufacturing in Europe with electrical energy at a competitive price rate. This means that energy legislation on European and national level needs to become the basis to provide chip manufacturers with a reliable pricing structure and a globally competitive pricing range. Europe will explicitly need to address this key requirement.

3.4.2 Acceleration of Administrative Processes

The Chips Act foresee tools to make eligibility of any fabrication plant project conditional to streamlined permitting procedures in the region concerned. We encourage the definition of clearly defined maximum acceptable timelines for pre-consultation, planning, and approval processes, which all regional and local authorities should commit to respect. Studies show that only five Member States are in the global top 30 countries with the most efficient construction permitting systems[18].

3.4.3 Supportive Tax Policy

Europe could encourage a targeted, realistic 25% tax credit by Member States on the purchase of chip R&D equipment and facilities until 2025. A reinvigorated European Semester can crucially push for the introduction of this measure throughout Europe. Korea, the US, and China have already adopted similar policies[19].

[18] Cf - https://www.digitaleurope.org/resources/digitaleurope-recommendations-on-semiconductor-priorities-for-the-eu/ and https://ec.europa.eu/info/sites/default/files/eu-single-market-barriers-staff-working-document_en.pdf

[19] Cf. https://www.digitaleurope.org/resources/digitaleurope-recommendations-on-semiconductor-priorities-for-the-eu/#_ftn4

3.5 REACH and Semiconductor Production

It has been mentioned on several occasions in this paper, that semiconductor manufacturing is a highly sophisticated and complex process. Chemicals play a core role in the manufacturing process and access to the necessary chemical substances for manufacturing[19] in Europe is of decisive importance to enhance production capacity reaching the envisaged 20% global market share. The interdependency between chemical substances and semiconductor manufacturing capacity is also addressed in a recent draft report by the European Parliament (cf. EPRS report "Future Shocks" 2022, unpublished) which states that "potential environmental issues linked with semiconductor production, which uses vast amounts of water, energy and chemicals" need to be addressed. The semiconductor manufacturers have been addressing these issues since a long time and are ceaselessly investing in reducing the environmental footprint of production and to replace chemical substances. However, there are substances that are covered by REACH which cannot be replaced on short term (e.g., PFAS). For those substances, additional research and possibly extended deadlines are necessary to avoid a scenario that the envisaged enhancement of production capacity in Europe is factually countered by the phase-out of chemical substances that do not have replacements available. Therefore, Europe needs to foresee the following:

- **Build an inventory of substances needed for semiconductor production and assess their relation to REACH, propose enhanced deadlines for phase out.**
- **The Chips Acts needs to reflect the advancement through EU committees and European Parliament of the "Chemicals Strategy for Sustainability" (CSS) which presently envisages changes to REACH. Under consideration/development are the concept of "essential use" as well as modifications to the restriction/authorization schema under REACH. Semiconductor manufacturers in Europe should not be subjected to production disruptions based on broad restrictions which eliminate the use of entire classes of chemicals without providing time for the development, testing, and implementation of alternatives.**
- **In parallel establish R&D structures to accelerate the research on the replacement of these substances, preferably in a trans-Atlantic context. TTC should take up this exercise.**

3.6 Cybersecurity and Semiconductor Design and Production

Chip design is a clear, albeit not the only, prerequisite of cybersecure electronic devices, installations, and applications. The initiative started by the German Ministry of Research on "trustworthy electronics"[20] and the respective funding programme give a respective illustration.

However, many chips are going to Asia for packaging, testing and assembly. This practice may cause a risk when it comes to potential manipulations by companies outside Europe specialized in this part of chip production. Therefore, Europe should address this issue and assess the respective risk. One remedy to address this is building up additional capacity in packaging, testing and assembly in Europe. Integrated Device Manufacturers may be less exposed to this risk, since production steps in question are carried out in the closed infrastructure of a single producer, even though the different steps are carried out on different territories.

[19] Cf. Above Fn. 5 – the cited paper gives a profound respective overview

[20] https://www.bmbf.de/bmbf/shareddocs/bekanntmachungen/de/2020/03/2888_bekanntmachung

4 Implementation and Next Steps

The potential for the Chips Act to deliver and build the foundation for making the semiconductor industry more competitive and innovative, enhance market share and enable the dual transition, depends on its implementation. In this regard the envisaged Alliance for Processors and Semiconductor Technologies is a crucial tool to achieve the aims outlined in the Chips Act. The organization of the Alliance as the major if not single European Semiconductor Platform is a key factor. The Alliance need to be organized in an output oriented, forward looking, and non-discriminatory vision that is carried by all entities that sign up to it. The structure of the Alliance should be organized along the following workstream and working groups (not exclusive):

WS 1: Framework to enhance production capacity via more attractive investment conditions

- WG A: Assessment and development of funding instruments
- WG B: Framework Conditions – Energy pricing, Tax Regimes, CAPEX conditions, etc.
- WG C: Adaptation of legal framework, focus on state aid rules

WS 2: Framework for R&D&I

- WG A: Strategic Research and Innovation Agenda
- WG B: Linking EU and national R&D programs

WS 3: Framework Skills, Talent, Diversity

- WG A: EU Pact for Skills
- WG B: Microelectronics Awareness Campaign
- WG C: Network of Competences Centres for Microelectronics, Digital Innovation Hubs

WS 4: International Collaboration

- WG A: Cross-regional R&D&I
- WG B: Regulations for global supply chains

WS 5: Communication

Platform to further explain Microelectronics to society and policy makers

It will be important to make this platform holistic and comprehensive with an immediate involvement from downstream industries, academia, education facilities, policy makers on regional, national, and European level and – the semiconductor industry in Europe. And this platform should be the main and overarching advisory body to Commission and Member States also facilitating those Working Groups which might be needed to advice the European Semiconductor Board. Redundant structures between the Alliance and sub-groups of the ESB should be avoided.

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