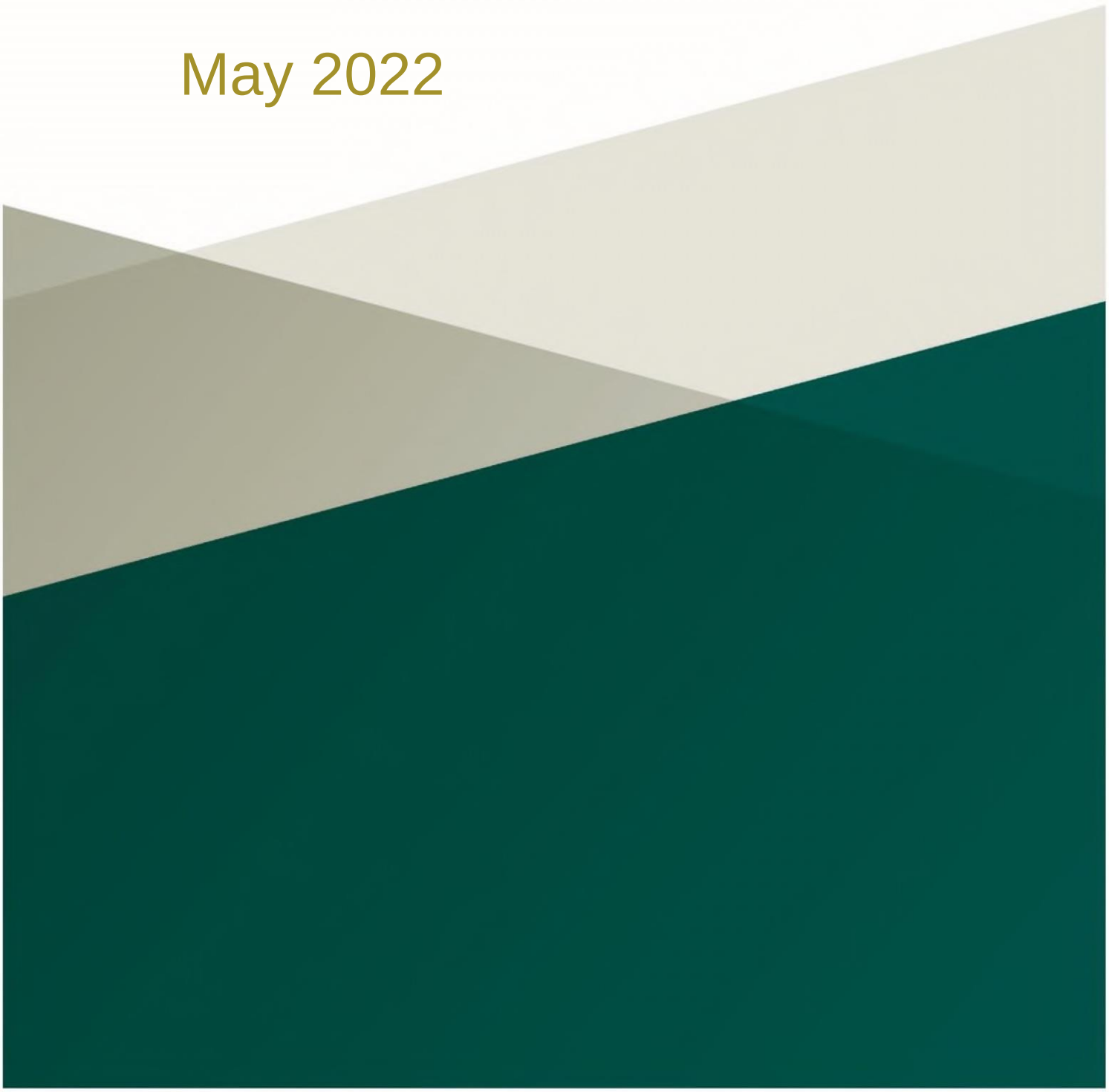
An Roinn Fiontar,
Trádála agus Fostaíochta
Department of Enterprise,
Trade and Employment

European Chips Act

Public Consultation Report

May 2022



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Introduction

The European Commission announced the European Chips Act on 8th February 2022.

In order to provide an opportunity for all interested parties to make their views on this matter known, the Department of Enterprise, Trade and Employment sought the views of stakeholders by means of a public consultation. The public consultation opened on 1st March and closed on 18th March 2022.

Stakeholders' views have been assessed by DETE and will help inform the work to be undertaken by the Department in this area.

The Department received eight responses from the following stakeholders:

- The American Chamber of Commerce
- Analog Devices
- IBEC
- Industry Research & Development Group
- Intel
- MIDAS Ireland
- Mr. Savio Victor Gomes
- Tyndall Research Institute

We thank respondents for their views and the time taken to prepare a submission.

Submissions received in response to the public consultation are reproduced in full below.

Consultation Paper

Subject of the Public Consultation

The Department of Enterprise, Trade and Employment is seeking the views of stakeholders on the European Chips Act, proposed by the European Commission on the 8th of February 2022.

Stakeholders are asked to submit written contributions on the proposal by the 18th of March 2022. DETE will represent Ireland at negotiations on the Commission's proposals over coming months and responses to the consultation will help inform the work to be undertaken by the Department in this area.

Background

Semiconductor chips are central to the digital economy and are used in numerous everyday products including smartphones and cars. They have critical application for health, energy, communications, and automation and as such, are central to the European Union's digital and green transitions. However, the world is currently facing a shortage in semiconductor chips and the recent crisis in the European supply chain has revealed structural vulnerabilities in the European value chain.

The European Chips Act is the European Commission's response to this shortage of supply and proposes a suite of measures to bolster Europe's semiconductor industry. The measures included in the Act will increase Europe's production of semiconductor chips, build our capacity and skills to innovate the design, manufacture and packing of chips and strengthen Europe's research and development capabilities in this sector. They will also enable us to develop a deep understanding of the global semiconductor supply chain.

The Department of Enterprise, Trade and Employment recommends readers to visit the European Commission website which provides further information on the proposal. The Commission's Proposal and accompanying texts are available on the Commission's website:

- Proposal for a Regulation establishing a framework of measures for strengthening Europe's semiconductor ecosystem (Chips Act). https://ec.europa.eu/newsroom/dae/redirection/document/83090
- Commission Recommendation on a common Union toolbox to address semiconductor shortages and an EU mechanism for monitoring the semiconductor ecosystem: https://ec.europa.eu/newsroom/dae/redirection/document/83095
- Communication from the Commission: A Chips Act for Europe: https://ec.europa.eu/newsroom/dae/redirection/document/83086
- European Chips Act – Questions and Answers: European Chips Act - Questions and Answers (europa.eu)

The European Commission has also launched a targeted stakeholder consultation available at EUSurvey - Survey (europa.eu). The Commission's consultation will be open until **20 March 2022.**

Objective

The purpose of the proposed Chips Act is to jointly create a state-of-the-art European chip ecosystem including production. To fulfil this vision, the European chips strategy is articulated around five objectives:

- Europe should strengthen its research and technology leadership;
- Europe should build and reinforce its own capacity to innovate in the design, manufacturing and packaging of advanced chips, and turn them into commercial products;
- Europe should put in place an adequate framework to increase substantially its production capacity by 2030;
- Europe should address the acute skills shortage, attract new talent and support the emergence of a skilled workforce;
- Europe should develop an in-depth understanding of global semiconductor supply chains.

Structure

The Chips Act is built on three distinct pillars, and we invite respondents to submit their views under each of the three headings: 1. A Chips for Europe Initiative; 2. A framework to ensure security of supply; 3. A coordination mechanism between Member States.

Pillar 1: A CHIPS FOR EUROPE INITIATIVE

The Chips for Europe Initiative will develop Europe's tech leadership by ensuring that infrastructure and industry are harmonized with EU research and development. This will strengthen capacity by bringing innovation from the lab right through to the design and manufacture of chips.

The Initiative will include an open-access virtual design platform to stimulate cooperation among users at every stage of development. The Initiative will also support pilot lines to enable third parties to test, validate, and further develop their product design. Furthermore, it will support a network of competence centres across the EU that will provide expertise to stakeholders. The Initiative will be implemented by means of the Chips Joint Undertaking, a Joint Undertaking under Horizon Europe.

A 'Chips Fund' will provide increased availability of funds to support the growth of start-ups, scale-ups, and SMEs.

PILLAR 2: A FRAMEWORK TO ENSURE SECURITY OF SUPPLY

This framework will strengthen security of supply by introducing guiding rules for investment and enhancing production capacities in semiconductor manufacture. It will promote integrated production facilities and open foundries as well as advanced packaging, testing, and assembly as part of integrated production facilities. The framework will lay down criteria for State Aid and assess the impact of investments for the EU economy.

PILLAR 3: A COORDINATION MECHANISM BETWEEN MEMBER STATES AND THE COMMISSION

The proposed mechanism will monitor supply and anticipate shortages of the supply of semiconductor chips. It will facilitate crisis coordination mechanism between Member States and strong Commission powers during times of crisis. A Semiconductor Board will be established to monitor the semiconductor value chain. Taking advice from this Board, the Commission may trigger a crisis stage, via an implementing act, that would enable an emergency toolbox. This toolbox would include export control mechanisms.

Consultation Responses

Stakeholder views are welcomed from interested parties, including manufacturing industry, the research community and beyond to end users. We ask that respondents structure their responses according to the three pillars outlined above, responding to one or more of the pillars as appropriate.

Views from stakeholders and interested parties on the proposed regulation are requested no later than **5pm on Friday 18 March 2022**. Submissions should be marked "European Chips Act" and should be emailed to EUChipsAct@enterprise.gov.ie. Further queries can also be made to EUChipsAct@enterprise.gov.ie.

Information on Consultation Process

Freedom of Information Act 2014 and Publication of Submissions

The Department will make public on its website all submissions received under this consultation. Your attention is also drawn to the fact that information provided to the Department may be disclosed in response to a request under the Freedom of Information Act 2014. Therefore, should you consider that any information you provide is commercially sensitive, please identify same, and specify the reason for its sensitivity. The Department will

consult with you regarding information identified by you as sensitive before publishing or otherwise disclosing it.

General Data Protection Regulation

Respondents should note that the General Data Protection Regulation ('GDPR') entered into force in Ireland on 25th May 2018 and it is intended to give individuals more control over their personal data. The key principles under the Regulation are as follows:

- Lawfulness, fairness and transparency;
- Purpose limitation;
- Data minimisation;
- Accuracy;
- Storage limitation;
- Integrity and confidentiality;
- Accountability.

The Department of Enterprise, Trade and Employment is subject to the provisions of the Regulation in relation to personal data collected by it from 25 May 2018. Any personal information which you volunteer to this Department, will be treated with the highest standards of security and confidentiality, strictly in accordance with the Data Protection Acts 1988 to 2018.

AMERICAN CHAMBER of COMMERCE IRELAND

European Chips Act

Response from the American Chamber of Commerce Ireland (AmCham) to the Department of Enterprise, Trade & Employment's public consultation on the European Chips Act.

March 2022

The American Chamber of Commerce Ireland
The Voice of US-Ireland Business

The American Chamber of Commerce Ireland (AmCham) is the collective voice of US companies in Ireland and the leading international business organisation supporting the Transatlantic business relationship. Our members are the Irish operations of all the major US companies in every sector present here, Irish companies with operations in the United States and organisations with close linkages to US-Ireland trade and Investment.

AmCham welcomes the introduction of legislation to improve, strengthen and further develop the environment in which chips are designed, manufactured, and distributed. Our ever-increasing dependency on technology in our day-to-day personal and professional lives means that the need to have strong, indigenous, and responsive supply chains is vital to meet future demand.

Pillar 1: A Chips for Europe Initiative

Undoubtedly the Chips for Europe initiative constitutes a key strategic investment in the skills and resources necessary to develop indigenous European chip production. However, it is key that the Chips for Europe initiative is accompanied by a roadmap or implementation plan which explains in clear terms how this fund will be used and distributed to individual Member States.

Ireland has a thriving Research, Development & Innovation (RD&I) sector and AmCham members have strong links to research institutes across Ireland with a view to investing in and developing the talent base in Ireland to support related industries. The provision of additional EU funding to support RD&I activities is one key area where the Chips for Europe initiative could provide a significant boost to the development of the sector in Ireland, advancing the design and manufacturing of chips.

Additionally, it is vital that there are employment opportunities for graduates in fields related to the production of chips, allowing them to invest the skills learned in specialised areas back into the professional environment within the Member State itself. Direct investment in the development of existing businesses within the chip and semiconductor sector, and investment in supporting new businesses in this sector, will provide key opportunities to utilise the skills base developed through RD&I investment within the respective Member States in which the related education and training occurred.

It is important that investment opportunities, as part of the Chips for Europe initiative, are accessible for businesses of all sizes within the industry. AmCham members have noted the importance of facilitating different organisations across the entire European chips ecosystem in bringing greater diversity of expertise and depth of innovation to the knowledge base of the chips and semiconductor industry in Europe. In this context, it would be key that the process of accessing funding at EU level is as direct as possible. A suggestion to improve this would be to release funding from the central European funds to individual Member States to be administered at state level, in line with national expertise of the sector on a state-by-state basis.

AmCham believes that the above considerations will support key foundational investment in the development of native EU industries at the cutting edge of chips technology and bolster the competitiveness of the EU in relation to the production of chips through the enhancement of the scale of opportunities available.

Pillar 2: A Framework to Ensure Security of Supply

There are two key aspects to developing a framework to ensure security of supply in the context of the European Chips Act. The existing supply chain as it relates to design, production, and the distribution of chips throughout Europe must be expanded and developed in the context of the wider

European ecosystem. Furthermore, there are key structural, long-term considerations that must be incorporated to ensure the strength and stability of this ecosystem into the future.

AmCham represents a number of members whose operations encompass different parts of the supply chain associated with the development of chips. AmCham's members believe it is important, when considering the security of supply, that there is an awareness of the wider ecosystem which is integral in the development of chips. Different organizations of varying sizes, functions, and outputs have different and equally valuable contributions to make within the European chips ecosystem. As such, AmCham advocates for a legislative and regulatory structure that facilitates cooperation between businesses of varying size and function within the ecosystem to optimise results and foster innovation within the sector. In this context, it would be important for any implementation plan associated with the European Chips Act to clearly outline the regulatory environment under which this co-operation and innovation may occur, and further outline how different aspects of the supply chain, such as design and manufacturing, would interact.

Additionally, it is important to acknowledge that the development of sustainable supply chains requires long-term planning. As part of this planning process, we must not only look to what constitutes a strong proposal to cater for existing circumstances, but also consider how opportunities for future expansion will be provided for in a manner that supports transparency and market competitiveness. The first key consideration must be at the examination of long-term funding plans for the sector. It would be important that the funding offered under the European Chips Act not just provide a once off stimulus payment, but instead offer on-going support to facilitate future investment and growth and provide certainty for businesses in this sector. Secondly, it is important that intellectual property protection measures are built into any future planning in this regard to ensure that the ecosystem in which the European Chips Act operates continues to be transparent and competitive while establishing an autonomous European supply chain. In this context, it would also be important that the definition of "first of a kind" entities is outlined clearly in the legislation to set definitive parameters as to what will constitute a "first of a kind" entity and how these entities will interact with the European market to ensure the competitiveness of the market is maintained.

It is important to note that, while the European Chips Act pertains to European development, there is no question that supply chains will continue to be global in nature. In this context, the importance of the transatlantic relationship cannot be overstated. Entities such as the EU-US Trade and Technology Council offer significant opportunities in relation to the development of strong supply chains in this sector. Furthermore, the enhancement of supply chains in the context of the transatlantic EU-US relationships will create stronger bonds within the global industry and provide opportunities to mitigate potential vulnerabilities through a more diverse supply chain in which EU Member States can play an increasingly strengthened role within the ecosystem, under the European Chips Act.

Pillar 3: A Co-ordination Mechanism Between Member States

The development of a coordination mechanism between Member States at EU level is a key cornerstone of the development of a strong ecosystem, allowing for the processing and development of chips and semiconductor across European Member States. It can provide a central point for subject

matter coordination, regulatory oversight, and to examine the potential contribution that the advancement of this sector can make to regional development.

The existence of a central oversight mechanism provides greater capacity for multi stakeholder engagement and an important space for industry leaders across the European Union to exchange key information, not only with a central European coordination point, but also with other partners. Such collaboration would be beneficial for industry leaders within the European Union itself, and also for partners in third party countries, given it would facilitate innovation within the sector and therefore drive market demand. This industry involvement at executive coordination level is vital to ensure informed decision-making at European level. Having an EU based central point for the coordination of such information will work to facilitate information sharing and co-ordination in a neutral and collaborative environment. In addition to this, it is of crucial importance that this central coordination body takes on a monitoring role in relation to the implementation of actions associated with the European Chips Act. AmCham is of the view that the potential for the delegation of monitoring responsibilities to Member States may, in this context, create regulatory fragmentation. As such, having these activities occur at EU level may better support the intention and aim of the European Chips Act.

In the context of the regulatory environment surrounding the European Chips Act, AmCham is of the view that further clarity is required in relation to the operation of the proposed European Semiconductors Board. The provision of clarity with regard to the scope of the proposed Board and the role of industry actors in this regard will provide certainty for industry. AmCham advocates for the involvement of industry leaders across all mechanisms associated with the European Chips Act, and this position is inclusive of the European Semiconductors Board. AmCham strongly recommends the inclusion of industry leaders as part of the decision-making processes of the Board as opposed to the current proposal whereby they would act in an observer capacity in respect of the Board's work.

Finally, the existence of a central coordination point at European level will facilitate export control oversight, potentially allowing for greater regional development across Europe. In the context of export controls, it is important to have a central oversight body that not only monitors European needs within the sector but is also cognisant of the related global need. AmCham is of the view that, through the implementation of the European Chips Act, it is essential to develop the capacity for industry growth to meet worldwide demand. Future planning, in relation to production and capacity for growth, should take into account current and future demand levels in the global market. The existence of a single central oversight mechanism would provide the opportunity to coordinate with regional development authorities within the European Union to bring opportunities for investment to every corner of the EU.

Analog Devices Submission to DETE Public Consultation on the European Chips Act

Date : 11th March 2022

The European Chips Act addresses a key issue for the sector and for the economy – how EU member states can partner with companies such as Analog Devices (ADI) to co-fund, co-innovate and rapidly scale up Europe's advanced technology and engineering capacity.

Europe is critically important for ADI as a manufacturing and innovation hub within our global supply chain. We've been here since 1976 and we have more than 2,200 employees across seven European sites, including our EMEA HQ and European Research and Development Centre in Limerick, Ireland.

The European Chips Act sets out a framework through which the EU will increase technological leadership and further develop an ecosystem around the semiconductor industry. This includes research and development as well as training and education for talented European workers.

European industry needs reliable access to a wide spectrum of semiconductors, including those made by ADI, which will power industry 4.0. It is important that the EU builds capacity right across the spectrum. The focus on digital technologies relying on semiconductors which, in industry parlance, are on "lower geometry nodes" to deliver higher processing power at even lower density, is both necessary and understandable. We must also ensure, however, a secure and reliable supply of semiconductors on industrial nodes (higher geometry nodes) with a rich suite of capabilities to address the requirements of real world signal processing. These integrated circuits will support the delivery of clean, efficient, sustainable, and fully automated manufacturing at scale. They will also support leading EU companies working to improve the smart technology that lowers energy emissions from electric vehicles, supports the delivery of digital healthcare and underpins next generation 5G telecommunications, among other challenges. We will do this in collaboration with our customers, research partners, with EU institutions and with Member States.

However, the relatively broad definition of 'first-of-a-kind' could undermine the 'level playing field' among companies that are global in nature compared to those with a more local footprint. Also, the proposal for an early warning mechanism on supply chain issues could require companies like ADI to share sensitive commercial information. The suggested export verification and control mechanism for semiconductors, even if it is only a measure of last resort, would be extremely sensitive for any US-origin company.

It is heartening to see the European Chips Act programme place particular emphasis on the need to bridge the gap between Europe's advanced research and innovation capabilities and their industrial exploitation. ADI is already sharing the benefits of collaboration with partners such as Fraunhofer, IMEC, KU Leuven, CEA Leti , University of Limerick and the Tyndall National Institute as part of our own dynamic ecosystem, which includes co-innovation we're undertaking with some of Europe's leading companies.

Key Take-aways for ADI in the EU Chips Act

- The EU will significantly increase its support for semiconductor R&D allowing ADI more opportunities to access EU R&D funding and to join in with collaborative projects.
- It would also provide the necessary support to open advanced semiconductor foundry services in Europe, which ADI would support, and could then access to diversify its foundry partner strategy.
- Key European semiconductor R&D hubs with whom ADI already partner, such as IMEC, will also benefit from significant additional funding, offering opportunities for more collaboration.
- The reinterpretation of the state aid rules for the semiconductor sector (under the 'first-of-a-kind' provision) has both positive and possible negative implications to it for ADI.
- Benefits would be the most direct in the case of ADI considering an investment in the state aid framework the Chip Act specifies.
- However, the relatively broad definition of 'first-of-a-kind' could undermine the 'level playing field' between competitors in the European market.
- The proposal for an early warning mechanism on supply chain issues would push companies like ADI to share information, which may be commercially sensitive.
- The suggested export verification and control mechanism for semiconductors, even if it is only a measure of last resort, would be extremely sensitive for any US-origin company.

European Chips Act

Ibec priorities

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Summary

1. This paper outlines preliminary Ibec comments and recommendations in relation to the proposed European Chips Act.
2. Ibec support beneficial digital and green transitions but there are no digital and green transitions without chips. Consequently, the EU ambition for a diversified, sustainable, and resilient semiconductor supply chain is welcome.
3. We welcome the proposed focus on prototyping and pilot lines. Further clarity on the terms and conditions for the development and third-party access to the virtual design platform and the pilot lines would be welcome.
4. Encourage capabilities and capacities in our semiconductor ecosystem based on identified points of weakness and market demand. Enhance certainty on eligibility criteria for European first-of-a-kind semiconductor facilities.
5. Consider EU level co-ordination of reporting requirements. Strengthen safeguards in Art 27, secure sensitive commercial data in 'crisis stage' reporting.
6. Ensure coherence both within the package and between the Chips Act and the work of the European Alliance on Processors and Semiconductor technologies.
7. Ensure formal and meaningful industry engagement. Include industry representation in the European Semiconductor Board and on its sub-groups.
8. Support international partnerships with likeminded countries. The EU-US Trade and Technology Council (TTC) provides an ideal platform on which to agree suitable topics for research cooperation and coordination, and to build a deep understanding of semiconductor supply chains and how partnerships can facilitate a steady and secure supply of chips.
9. Europe should partner with universities and vocational colleges to attract new talent and build a pipeline of skilled workers that fuels leading-edge semiconductor breakthroughs.

Introduction

Trusted digital innovation, connectivity and international co-operation have proven critical to our economic and societal well-being throughout the pandemic and will be essential to the EU's future success in addressing generational challenges including economic resilience[1], the green transition[2] and health[3] [4].

The Ibec vision for the future of Europe[5], is an EU that:

I. Is focused on its strengths and competitiveness
II. Leads an inclusive and innovative digital decade
III. Puts sustainability at the heart of our prosperity
IV. Is open for trade and investment

In short, Ibec support beneficial digital and green transitions that develop both Europe and Ireland's digital leadership while maintaining market openness, access, innovation, and choice.

As rightly noted by European Commission Vice-President Vestager, 'in our digitised societies, chips really matter ... there are no digital and green transitions without chips'[6]. In this context, the EU ambition for a diversified, sustainable, and resilient semiconductor supply chain is welcome.

This paper outlines preliminary Ibec comments and recommendations in relation to the proposed European Chips Act[7].

[1] Joint statement to D9+ Ministerial meeting, Prague, March 29, 2022
[2] Joint statement to D9+ Ministerial meeting, Luxembourg, October 27, 2021
[3] Ibec (2021) https://www.ibec.ie/digitalhealth
[4] Deloitte (2021) Semiconductor chip shortage hits medtech: Strategies to build resilient supply chains
[5] Ibec (2022) Stronger Europe, Stronger Ireland
[6] https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_22_888
[7] European Commission (8 February, 2022) Communication, Proposed Regulation, Joint Undertaking and Recommendation

Pillar 1: Chips for Europe initiative[8]

1. We welcome the proposed focus on prototyping and pilot lines. Prototyping will help bridge the gap between research and product, enabling the porting of leading-edge innovations from lab to fab and bring new semiconductor products to market quickly.

2. The provisions aimed at promoting advanced R&D in sub-2 nanometer nodes, energy-efficient processors, quantum chips, and 3D integration are important for the future. We support the Act's focus on manufacturing and packaging of chips below the 10nm level, which will be critical to unlocking next-generation advances in AI, quantum, and high-performance computing.

3. Increasing European semiconductor manufacturing capacity across a range of nodes is also important, as is R&D aimed at improving the security and resilience of the global supply chain. Targeted incentives have a role to play in securing the necessary investments.

4. Further clarity on the terms and conditions for the development and third-party access to the virtual design platform and the pilot lines would be welcome.

Pillar 2 Security of supply framework[9]

5. The Chips Act should encourage capabilities and capacities in our semiconductor ecosystem based on identified points of weakness and market demand.

6. Enhance certainty on eligibility criteria for European first-of-a-kind semiconductor facilities:
    - Recognise the value of international cooperation in cases where an entity is simultaneously subject to EU priority-rated orders and third-country extraterritorial obligations[10].
    - Acknowledge an applicant's planned and ongoing EU R&D&I activities in its investment commitment[11].

[8] Focuses on infrastructure building in synergy with research and support to start-ups and SMEs.
[9] Addresses first-of-a-kind semiconductor production facilities
[10] Art. 10 (2) (c) and Art. 11 (2) (c)
[11] Art. 10 (2) (d) and Art. 11 (2) (d)

Pillar 3 Preparedness and monitoring[12]

7. Consider EU level co-ordination of reporting requirements. Enhance coherence in monitoring and alerting[13].

8. Strengthen safeguards in Art 27, secure sensitive commercial data in 'crisis stage' reporting.

Horizontal Issues: Governance, Talent, and International Co-operation

9. Enable certainty for further investment. Ensure coherence between:
   - the Communication and the proposed Regulation
   - the Chips Act and the work of the European Alliance on Processors and Semiconductor technologies[14].

10. Ensure formal and meaningful industry engagement. Include industry representation in the European Semiconductor Board and on its sub-groups. Industry knowledge and engagement can make an essential contribution to the work of the Board.

11. Support international partnerships with likeminded countries. We strongly agree with the need for international cooperation with like-minded countries that is reflected throughout the proposed Act. Semiconductors are the product of diverse and highly complex supply chains that stretch across borders. Ibec and its international partners encourage the EU to promote transatlantic collaboration and coordination among industry, government, and academia, especially in research. The EU-US Trade and Technology Council (TTC) provides an ideal platform on which to agree suitable topics for research cooperation and coordination, and to build a deep understanding of semiconductor supply chains and how partnerships can facilitate a steady and secure supply of chips[15].

[12] Co-ordination mechanism between Member States and the European Commission
[13] Art. 15
[14] https://digital-strategy.ec.europa.eu/en/policies/alliance-processors-and-semiconductor-technologies
[15] https://www.businesseurope.eu/publications/eu-us-trade-and-technology-council-letter-markus-j-beyrer-valdis-dombrovskis and Joint statement to D9+ Ministerial meeting, Prague, March 29, 2022

12. We agree with the need for investments to build a workforce fluent in semiconductors. To promote advanced R&D capabilities and next-generation semiconductor advances, Europe should partner with universities and vocational colleges to attract new talent and build a pipeline of skilled workers that fuels leading-edge semiconductor breakthroughs.

About Ibec

Ibec is Ireland's largest lobby group and business representative. We campaign for real changes to the policies that matter most to business. Policy is shaped by our diverse membership, who are home grown, multinational, big and small and employ 70% of the private sector workforce in Ireland. With 38 trade associations covering a range of industry sectors, 6 offices around Ireland as well as an office in Brussels. With over 240 employees, Ibec communicates the Irish business voice to key stakeholders at home and abroad. Ibec also provides a wide range of professional services and management training to members on all aspects of human resource management, occupational health and safety, employee relations and employment law.

www.ibec.ie/digitalpolicy
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Submission to the Public Consultation on the EU Chips Act

Introduction – Intel in Ireland

Intel Ireland's Leixlip campus, located in County Kildare, began operations in 1989. Since then, Intel has invested $22 billion in turning the 360-acre former stud farm into one of the most technologically advanced manufacturing locations in Europe. This facility is the largest private investment ever made in the history of the Irish State. Today, more than 4,500 people work at the campus in Leixlip.

The Leixlip campus is home to a semiconductor wafer fabrication facility, which in recent years, has undergone an upgrade project that has enabled the site to be a key location for production of Intel's 14nm process technology. The advanced silicon microprocessors that are manufactured in Ireland are at the heart of a variety of platforms and technology advancements that are essential to the way we learn, live, and work today.

In September 2016, Intel announced the acquisition of Movidius, a Dublin founded company that is transforming the future of computer vision and Artificial Intelligence (AI) to accelerate innovation for the next generation of smart and connected devices.

Additionally, there's a dedicated team of Intel employees involved in Silicon Nanoelectronics Research. This team collaborates with research institutes such as the CRANN Nanoscience Research Centre in Trinity College Dublin, which hosts SFI Research centre AMBER (Advanced Materials and Bioengineering Research), and the Tyndall National Research Institute in Cork.

Ireland is part of Intel's global manufacturing site expansion plans. Construction activity began in early 2019 on the multiyear project that will double the available manufacturing space in Ireland. A total of €17 billion will be invested in the project which is a planned location for the production of the latest generation Intel 4 technology. Construction activity is well advanced and tool installation began at the end of 2021. Once completed, the project will have created 1,600 full time, hi-tech roles and involve 6,000 construction workers at its peak. This will bring the total investment in Ireland since 1989 to more than €30 billion.

The work that Intel undertakes at the Leixlip campus is world class and unique in terms of its scale and complexity and has had a very significant impact on both the local and national economy in many ways. For example, Intel Ireland contributes €1.08 billion each year to the Irish economy and supports 6,669 full time equivalent jobs in the economy that are in addition to the 4,500 people working for Intel. We spend €284 million every year to support 771 Irish suppliers.

General remarks on the EU Chips Act

- Intel welcomes and strongly supports the EU Chips Act package and its ambition to develop a more geographically diversified, sustainable and resilient semiconductor supply chain. The initiative is timely to address key trends such as a) the EU decades-long decline in semiconductor manufacturing; b) the ever-growing EU demand and consumption of semiconductors, including leading-edge for AI, HPC, autonomous driving, 5G, cloud and IoT applications; and c) the current dependencies on Asia that created the chip shortages

experienced over the past years. The Kearney report, published in November 2021, provides further details about these trends.[1]

- The EU Chips Act focusses on the right priorities: increased investments in R&D&I, public funding for first-of-a-kind manufacturing facilities in Europe to increase EU supply chain resilience, and a crisis response mechanism to strengthen the EU semiconductor ecosystem and talent pipeline.
- While Intel is encouraged by the EU plan to mobilize 43B EUR, the financial breakdown remains still vague and will need concrete actions by Member States to allocate appropriate resources.
- To Intel, the biggest benefit of the EU Chips Act package is its injection of more flexibility in the state aid rules so they can support large front and back-end manufacturing investments that do not currently exist in Europe. This drive to be "in a position to produce in Europe the most advanced chips" by setting up "a favourable framework for private investment"[2] can be a catalyst for Intel's IDM 2.0 vision and execution in Europe. To this purpose, we are grateful that the guiding principles of the Communication apply right now and we petition the Government of Ireland to ensure that their application in the proposed Regulation not be diluted throughout the lawmaking process of the proposed Regulation.[3]

Pillar 1 – Chips for Europe initiative

- Intel agrees with the focus on R&D&I across all segments of the semiconductor supply chain. Emphasis on innovative design (with the creation of an EU design platform) is consistent with the parallel goal of increasing production. In fact, co-locating manufacturing and design proved successful for semiconductor leadership in the US, in South Korea and in Taiwan and for other industries in Europe, as described in the Kearney report.[4]
- Pilot lines will play an important role in driving innovation with testing and experimentation. The EU Chips Act, however, does not provide details on how the EC envisions those pilot lines will be created, funded, and operated (including providing access to those lines by first-of-a-kind facilities in Europe).
- We commend the European Commission for the fact that the Chips for Europe initiative draws attention to and drives investments in quantum chips capacities, the development of a network of competence centers, and access to funds for startups, scaleups and SMEs.
- Europe has many strengths to build on, including some of the leading tool makers and research centers. It is the region that trains the highest number of master's- and PhD-level graduates in STEM disciplines. Where Europe has critical gaps in its supply chain (e.g.,

[1] Kearney report, "Europe's urgent need to invest in a leading-edge semiconductor ecosystem", Chapter 1 and 2, https://www.kearney.com/documents/20152/272966470/Europes+urgent+need+to+invest+in+a+leading-edge+semiconductor+ecosystem.pdf/f3ec1e30-b8ff-b367-417c-62cf476342ea?t=1636491271000

[2] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, A Chips Act for Europe, COM (2022), 8.2.2022, at 11 [hereinafter Communication].

[3] Proposal for a Regulation of the European Parliament and of the Council, establishing a framework of measures for strengthening Europe's semiconductor ecosystem (Chips Act), 2022/0032 (COD), 8.2.2022.

[4] Ibid. page 19

manufacturing), it should focus its resources on filling those gaps and partnering with global companies to develop leading-edge technologies.

Pillar 2 – Supply chain security

- Intel supports the definition of first-of-a-kind production facilities in the EU because it is laser focused on advanced manufacturing opportunities that merit public funding to attract them to the EU by leveling the playing field with other attractive locations outside Europe. The EU Chips Act makes clear that big first-of-a-kind projects supported by large state aid packages can be submitted directly under the Treaty on the Functioning of the European Union. They will not be treated as part of an Important Project of Common European Interest (IPCEI) for which state aid approval can take a long time because IPCEIs typically involve many projects and Member States. This is a major benefit of the EU Chips Package in fulfilling the Commission's desires to develop a next gen state-of-the-art ecosystem.
- Intel commends the Commission in its presumption under the EU Chips Act that first-of-a-kind facilities are in the public interest (e.g., they provide supply chain security for the continent at large) and acknowledges that they may have significant positive effects. The Commission has clarified that those benefits may include, in addition to contributing to supply chain security, an increasing qualified workforce, a positive impact on innovation, allowing access to innovative products in geographic proximity and additional benefits that can be shared widely and without discrimination across the EU economy. This guidance is very useful to investors.
- In addition, we strongly support the EU Chips Act's encouragement to Member States to implement faster procedures for permits needed to construct and operate first-of-a-kind facilities. This approach reflects the sense of urgency that the Commission has in reversing as fast as possible the steady decline in the EU's share of manufacturing capacity.
- In relation to Open EU Foundries, while the amount should not be minimal, the proportion of own production capacity vs capacity for third parties should be market driven and based on business needs that might change over time.
- Some other clarifications would be welcomed in the context of eligibility criteria for the recognition of first-of-a-kind facilities in the EU, specifically:
    - The commitment to invest in the next gen chips is broadly worded. Intel assumes that investments which make a marked contribution to the development of next gen chips qualify even if they are not directly connected to the investor's production facility that has been designated first-of-a-kind.
    - The possibility of revocation of the status of a facility as first-of-a-kind is troubling because, without clear and narrow standards for revocation that don't yet exist, this creates significant uncertainty that can undermine confidence in making major manufacturing investments sorely needed for Europe's technology future.
    - The guarantee to be given that extraterritorial requirements for priority orders from non-EU countries will not apply to the first-of-a-kind facility also is concerning despite some of the exemptions included in the EU Chips Act package. Implementation of any

priority orders will need to be done very carefully and in a balanced way to not upset the market and EU competitiveness. This issue is discussed again later on.

- Intel believes the EU Chips Act should foster "long term" structural support of first-of-a-kind investments. The EU Chips Act currently appears to exclude the possibility for "continued operating support" (i.e., use of long-term incentives to sustain the long-term viability of a project). To level the playing field well into the future, Intel thinks the EC will need to look at the long-term cost structure of large manufacturing investments. For instance, in addition to grants, a number of attractive jurisdictions in other parts of the world that have semiconductor ecosystems use special tax rates for our industry and/or investment tax credits that last the entire life of the semiconductor facilities. More discussions are needed on potential policy instruments to ensure financial viability during the entire long lifetime of semiconductor facilities.
- New certifications for trusted, secure and green chips will be defined in the context of the new EU Standardization Policy. It is important for the semiconductor sector to provide perspective and expertise from the outset of developing the standardization request for chips.

Pillar 3 – Monitoring and crisis response mechanism

- The emergency toolbox described in the EU Chips Act recommendation to Member States will require more industry participation in the definition of requirements for new facilities in the proposed Regulation. Practical implementation of export controls, information-sharing and priority orders will require industry input, as well as strong alignment with international standards, market-driven best practices, and harmonized approaches across Member States.

Governance, international collaboration, and industry participation

- We trust the Industrial Alliance for Processors and Semiconductor Technologies can start without further delay its activities.
- The EC may consider a more structured interaction between the European Semiconductor Board and the private sector. Further clarity would also be beneficial with regards to the Chips Joint Undertaking.
- Intel strongly supports the Trade and Tech Council initiative and hopes that semiconductors can be the testbed for renewed transatlantic relations by strengthening engagement and cooperation on semiconductor and other strategic supply chains to (1) identify collaborative actions to improve resilience; and (2) ensure reciprocity for transatlantic FDIs to support R&D and manufacturing.

18th March 2022

IRDG Submission to the Department of Enterprise, Trade and Employment on the EU Chips Act

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IRDG Overview

The Industry Research & Development Group (IRDG) is a non-profit, industry-led, innovation network and representative group for companies and third level institutions engaged in research, development & innovation (RD&I). Founded in 1992, IRDG's mission is to drive excellence in innovation within Ireland's industry to create growth, jobs and prosperity.

IRDG is unique as the only business organisation in Ireland wholly focused on business RD&I. IRDG has over 300 member organisations with membership evenly distributed between foreign direct investment and indigenous firms that range in size from start-ups to the largest companies in Ireland.

A key differentiating factor of IRDG as an industry body is the diversity of membership from across all sectors of industry, including agriculture, construction, engineering, food & beverage, healthcare, ICT, medical devices, pharmaceuticals, software, technology and utilities. In addition, IRDG membership includes most of the third-level colleges, institutes and R&D centres. This unique combination makes for a very an interesting and experienced network.

IRDG activity is organised around the 5 core elements:

- Representation
- Funding & Support
- Innovation Networking
- Collaboration
- Learning

IRDG is the respected voice of industry on RD&I matters and over the years the views of IRDG members have been invaluable in influencing and shaping RD&I schemes and incentives available to industry. We run bimonthly R&D tax credit series with hundreds of companies attending annually as well as an annual R&D Tax Forum with participation from Revenue, Dept of Finance, IDA and Enterprise Ireland together with research collaboration events with Industry and Research Centres.

IRDG has extensive exposure to industry-wide RD&I within the SME and large company sectors through our work and dialogue with members. We actively support members to better understand and contribute towards the eco-system within Ireland as a whole.

We have consulted with a number of our members who are stakeholders in the area of semiconductor research, design, manufacture and supporting services. This feedback has been aggregated and anonymised and is presented under the requested pillars below.

Current EU Landscape

The semiconductor manufacturing landscape within Europe is virtually non-existent and has suffered from two decades of a lack of investment. As companies looked to access scaled production volumes at the most cost competitive price point, this has resulted in the large majority (85%) of manufacturing being outsourced outside of the EU, predominantly Taiwan and China. Additionally, fabless or fab-lite companies (those with small volume, niche manufacturing capability, but outsource the majority of production) benefited from higher valuations and stock prices for pursuing this model. In addition, the geopolitical sensitivities between China and Taiwan are a real threat to what is already a supply chain under pressure. Additionally, secure supply of semiconductor chips is a key component to both Digitalisation and Green Strategies for Europe.

Pillar 1: A chips for Europe initiative

The concept is of strengthening the relationship between infrastructure, industry and EU R&D capability is strongly welcomed and seen as a positive initiative. In particular if administrative loads can be kept to a minimum.

In addition, while access to virtual design platforms would satisfy the initial needs of concept development and scale-up, a key next step would be access to pilot line production and testing capability, as outlined in the initiative. This is something that does not widely exist, or if it does not at a scale that would satisfy potential scope of testing or demand. There is strong concern, that to become established, such facilities are highly complex in nature and would require significant capital cost outlay. As an example, such an entry-level facility could cost in the region of €1Bn to build and equip. In addition, with the exception of ASML, the leading suppliers of equipment semiconductor manufacturing (Lam Research, Applied Materials, Veeco, Tokyo Electron etc.) that operate at the cutting edge of semiconductor research have transitioned all their RD&I capability to Asia, in line with US and European outsourcing policies and the dominance of Taiwanese (TSMC) and Chinese production. A significant demonstration of long-term commitment from the EU would be necessary for these suppliers to re-establish entities with Europe again.

Through private and public European venture capital entities, Europe has effectively provided an innovation pipeline to the large American semiconductor companies. Over the last number of years, many Irish and European fabless semiconductor start-ups (e.g. Movidius and Decawave) have been extremely successful in securing venture capital funding and scaling their businesses. And key requirements of accessing these funding streams required that they procure their production chips from the lowest cost base to ensure rapid growth and maximum profit. This has pushed start-ups to procure from Asian geographies to meet these targets. Once at scale, these companies have then been acquired by the large American semiconductor companies. This has been seen as a tremendous success to date but has resulted in an exodus, by in large, of leading-edge technology out of Europe. Ensuring a more balanced approach for the next round of start-ups, scale-ups and SME's which directly benefits Europe, will be key to delivering on the proposed 'Chips Fund'. There is a concern that such an initiative would only serve as the next generation of an innovation pipeline for the already established Asian and American companies active in the space.

Pillar 2: A framework to ensure security of supply

The acknowledgment from the Commission that public support may be necessary in the establishment of semiconductor manufacturing facilities within Europe is broadly welcomed. The recent announcement from Intel to invest €12Bn in foundry operations in Ireland, €4.5Bn in back-end processing in Italy and a €17Bn to build a leading edge mega-fab to Germany gives insight into the scale of investment required to operate in this industry. It also represents the significant shift from Intel to become more fully integrated and also to act as a foundry. On a side note, the failure for Ireland to secure the investment in the new leading edge mega-fab will result in a potential erosion of Ireland's position within European semiconductor manufacturing to become commoditised.
In addition, the prioritised access of these designated 'Open EU Foundries' to pilot lines established under the Chips for Europe initiative is also welcomed. The main challenges identified will be technology ownership and ensuring balanced access for SME's and MNC's alike.

We broadly welcome the promotion of integrated production facilities and open foundries incorporating advanced packaging, testing, and assembly within the EU. However, the requirement that either an 'Open EU Foundry' or an 'Integrated Production Facility' must be a 'first of a kind' in Europe is a strong concern. As it currently stands, due to the extensive outsourcing of leading-edge manufacturing over the past two decades, Europe does not have the requisite skills or manufacturing knowledge base to establish leading edge manufacturing sites within the region. This 'first of a kind' requirement is potentially too restrictive and a less restrictive approach to rapidly increase overall manufacturing capability would be more welcome, especially given the long lead-times involved in building the necessary infrastructure and skill base. Maybe a twin track approach would be better as an increased supply of existing manufacturing capabilities now.

In conjunction to this, the back-end processing (slicing, dicing, lead-frame assembly, packaging) that would be required for a fully integrated manufacturing site is a more labour intensive process than manufacturing. Any transition of these activities from low-cost Asian countries will meet significant cost hurdles.

An additional layer to establishing Europe as a semiconductor manufacturing powerhouse will be the establishment of strong relationships between Governments, technology owners, manufacturers, and end-users (of significant volume e.g. car manufacturers). This is a model that the US Government pursued ~10 years ago and which is now bearing fruition. However, a key driver behind Global Foundries, Samsung's and more recently TSMC's decisions to establish manufacturing bases in the US was driven by the end user (i.e. Apple) and a more protectionist federal policy. While Europe has promoted and greatly benefitted from globalisation and an open borders policy, a more closed and protectionist mindset may be required in this instance.

Pillar 3: A coordination mechanism between member states and the Commission

Semiconductor supply is at the heart of both Europe's Digitalisation and Sustainability strategies. The global demand for semiconductors is expected to grow from $500billion in 2021 to $1.4trillion by 2030 as the world becomes more digitised and connected. Chip demand is no longer purely driven by compute centric devices but also for feature rich applications (phones, tablets), data centric applications, autonomous vehicles, 6G applications, artificial intelligence, medical, government, military, therapeutics, etc. Demand for semiconductors will be critical in such industries and applications as we move towards 2030 and beyond.

In what is a relatively fragile supply-chain, where all the large industrial fabless companies are pulling form the same limited resource pool, securing regional independent semiconductor supplies will be critical for the success of industries, country developments, technology leadership and advancement in economies. With this, EU wide collaboration and partnership will be essential to the success for Europe to achieve its 2030 goals.

Several our member companies have highlighted significant supply shortages in the last 12 months as well as the upcoming 12-18 months. Interestingly, they have all flagged a shortage of lead-frames as the main driver for these shortages. So, in addition to the mechanisms outlined in Pillar 3, there may be an opportunity for the newly established Semiconductor Board to monitor and forecast semiconductor production across the whole supply-chain, similar to the manner that institutions such as the European Bank monitors and forecasts economic performance. This could be delivered in three phases of (i) coordination and support as outlined, (ii) quarterly sentiment surveys and (iii) predictive forecasting of supply and demand. A suggestion was made that all fabless or fab-lite companies should declare for each part number where they source their material if delivering into the EU. In the first instance, this would tangibly highlight the risk of leading-edge manufacturing being centralised in Taiwan.

Given the complex, global and multi-lateral nature of the existing supply chains, several members also questioned the tangible impact that export control mechanisms would deliver to prioritise supply for European companies. There was a sense that while such an initiative would generate positive headlines, they could not in reality be enforced.

About MIDAS Ireland

MIDAS Ireland is an industry led cluster consisting of industry, educational, research and government agencies. The mission of MIDAS Ireland is to assist in the development of the electronics based systems sector in Ireland. MIDAS began in 1999 as the Microelectronics Industry Design Association with a focus mainly on the design of advanced integrated circuits. Today MIDAS represents the entire value chain, as the industry evolves to deliver more complete electronic and software system solutions. The industry cluster consists of 20,000 highly skilled professionals in Ireland who are part of a broader ICT sector. The cluster generated over €6.9 billion in expert revenue annually, making it Ireland's 4th largest exporting sector, while typically committing 15% of its revenue to R&D.

MIDAS has over 60 member organisations from around Ireland, including multinational companies such as Analog Devices, Intel, AMD, Qualcomm, Cypress Semiconductor, onsemi and ARM, along with indigenous enterprises such as Western Automation, Mbryonics and Firecomms Technologies. The membership extends to the third level institutes including Carlow IT, UCC, UL, UCD, TCD and QUB and to the Tyndall National Institute, Ireland's largest dedicated research institute in ICT.

Introduction

MIDAS Ireland welcomes the opportunity to respond to the call from Department of Enterprise, Trade and Employment on the European Chips Act, proposed by the European Commission on the 8th of February 2022.

The 'digital revolution' which has been defined[1] as "advancement of technology from analog electronic and mechanical devices to the digital technology available today" , started in the 1980s with the wide availability of silicon chips, whose capacity and capabilities was doubling every two years following the 1965 prediction by Intel's Gordon Moore. During the early phases of this growth, the demand for silicon chips was largely driven by computing, with the microprocessors and memory chips being produced by large semiconductor facilities in the USA, Europe and Asia. Today the growth is being driven by the wider spectrum of demands which still includes computing, but also now encompasses communications, automotive and industrial as more and more sectors turn to the kinds of silicon hungry technologies such as Artificial Intelligence, Big Data, Blockchain, Social Media, entertainment, 5G communications and the Internet of things to create new applications, improve efficiencies and expand globally.

The move to digital platforms has been greatly enhanced due to the COVID pandemic as the World depended on remote working as enabled by online communication technologies. Furthermore, the fragility of global supply chains became very evident and greater autonomy of ownership of the fuel that drives the digital economy became a point of concern.

Over the decades there has been a move towards Asia of manufacturing capacity of the semiconductor chips as both the US and Europe failed to keep pace with the growth of manufacturing, choosing instead to focus on the less capital intensive and more lucrative areas such as design and digital services. This has led to a situation where the US share of the market dropped from 37% in the 90s to just 12% today[2]. Europe's fall has been more dramatic, falling from 44% in the late 80s to less than 10% today. As the industry is projected to double to €1trillion by the end of the decade[3], there is a

real risk that Europe's share, and hence influence, could drop to less than 5% if nothing is done to address the downwards trajectory.

As such MIDAS Ireland very much welcomes the EU Chips Act ambition to "build and reinforce its own capacity to innovate in the design, manufacturing and packaging of advanced chips, and turn them into commercial products while putting in place an adequate framework to increase substantially its production capacity to 20% by 2030"

Considerations

Pillar 1: A Chips for Europe Initiative

Ireland's semiconductor ecosystem differs to that on 'mainland' Europe in that is built around foreign direct investment(FDI), as per the Ireland's successful industrial policy, with Intel and Analog Devices having major manufacturing facilities here and all other leading US semiconductor companies including Qualcomm, Microchip, AMD and Dell having a significant presence in the country. In addition the Chinese leading company Huawei has a growing presence and Infineon from Europe also has a presence. There are also many small indigenous companies but the engine is very much the FDI players. As such for Ireland to play its role in the EU Chips Act, then we would need to focus on ways to increase the capacity of FDI in Ireland or attract other players. A key requirement in this regard is that there should be no restrictions on the integration of strategic FDI into the European ecosystem while incentivising dedicated manufacturing sites and R&D Centres of Excellence.

The supply chain crunch wasn't mainly driven by e.g. the most advanced nodes. Particularly for automotive older nodes such as 180nm were critical, especially when orders were initially cancelled and could not be re-instated. Older nodes are also critical for PV/Solar applications and high Voltage. The definition of first of a kind should be expanded to include "more than Moore" facilities that support e.g. automotive/power/RF, compound semiconductors, photonics, advanced packaging and enhanced analog nodes to support EU based companies.

We need to consider the availability of talent which is the constraint for the growth of the industry here, with most companies hiring up to 30% of their workforce overseas or in many cases, turning down opportunities to grow in Ireland due to their inability to resource it. A report commissioned by MIDAS Ireland in 2020[4] showed over 50% of the jobs in the industry are in highly skilled technical roles, with about 3,000 of these in world-class research and development (R&D). During the years 2017-2020, over 900 people have been hired into R&D positions, with over a third of these college graduates at a rate of over 100 per year. To exploit the projected growth of the sector the availability of overseas talent would need to double, as would the supply of engineers, from Level 8 to Level 10 (PhD) from Ireland's HEI system. With respect to the former, we need to increase awareness amongst EU engineers of the opportunities in Ireland and reduce the visa turnaround times for non EU citizens from 22 weeks to nearer 10. With respect to the latter, there would need to be an increase of undergraduate places for electronic engineers and targeted PhD programs, such as the SFI 'Centres for Research Training[5]". Also, top-down calls for Marie-Sklowdoska-Curie Doctoral Networks and COFUND actions in alignment with the EU Chips Act can be prioritised to 'address the acute skills shortage, attract new talent and support the emergence of a skilled workforce'.

Consideration should also be given as to how the EU Commission could help 'level the playing field' in enabling the SME sector to compete for talent with the FDI sector. Tax incentives for high skilled semiconductor Engineers to improve competitiveness with Finance career path could also be considered as a method to retain valuable engineering talent in the sector.

Another key resource which would be required in Ireland is very much in line with the EU Chips Act goal of "strengthening research and technology leadership " is an increase in funding for semiconductor related research. Ireland is fortunate to have two excellent centres with the Tyndall National Institute at UCC and the SFI centre Amber at Trinity College. Efforts should be made to combine the best of these very much complementary research entities, while broadening their research capacity.

The number of "Principal Investigators"(PI) in topics related to the semiconductor industry needs to be greatly increased. This PI resource is a key one in the system as it ensures that the graduates are instructed on the latest technologies, the number of PhD students are increased and the possibility of spin out companies are enhanced to drive greater activity in the indigenous sector. The possibility of spin out companies from FDI companies should be explored and incentivised. Europe also needs to fuel the pipeline at TRL3-6 by retaining and increasing committed funding under the HEU Pillar 2, in particular Cluster 4 Digital, Industry and Space [fully funded by the Commission without the need for further national support].

Furthermore, in regards to the indigenous sector, greater efforts must be made to encourage the interaction and integration of the sector with the FDI sector. Recent acquisitions including Movidius by Intel, Sensl by OnSemi, InfiniLED by Facebook and Decawave by Qurvo are excellent examples of what can be achieved but the pipeline of future such companies is but a trickle.

Another key incentive would be the availability of dedicated and well informed venture capital for the sector. To avoid the over reliance on venture capital which can lead to European companies being snapped up by non-European funds or companies, SMEs and startups with access to alternative levels of capital at low risk and low interest rates, will enable such companies to focus on their commercialisation plans and secure a greater share of the marketplace.

There should also be a focus ensuring that SMEs, Startups and Mid Caps have sufficient access to risk finance on attractive terms to invest into infrastructure, plant and securing talent.

Pillar 2: A framework to support continuity of supply

Due to the nature of the global supply chain, it is not entirely clear how the increase in capacity of either 'integrated production facilities' and open foundries will drive the overall system as most companies, both large and small, source their silicon from around the world. That said, the presence of these multi billion dollar facilities does 'lift all boats' and catalyse the ecosystem around them.

For Europe to stand any chance of reaching the 20% capacity goal for global supply, then it will be essential that overseas actors will need to be attracted. We are fortunate to have one of these major actors already present in Ireland and Intel's recent announcement of a €12bn expansion at their Leixlip campus was most welcome, as was the company's stated ambition to invest further significant funds in Europe.

The other two international players who could make an impact would be Samsung from Korea and TSMC from Taiwan. Key to attracting these companies, along with the potential further investment from Intel, will be the availability of space, talent and incentives. MIDAS Ireland very much welcomes the plans within the EU chips act to address the latter by addressing the state aid issue which is

currently a major constraint. MIDAS Ireland also welcomes the proposal that any operator of the "integrated production facility" should commit to "continued investments in innovation in the Union's semiconductor sector " as such a symbiotic relationship would be a win-win for all concerned as the innovation sector (e.g. universities and RTOs) could benefit from increased industry funding, along with presumably valuable direction from the company, and the company would benefit not only from the research output but also from the supply of relevant talent.

With regards to the proposed 'Open EU Foundaries', scaling foundry capacity, supply chain security and short lead times would be fundamental requirements, as would accessibility from the smaller member states to the capacity.

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[redacted]

From: Savio Victor Gomes [redacted]
Sent: 11 March 2022 12:40
To: Chips Act
Subject: European Chips Act

Dear Ma'am/sir,

My name is Savio, I am an ASIC design engineer working in the semiconductor industry for seven years now, I have designed semiconductor IPs which have gone into leading microprocessors in the market. I am currently neither a citizen nor a resident of Ireland, I am not even a EU citizen, but I would like to give my support and suggestions for the European Chips Act as I believe that the semiconductor industry is a global industry and being a part of this global industry makes me available to assist wherever possible. I was elated to know that the EU is finally considering substantial investment in the semiconductor industry. It is indeed an opportune time for the EU to finally give this a good amount of thought and impetus given the global shortage in chip production as well as the advent of 5G and other revolutionary frameworks like machine learning and artificial intelligence which are here to stay for the foreseeable future. It is my dream to see Europe being home to the next Silicon Valley. I offer the following ideas for the lawmakers and other interested parties to consider –

1. **Tax credits for semiconductor OEMs who manufacture their products in Europe –** Every semiconductor development board like the FPGA boards used in engineering universities and other mini-project based boards and systems (e.g., ARM® development boards like Raspberry Pi, Arduino etc.) are manufactured in Asia as of today. To boost local production in the EU, tax credits should be given to those manufacturers and small businesses who manufacture their digital systems and boards in the EU. Many of these development boards are a craze among hobbyists and electronics enthusiasts, boosting local production through tax credits will help the semiconductor industry in the EU in the long run. The annual federal budget of every country in the EU should make this provision for tax credits to boost local digital board production by SMEs and other business owners.

2. **Updated syllabus in engineering universities that are more in conformity with the semiconductor industry –** When I joined the industry as a fresh college graduate in 2014, I found that it took me almost a month or two to get acquainted with the tools and methodologies used in the company. I realized it was due to the outdated syllabus that was followed in my engineering college. To enable the new generation of fresh college graduates to be industry ready I propose that all engineering universities in Europe update their electrical/computer/electronics engineering syllabus to be more in line with the skills required by the industry. As a frontend ASIC designer, I would say that the following needs to be incorporated in every electrical/computer/electronics engineering syllabus –

   - Modern hardware description languages like SystemVerilog (as I understand Europe mainly uses VHDL instead of SystemVerilog).
   - Universal Verification Methodology (UVM) for verifying digital systems.
   - IEEE 1801 Unified Power Format.

- Industry standard bus protocols like the ARM® AMBA protocols, MIPI protocol, and the IEEE Ethernet standard.
- Formal Verification of digital systems using industry standard formal verification tools.
- SystemVerilog Assertions and SystemVerilog Coverage.

These are the skills that every frontend ASIC design hiring manager looks for in a college graduate. If the electronics engineering graduate possesses these skills right upon graduation, then the skill gap would drastically reduce, and he/she would be equipped to get started immediately upon joining the company.

3. Training in industry standard EDA tools to be provided during the engineering studies of the student – In the semiconductor industry we have a separate area of R&D into Electronic Design Automation (EDA) tools. These are tools that we ASIC design engineers use daily to get our jobs done. These tools are provided by EDA vendors like Synopsys Inc. and Cadence Design Systems. I propose that the engineering students be given training in these tools by the tool experts from these companies during their regular engineering studies so that upon graduation they are equipped with these skills. Every university offering courses in electrical/computer/electronics engineering should set up a memorandum of understanding with the aforementioned EDA vendors to provide training in these EDA tools during the course of the semester. Some of these training costs a fortune but the Chips Fund can be used to help universities cover these costs and make these training available for the students. If this is not possible at the university level then dedicated training institutes can be founded that will provide training in these skills, there are many such institutes in the U.S. as well as in Asia. I would like to see such training institutes come up in the EU as well. To assist the students and trainees with an affordable cost for these trainings once again the Chips Fund can be used to subsidize these trainings.

4. Periodic revision of the electronics/computer/electrical engineering syllabus with industry experts – The semiconductor industry changes in leaps and bounds and so there should be an annual revision of the syllabus of electronics/computer/electrical engineering courses with experts from the industry or if possible, the CEOs of leading semiconductor companies. The universities should evaluate together with the CEOs and industry experts on what topics need to be kept, removed, added, or improved to meet the needs of tomorrow's semiconductor industry. This will ensure that both the universities and the industry go hand in hand and there are no skill gaps in tomorrow's workforce.

5. Introduction to semiconductor systems should be given to students at a very young age – In order to pique the interests of students to consider pursuing a career in the semiconductor industry they should be introduced to this industry from a very young age, I would say right from high school. Schools should encourage science projects based on some of the semiconductor development systems and boards like the ones mentioned above (Raspberry Pi, Arduino etc.). If possible, these students should be taken on a field visit to the semiconductor fabrication facilities to show them how semiconductor chips are made as part of their usual curriculum. This would only be possible if there are semiconductor fabs in the country (as I understand Ireland already has Intel Corporation's fabrication facility in one of the counties). They should also have guest lectures during their high school from CEOs of semiconductor industries who will get them excited about this industry so that they can consider a career opportunity as a semiconductor design engineer.

6. **A separate booth/stall/section on the semiconductor industry to be set up in every career fair in the EU** – Whenever there is a career/job fair in any country the government should mandate by law and request semiconductor industry professionals and companies to open a separate section that would give the students and their parents an idea or an introduction to the industry and its impact to the world as a whole. This will help in mobilizing the mindset and get new job seekers excited about this industry.

7. **Lastly, a European semiconductor fab needs to be set up in Europe** – The bulk of semiconductor manufacturing happens today in Asia. The fabrication facilities available in the EU are those of American semiconductor companies. Fabless semiconductor companies in Europe outsource their manufacturing to Asia. It is imperative that the Chips Fund dedicate some portion of resources to building a fab in one of the EU member countries that would cater to the demands of customers both in Europe and elsewhere. This will not happen overnight as we need leading researchers and industry experts to come together and develop a semiconductor process technology that would compete with the likes of TSMC. However, the first steps need to be taken in this direction such that all fabless companies would find this new European fab to be their one-stop shop for their fabrication needs. This is a long-standing requirement that needs to be addressed immediately and should be made part of the European Dream. There must be a native semiconductor fabrication facility in Europe.

As a frontend ASIC design engineer I feel these to be of vital importance to the development of a strong semiconductor ecosystem in Europe and it is my earnest desire that you put forward these requirements to the EU lawmakers so that they can enable this through proper legislation both at the EU as well as the individual country level.

Thanks and with Regards,

Savio

Tyndall Briefing on the European Chips Act – Public Consultation

"Leveraging Ireland's advantage for the long-term"

Tyndall welcomes the European Commission's Communication on 'A Chips Act for Europe'. This is a momentous policy underpinning Key Digital Technologies along the whole value chain of Sense, Think, Act and Communicate. The recent chip shortages and geopolitical changes have made it clear that Europe needs to address its strategic autonomy in the supply chain of chip manufacturing. The COVID pandemic has demonstrated our reliance on digital technology and also highlighted that the demand for broadband capacity will continue to increase exponentially. A European Chips Act is critical for the future of the twin Green and Digital Transition and provides a great opportunity for Ireland's technology sector, from semiconductors and IT hardware to software and digital services.

The large software platform companies have extracted a disproportionate share of the value chain in the last two decades, without investing in the infrastructure to support their platforms. The demand for their products, along with the ongoing digitization of the economies has led to the unprecedented demand for the underlying silicon chips (but without their investment). This demand has not been met in tandem by capacity installation due to the large investment required and the timescale to achieve a return. Similarly, the recent chip shortage for automotive industry can be, at least partially, explained by the car makers having engaged in a race to the bottom for the last decade with the chip suppliers, squeezing their profits (yet utilizing their innovation). When capacity was restricted, the semiconductor manufactures directed to some extent their capacity at high return offerings. Resulting consolidation of the semiconductor industry has gathered significant pace in the last decade to the extent that there are only now three (and arguably four) companies capable (technically and financially) of continuing the Moore's Law curve for the next generation of technology. None of these are European and only one is US founded (Intel). For over three decades the backend processing (packaging and test), which can constitute up to 50% of the cost of an IC, had been outsourced to the Far East, China in particular. While the labour content of these steps had diminished with automation, and hence the attraction of low labour cost economies is reduced, the bulk of the installed capacity remains in the Far East.

Ireland is well positioned to play a central role in the EU Chips Act and the broader semiconductor ecosystem thanks to its strong ICT industrial base and R&D excellence in the sector. Ireland has played a central role in the European semiconductor landscape for over 35 years with the establishment of the first semiconductor packaging plant by NEC in the 1980's. Today, Ireland hosts the only Intel Fab in Europe (and Intel's largest outside the US) - established in the first global wave of semiconductor expansion in 1989 - with advanced node manufacturing capability and employing more than 5,000 people at its ever-expanding 360-acre Leixlip, Co Kildare facility and at a site at Shannon, Co Clare. Most recently Intel announced to continue the expansion project in Leixlip, spending an additional 12 billion euros, bringing Intel's total investment in Ireland to more than 30 billion euros.[1] The expansion will

[1] Intel Announces Initial Investment of More Than €33 Billion for Semiconductor R&D and Manufacturing in EU :: Intel Corporation (INTC)

see doubling the manufacturing space to bring Intel 4 process technology to Europe and grow the foundry services.

Another exemplar semiconductor-manufacturing site on Irish soil is Analog Devices (ADI) in Limerick. The ADI Irish facility has had a fully integrated marketing, design, and wafer fabrication facility in Limerick along with full research and development capabilities in product and process design and development since its inception. The 1,300 employees in Limerick contribute annually to the launch of over 100 new products and advanced semiconductor processes. These products are designed in ADI's leading edge 14,000m2 European Research and Development Centre that opened in 2015 (following over 30 years of semiconductor innovation and manufacturing since 1979). Also recently announced, ADI is to create 250 new jobs as it invests €100 million over the next three years in ADI Catalyst, a 9,290m2 facility for innovation and collaboration located at its Limerick campus. [2]

Other leading semiconductor companies along the value chain have also significant presence in the country including Qualcomm, Microchip, onsemi, Applied Materials, Lam Research, Synopsys, Infineon, Huawei, AMD and Dell. There is also a well-established indigenous sector with many small companies, some of which have been significant acquisitions for the FDI players that led to further expansion in Ireland incl. Movidius by Intel, SensL by onemi, InfiniLED by Facebook and Decawave by Qurvo.

In the R&D sector, Tyndall is an acknowledged key player in the European semiconductor research and ICT ecosystem and Ireland's leading research centre over 40 years of operations. For the ICT sector alone, Tyndall is in the top 5 EU RPO and #12 among all EU public research bodies incl. major RTOs such as imec, CEA and Fraunhofer Gesellschaft. Within Horizon 2020 Tyndall is involved in projects with a value of €782m, with €62m coming to Tyndall, and €53m to other Irish partners. Tyndall has been a semiconductor research and supply partner to the European Space Agency since 1986 and is one of the leading space qualification competence centres in Europe.

Opportunities for Ireland

Ireland can build on its strengths in chip design, deep-tech, smart manufacturing and chip fabrication to strengthen its technology sector. This opportunity can be materialised as support for the indigenous SMEs and creation of start-ups/scale-ups, a stronger cluster of the ICT industry with increased FDI – in particular in the design and manufacturing capacities in Europe - and through leadership in knowledge transfer and technological innovation in the semiconductor value chain and its application sectors. Specifically:

- Deliver design capacity, prototyping pilot lines and testing facilities to create new value chains between the micro/nano-electronics and photonics technology sector and its strong digital service, medical devices, biopharma and agri-food industries;
- Utilise the IPCEI mechanism and the new possibilities offered by the Integrated Production Facilities and Open EU Foundries to grow and increase the chip manufacturing sites in Ireland and attract further FDI to this end;

[2] Analog Devices Plans to Invest €100m in Ireland - EE Times Europe

- Leverage the European ecosystem to globalise its Research and Technology Infrastructure with a dedicated Competence Centre of scale;
- Lead in attracting and growing highly-skilled talent in semiconductor technologies and applications through national and European training networks;
- Use of the 'Chips Fund' to allow Irish semiconductor start-ups achieve scale.

Considerations

While there is broad agreement on the drivers and objectives for the European Chips Act as articulated in the Commission's document COM(2022) 45 final (Brussels, 8.2.2022), the proposed implementation Framework presents some challenges and potential threats for the Irish ecosystem and the broader European R&D sector in ICT. There are also areas such as a creating a pipeline of talent and leading edge research and innovation across the entire value chain where the European Chips Act may fall short.

Pillar 1: A Chips for Europe Initiative

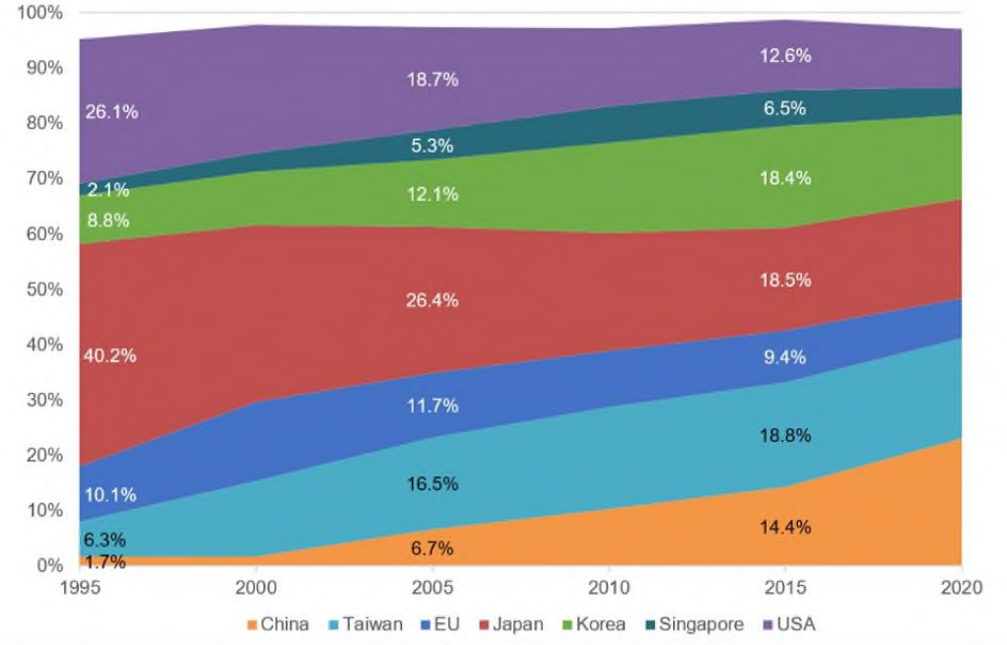
Budgetary allocation

The Commission proposes that 'the Chips for Europe Initiative will not have a separate financial envelope, but will be supported by funding from the HEU, and the DEP'. It is understood that the proposed zero-sum financial impact largely arises from repackaging of funding already committed to R&D for the Digital Industry and ICT topics in Pillar 2 of Horizon Europe and the Digital Europe Programme. This will create a new funding gap for low- to medium- TRL activities in Key Digital Technologies along the whole value chain of Sense, Think, Act and Communicate and put much strain onto the national publicly funded R&D systems, in particular the ones from smaller countries as well as less developed and/or with smaller semiconductor manufacturing industry.

Europe cannot solve the problem of 'bridging the gap between Europe's advanced research and innovation capabilities and their sustainable industrial exploitation' with the **creation of new funding, technological and geographical gaps**. The participation for actions for the Chips for Europe Initiative need to have the broadest possible participation, pulling resources from across Europe and not creating new barriers. Specifically, there are opportunities to mobilise already allocated budget across all Pillars and Clusters of Horizon Europe to serve the Chips for Europe Initiative (see examples below under 'implementation') which would work synergistically with already committed resources for Digital Technologies.

Implementation

The Commission's suggestion to implement 'the Chips for Europe Initiative' through renaming and enlarging the Key Digital Technologies Joint Undertaking (KDT JU) to 'Chips JU' is questionable. The predecessor of KDT JU (ECSEL JU - Electronics Components and Systems for European Leadership) was established on the basis of the Commission Communication COM(2013) 298 final (Brussels, 23.5.2013) as the main tool of implementing 'A European Strategy for Micro- and Nanoelectronic Components and Systems'. The objective has been to double the economic value of the semiconductor component production in Europe by 2020. On the contrary, in its seven year of implementation the EU chip production followed an opposite trend to reach 7.2 % in 2020 from around 10% at the time (see Figure below).



World wafer fab capacity by country, region 1995 to 2020. Source: ESIA.

Notwithstanding the added value of the KDT JU (or Chips JU) to mobilise industry commitment in target areas, there are already many instruments under the Horizon Europe and the Digital Europe Programme that can serve directly the Policy objectives - in particular the medium and long term horizons - of the European Chips Act. For example, networks of Competence Centres and the European Chips Infrastructure Consortium (ECIC) for the EU Chips Act can be implemented as priority Technology Infrastructures to advance innovation in semiconductor technologies in tandem with the Research Infrastructures networks and European Research Infrastructure Consortium (ERIC) under Pillar 1 [see e.g., ASCENT+[3] and EnABLES[4] consortia]. Top-down calls for Marie-Sklowdoska-Curie Doctoral Networks and COFUND actions in alignment with the EU Chips Act can be prioritised to 'address the acute skills shortage, attract new talent and support the emergence of a skilled workforce'. Finally, 'to strengthen its research and technology leadership' and 'build and reinforce its own capacity to innovate' Europe needs to fuel the pipeline at TRL3-6 under the HEU Pillar 2 [fully funded by the Commission without the need for further national support]. Such an approach would also resolve the creation of the aforementioned funding, technological and geographical gaps by mobilising budget allocated across all Pillars and Clusters of Horizon Europe.

There is also uncertainty regarding Ireland's overall opportunity to strongly position in the EU Chips Act. While no particular reference is made about the participation of non-EU headquartered MNCs, issues around Article 22.5 could also be of concern under the new Chips JU and this could impact on the participation of our FDI companies, similar to the restrictions applied in the Quantum Flagship topics of HEU.

[3] ASCENT+ – European Nanoelectronics Network

[4] Access to facilities & expertise – European Infrastructure Powering the Internet of Things (enables-project.eu)

Pillar 2: A Framework to Ensure Security of Supply

The EU Chips Act (and the US equivalent) can be thought of as an inevitable response to two decades of outsourcing and underinvestment in semiconductor technology/capacity and overall a lack of understanding of the dependence of our economies on the continuation of Moore's Law. The temptation must be to meet the 2030, 30% EU-based chip fabrication target by supporting a few large scale fabs to produce the latest processor and memory technology chips. While such support through the Integrated Productions Facilities and Open EU Foundries along with the crisis management would be welcome, this does not really reduce the EU's dependency overall.

Importantly, the chip shortage and supply chain pressures are not just confined to processors and memory products. Indeed, processors and memory is where the capacity is being installed worldwide. The supply shortage is across a broad range of electronic chips, components, sensors and actuators that are used in every piece of equipment. In technology terms, there is an even greater shortage in legacy nodes and also in specialized nodes (e.g. higher voltages). The leading semiconductor companies are investing only in the latest nodes, not in capacity for legacy. This is certainly the case for the automotive industry, so important to Europe.

The EU Chips Act must encompass the entire semiconductor spectrum to include legacy nodes as well as the latest silicon nodes, compound semiconductors for optical communications, GaN and SiC for power technology, and "More than Moore" sensor technologies for Industry 4.0, automotive electrification and healthcare. Only by looking across this broad range and investing in all of these, including research and innovation, do we really tackle our dependency and supply challenges. Packaging and integration technologies (e.g. heterogeneous integration) will play and even more important role in the coming decade as the limitations of Moore's Law will be offset with new post fabrication technologies. The EU Chips Act must extend to investment in this area.

Semiconductor fabrication facilities rely on a large number of diverse, highly specialised and expensive equipment sets. Indeed, the supply of semiconductor equipment is a current strength of Europe with many leading names e.g. ASML, Evatec, amongst others. The EU Chips Act must extent to supporting the ongoing development of semiconductor equipment and more importantly the science behind the processing steps that these equipment sets perform. Leading edge research and innovation across the entire spectrum mentioned here is vital as we look beyond 2030. A one off 2030 target will not create a sustainable semiconductor industry in Europe without continued investment in Research and Innovation.

Lastly, but most importantly, is that the entire semiconductor industry relies heavily on highly talented people with imagination, ingenuity and innovative instincts. The last decade in particular has seen a large decline in technical gifted people entering the industry, attracted to other areas such as software development, Machine Learning and Artificial Intelligence. There is a looming crisis in the areas of IC circuit design, test engineering, process development engineers and most acutely equipment technicians. The same applies in the Research and Innovation fields, where brilliant people are still entering but not at the numbers required. Addressing this talent deficit should be one of the priorities of the EU Chips Act and is a vital strategic input to the whole digital economy.

Pillar 3: A Coordination Mechanism between Member States and the Commission

The total supply chain for semiconductors is not well understood even by the biggest companies. For example, the Ukraine War in 2014 lead to world-wide shortage of neon, an inert component used in specialised chips. A fire at a Japanese chemical plant led to a shortage of material to make specialised semiconductor photo resist. A large scale EU-wide supply chain audit should be required by this Act to understand the critical dependency of the EU's digital economy to worldwide events and disruptions.

About Tyndall

Tyndall is an acknowledged key R&D player in the European semiconductor research and ICT ecosystem and Ireland's leading research centre in over 40 years of operations. Tyndall was established in 2004 as a successor of the National Microelectronics Research Centre (NMRC), founded in 1981 following the opening of a silicon wafer-fabrication laboratory in 1979 to provide R&D and specialised training facilities for the semiconductor manufacturing industry. Tyndall has been a semiconductor research and supply partner to the European Space Agency since 1986 and is one of the leading space qualification competence centres in Europe.

Hosting over 600 staff, postgraduate students and industrial researchers-in-residence, Tyndall is Ireland's largest dedicated research institute. In the area of ICT, Tyndall is in the top 5 EU RPO and #12 among all EU public research bodies incl. major RTOs such as imec, CEA and Fraunhofer Gesellschaft. With the vision to be a global leader for deep-tech innovation and impact through excellence in research by 2025, Tyndall addresses electronics and photonics technologies across the value chain – from materials and devices to circuits and systems - to tackle major societal challenges through advances in scientific and engineering research.

Tyndall's excellent track-record in Europe and national position allows to contribute across all three pillars of the European Chips Act. Tyndall is currently implementing a growth strategy to double in size by 2027, advancing as Ireland's Competence Centre of scale and international reach to:

- Offer access to design expertise, state-of-the-art facilities and rapid prototyping for SMEs;
- Provide access to pilot lines for heterogeneous integration and packaging;
- Deliver enabling technologies and building blocks for quantum circuits;
- Establish a high-throughput node for skills development and training of high-quality engineers;
- Catalyse the creation and scale-up of deep-tech Irish start-ups in the semiconductor value chain.