European Innovation Council

Workshop on Quantum Technologies & Electronics with Member States representatives

On 27th September 2022, Samira Nik, EIC Programme Manager (PM) for Quantum Tech & Electronics and Isabel Obieta Vilallonga, PM for Responsible Electronics, hosted a workshop to present future EIC challenges to European Union Member States and Associated States. The online workshop was moderated by the Head of Unit Anne-Marie Sassen. Each part of the agenda was followed by an interactive part in which representatives gave their input and raised questions.

Programme Manager Nik started by giving an overview of the objectives of the European Innovation Council (EIC) and its relation to the European Chips Act and the European Quantum Technology Ecosystem. In this session, she emphasised that besides focusing on the most novel and breakthrough technologies for reduced node sizes, the European Chips Act is also concerned with covering all types of sensors, MEMs, photonics and devices.

The EIC Digital Challenges for WP2023 presented by PM Nik were *Responsible Electronics* (Pathfinder), *Chip-scale Optical Frequency Combs* (Transition), *Fault-Tolerant Quantum Computers Hardware And Real Environment Quantum Sensors* (Accelerator) and *Semiconductor Chips Design* (Accelerator). She explained how the mentioned challenges are contributing to the Chips Act initiative as they focus on reducing Europe's dependency on Critical Raw Materials, fostering the development of the semiconductor chips design ecosystem in Europe by increasing the number of innovative fabless start-ups and semiconductor IP companies in the EU. Regarding inputs from the Member States, representatives suggested supporting the development of other photonics-based devices for communication, sensing and computing as part of the Transition Challenge.

Colleagues from C.02 Unit - DG CONNECT were invited to briefly explain other funding activities in Quantum Computing, namely the Quantum Technology Flagship and the European High-Performance Computing Joint Undertaking (EuroHPC JU).

In the last part of the workshop, PM Obieta presented early ideas for challenges in the field of Cutting Edge Semiconductors for WP2024 and WP2025, whereas Nik provided an overview of possible Quantum topics. Both of them pointed out that the future challenges are for now only suggestions and would require a thorough examination of deep-tech needs in the field.

Anne-Marie Sassen closed the session by informing participants that the slides will be made available in the upcoming weeks and reiterated that representatives are welcome to share their inputs by reaching out to EISMEA-D.02@ec.europa.eu

Workshop on EIC Quantum Technologies, Electronics and Chips Act Challenges

Samira Nik

Programme Manager Quantum Tech and Electronics

Isabel Obieta Vilallonga

Programme Manager for Responsible Electronics

27 Sep 2022

Outlook

European Innovation Council

EIC Digital

- EIC Goal
- Overview of European Chips Act and Role of EIC
- European Quantum Technology Ecosystem

EIC Digital Challenges - WP2023

- Pathfinder: Responsible Electronics
- Transition: Chip-scale Optical Frequency Combs
- Accelerator: Fault-Tolerant Quantum Computers Hardware And Real Environment Quantum Sensors
- Accelerator: Semiconductor Chips Design

Disclaimer
"The view expressed in this presentation is the sole responsibility of the Programme Managers and does not necessarily reflect the views of the European Commission"

European Innovation Council

EIC Goal

What's holding back European innovation?

Innovation **performance**	• **Strong research performance not translated** into innovation • **Lack of breakthrough/ disruptive innovations** that create new markets
Innovation **funding**	Financing gaps (2 "valleys of death") in • **Transition** from lab to enterprise • **Scaling up** for high-risk innovative start-ups
Innovation **ecosystem**	• Many national & local ecosystems, but **fragmented at European** level • Need to **include all regions and all talent** (especially female)

EIC Digital

European Innovation Council

EIC Goal ‘EIC: The European Unicorn Factory’

Focus on disruptive, high risk breakthrough technologies

Innovator friendly: apply at any time with a short pitch

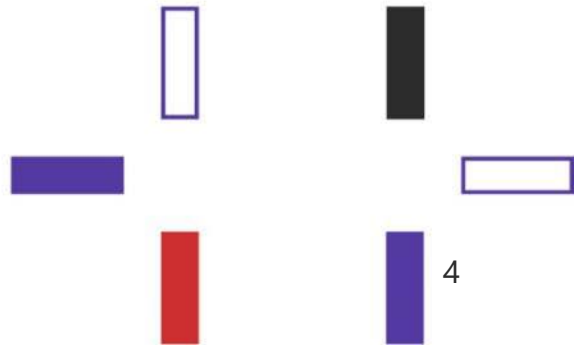
EIC Fund set to become largest early stage VC investor in Europe, crowding in other investors

EIC “Programme Managers” to develop visions, proactively manage projects, steer portfolios

Focus on high risk, disruptive startups & SMEs with scale up potential

New EIC Forum bringing together innovation ecosystem actors from across Europe

Partnerships with European Institute of Innovation & Technology (EIT), European Research Council (ERC) and others.



EIC Digital

European Innovation Council

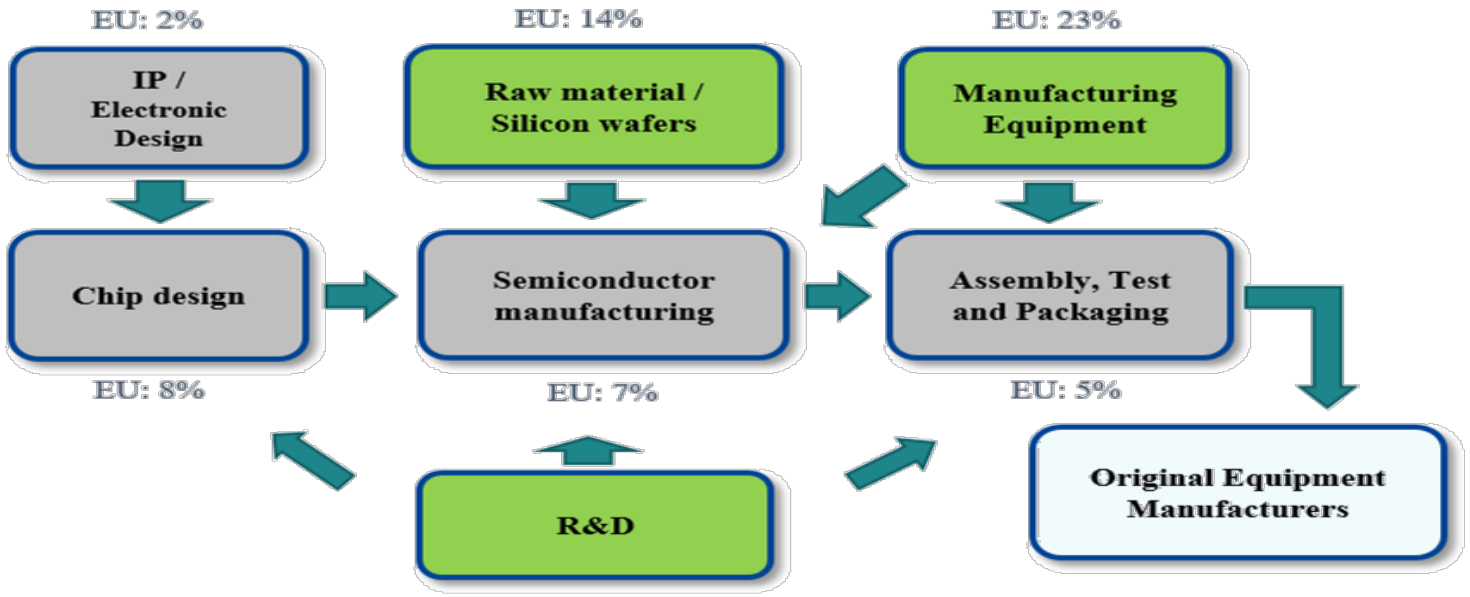
EIC Focus on Digital

- Digital start-ups, scale-ups and cutting-edge technology comprising more than 50% of the 93 centaur companies in the EIC portfolio;
- EIC Quantum portfolio: 86 projects, 12 of them at TRL 6 and above.
- EIC Challenges in strategic digital technologies (quantum, edge computing, etc)
- 300 million future EIC support for reaching the objectives of the Chips act

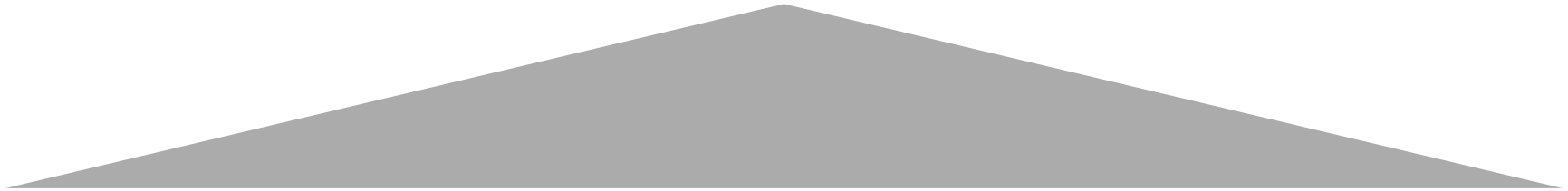
The EU's Chips Act: a EUR 43 bn initiative

Objectives

1. Strengthen research and technological leadership – innovate in design, assembly and packaging
2. Reach 20% of chip production globally by 2030, compared with today's 7-8%
3. Create a dynamic semiconductor ecosystem in Europe and address skills shortage
4. Understand the global semiconductor supply chain



Three Pillars of the Chips Act



European Semiconductor Board (Governance)

Pillar 1

Chips for Europe Initiative

- **Initiative on infrastructure building in synergy with the EU's research programmes**
- **Support to start-ups and SMEs**

Pillar 2

Security of Supply

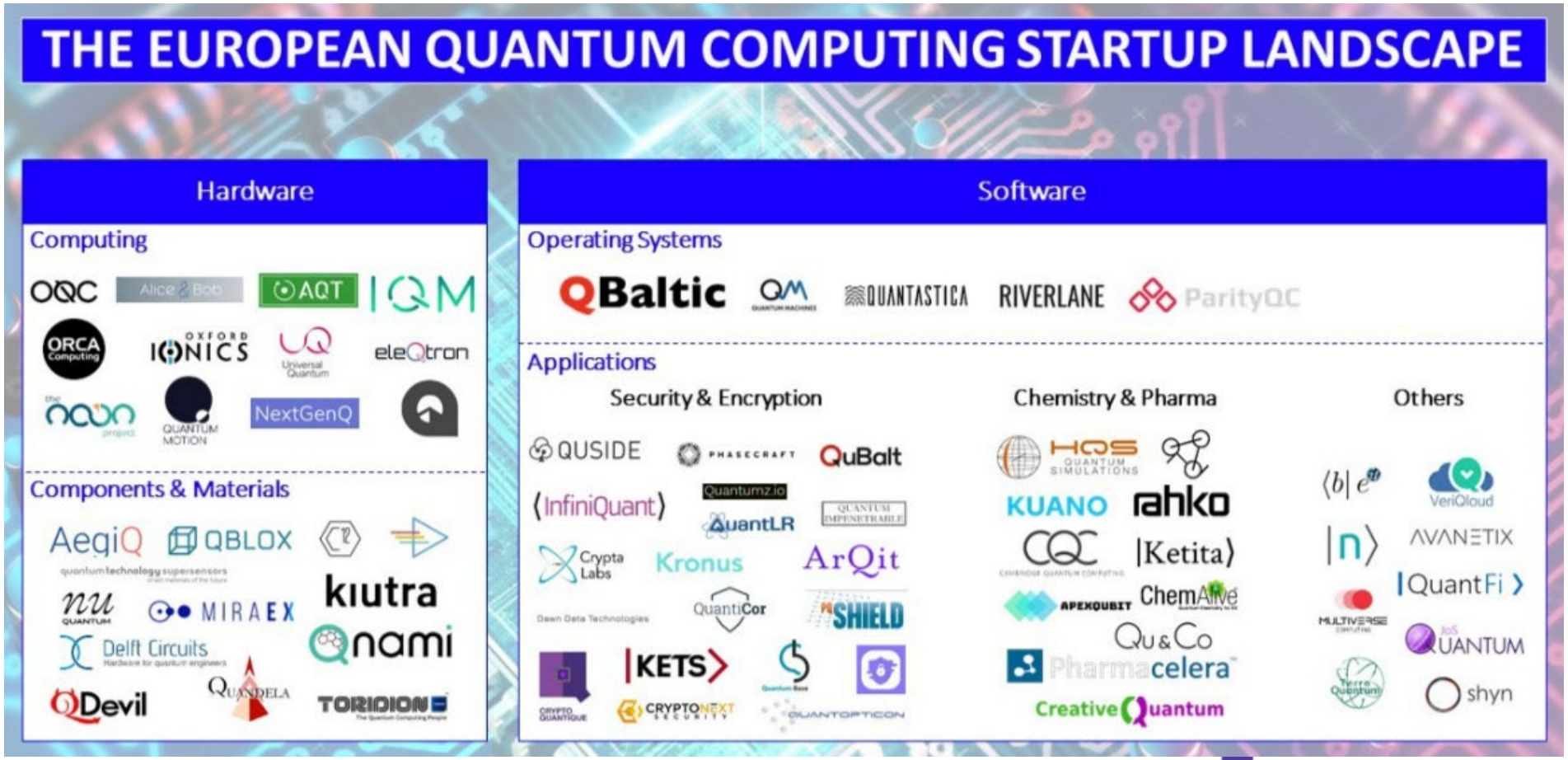
- **First-of-a-kind semiconductor production facilities**

Pillar 3

Monitoring and Crisis Response

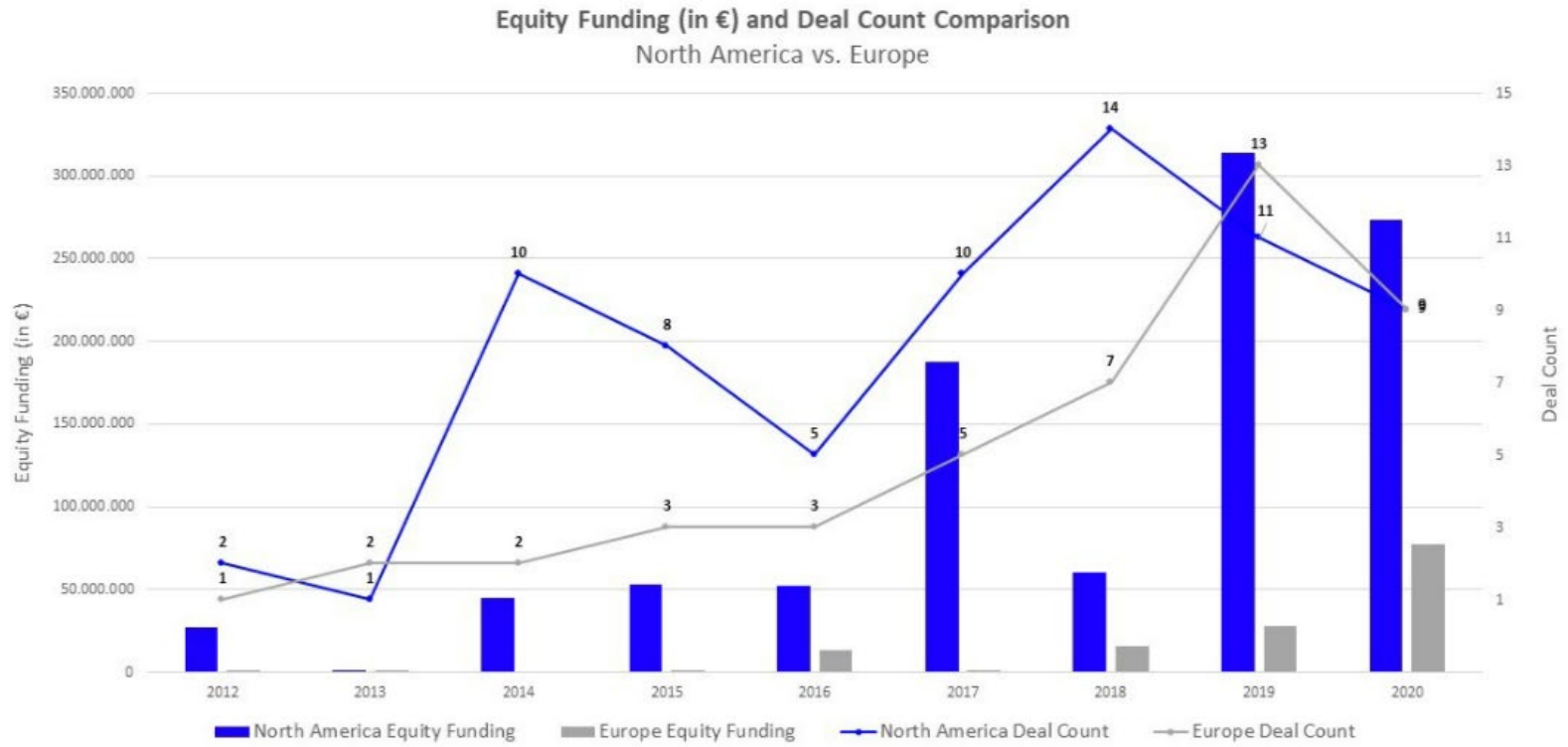
- **Monitoring and alerting**
- **Crisis coordination mechanism with MS**
- **Strong Commission powers in times of crisis**

European Quantum Technology Ecosystem



More than 70 QT start-ups

European Quantum Technology Ecosystem



Venture Capital Funding in Quantum Computing Startups in North America vs. Europe

European Quantum Technology Ecosystem

- EIC should help create and grow the EU quantum marketplace.
- Create testbed facilities for quantum network R&D, demonstrations and developing the HW/SW ecosystem. Testbeds should be open to external users so they can test their solutions.
- Support quantum start-ups as enablers of the transition through the gap between lab and market.
- Connect and align with National programs who all want to create startups
- Innovation Valleys: Can we link all the national efforts and add more in widening countries?
- Some MSs have seen procurement programmes as an opportunity to support their nascent quantum industries. However, QT ecosystem have identified a lack of understanding by procurement departments of the situation of start-ups.

EIC Digital Challenges - WP2023

European Innovation Council

Pathfinder
- Early stage research on breakthrough technologies
- Grants up to €3/4 million
- Open/Thematic

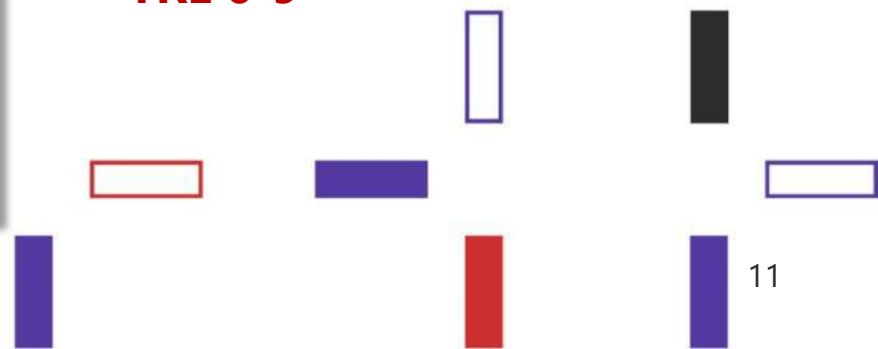
TRL 1-4

Transition
- Technology maturation from proof of concept to validation
- Business & market readiness
- Grants up to €2.5 million

TRL 3-6

Accelerator
- Development & scale up of deep-tech/ disruptive innovations by startups/ SMEs
- Blended finance (grants up to €2.5 million; equity investment up to €15 million)
- Successor of SME instrument
- Open/Thematic

TRL 6-9



EIC Digital Challenges - WP2023

European Innovation Council

- **EIC Pathfinder Challenge: Responsible Electronics**
  - Suitable electronics can contribute to drastically reducing the environmental load of the electronics industry by shifting from traditional manufacturing industrial methods to innovative methods and materials with lower environmental impacts.
  - The overall goal of this challenge is to create opportunities for the discovery of new environmentally friendly electronic materials, thus reducing its environmental impact and the need for critical raw materials and hazardous chemicals
  - Specific objectives: breakthroughs in development/discovery of:
    - Advanced electronic materials for unconventional devices
    - Advanced processes
    - Unconventional applications including e-textile/e-skin

Circular Economy Action Plan
The European Green Deal

Chips Act

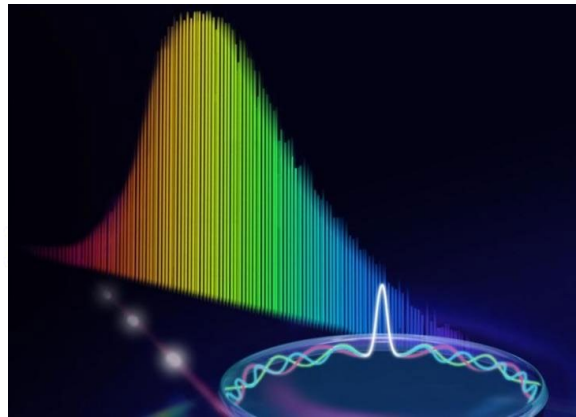
EIC Digital Challenges - WP2023

European Innovation Council

• EIC Transition Challenge: Chip-scale optical frequency combs

Chips Act

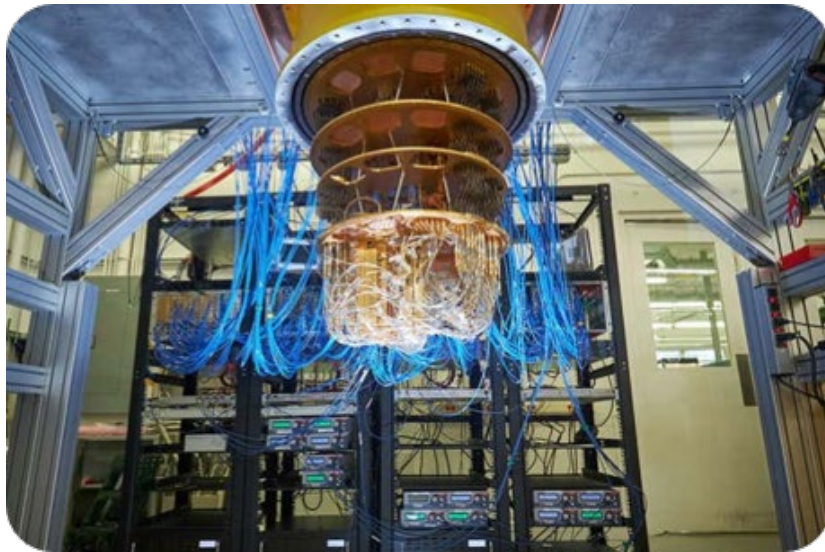
- This Challenge should lead to deep tech innovations for next-generation chip technologies that will enable new applications, providing a strong competitive advantage for future innovative start-ups and SMEs in microelectronics that the EIC can further support towards scale-up through its Accelerator scheme.
- Advancing or maturing novel technologies for chip-scale frequency combs for applications that require multiple frequencies of coherent laser light, with higher than the currently mainstream conversion efficiencies.
- Mature the frequency combs technologies to include integration options for other functional elements, compatible with wafer scale manufacturing. Use of new nonlinear materials such as Gallium Phosphide, Lithium Niobate and others may be considered as well.
- Exploit the precision of optical frequency combs by developing concepts for new industrial applications such as: Optical atomic clocks on a chip and Highly efficient sensors



EIC Digital Challenges - WP2023

European Innovation Council

- **EIC Accelerator Challenge: fault-tolerant quantum computers hardware and real environment quantum sensors**
  - Current QC hardware suffers from large error rates during computation and will not scale to the device size required for industry-relevant applications.
  - Quantum sensors have made significant improvement in recent years and they have a very wide range of application. However, large number of current quantum sensors are only functional in controlled environment such as laboratories or very specific testbeds
  - The objective of this Challenge is to support ground-breaking innovations that have a high potential to develop:
    - Fault-tolerant quantum computer(s) with: improved performance; significantly simplified QPU integration with control electronics; scalable control systems
    - Quantum sensors to function in real/harsh environment for various application areas, such as ecotoxicology, pharmaceuticals, biomedical, space, corrosion detection in power plants, gas/oil tanks, raw material detection, medical imaging, automotive and many more.

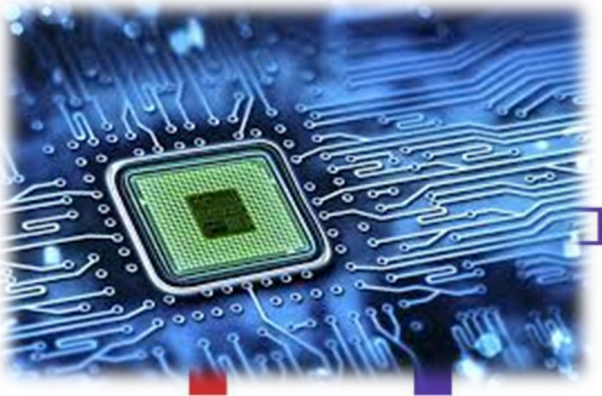


EIC Digital Challenges - WP2023

European Innovation Council

Chips Act

- **EIC Accelerator Challenge: Semiconductor Chips Design**
  - The recent chips shortage had a severe impact on key industrial sectors, exposing Europe's dependency on supply from other regions. Such reliance on imports jeopardizes EU's industrial production, affecting European sovereignty
  - Currently, only a few companies worldwide are capable of designing and manufacturing the most advanced chips with node sizes of 14 nm and below. At the same time demand for these chips in some major market segments, including AI and machine learning is surging as they combine strong performance with lower power consumption.
  - The aim of this Challenge is to support the design and development of innovative semiconductor components and intellectual property for analogue and digital integrated circuits and systems including memory, logic, optical components, and sensors, in relevant technology fields such as: AI, edge computing, IoT, autonomous vehicles, 5G/6G communication, cybersecurity, health, environmental sustainability.
  - The scope also includes innovative design approaches that address combination of different functionalities such as computing, RF, power, memory and sensing. Moreover, this Challenge should support sophisticated chips design for 14nm nodes and bellow in order to keep Europe in the front line of semiconductor industry in the coming years as the industry thrives for higher performance and greater circuit complexity.



European Innovation Council

Thank you!

www.eic.ec.europa.eu

@EUeic

#Eueic