Horizon Europe for Electronics

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European Commission

Directorate Artificial Intelligence and Digital Industries

Microelectronics and Photonics Industry

European Commission

European Innovation leadership in electronics and photonics

2021

DIGITAL-EMERGING-01-31 	**Functional electronics for green and circular economy (RIA)**
DIGITAL-EMERGING-01-06 	**Advanced optical communication components (IA)**
DIGITAL-EMERGING-01-07 	**Advanced Photonic Integrated Circuits (RIA)**
DIGITAL-EMERGING-01-01 	**Ultra-low-power, secure processors for edge computing (RIA)**
DIGITAL-EMERGING-01-05 	**Open Source Hardware for ultra-low-power, secure processors (CSA)**

2022

DIGITAL-EMERGING-01-03	**Advanced multisensing systems (RIA)**
DIGITAL-EMERGING-01-38	**International cooperation in Semiconductors (CSA)**

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HORIZON-CL4-2021-DIGITAL-EMERGING-01-31

Functional electronics for green and circular economy

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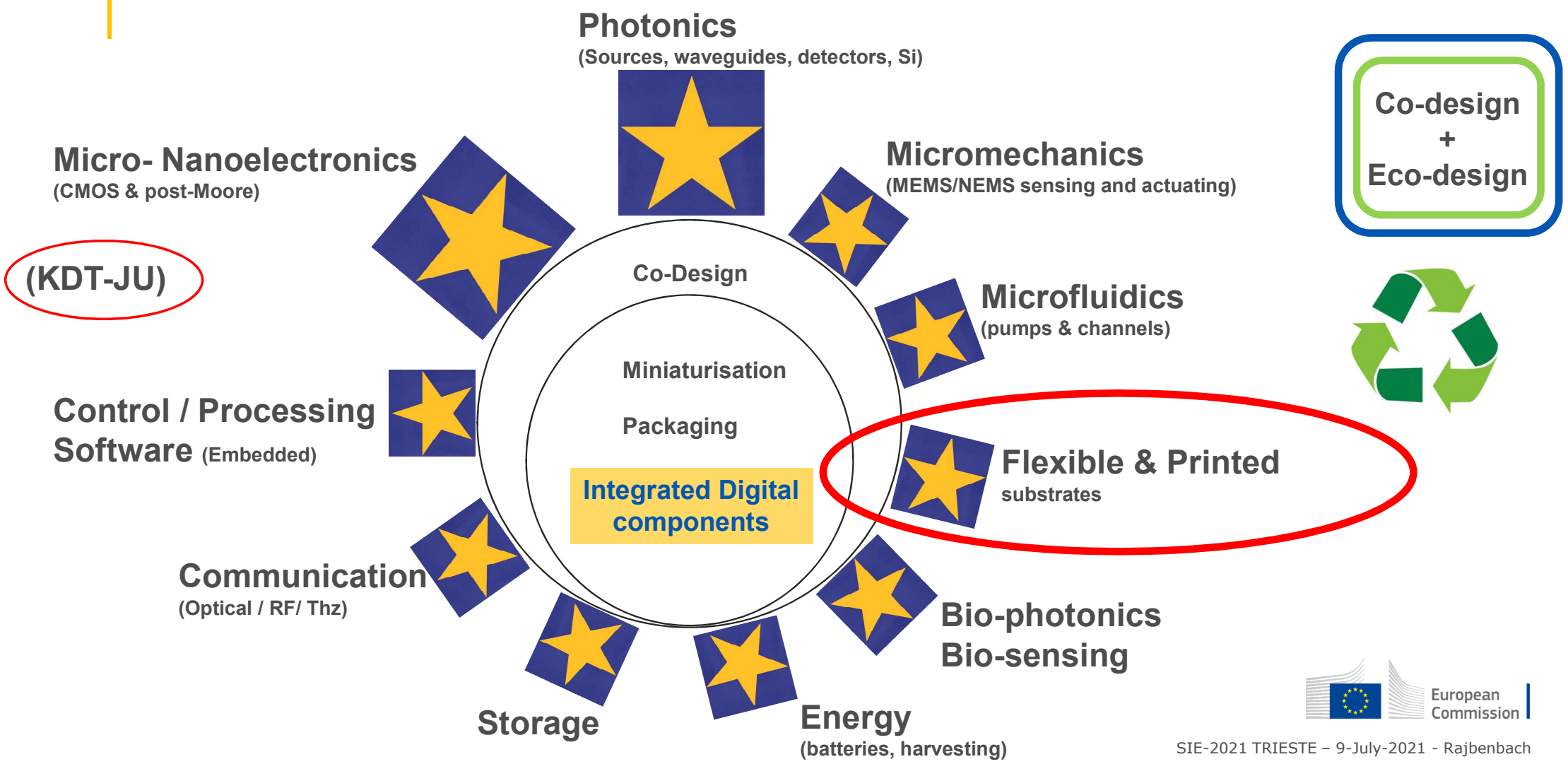
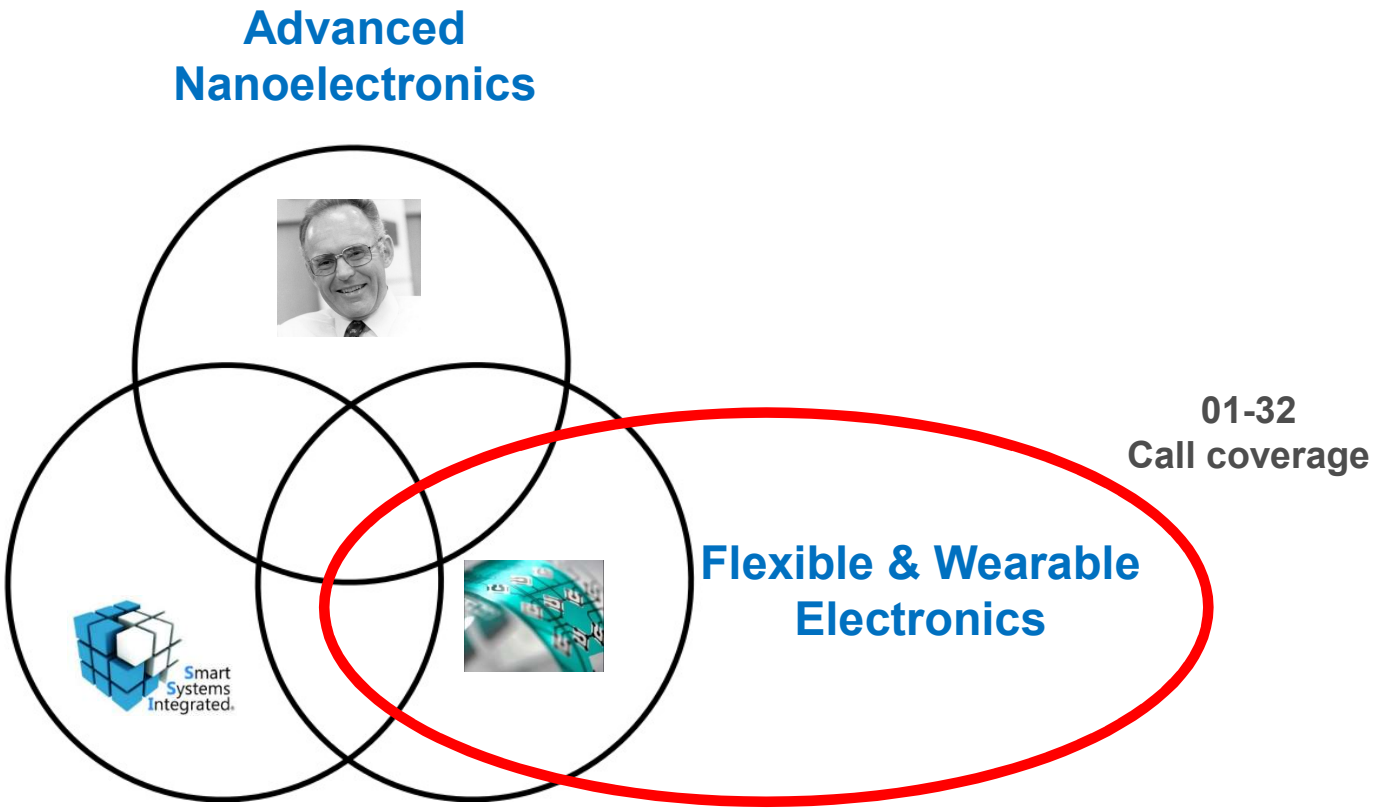
Technology context: "*Integrated in Diversity*"



Functional Electronics ?

A holistic approach



01-32
Call coverage

Source: the 5E project - www.5e-project.eu

HORIZON-CL4-2021-DIGITAL-EMERGING-01-31:

Functional electronics for green and circular economy

BUDGET

- **35 million Euro**
- Call opening 22-June-2021
- Submission: 21-Oct-2021

PROJECTS

- **RIA**
- EU contribution: **3-5 M€**

TRL (TECHNOLOGY READINESS LEVEL)

- **From 2-3 to 4-5** by the end of the project

HORIZON-CL4-2021-DIGITAL-EMERGING-01-31:

Functional electronics for green and circular economy

Expected Outcomes:

- European leadership in the area of **flexible, printed and organic electronics**
- New concepts, designs and technologies in electronics for **circular economy and sustainability**.
- Next generation components and systems that will deliver **climate-neutral digital solutions**

Scope:

- **Technological breakthroughs** in functional electronics technologies
- Addressing challenges & opportunities of **green and digital transformations**.
- **Eco-design principles**
  - reduction of energy and resource consumption.
  - low-cost / light- weight / less energy intensive approach

European Commission

HORIZON-CL4-2021-DIGITAL-EMERGING-01-31:

Functional electronics for green and circular economy

Focus:

- Use of different types of substrates e.g. **flexible, stretchable and conformable**
- **Integration** in textiles, plastics, glass, paper and metal.
- Improvement of system characteristics - **performance, robustness, reliability**
- High throughput and low-cost **manufacturing processes**

- Application domains:
  wearables, mobility, health/well-being, agriculture and environment, energy and smart logistics

- **Eco-design principles**:
  Recovery and recycling solutions
  Optimisation of the use of resources
  e.g. energy efficiency at system and manufacturing level, material consumption

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How much eco is eco ?

The principles of eco-design were published in 2002 (ISO/TR14062) https://www.iso.org/standard/33020.html

Eco-design considers **environmental** aspects at all stages of the product development process, striving for products which make the lowest possible **environmental** impact throughout the product life cycle. (Source: EEA Glossary)

Successive stages	• Raw material extraction and supply • Manufacturing • Product distribution • Consumer use • End of life (recovery and recycling)
Main criteria taken into account	• Consumption of raw materials • Energy consumption • Releases in the natural environment and other pollutions • Climatic impacts • Impacts on biodiversity
Some goals and principles are specifically about	• Using fewer materials and resources for manufacturing products • Using materials and resources obtained with a minimum environmental impact • Producing the least waste and pollution possible • Reducing the ecological impacts of distribution • Making reusing / recycling easier by intelligent design that makes disassembly easy

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HORIZON-CL4-2021-DIGITAL-EMERGING 01-06

Advanced optical communication components

Werner Steinhögl

European Commission

Advanced optical communication components

HORIZON-CL4-2021-DIGITAL-EMERGING-01-06

PROJECTS

- **IA**
- EU contribution/project: **4-6 million Euro**
- Implementing the photonics partnership

BUDGET

- **26 million Euro**
- Call in **2021**

TRL (TECHNOLOGY READINESS LEVEL)

- **From 3-4 to 5-6** by the end of the project

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Advanced **optical communication components - Scope**

- **Develop ultra-dynamic photonic components and subsystems for time-deterministic and time-sensitive networks**

  using for example: new optical wavelength bands, space division multiplexing, new integration schemes, optical switching and new switching paradigms

- **Solutions should**
  - enable ultra-dynamic reconfiguration on the optical layer
  - mitigate amplifier power transients
  - save energy and improve bandwidth efficiency
- **Work should cover a range of use cases e.g. from commercial applications to the industrial internet**

European Commission

Advanced **optical communication components** - **Expected Outcome**

- **Reliable and low latency communication** with guaranteed service quality
  - **For the digital transformation of industrial processes**
- **Reduce congestion** in data communication
  - **Cope with multiplicity of applications compete for simultaneous delivery**
  - **Prevent data loss or delay**
- Reduce **power consumption**
  - **To some pico-Joule per bit**
  - **through broader use of optical networking technologies, interconnects and integrated components**
- Lower barrier for the **uptake of performant communication technologies**
  - **Reduce cost of transmission interfaces to around 50 cents per Gigabit per second**

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HORIZON-CL4-2021-DIGITAL-EMERGING 01-07

Advanced Photonic Integrated Circuits

Werner Steinhögl

European Commission

Advanced Photonic Integrated Circuits (RIA)

HORIZON-CL4-2021-DIGITAL-EMERGING-01-07

PROJECTS

- **RIA**
- EU contribution/project: **3-5 million Euro**
- Implementing the photonics partnership

BUDGET

- **39 million Euro**
- Call in **2021**

TRL (TECHNOLOGY READINESS LEVEL)

- **From 2-3 to 4-5** by the end of the project

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Advanced **Photonic Integrated Circuits - Scope**

- **Facilitate new applications in biomedical, environmental and industrial fields by enhancing functionality and spectral coverage**
- **Extend the functionalities of optical components through**

  Design, integration, fabrication, assembly and packaging techniques including the co-integration of photonic and electronic components.

- **Proposals should demonstrate the developed integration technologies in at least two application oriented use cases**
- **Establish integration platforms, which help potential user companies with their uptake.**

Advanced **Photonic Integrated Circuits- Expected Outcome**

- Next generation **photonic integrated circuits and devices**
- **Strengthen industrial capability of photonic device fabrication by integration and miniaturisation**
- **Lower the barrier to the use of advanced photonic integration technologies for companies, in particular high-tech SMEs**
- **Providing European open strategic autonomy in Photonic Integrated Circuits and related manufacturing processing**

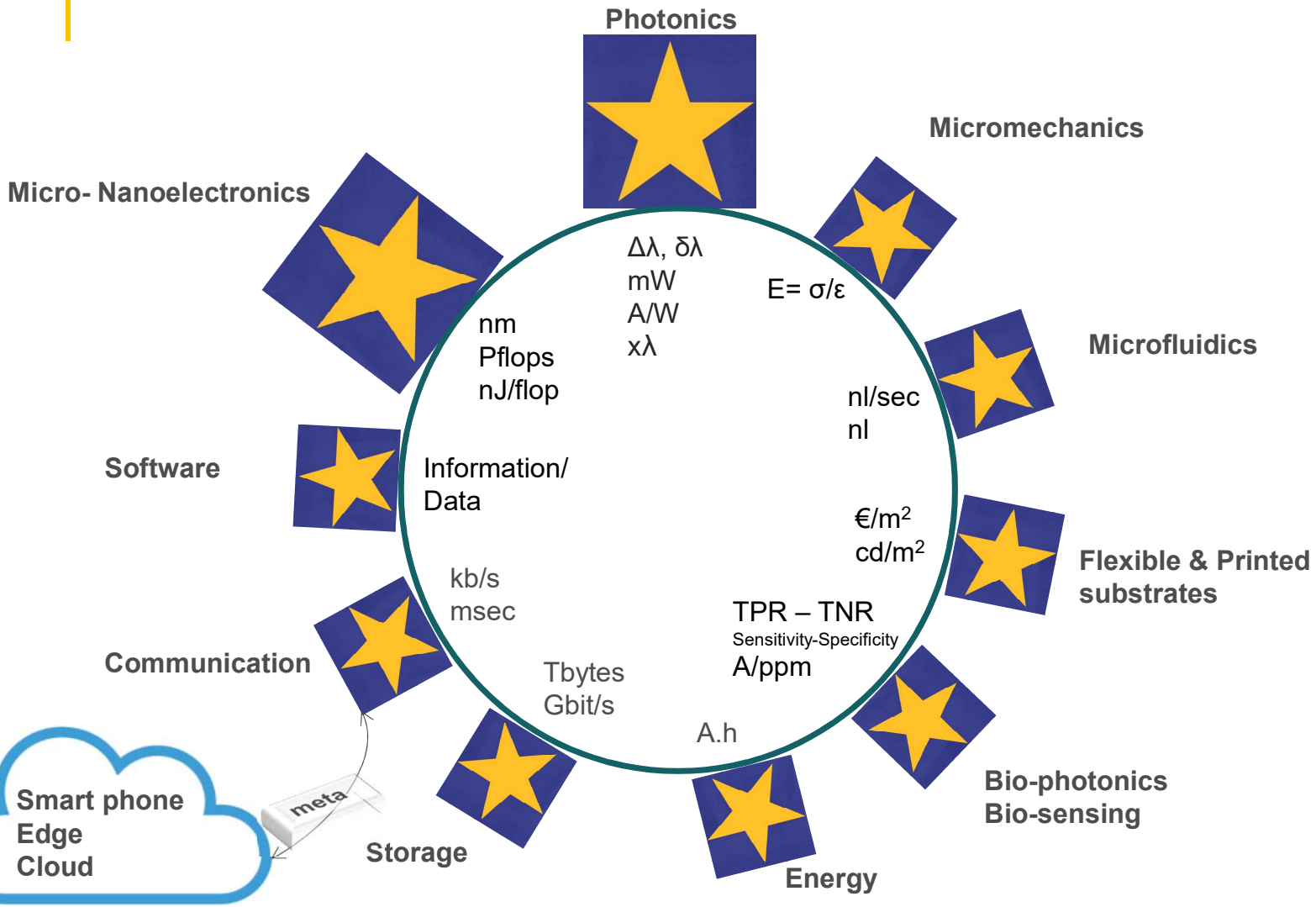
Thank you!

HorizonEU

http://ec.europa.eu/horizon-europe

Additional slides

"*Integrated in Diversity*" : *Specification space*



HORIZON-CL4-2021-DIGITAL-EMERGING 01-01

Ultra-low-power, secure processors for edge computing

Panagiotis Tsarchopoulos

European Commission

HORIZON-CL4-2021-DIGITAL-EMERGING-01-01:
Ultra-low-power, secure processors for edge computing

Expected Outcomes:

- Develop European secure specialised microprocessor designs (including accelerators and controllers) that deliver **high-performance computing at ultra-low power operation**.

- Improve by **at least two orders of magnitude** the performance per watt for the targeted edge applications

HORIZON-CL4-2021-DIGITAL-EMERGING-01-01:
Ultra-low-power, secure processors for edge computing

Examples of approaches (non-exhaustive list)

neuromorphic
in-memory computing
probabilistic computing
neural networks
programmable logic
hardware-software co-design
open-source hardware and processor IP

Examples of targeted applications (non-exhaustive list)

automated driving
artificial intelligence
machine learning
computer vision
machine translation
speech recognition
sensor fusion
signal processing

HORIZON-CL4-2021-DIGITAL-EMERGING-01-01:
Ultra-low-power, secure processors for edge computing

Proposals should have **a longer-term perspective** taking into account the reduced performance improvements of general-purpose computing, the slow-down of Moore's law and the changing economics of semiconductor manufacturing.

Proposals should include research on **advanced hardware-based security at silicon-level**.

Proposals should take into account **certification guidelines for secure and safety-critical applications where relevant.**

Proposals should include **a preliminary analysis of bringing successfully to the market** the proposed research either as IP blocks or as standalone chips.

Proposals may include **early chip prototyping in well-justified cases**.

HORIZON-CL4-2021-DIGITAL-EMERGING-01-01:
Ultra-low-power, secure processors for edge computing

BUDGET

- **26 million Euro**

PROJECTS

- **RIA**
- EU contribution/project: **8-10 M€**

TRL (TECHNOLOGY READINESS LEVEL)

- **From 2-3 to 4-5** by the end of the project

HORIZON-CL4-2021-DIGITAL-EMERGING 01-05

Open Source Hardware for ultra-low-power, secure processors (CSA)

Panagiotis Tsarchopoulos

European Commission

HORIZON-CL4-2021-DIGITAL-EMERGING-01-05

Open Source Hardware for ultra-low-power, secure processors (CSA)

Expected Outcomes:

- Structure European involvement in open source hardware efforts (including **open Instruction Set Architectures**) related to the design of ultra-low-power, secure microprocessors, microcontrollers and accelerators.

- Develop **a roadmap for open source hardware in Europe** covering both R&D as well as funding & business aspects for edge applications in all power and performance ranges from deeply embedded to high-end computing.

HORIZON-CL4-2021-DIGITAL-EMERGING-01-05

Open Source Hardware for ultra-low-power, secure processors (CSA)

Issues to address (non-exhaustive list)

- availability of a sustainable and reliable open hardware IP supply
- maturity of the IP components
- open source design tools
- compilation
- simulation
- verification
- real-time and mixed criticality

Bring together all relevant European stakeholders and further develop and grow the European open source hardware ecosystem

Align with related regional or national initiatives covering both academia and industry

Interface with international efforts in the area including certification guidelines for design of IP to be used in safe/secure applications

Participate and lead in the development of open source hardware standards and specifications.

HORIZON-CL4-2021-DIGITAL-EMERGING-01-05
Open Source Hardware for ultra-low-power, secure processors (CSA)

BUDGET

- **2 million Euro**

PROJECTS

- **CSA**
- EU contribution: **2 M€**

HORIZON-CL4-2021-DIGITAL-EMERGING 01-38

International cooperation in semiconductors

Francisco Ibanez

European Commission

International cooperation in semiconductors
Expected outcomes

Proposals are expected to contribute to all of the following outcomes:

- Advise the EC on joint actions with leading semiconductor countries (e.g. Japan, South Korea, Taiwan).
- Support the Commission to define and implement joint measures in the context of global value chains.
- Provide support in the analysis (e.g. state-of-the-art, emerging technologies…) of cooperation actions.

International cooperation in semiconductors
Scope

Within the context of semiconductor and semiconductor-based photonics (e.g. Silicon photonics), the CSA will address the following activities:

- Preparation of a regional mapping of industrial strengths and gaps
- Identification of emerging opportunities (e.g. technologies, approaches)
- Definition of research areas for international cooperation
- Promotion and contribution to standardisation activities
- Organisation of joint events contributing to the above outcomes
- Promotion of mobility of researchers in specific topics
- Preparation of modalities for cooperation

HORIZON-CL4-2022-DIGITAL-EMERGING-01-38:

International cooperation in semiconductors (CSA)

- Type of instrument: Coordination and Support Action (CSA)
- Budget: 3 M€
- Intended call key dates: 23rd November 2021 (call opening)
  5th April 2022 @ 5pm (call closing)
- Proposal expected duration: 3 years
- Proposal expected funding: 3 M€

HORIZON-CL4-2022-DIGITAL-EMERGING-01-38:

International cooperation in semiconductors (CSA)

- The CSA aims at supporting EU policy ‘open strategic autonomy’ in semiconductors. In particular, the cooperation with trusted countries for mutual benefit
- A single CSA that covers the full scope and expected outcomes
- CSA partners should have a deep understanding of the different aspects of semiconductors (technologies, industry, research, applications, public initiatives, etc.)
- The participation of international organisations to contribute with knowledge of semiconductor ecosystems in specific countries is welcome
- Information to participants (including reference documents) at https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-search

European Commission
Funding and Tender opportunities