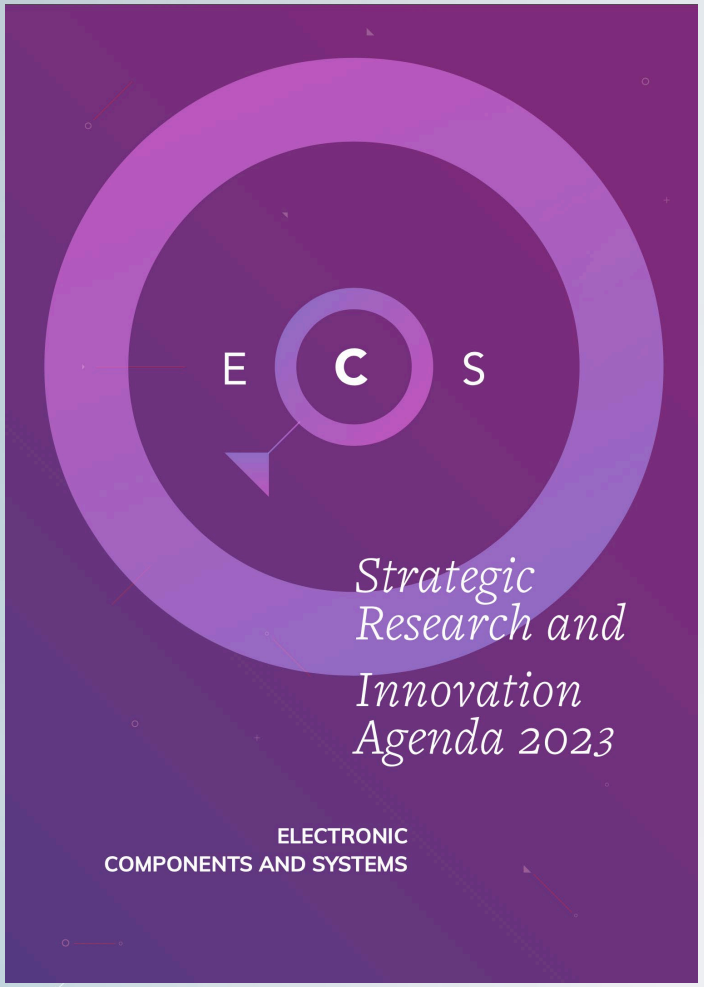

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Electronic Components and Systems

ECS-SRIA 2023

ECS Brokerage Event 2023
Brussels 07-08/02/2023

Paolo Azzoni, Chairman, Inside-IA

Patrick Cogez, Co-Chair, AENEAS

Nicolas Gouze, Co-Chair, EPoSS

Summary

- Introduction
- The ECS-SRIA and KDT call
- ECS-SRIA 2023 updates
- The ECS-SRIA web site

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The ECS-SRIA

The SRIA for the ECS value chain

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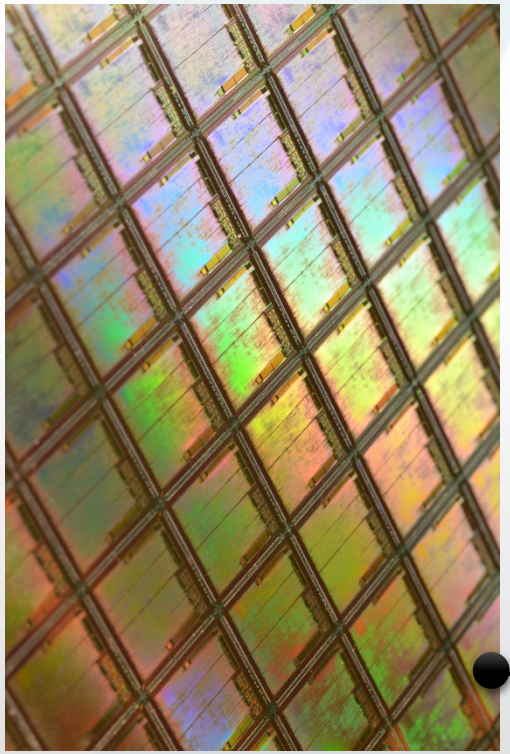
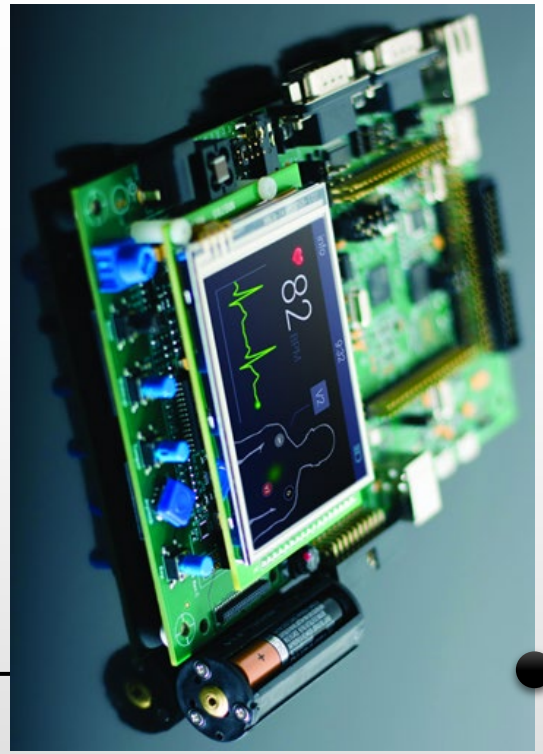


Materials, processes, semiconductors, micro & nano electronic components, …



Smart sensors, integrated devices, edge AI, embedded SW, …

Systems and applications, value creation, societal goals, …

ECS engineering tools

The ECS-SRIA 2023

Basis for KDT Calls 2023

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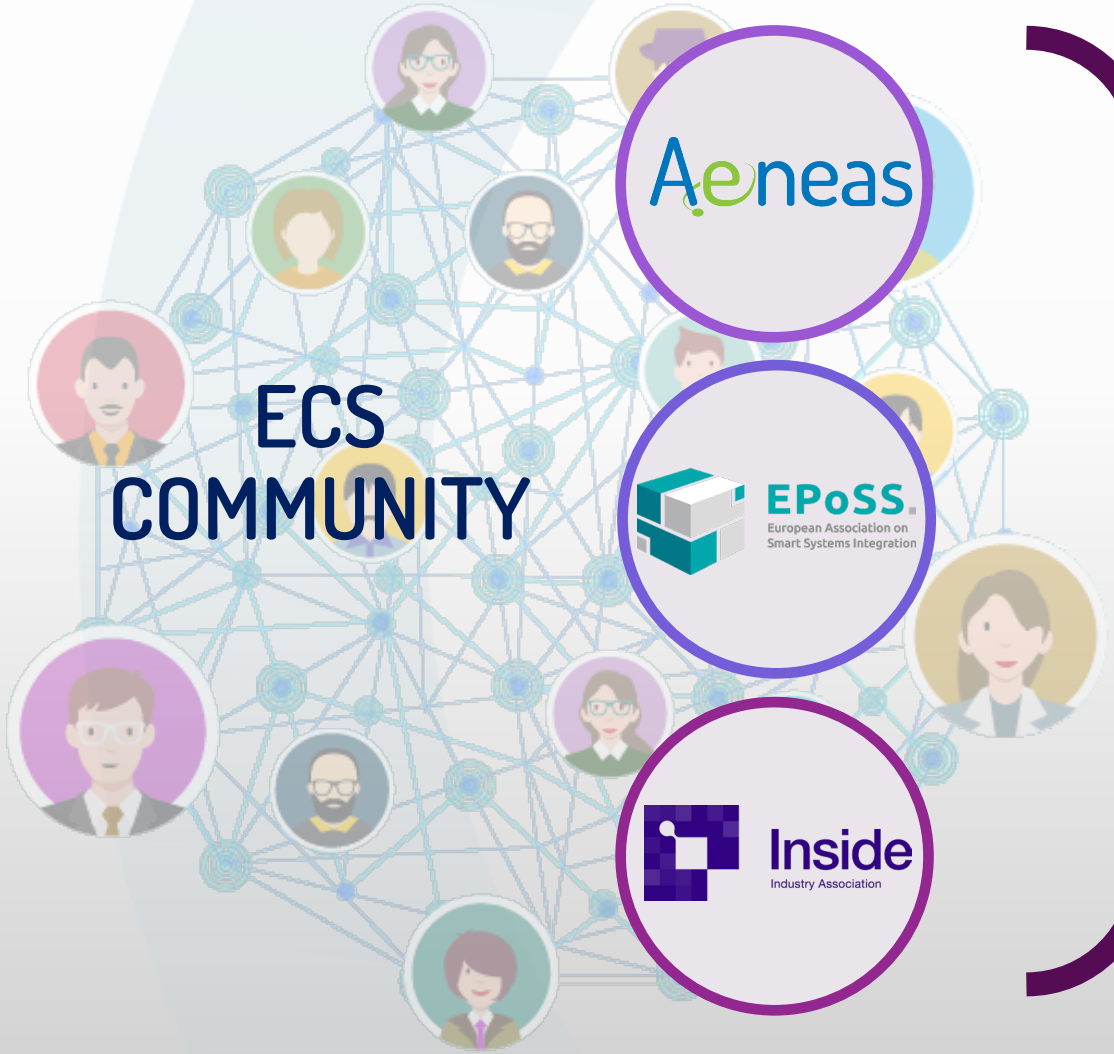

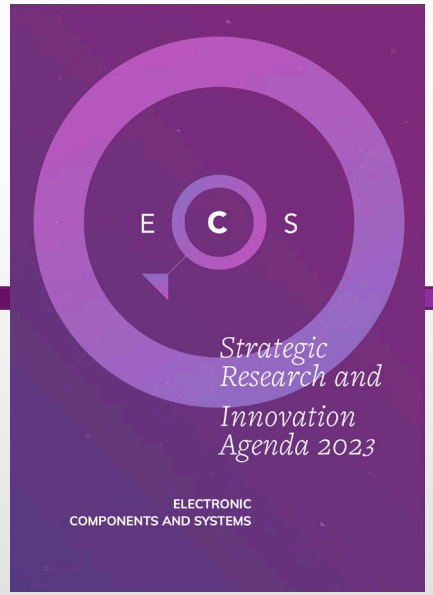

KDT JU
KEY DIGITAL TECHNOLOGIES JOINT UNDERTAKING

Xecs

The ECS-SRIA Team 2023

Paolo Azzoni
Inside IA
Chairman

Patrick Cogez
AENEAS
Co-chairman

Nicolas Gouze
EPOSS
Co-chairman

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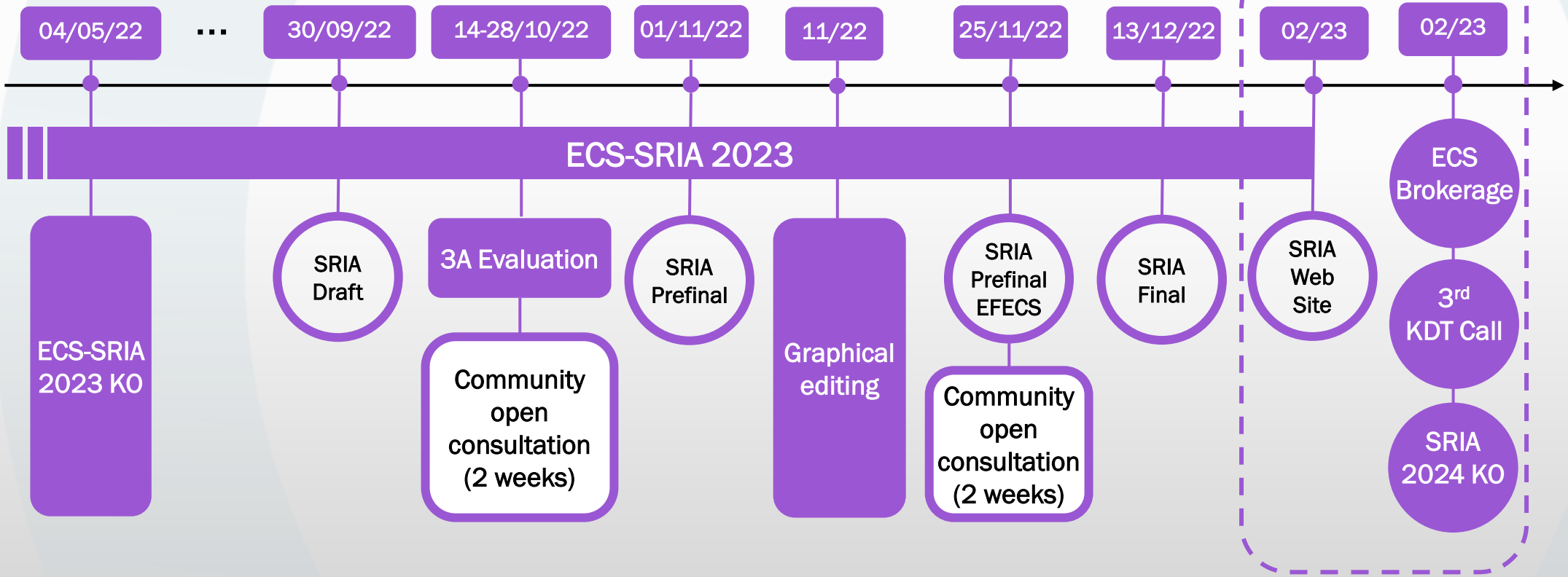
Core Team

- Arco Krijgsman - ASML
- Christophe Wyon - CEA
- Jerker Delsing - LTU
- Juergen Niehaus - Safetrans
- Patrick Pype - NXP
- Sven Rzepka - Fraunhofer
- Wolfgang Dettmann - Infineon

More than 300 European experts

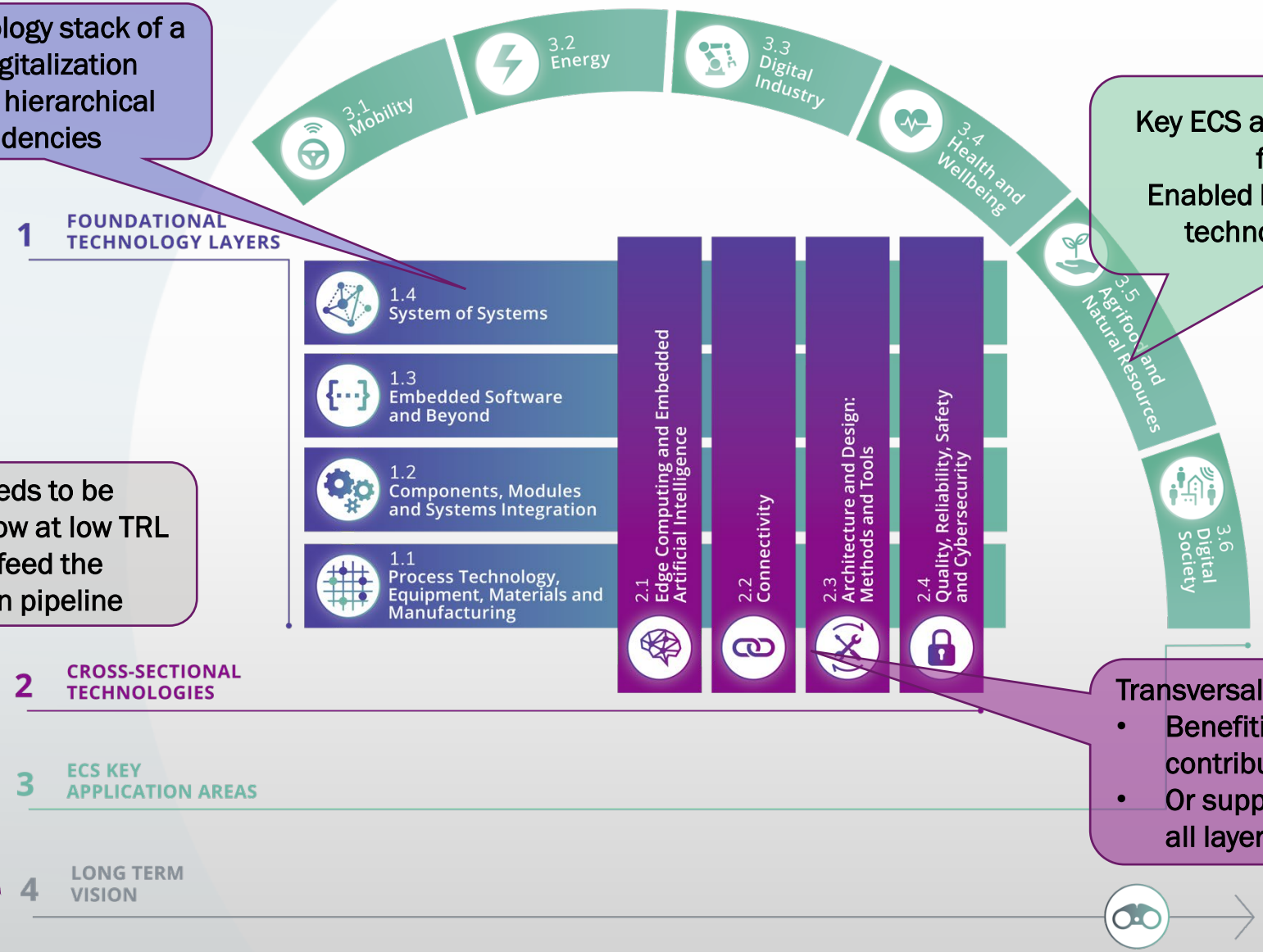
ECS-SRIA 2023 Timeline



ECS-SRIA structure

Basic technology stack of a typical digitalization solution & hierarchical dependencies

What needs to be addressed now at low TRL level to feed the innovation pipeline



Key ECS application domains for Europe
Enabled by and driving ECS technology roadmaps

Transversal areas
- Benefiting from interdisciplinary contribution of the foundational layers
- Or supporting technology stack across all layers

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ECS SRIA and KDT calls 2023

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Basis for KDT calls 2023

Global Call:

- Includes all Major Challenges of the SRIA (from CHP 1.1 to 3.6)
- Refer directly to the ECS-SRIA for both RIA and IA

Focus Topics:

- Refer to call text
- ECS-SRIA is aligned with focus topics
- The ECS-SRIA represents a complementary source of information to:
  - position the focus topics in the ECS value chain
  - identify synergies/dependencies with other technology areas (interdisciplinarity)

ECS-SRIA & Focus topics

Examples of links

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6G Integrated Radio Front-End for THz Communications (Call 2023-1-IA Topic 2)

CHP 1.1 process technology, equipment, …

- MC 2 (novel devices and circuits that enable …) semiconductor technologies targeting THz connectivity (III-V on Si, FD SOI, RF SOI, advanced BiCMOS)
- MC 3 (advanced heterogeneous integration and packaging solutions) advanced interconnect, encapsulation, packaging for THz; 2D, 2.5D and/or 3D integration for THz

CHP 2.2 Connectivity

- MC 1 (strengthening the EU connectivity technology portfolio …)
  - Semicon. techs like CHP1.1 MC 2
  - Ultra-low power transceivers
  - Antenna and packages for THz, on-chip antennas
  - Meta-materials for antennas, meta-materials for intelligent reflective surfaces and meta-surfaces
- MC 2 (investigate innovative connectivity technology …)
  - New spectrum (e.g. THz) exploration

Integration of trustworthy Edge AI technologies in complex heterogeneous components and systems (Call 2023-1-IA Topic 3)

CHP 2.1 - Edge computing & embedded AI

- MC 2 (Managing the increasing complexity of systems)
  - End-2-end AI architecture including the continuum of AI-based solutions
  - Collaborative AI, transfer and meta learning
- MC-3 (supporting the increasing lifespan of devices and systems)
  - Engineering tools supporting Edge AI lifecycle
  - Self-configurability & upgradability
- MC 4 (Ensuring European sustainability)
  - Towards edge AI trustworthiness (certifiable, interpretable, explainable AI)
  - Tightly integrated open edge AI platforms and ecosystems
  - Life cycle assessment of edge AI environmental impact

ECS-SRIA & Focus topics (2)

Examples of links

Hardware abstraction layer for a European Vehicle Operating System
(Call 2023-2-RIA Topic 2)

CHP 3.1 - Mobility

- MC 3 (Modular, scalable, reusable, flexible, cloud-based safe and secure end-to-end software platform able to manage software-defined mobility of the future)
  - Scalable, cloud-capable, and modular target architecture decoupling of hardware and software, and features a strong middleware layer
  - Support for current and future OSs
  - Hardware abstraction layer with open, robust, safe & secure APIs
  - Layer natively support for safety & security
  - Unified, open and shared SDK
- Indirectly contribute also to MC 4 & 5 simplifying validation and certification, and real-time data handling

Electronic Control Systems (ECS) for management & control of decentralized energy supply & storage (Call 2023-1-IA Topic 4)

CHP 3.2 - Energy

Distributed Renewable Energy Systems is linked to all challenges:

- MC 1 (Smart & Efficient - Managing Energy Generation, Conversion, and Storage Systems) smart control units; sensors, actuators, drives, controls and innovative components; Energy Management Systems; smart system integration; future of storage (including hydrogen)
- MC 2 (Energy Management from On-Site to Distribution Systems) Security, reliability and stability of total energy system; grid plug play components
- MC 3 (Future Transmission Grids) the transmission & distribution grids are the backbone of the system to monitor and control
- MC 4 (Achieving Clean, Efficient & Resilient Urban/ Regional Energy Supply) renewables sources
- MC 5 (Cross Sectional Tasks for Energy System Monitoring & Control) energy management platforms for monitoring & control

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ECS-SRIA 2023 Updates

ECS-SRIA 2023 Updates

Electronic Components and Systems

The ECS-SRIA website

Updates focused on societal benefits

Intro update with focus on climate & energy

Open Source HW and RISC-V new Appendix

4 “Main Objectives” confirmed

Structural updates

Research and market trends

New market figures

Timelines

Highlight interdisciplinarity

References to recent reports and studies

Improved chapters integration & synergies

Updates focused on technology

Part 1
Foundational Technology Layers

Electronic Components and Systems

1.1 - Process technology, equipment, materials and manufacturing

- 2D and 3D integration
- Heterogeneous integration & packaging
  - Flip Chip Ball Grid Array Substrates
  - New materials & new SiP combination diagram
- Sustainable manufacturing of chips
  - Analysis of manufacturing footprint

1.2 Components, modules & systems integration

- Review of societal benefits and application breakthroughs
- Clarified development goals and needs both from technology & functional perspectives
- Major challenges re-structured to improve clarity

1.3 - Embedded SW & beyond

- Embedded SW technologies
  - Parallelisation, SOA, SoS & new comp. par., …
  - Heterogeneous computing architectures
- Evolvability of embedded SW
- Embedded SW architectures to enable SoS
- Reviewed the concept of Embedded Intelligence

1.4 System of systems

- SoS integration along the life cycle
  - Integration and engineering methodologies, tools and tools interoperability
- AI support to ”Trustable” SoS
- MCs Alignment with the new concepts

Part 2
Cross Sectional Technologies

Electronic Components

2.1 - Edge computing & embedded AI

- New market figures and trends
  - Landscape of AI chips
  - Positioning of EU semiconductors industries
- New technology challenges
  - New deep learning models, automatic adaptation of complex networks, certifiable AI

2.2 - Connectivity

- Alignment with SNS on 6G
- Update of major challenge 5
  - Virtual connectivity architecture for 5G & 6G
  - Reference architecture
  - Engineering, integration and management frameworks

2.3 - Architecture and design: methods and tools

- Virtual verification & validation (V&V)
  - Support certification, simulators accuracy and faithfulness, model accuracy and faithfulness, …
- V&V of AI based systems
  - Enable V&V of AI-based functions for certification

2.4 - Quality, reliability, safety and cybersecurity

- General improvement & focus on 5G/6G
  - Improved MC1, focused on quality and reliability
  - Improved MC3, analysing the impact of 5G/6G on cybersecurity, certifications, impact of methods and tools on sustainability

Part 3
ECS Key Application Areas

Electronic Components

3.1 - Mobility

- Key market trends, industry objectives and societal benefits
- Enabling the Software Defined Vehicle
- Towards carbon neutrality

3.2 Energy

- Evolution pace & supply needs
  - Post-pandemic effects
- New affordable technologies for sustainability
- Industrial transformation towards sustainability

3.3 Digital industry

- General review, new links to RISC-V, AI, energy, new references to recent publications

3.4 Health and wellbeing

- Improved the alignment with Health.E Lighthouse
- Synergies with Innovative Health Initiative (IHI) Joint Undertaking

3.5 Agrifood & natural resources

- Impact of climate change
- Digital twins and block-chain
- Farming as a service
- New connectivity solutions
- Analysis of challenges

3.6 Digital society

- General review, minor changes

Part 4
Long Term Vision

Electronic Components and Systems

- Green Deal & sustainability objectives
  - Sustainable chips production, to reduce environmental pollution, energy and water consumption, CO_2 and GHG emission
  - ECS repair, reuse and recycle, for circular economy, non invasive and reusable electronics
- Next generation computing devices
- New frontiers in Edge AI
  - Distributed & coordinated AI
  - Social acceptance of AI
  - Explosion of diversity of ECS
- Increased heterogeneity of SoS
- Integrity of the ECS and ECS application supply chain

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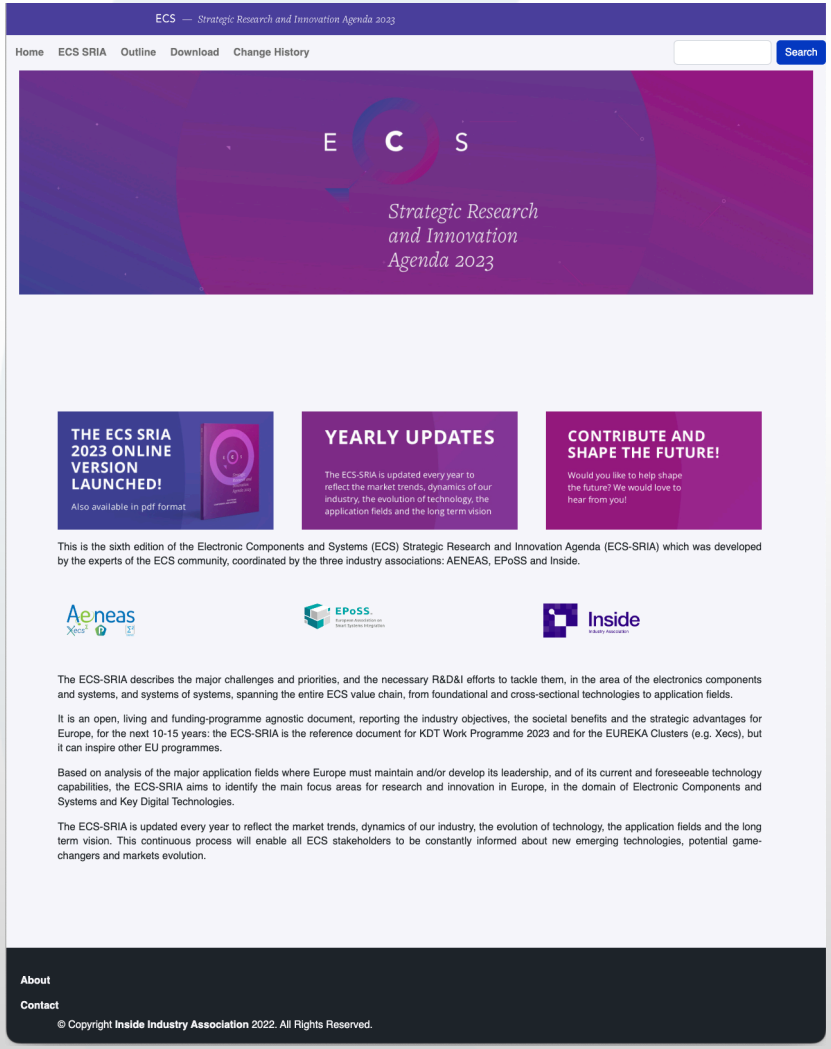
ECS-SRIA Web Site

ECS-SRIA Web Site



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The ECS-SRIA goes online!

- Increased visibility and accessibility
- Simple to browse with hyperlinks
- Attract new talents and experts
- Native indexing and analytics
- More advanced functionalities for:
  - Topics search
  - Selective reading
- W3C standard

ECS-SRIA Web Site (2)

Electronic Components and Systems

Status:

- 1st release currently online
- WWW and PDF contents fully aligned

Next steps:

- Continuous consolidation and improvement
- Staging environment for editing of new versions
- Evaluating a semantic-based extension of the web site, providing
  - reasoning native support
  - semantic maps
  - semantic navigation and search
- Automation of the editing process

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References

References to the ECS-SRIA

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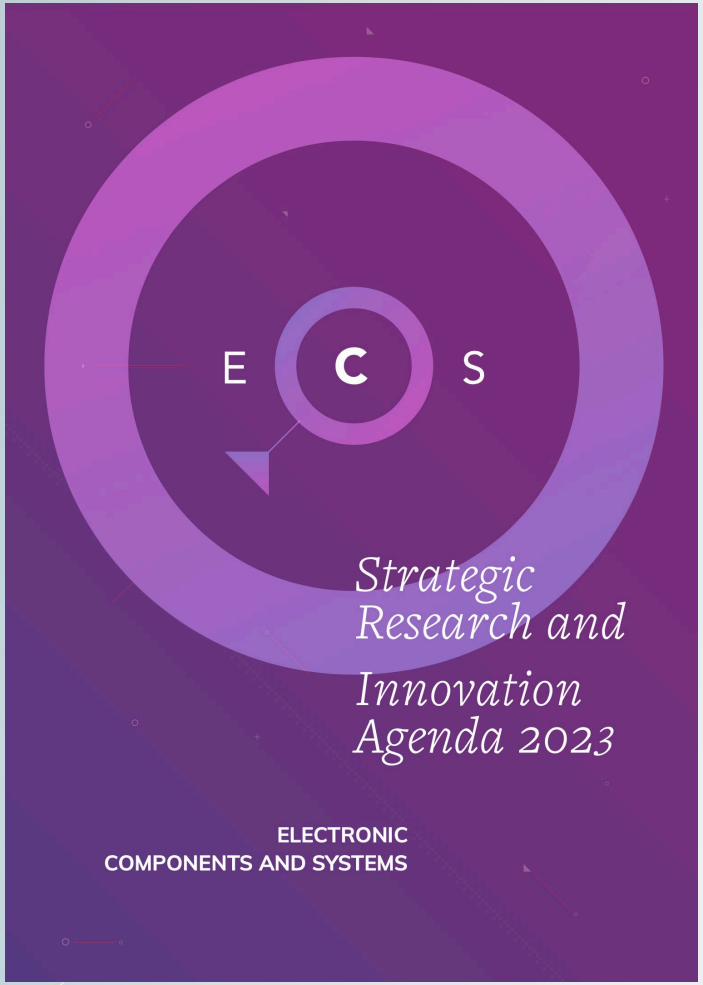
ECS-SRIA Web Site https://ecssria.eu/

ECS-SRIA PDF Version
ECS-SRIA Outline
ECS-SRIA Updates

https://ecssria.eu/download



Thanks for the attention

Any question?

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