E C S

Electronic Components and Systems

ECS-SRIA 2021 & 2022 OVERVIEW

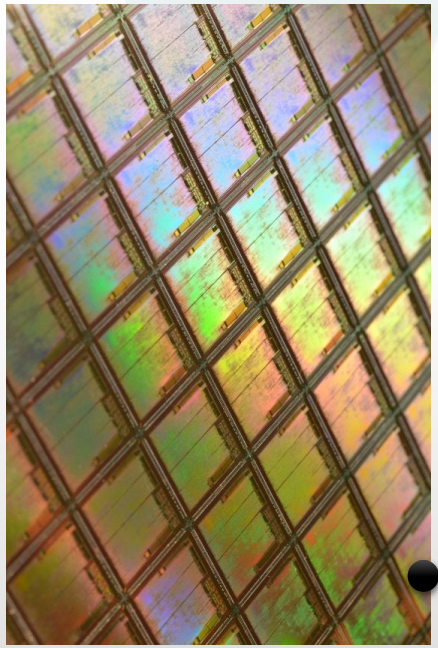
KDT National Infoday

Lisbon, 21 February 2022, online meeting

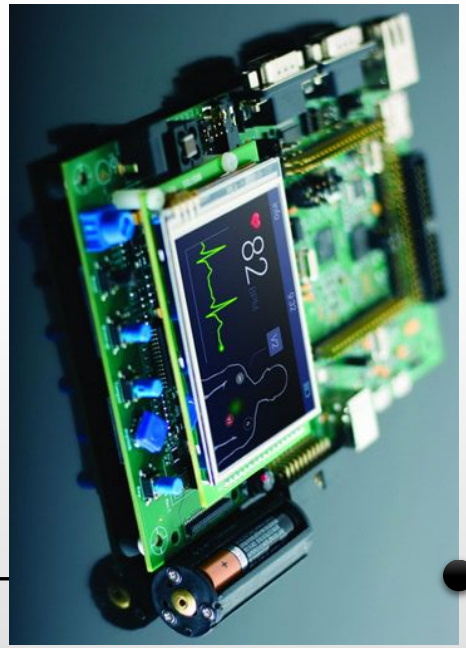
Paolo Azzoni
Chairman of ECS-SRIA 2022
Secretary general, Inside Industry Association

The SRIA for the ECS value chain

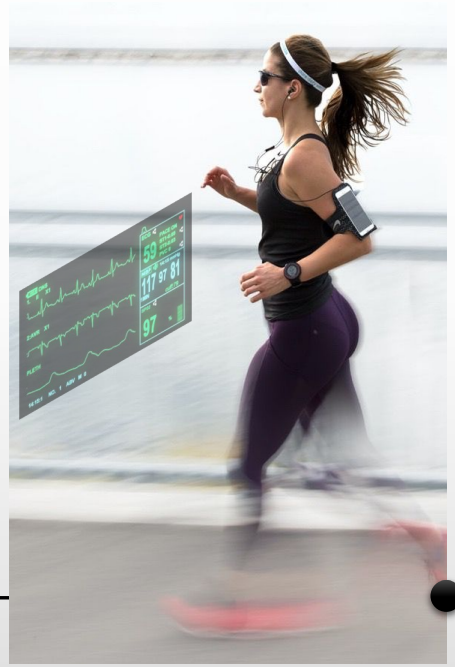
Electronic Components and Systems



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



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



Systems and applications, value creation, societal goals, …

ECS engineering support

The ECS-SRIA 2022

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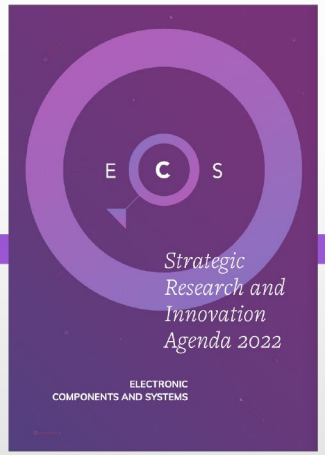
SHAPING

Aeneas

EPoSS European Association on Smart Systems Integration

Inside Industry Association

> 300 EXPERTS



KDT JU KEY DIGITAL TECHNOLOGIES JOINT UNDERTAKING

European Commission

EUREKA innovation across borders

Xecs

ECS-SRIA 2021 vs 2022

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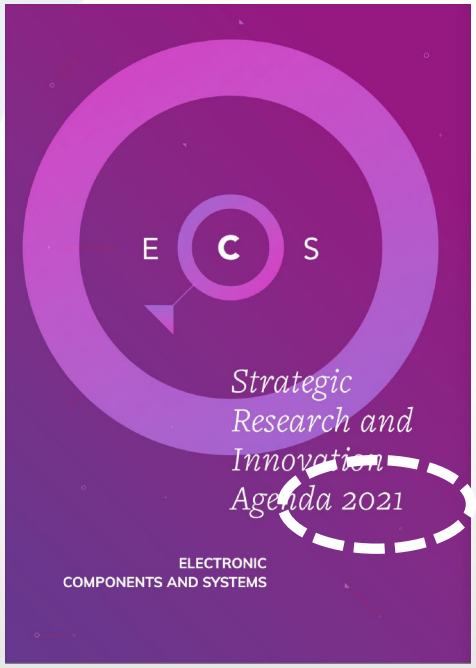
ECS COLLABORATION TOOL

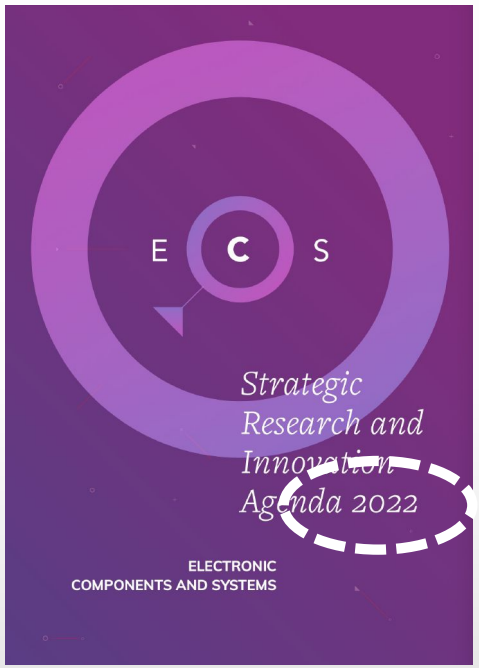
https://ecscollaborationtool.eu/news-overview/news-ecs-sria-final.html



KDT-SRIA ‘21

KDT Call 1:

- Published 16/12/21
- Closes 27/04/22



ECS COLLABORATION TOOL

https://ecscollaborationtool.eu/news-overview/news-ecs-sria-2022.html

KDT-SRIA 2022

KDT Call 2 (beginning 05/22)

ECS-SRIA structure

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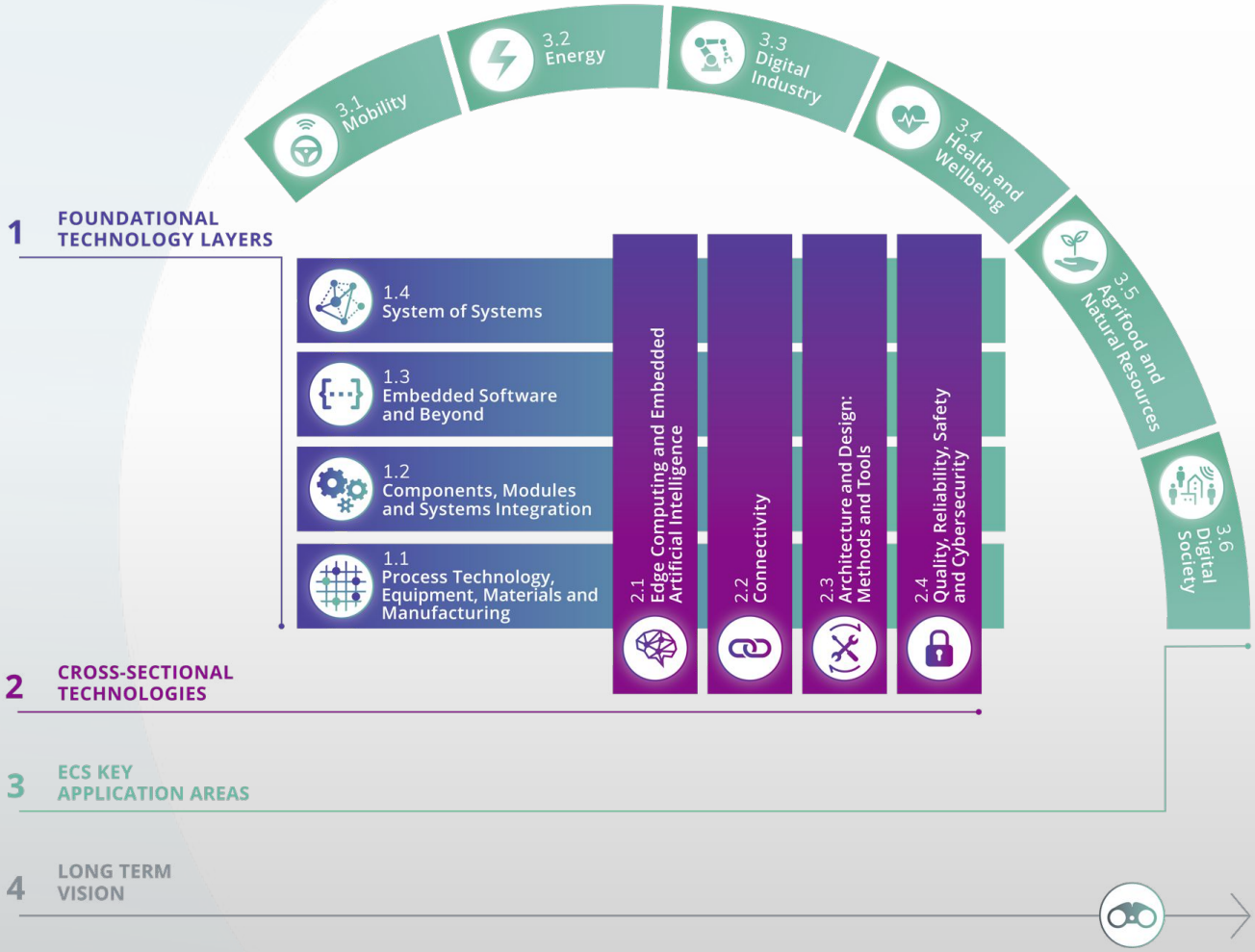

Foundational technologies

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The **Foundational Technology Layers** cover the **technology stack** of a typical digitalization solution based on ECS.

They have **hierarchical dependencies**, due to the inherent nature of ECS and the way they compose and integrate in complex entities.

Essential to creating the main components of a digitalization solution.

Represent a very **fertile ground** where new **interdisciplinary** technologies, products and solutions can grow.

Cross sectional technologies

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Four **Cross-Sectional Technology** chapters focus on **transversal** areas, where innovative results emerge from the **interdisciplinary** contribution of the foundational layers.

E.g.: embedded intelligence on the edge requires

- new integrated circuits
- to develop innovative electronic components
- that can be used to develop smarter and more connected components, modules and entire systems,
- running smart software that will offer new functionalities and capabilities
- that will allow these systems to interact, cooperate and merge in larger Systems of Systems.

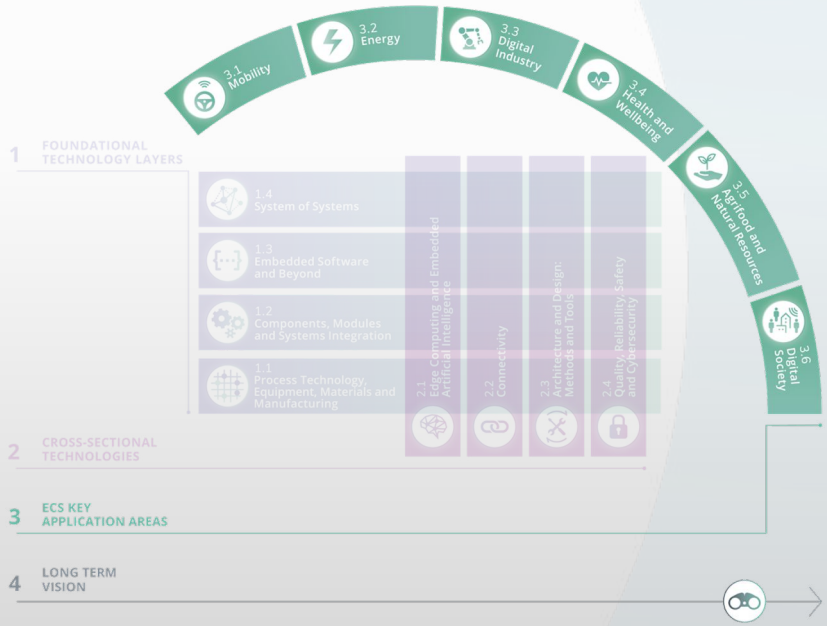
The innovation generated by cross-sectional technologies influences foundational layers and **amplifies the effect** of innovation also in the application domains.

Application chapters and LTV

Six **Application chapters** describe the challenges of specific ECS application domains, that are key for Europe, and identify the required R&D&I efforts.

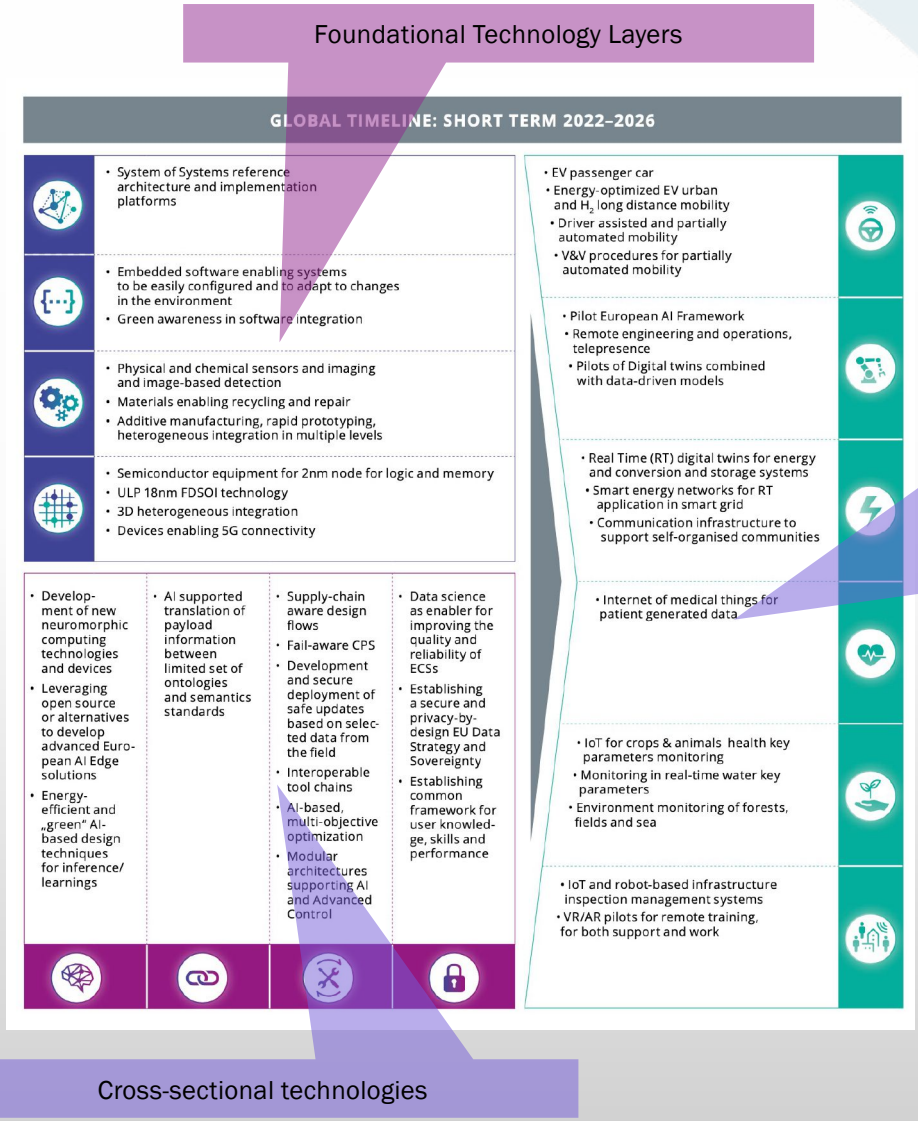
Finally, the **Long-Term Vision** chapter illustrates our vision of the ECS beyond the time horizon covered by the other chapters:

- it seeks to identify the research subjects that must be addressed at low TRL levels
- and help the research programs in the continuous improvement of European digital technology



Global Timelines
Short-term example

- Global timelines provide a compact and structured view of the main milestones foreseen in the next 10 years.
- Three periods:
  - Short term (2022–2026):
    The industry has a **precise idea** of what must be achieved during that timeframe.
  - Medium term (2027–2031):
    Reasonably good knowledge of what can possibly be achieved.
  - Long term (2032 and beyond):
    Expected achievements are more of a **prospective nature**.
- Described features expected to be available as ECS at TRL levels 8–9 (prototype or early commercialisation) within that timeframe
- Detailed timelines available in each technology or application section



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Objectives of 2022 Update

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Updates follow/influence research and market trends and focus both on **contents and on the relations** between them.

Updates focused on **contents**:

- Improve the delineation of existing concepts and introduce new concepts
- Minimize unnecessary overlapping and avoid fragmentation

Updates are intended to highlight the **ECS-SRIA "systemic" nature**:

- Highlight and improve the **synergies** between the chapters
- Highlight **interdisciplinarity**
  - Between technology domains
  - Between technology and applications

ECS-SRIA 2022 Outline

https://ecscollaborationtool.eu/publication/download/sria-global-outline-programme.pdf

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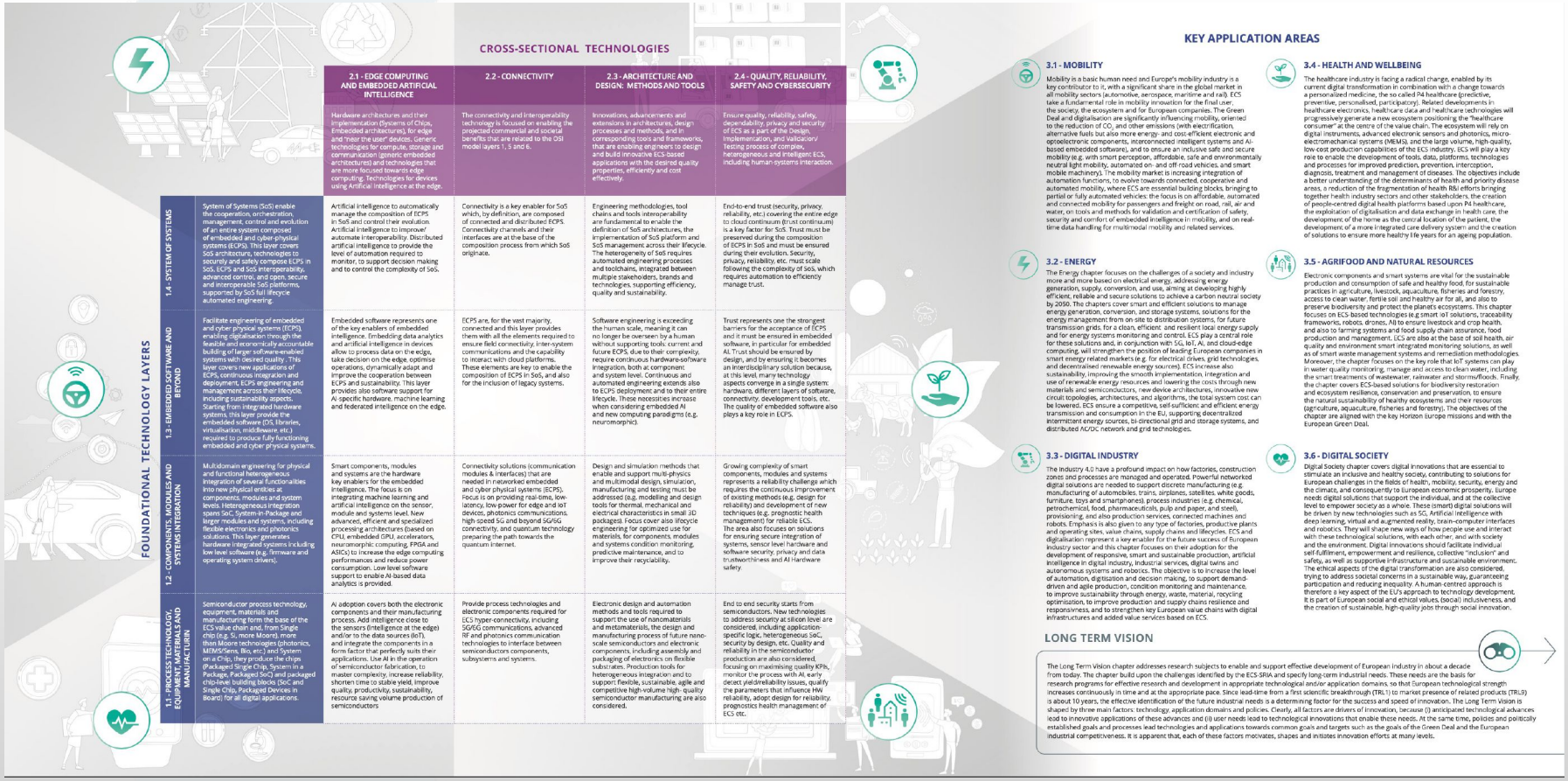
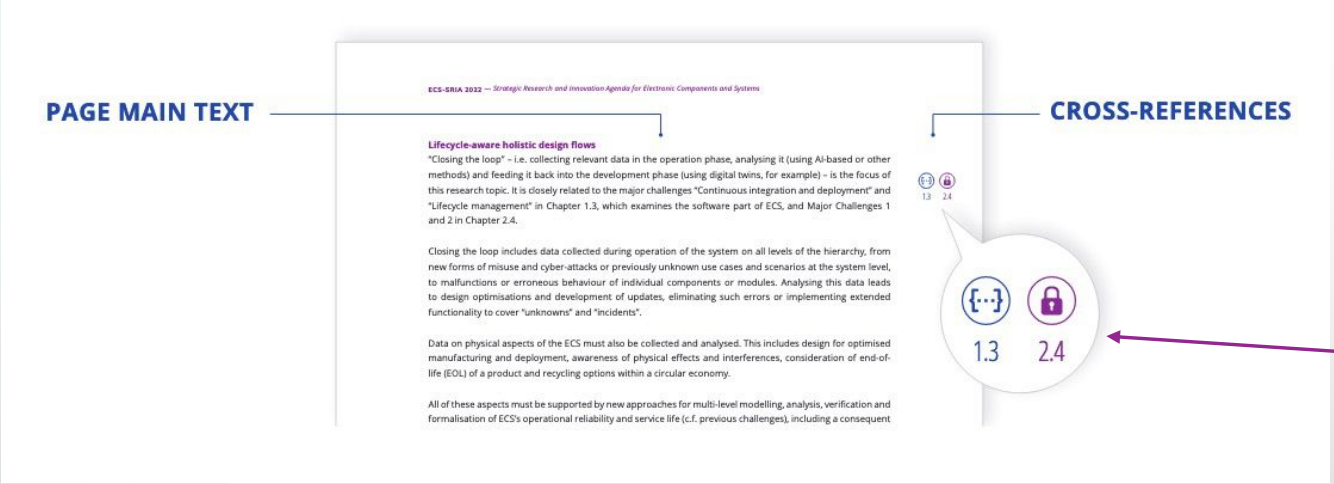


Chapter cross references

To highlight the synergies between Chapters and provide hints to the reader, cross-references have been introduced alongside the text.



- Chapter icon
- Chapter number

Cross-references indicate that the topic described in the main text is linked to the referenced Chapter.

ECS-SRIA 2022 updates

Electronic Components and Systems

SRIA 2022 updates cover, in different ways, the entire SRIA and include:

- Feedback from the ECS community and the EU Commission on specific topics
- The input provided by the 6 thematic workshops
- Updates already planned last year
- Updates emerging this year

New chapter leaders, e.g. in chapters 1.1 (PTEMM), 3.3 (Digital Industry) and 4 (LTV).

New contributors, in almost all the chapters.

ECS-SRIA 2022 updates (2)

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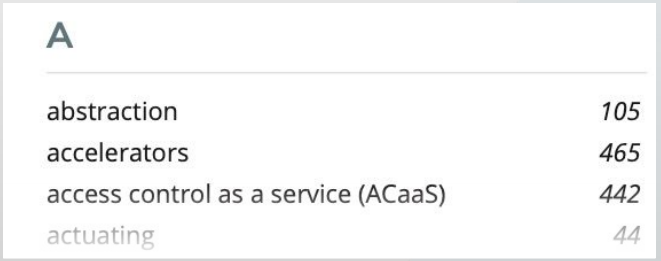
Introduction updates:

- Main Objectives update
  - Extension of the analysis to the new challenges and re-check of updated challenges
  - Main Objectives confirmation
- Global timelines update
- ECS-SRIA Outline

Scope extension to include quantum technologies, integrated photonics, flexible electronics and open-source hardware.

New **“Keywords Index”**, to quickly search key topics and simplify the SRIA “navigation” jumping directly to them.

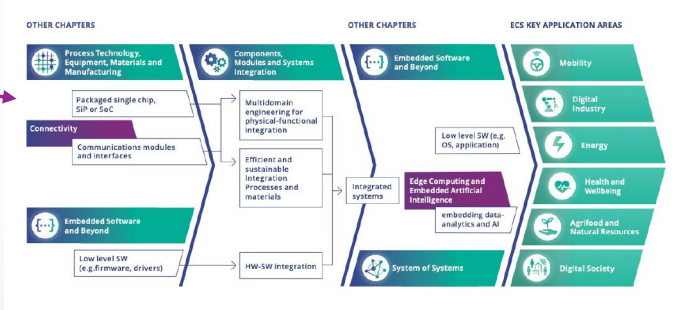


ECS-SRIA 2022 updates (3)

Electronic Components and Systems

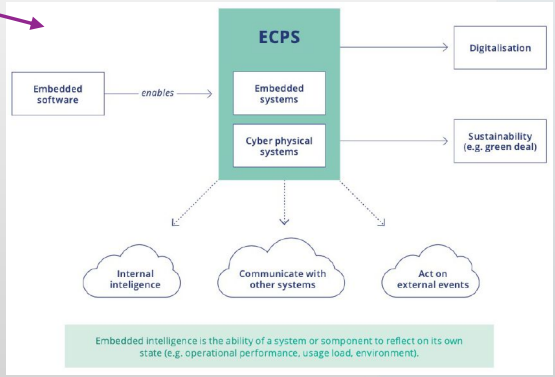
Chapters 1.1 and 1.2 (- Process Technology, Equipment, Materials and Manufacturing
- Components, Modules and Systems Integration**):**

- Improved delineation of concepts and synergies between the Chapters
  - SoC to System-in-Package (SiP) represents the transition between 1.1 and 1.2
  - In chapter 1.2, a new chapter structure has been included
- Extended focus on heterogeneous integration of devices and components for physical and functional integration (PFI) (1.2)
  - Including support for flexible electronics and photonics solutions



Chapter 1.3 (Embedded Software and Beyond):

- Better delineation of the concept of Embedded and Cyber-physical System (ECPS).
- Stronger link with embedded intelligence (2.1)
- Trade off between HW resources and SW abstraction (Green Deal)
- More focus on:
  - Open-source software
  - Digital twin
  - SW features supporting SoS



ECS-SRIA 2022 updates (4)

Electronic Components and Systems

Chapter 1.4 (System of Systems):

- General restructuring and improvement of concepts delineation
- M.C. 1 and M.C. 5 (2021) merged in a new M.C. 1 - “SoS architecture and open integration platforms”
- “Advanced control” topic moved from Chapter 2.1 and created a new challenge M.C. 5 - “Major Challenge 5: control in SoS composed of embedded and cyber-physical systems”
- New M.C. 6 - “SoS monitoring and management”

Chapter 2.1 (Edge Computing and Embedded Artificial Intelligence):

- Complete restructuring and editing
  - Improved delineation of Edge Computing and Artificial Intelligence
  - And their convergence towards the embedded intelligence on the edge - Edge AI
  - Classification of edge computing levels included
  - Positioning of Embedded Artificial Intelligence
  - All 4 M.C. split between Edge Computing and Embedded Intelligence
- Broaden the scope of “advanced control” that has been moved in chapter 1.4 (SoS):
  - Edge AI remains linked to advanced control as an enabler

ECS-SRIA 2022 updates (5)

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Chapter 2.2 (Connectivity):

- Analysis of European HW production capability (6G focus)
- 6G focus: alignment with 6G EU Initiatives
- Expansion of connectivity from point-to-point to application-to-application:
  - To support SoS paradigm and network virtualization
  - New M.C. 5: network virtualization enabling run-time engineering, deployment and management of edge and cloud network architectures.

Chapter 2.3 (Architecture and Design: Methods and Tools):

- Better delineation and extended focus on:
  - Support for Fog–Edge–Cloud continuum
  - Integration platforms
  - Full lifecycle support, including maintenance and End-of-Life / second life aspects (Green Deal)
  - Support for AI based components
  - Support for legacy components
  - Support for (SW-)updates

ECS-SRIA 2022 updates (6)

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Chapter 2.4 (Quality, Reliability, Safety and Cybersecurity):

- New topics:
  - HW quality and reliability:
    - Digital twin – deeper look on the concept
    - Virtualization support
    - Simulation data and process management
    - Design to field – to improve test and modelling using field load simulator
    - SW/HW reliability in their interaction
  - Development of novel security and safety approaches with respect to energy and the impact on environment
- M.C. 5 updated from “Human Systems Interaction” to “Human Systems Integration”

Application Chapters

Chapters 3.2, 3.3, 3.5, 3.6: general refresh, following the overall update guidelines

ECS-SRIA 2022 updates (7)

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Chapter 3.1 (Mobility):

- New/updated topics:
  - SW defined vehicle
  - Importance of new HW and SW architectures in electronics for mobility
  - Edge2cloud continuum in mobility
  - Influence of pandemic on long-term vision

Chapter 3.4 (Health and wellbeing):

- Refreshed the role of Integrated Silicon Photonics and Flexible Electronics
- Alignment with Health.E lighthouse

Chapter 4 (LTV):

- Complete restructuring and re-editing of the ECS long-term vision
- All the SRIA Chapters have been included

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Thanks for the attention.

Any question?