E C S

Electronic Components and Systems

ECS-SRIA 2021 & 2022 OVERVIEW

5th ECSEL Italy Day and Brokerage Event

26 January 2022, online meeting

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Chairman of ECS-SRIA 2022

Secretary general, Inside Industry Association

The ECS-SRIA

The ECS Strategic Research and Innovation Agenda (ECS-SRIA):

- describes the **major challenges** and **priorities**,
- and the necessary **R&D&I efforts** to tackle them,
- in the area of the **electronics components and systems, and systems of systems**
- spanning the entire **ECS value chain**, from foundational and cross-sectional technologies to application domains.

Joint effort of the **3 Industry Associations**

- AENEAS, EPOSS and Inside-IA,
- 2021: with a core team of **12 members, 53 chapter leaders**,
- 2022: with a core team of **9 members, 57 chapter leaders**,
- and the involvement of more than **300 experts** from the ECS community.

Funding-programme agnostic, open and living document looking 15 years ahead.

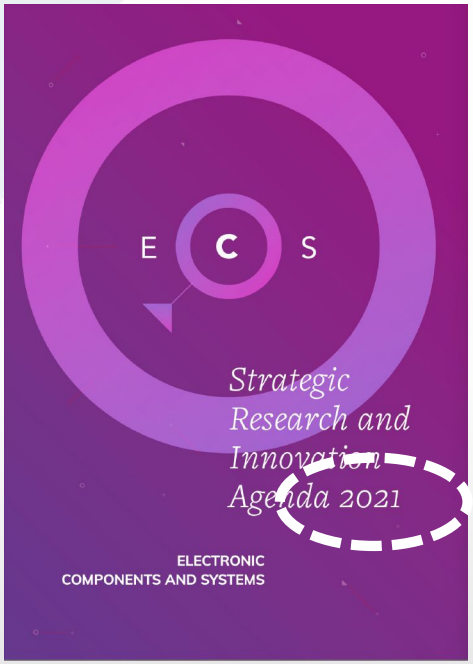
The ECS-SRIA is the reference document for:

- **KDT** (previously ECSEL), the KDT JU adopts the ECS-SRIA as the KDT-SRIA,
- **EUREKA** Clusters (e.g. Xecs).

ECS-SRIA 2021 vs 2022

Electronic Components and Systems

- Edited in 2020
- Published in January 2021

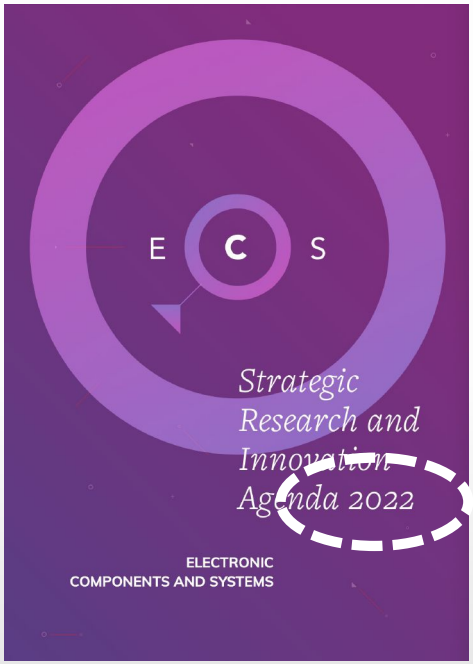


ECS COLLABORATION TOOL

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

KDT-SRIA 2021

KDT Call 1 (16/12/2021)



- Edited in 2021
- Published in January 2022

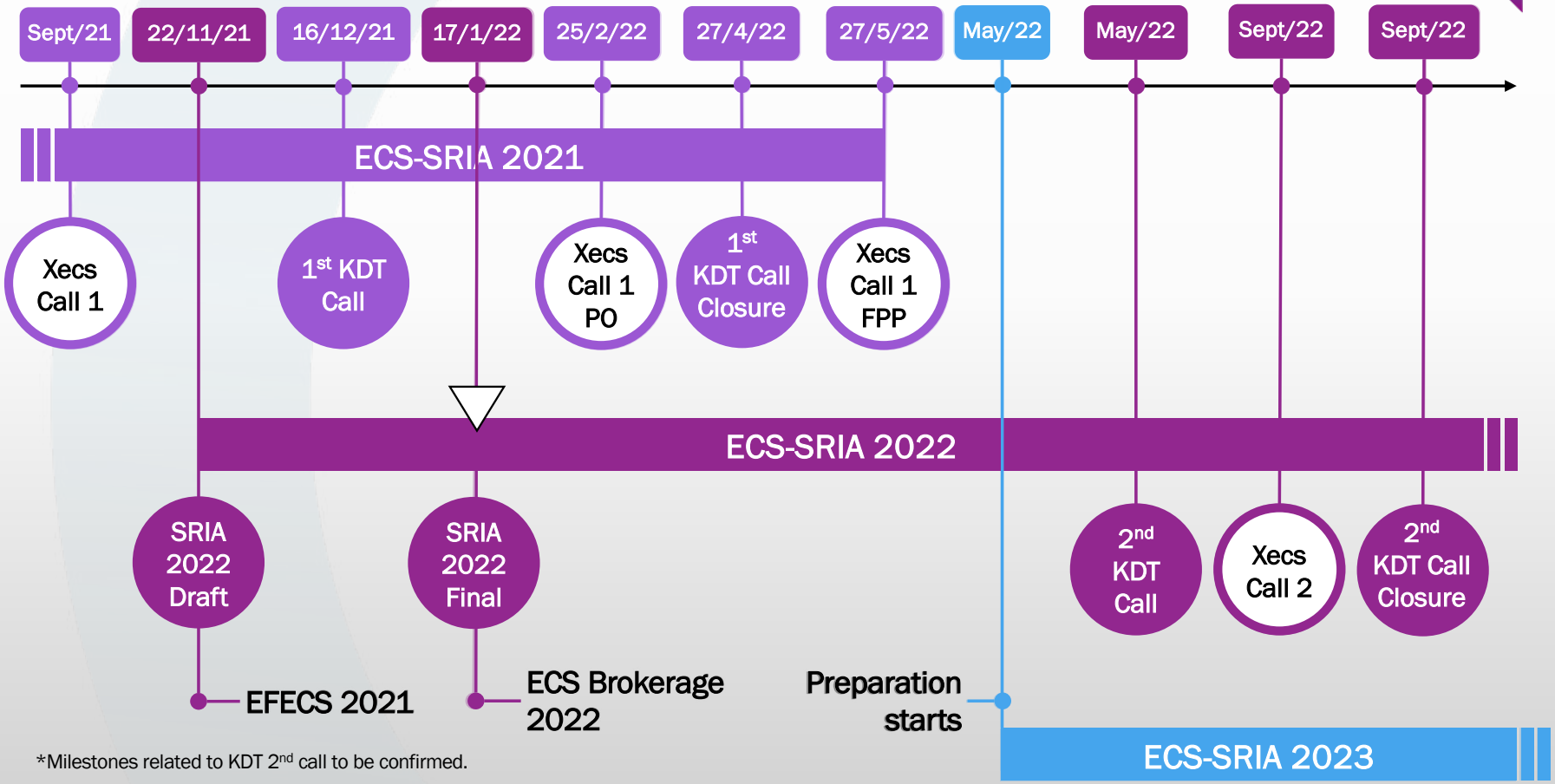
ECS COLLABORATION TOOL

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

KDT-SRIA 2022

KDT Call 2 (05/2022)

ECS-SRIA 2022 Timeline*



*Milestones related to KDT 2nd call to be confirmed.

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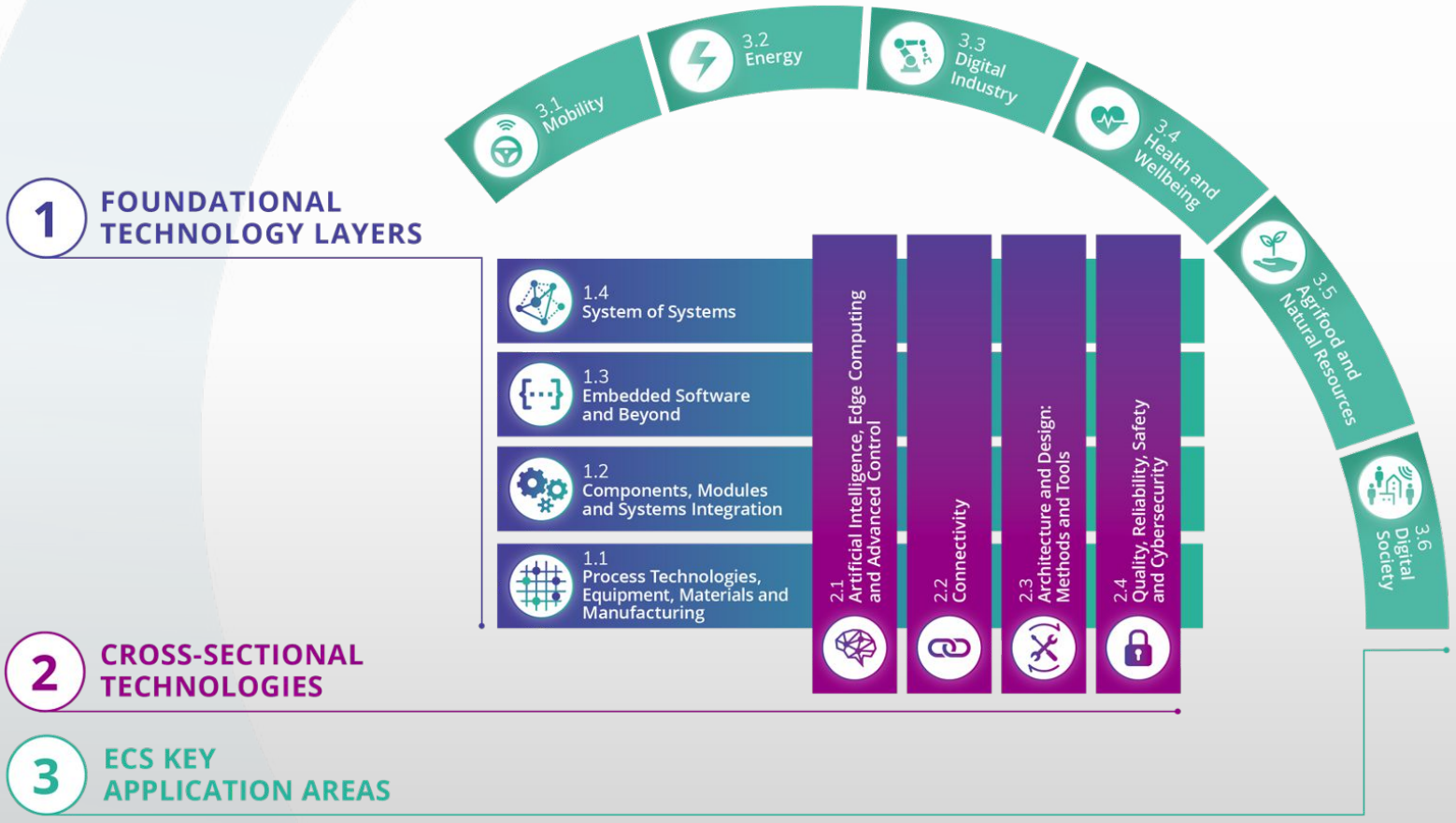
ECS-SRIA 2021: what is new?

Electronic Components and Systems

- New Structure
- Analysis of all Major Challenges allowed identification of 5 Main Objectives
- Global Timelines (short term, mid term and long term)
- Broadened Scope (Integrated photonics; flexible electronics topics; higher layers of software)
- New introduction, that guides the reader through the SRIA
- Updated Long Term Vision Chapter
- Common Glossary (SRIA definitions of specific terms)

ECS-SRIA 2021 structure

Electronic Components and Systems



Foundational technologies

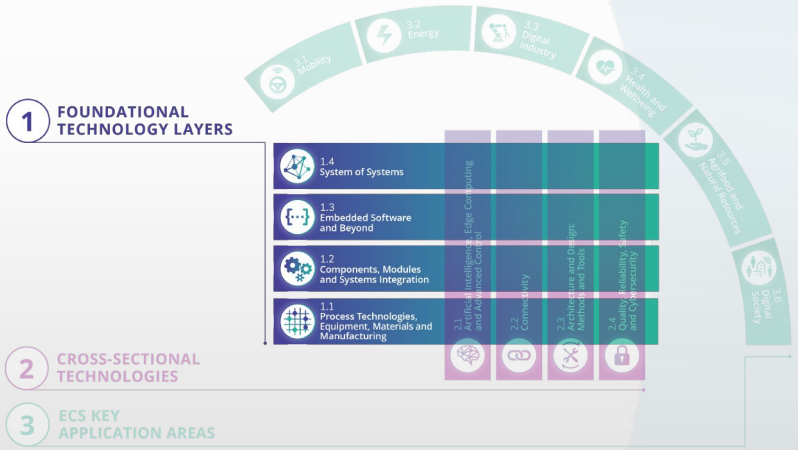
Electronic Components and Systems

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.



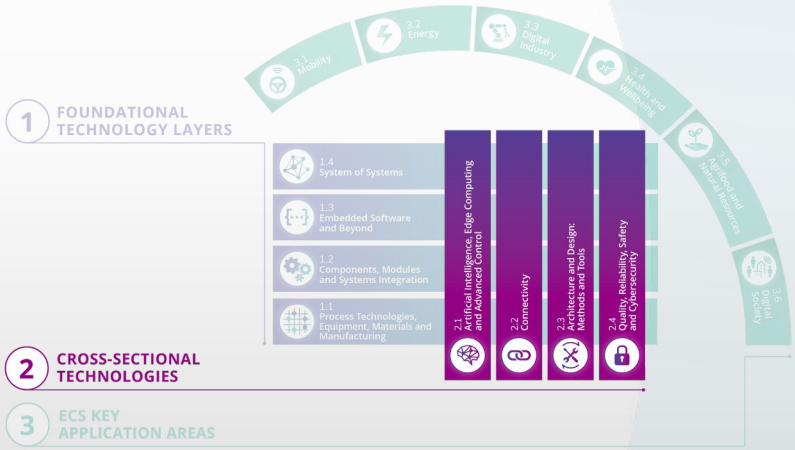
Cross sectional technologies

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.

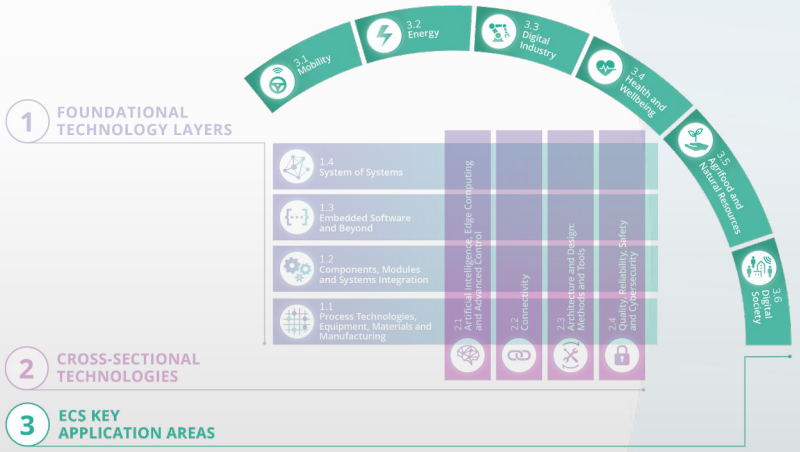


Application chapters and LTV

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



EU Main Objectives covered by SRIA

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1

Boost industrial competitiveness through interdisciplinary technology innovations

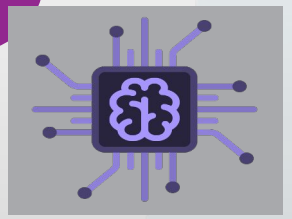
2

Ensure European digital autonomy through secure, safe and reliable ECS supporting key European application domains

3

Establish and strengthen sustainable and resilient ECS value chains the Green Deal

4



Unleash the full potential of intelligent and autonomous ECS-based systems for the European Digital Age

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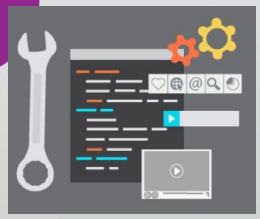
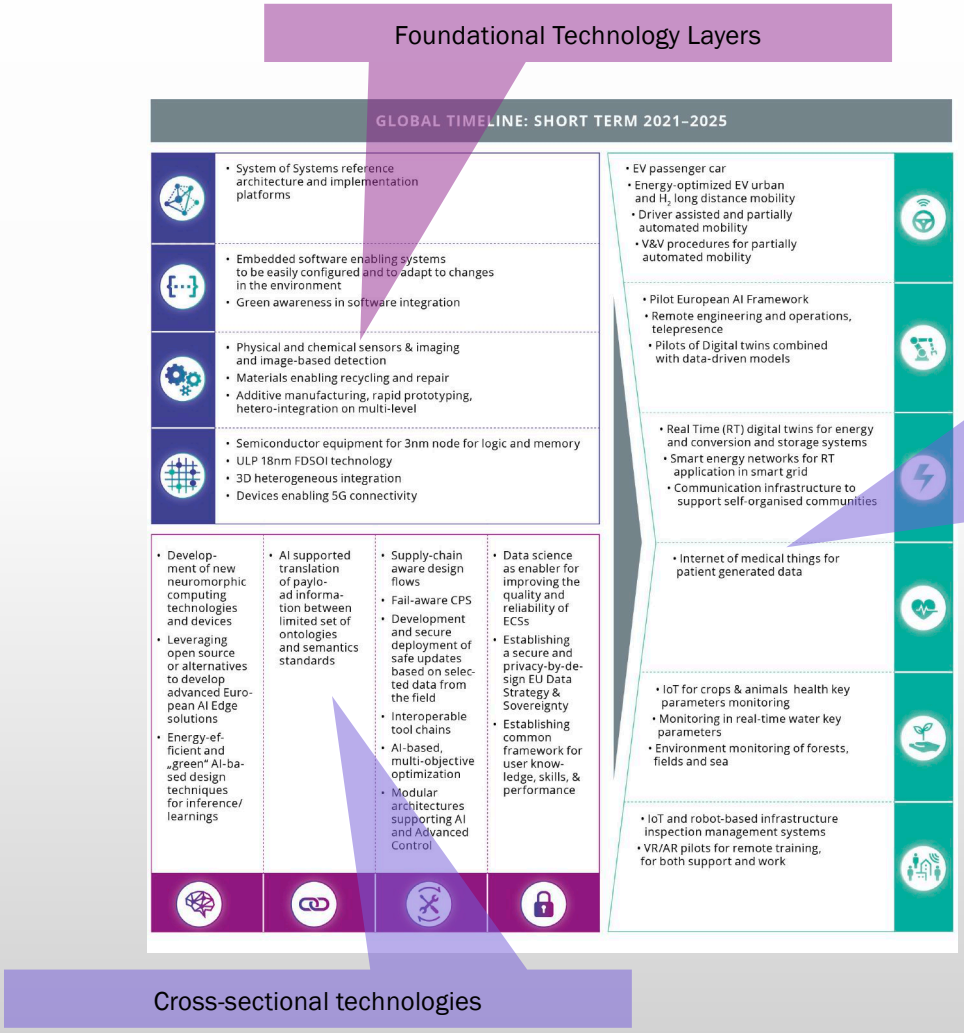


Ensure engineering support across the entire lifecycle of complex ECS-based systems

Global Timelines
Short-term example

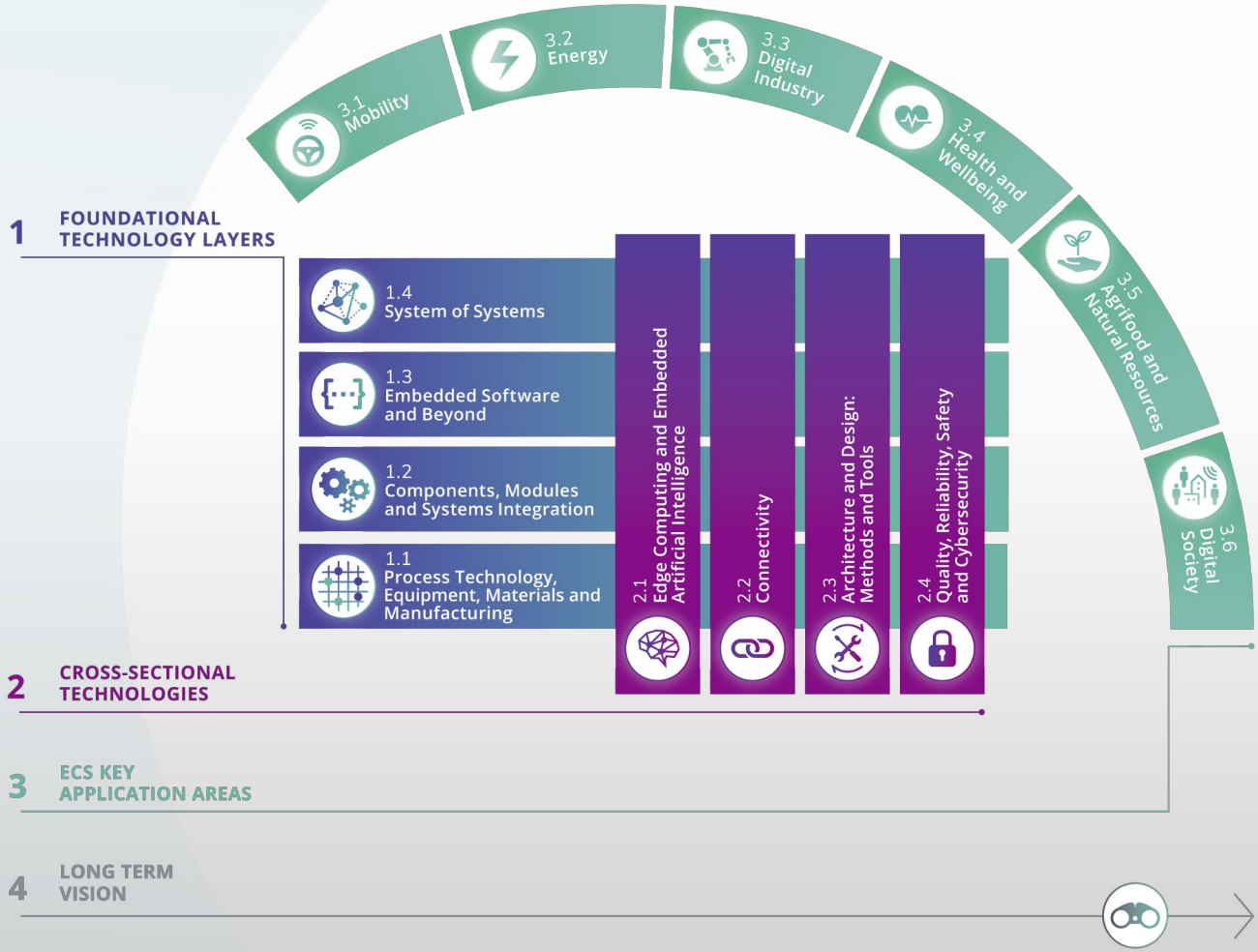
- Global timelines provide a compact and structured view of the main milestones foreseen in the next 10 years.
- Three period:
  - Short term (2021–2025):
    The industry has a **precise idea** of what must be achieved during that timeframe.
  - Medium term (2026–2030):
    Reasonably good knowledge of what can possibly be achieved.
  - Long term (2031 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



Electronic Components and Systems

ECS-SRIA 2022 structure

Electronic Components and Systems



Objectives of 2022 Update

Electronic Components and Systems

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

Updates focused on **contents**:

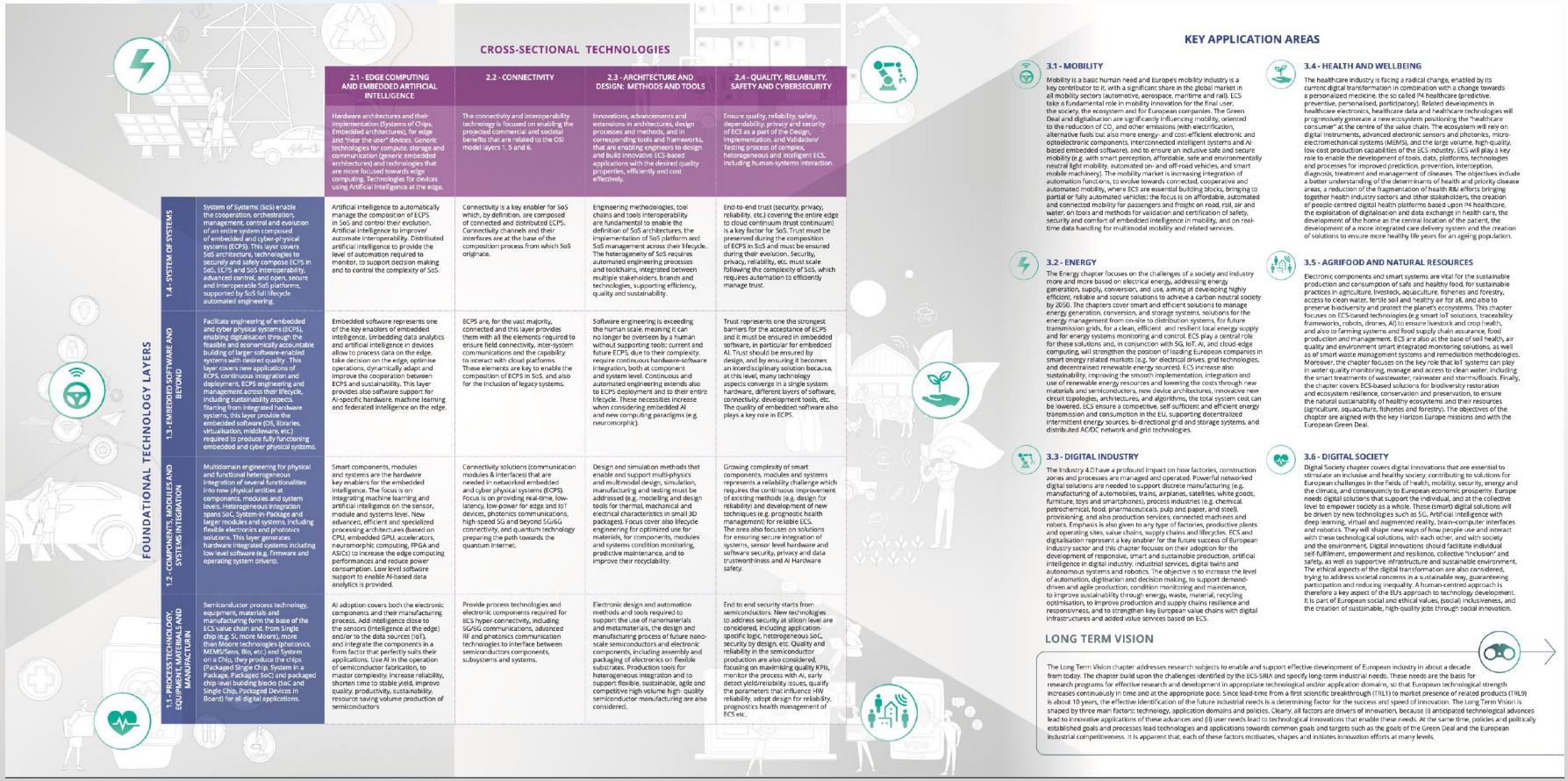
- Improve the delineation of existing concepts and introduce new concepts
- Minimize unnecessary overlapping and avoid fragmentation

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

Electronic Components and Systems



CROSS-SECTIONAL TECHNOLOGIES

	2.1 - EDGE COMPUTING AND EMBEDDED ARTIFICIAL INTELLIGENCE	2.2 - CONNECTIVITY	2.3 - ARCHITECTURE AND DESIGN: METHODS AND TOOLS	2.4 - QUALITY, RELIABILITY, SAFETY AND CYBERSECURITY
	Hardware architectures and their implementation (Systems of Chips, Embedded architectures), for edge and 'near the user' devices. Generic technologies for compute, storage and communication (generic embedded architectures) and technologies that are more focused towards edge computing. Technologies for devices using Artificial Intelligence at the edge.	The connectivity and interoperability technology is focussed on enabling the projected commercial and societal benefits that are related to the OSI model layers 1, 5 and 6.	Innovations, advancements and extensions in architectures, design processes and methods, and in corresponding tools and frameworks, that are enabling engineers to design and build innovative ECS-based applications with the desired quality properties, efficiently and cost effectively.	Ensure quality, reliability, safety, dependability, privacy and security of ECS as a part of the Design, Implementation, and Validation/ Testing process of complex, heterogeneous and intelligent ECS, including human-systems interaction.
1.4 - SYSTEM OF SYSTEMS: System of Systems (SoS) enable the cooperation, orchestration, management, control and evolution of an entire system composed of embedded and cyber-physical systems (ECPS). This layer covers SoS architecture, technologies to securely and safely compose ECPS in SoS, ECPS and SoS interoperability, advanced control, and open, secure and interoperable SoS platforms, supported by SoS full lifecycle automated engineering.	Artificial intelligence to automatically manage the composition of ECPS in SoS and control their evolution. Artificial intelligence to improve/ automate interoperability. Distributed artificial intelligence to provide the level of automation required to monitor, to support decision making and to control the complexity of SoS.	Connectivity is a key enabler for SoS which, by definition, are composed of connected and distributed ECPS. Connectivity channels and their interfaces are at the base of the composition process from which SoS originate.	Engineering methodologies, tool chains and tools interoperability are fundamental to enable the definition of SoS architectures, the implementation of SoS platform and SoS management across their lifecycle. The heterogeneity of SoS requires automated engineering processes and toolchains, integrated between multiple stakeholders, brands and technologies, supporting efficiency, quality and sustainability.	End-to-end trust (security, privacy, reliability, etc.) covering the entire edge to cloud continuum (trust continuum) is a key factor for SoS. Trust must be preserved during the composition of ECPS in SoS and must be ensured during their evolution. Security, privacy, reliability, etc. must scale following the complexity of SoS, which requires automation to efficiently manage trust.
1.3 - EMBEDDED SOFTWARE AND BEYOND: Facilitate engineering of embedded and cyber physical systems (ECPS), enabling digitalisation through the feasible and economically accountable building of larger software-enabled systems with desired quality. This layer covers new applications of ECPS, continuous integration and deployment, ECPS engineering and management across their lifecycle, including sustainability aspects. Starting from integrated hardware systems, this layer provide the embedded software (OS, libraries, virtualisation, middleware, etc.) required to produce fully functioning embedded and cyber physical systems.	Embedded software represents one of the key enablers of embedded intelligence. Embedding data analytics and artificial intelligence in devices allow to process data on the edge, take decision on the edge, optimise operations, dynamically adapt and improve the cooperation between ECPS and sustainability. This layer provides also software support for AI-specific hardware, machine learning and federated intelligence on the edge.	ECPS are, for the vast majority, connected and this layer provides them with all the elements required to ensure field connectivity, inter-system communications and the capability to interact with cloud platforms. These elements are key to enable the composition of ECPS in SoS, and also for the inclusion of legacy systems.	Software engineering is exceeding the human scale, meaning it can no longer be overseen by a human without supporting tools: current and future ECPS, due to their complexity, require continuous hardware-software integration, both at component and system level. Continuous and automated engineering extends also to ECPS deployment and to their entire lifecycle. These necessities increase when considering embedded AI and new computing paradigms (e.g. neuromorphic).	Trust represents one the strongest barriers for the acceptance of ECPS and it must be ensured in embedded software, in particular for embedded AI. Trust should be ensured by design, and by ensuring it becomes an interdisciplinary solution because, at this level, many technology aspects converge in a single system: hardware, different layers of software, connectivity, development tools, etc. The quality of embedded software also plays a key role in ECPS.
1.2 - COMPONENTS, MODULES AND SYSTEMS INTEGRATION: Multidomain engineering for physical and functional heterogeneous integration of several functionalities into new physical entities at components, modules and system levels. Heterogeneous integration spans SoC, System-in-Package and larger modules and systems, including flexible electronics and photonics solutions. This layer generates hardware integrated systems including low level software (e.g. firmware and operating system drivers).	Smart components, modules and systems are the hardware key enablers for the embedded intelligence. The focus is on integrating machine learning and artificial intelligence on the sensor, module and systems level. New advanced, efficient and specialized processing architectures (based on CPU, embedded GPU, accelerators, neuromorphic computing, FPGA and ASICs) to increase the edge computing performances and reduce power consumption. Low level software support to enable AI-based data analytics is provided.	Connectivity solutions (communication modules & interfaces) that are needed in networked embedded and cyber physical systems (ECPS). Focus is on providing real-time, low-latency, low-power for edge and IoT devices, photonics communications, high-speed 5G and beyond 5G/6G connectivity, and quantum technology preparing the path towards the quantum internet.	Design and simulation methods that enable and support multi-physics and multimodal design, simulation, manufacturing and testing must be addressed (e.g., modelling and design tools for thermal, mechanical and electrical characteristics in small 3D packages). Focus cover also lifecycle engineering for optimized use for materials, for components, modules and systems condition monitoring, predictive maintenance, and to improve their recyclability.	Growing complexity of smart components, modules and systems represents a reliability challenge which requires the continuous improvement of existing methods (e.g. design for reliability) and development of new techniques (e.g. prognostic health management) for reliable ECS. The area also focuses on solutions for ensuring secure integration of systems, sensor level hardware and software security, privacy and data trustworthiness and AI Hardware safety.
1.1 - PROCESS TECHNOLOGY, EQUIPMENT, MATERIALS AND MANUFACTURING: Semiconductor process technology, equipment, materials and manufacturing form the base of the ECS value chain and, from Single chip (e.g. Si, more Moore), more than Moore technologies (photonics, MEMS/Sens, Bio, etc.) and System on a Chip, they produce the chips (Packaged Single Chip, System in a Package, Packaged SoC) and packaged chip -level building blocks (SiC and Single Chip, Packaged Devices in Board) for all digital applications.	AI adoption covers both the electronic components and their manufacturing process. Add intelligence close to the sensors (intelligence at the edge) and/or to the data sources (IoT), and integrate the components in a form factor that perfectly suits their applications. Use AI in the operation of semiconductor fabrication, to master complexity, increase reliability, shorten time to stable yield, improve quality, productivity, sustainability, resource saving volume production of semiconductors	Provide process technologies and electronic components required for ECS hyper-connectivity, including 5G/6G communications, advanced RF and photonics communication technologies to interface between semiconductors components, subsystems and systems.	Electronic design and automation methods and tools required to support the use of nanomaterials and metamaterials, the design and manufacturing process of future nano-scale semiconductors and electronic components, including assembly and packaging of electronics on flexible substrates. Production tools for heterogeneous integration and to support flexible, sustainable, agile and competitive high-volume high- quality semiconductor manufacturing are also considered.	End to end security starts from semiconductors. New technologies to address security at silicon level are considered, incuding application-specific logic, heterogeneous SoC, security by design, etc. Quality and reliability in the semiconductor production are also considered, focusing on maximising quality KPIs, monitor the process with AI, early detect yield/reliability issues, qualify the parameters that influence HW reliability, adopt design for reliability, prognostics health management of ECS etc.

FOUNDATIONAL TECHNOLOGY LAYERS

KEY APPLICATION AREAS

3.1 - MOBILITY

Mobility is a basic human need and Europe's mobility industry is a key contributor to it, with a significant share in the global market in all mobility sectors (automotive, aerospace, maritime and rail). ECS take a fundamental role in mobility innovation for the final user, the society, the ecosystem and for European companies. The Green Deal and digitalisation are significantly influencing mobility, oriented to the reduction of CO_2 and other emissions (with electrification, alternative fuels but also more energy- and cost-efficient electronic and optoelectronic components, interconnected intelligent systems and AI-based embedded software), and to ensure an inclusive safe and secure mobility (e.g. with smart perception, affordable, safe and environmentally neutral light mobility, automated on- and off-road vehicles, and smart mobile machinery). The mobility market is increasing integration of automation functions, to evolve towards connected, cooperative and automated mobility, where ECS are essential building blocks, bringing to partial or fully automated vehicles: the focus is on affordable, automated and connected mobility for passengers and freight on road, rail, air and water; on tools and methods for validation and certification of safety, security and comfort of embedded intelligence in mobility, and on real-time data handling for multimodal mobility and related services.

3.2 - ENERGY

The Energy chapter focuses on the challenges of a society and industry more and more based on electrical energy, addressing energy generation, supply, conversion, and use, aiming at developing highly efficient, reliable and secure solutions to achieve a carbon neutral society by 2050. The chapters cover smart and efficient solutions to manage energy generation, conversion, and storage systems; solutions for the energy management from on-site to distribution systems, for future transmission grids, for a clean, efficient and resilient local energy supply and for energy systems monitoring and control. ECS play a central role for these solutions and, in conjunction with 5G, IoT, AI, and cloud-edge computing, will strengthen the position of leading European companies in smart energy related markets (e.g. for electrical drives, grid technologies, and decentralised renewable energy sources). ECS increase also sustainability, improving the smooth implementation, integration and use of renewable energy resources and lowering the costs through new materials and semiconductors, new device architectures, innovative new circuit topologies, architectures, and algorithms, the total system cost can be lowered. ECS ensure a competitive, self-sufficient and efficient energy transmission and consumption in the EU, supporting decentralized intermittent energy sources, bi-directional grid and storage systems, and distributed AC/DC network and grid technologies.

3.3 - DIGITAL INDUSTRY

The Industry 4.0 have a profound impact on how factories, construction zones and processes are managed and operated. Powerful networked digital solutions are needed to support discrete manufacturing (e.g. manufacturing of automobiles, trains, airplanes, satellites, white goods, furniture, toys and smartphones), process industries (e.g. chemical, petrochemical, food, pharmaceuticals, pulp and paper, and steel), provisioning, and also production services, connected machines and robots. Emphasis is also given to any type of factories, productive plants and operating sites, value chains, supply chains and lifecycles. ECS and digitalisation represent a key enabler for the future success of European industry sector and this chapter focuses on their adoption for the development of responsive, smart and sustainable production, artificial intelligence in digital industry, industrial services, digital twins and autonomous systems and robotics. The objective is to increase the level of automation, digitisation and decision making, to support demand-driven and agile production, condition monitoring and maintenance, to improve sustainability through energy, waste, material, recycling optimisation, to improve production and supply chains resilience and responsiveness, and to strengthen key European value chains with digital infrastructures and added value services based on ECS.

3.4 - HEALTH AND WELLBEING

The healthcare industry is facing a radical change, enabled by its current digital transformation in combination with a change towards a personalized medicine, the so called P4 healthcare (predictive, preventive, personalised, participatory). Related developments in healthcare electronics, healthcare data and healthcare technologies will progressively generate a new ecosystem positioning the "healthcare consumer" at the centre of the value chain. The ecosystem will rely on digital instruments, advanced electronic sensors and photonics, micro-electromechanical systems (MEMS), and the large volume, high-quality, low-cost production capabilities of the ECS industry. ECS will play a key role to enable the development of tools, data, platforms, technologies and processes for improved prediction, prevention, interception, diagnosis, treatment and management of diseases. The objectives include a better understanding of the determinants of health and priority disease areas, a reduction of the fragmentation of health R&I efforts bringing together health industry sectors and other stakeholders, the creation of people-centred digital health platforms based upon P4 healthcare, the exploitation of digitalisation and data exchange in health care, the development of the home as the central location of the patient, the development of a more integrated care delivery system and the creation of solutions to ensure more healthy life years for an ageing population.

3.5 - AGRIFOOD AND NATURAL RESOURCES

Electronic components and smart systems are vital for the sustainable production and consumption of safe and healthy food, for sustainable practices in agriculture, livestock, aquaculture, fisheries and forestry, access to clean water, fertile soil and healthy air for all, and also to preserve biodiversity and protect the planet's ecosystems. This chapter focuses on ECS-based technologies (e.g. smart IoT solutions, traceability frameworks, robots, drones, AI) to ensure livestock and crop health, and also to farming systems and food supply chain assurance, food production and management. ECS are also at the base of soil health, air quality and environment smart integrated monitoring solutions, as well as of smart waste management systems and remediation methodologies. Moreover, the chapter focuses on the key role that IoT systems can play in water quality monitoring, manage and access to clean water, including the smart treatments of wastewater, rainwater and storms/floods. Finally, the chapter covers ECS-based solutions for biodiversity restoration and ecosystem resilience, conservation and preservation, to ensure the natural sustainability of healthy ecosystems and their resources (agriculture, aquaculture, fisheries and forestry). The objectives of the chapter are aligned with the key Horizon Europe missions and with the European Green Deal.

3.6 - DIGITAL SOCIETY

Digital Society chapter covers digital innovations that are essential to stimulate an inclusive and healthy society, contributing to solutions for European challenges in the fields of health, mobility, security, energy and the climate, and consequently to European economic prosperity. Europe needs digital solutions that support the individual, and at the collective level to empower society as a whole. These (smart) digital solutions will be driven by new technologies such as 5G, Artificial intelligence with deep learning, virtual and augmented reality, brain-computer interfaces and robotics. They will shape new ways of how people use and interact with these technological solutions, with each other, and with society and the environment. Digital innovations should facilitate individual self-fulfilment, empowerment and resilience, collective "inclusion" and safety, as well as supportive infrastructure and sustainable environment. The ethical aspects of the digital transformation are also considered, trying to address societal concerns in a sustainable way, guaranteeing participation and reducing inequality. A human-centred approach is therefore a key aspect of the EU's approach to technology development. It is part of European social and ethical values, (social) inclusiveness, and the creation of sustainable, high-quality jobs through social innovation.

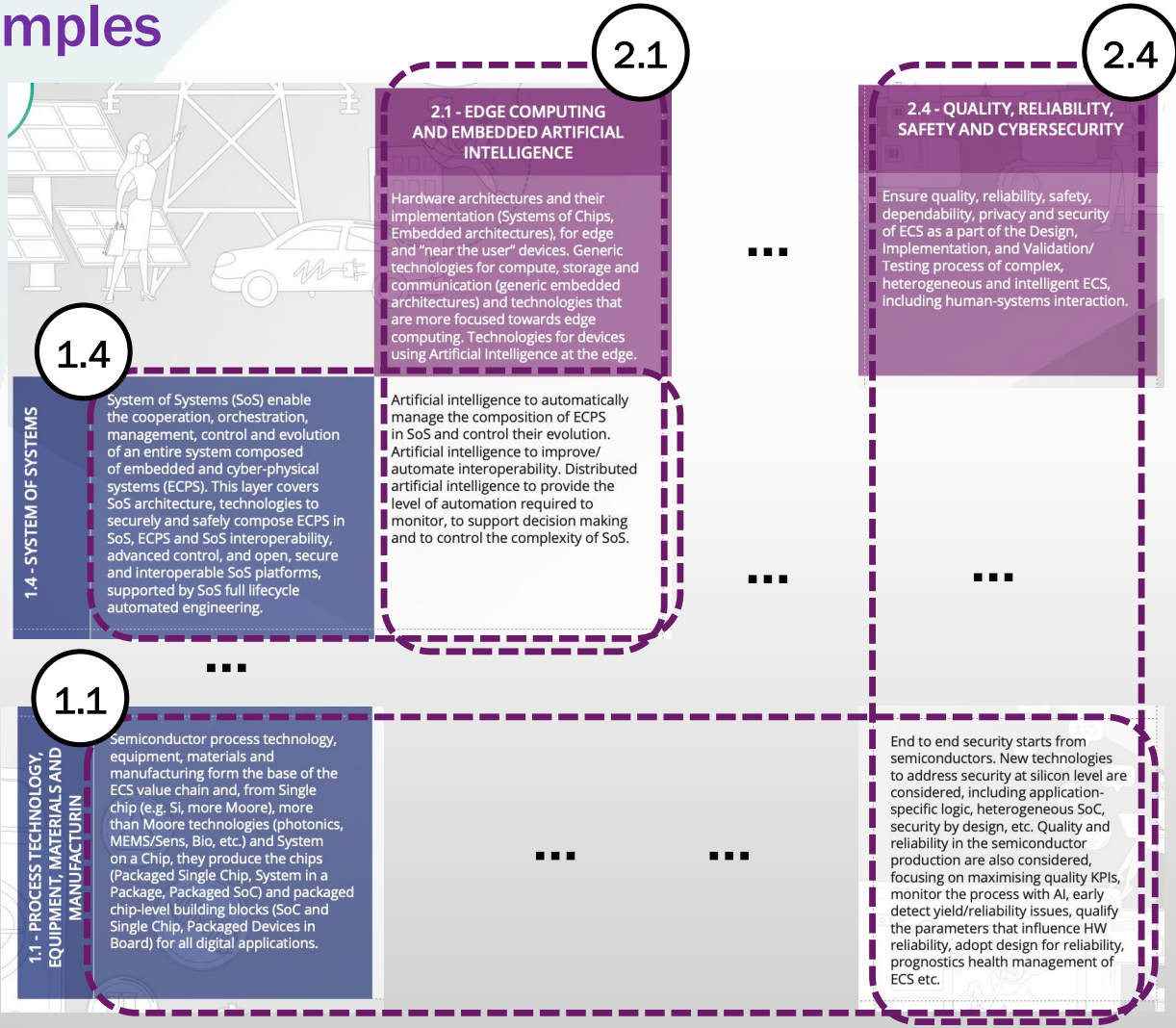
LONG TERM VISION

The Long Term Vision chapter addresses research subjects to enable and support effective development of European industry in about a decade from today. The chapter build upon the challenges identified by the ECS-SRIA and specify long-term industrial needs. These needs are the basis for research programs for effective research and development in appropriate technological and/or application domains, so that European technological strength increases continuously in time and at the appropriate pace. Since lead-time from a first scientific breakthrough (TRL1) to market presence of related products (TRL9) is about 10 years, the effective identification of the future industrial needs is a determining factor for the success and speed of innovation. The Long Term Vision is shaped by three main factors: technology, application domains and policies. Clearly, all factors are drivers of innovation, because (i) anticipated technological advances lead to innovative applications of these advances and (ii) user needs lead to technological innovations that enable these needs. At the same time, policies and politically established goals and processes lead technologies and applications towards common goals and targets such as the goals of the Green Deal and the European Industrial competitiveness. It is apparent that, each of these factors motivates, shapes and initiates innovation efforts at many levels.

Chapters synergies

Some examples

E.g. AI in ECPS (2.1 MC 2, 3) and in SoS SW platforms (1.4 MC 1) are adopted to manage composition of ECPS in SoS, improve interoperability, etc.



E.g. semiconductors (1.1 MC 2, 3) represent the basement of end-2-end security (2.4 MC 3)

E.g. quality and reliability in semiconductors production (2.4 MC 1), to maximise the yield, improve efficiency, etc. (1.1 MC 3, 4)

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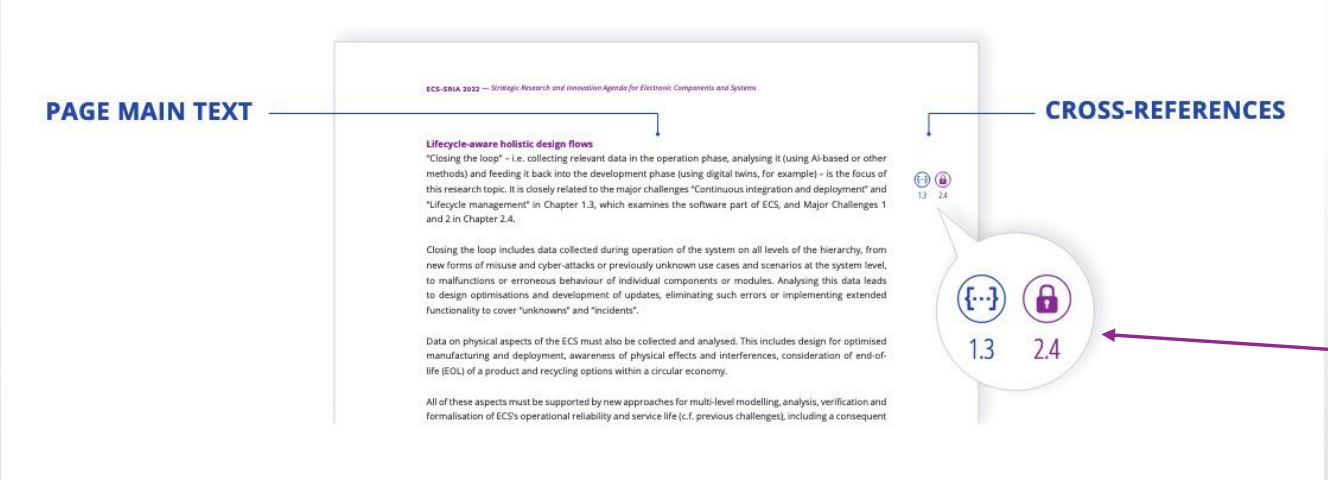
Chapter cross references

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)

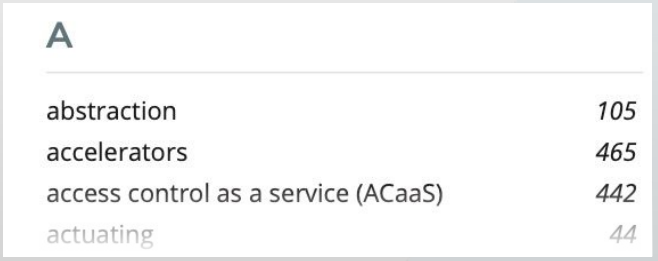
Electronic Components and Systems

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.

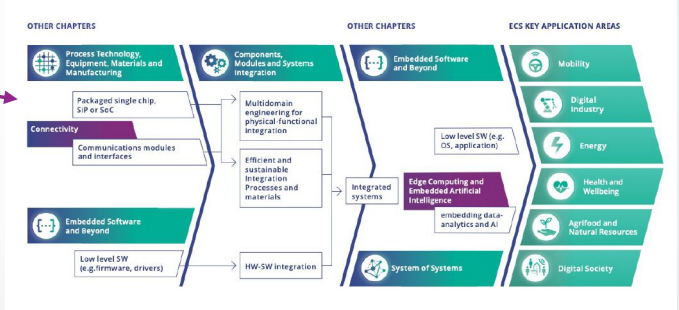


ECS-SRIA 2022 updates (3)

Electronic Components and Systems

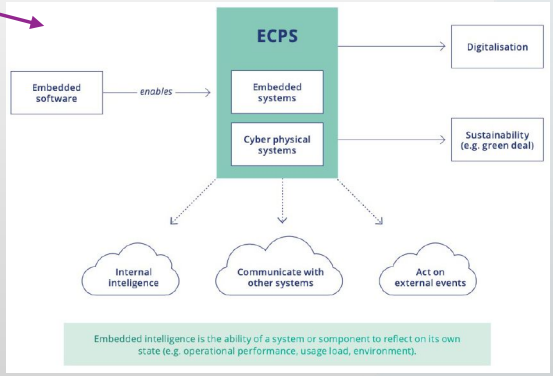
Chapters 1.1 and 1.2 (- Process Technology, Equipment, Materials and Manufacturing
- Components, Modules and Systems Integration **):**

- 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

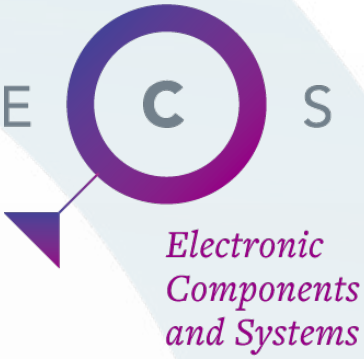
Chapter 1.4 (System of Systems):

- 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)



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)

Electronic Components and Systems

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)

Electronic Components and Systems

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

E C S

Electronic Components and Systems

ECS-SRIA 2021 & 2022

Thanks for the attention.

Any question?