E C S

Electronic Components and Systems

ECS - SRIA 2021

A MAJOR UPDATE

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History

ECS
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Aeneas | ARTEMIS Industry Association | EPoSS European Technology Platform on Smart Systems Integration

2014
3 Separate SRAs

2018
1 Common ECS SRA

2021
1 Common ECS SRIA

ECSEL JU → KDT → **2030**

EUREKA Clusters (Penta, Euripides, etc.)

WHAT'S NEW?

1. SRIA with added **I for innovation**
2. Funding-programme agnostic document **looking 15 years ahead**
3. Basis for the **KDT SRIA 2021**

A great TEAM effort

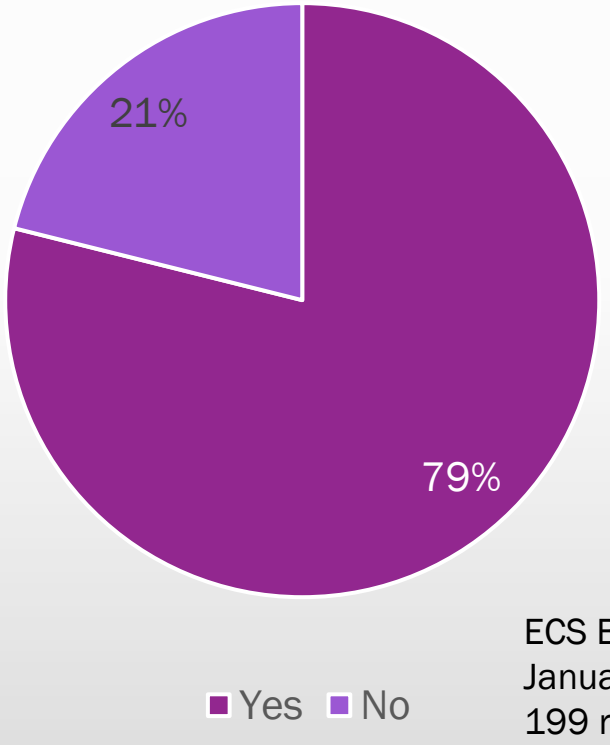
January 15, 2020:

- Kick-off for ECS-SRIA 2021 in Brussels

The ECS-SRIA 2021 Team:

- **12** Core Team Members
- **53** Section Leaders
- **299** Contributors

Are you willing to contribute to the 2021 ECS-SRIA?



ECS Brokerage; January 2021: 199 respondents

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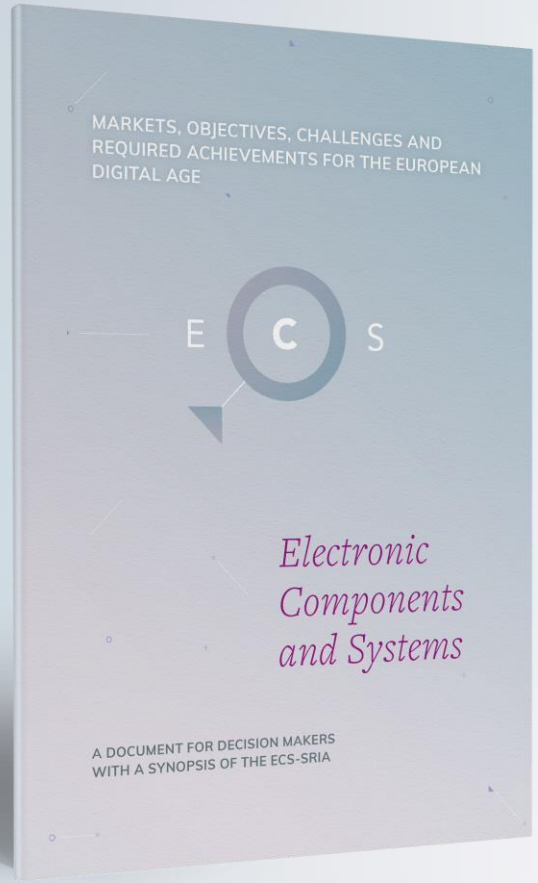
ECS-SRIA 2021: What is new?

- New Structure (Introduction in Chapter 0)
- Analysis of all Major Challenges = 4 Main Objectives
- Global Timelines (short term, mid term and long term)
- Broadened Scope (Integrated photonics and flexible electronics topics)
- Common Glossary

  (SRIA definitions of specific terms: APPENDIX p. 419 ff.)
- Executive Summary



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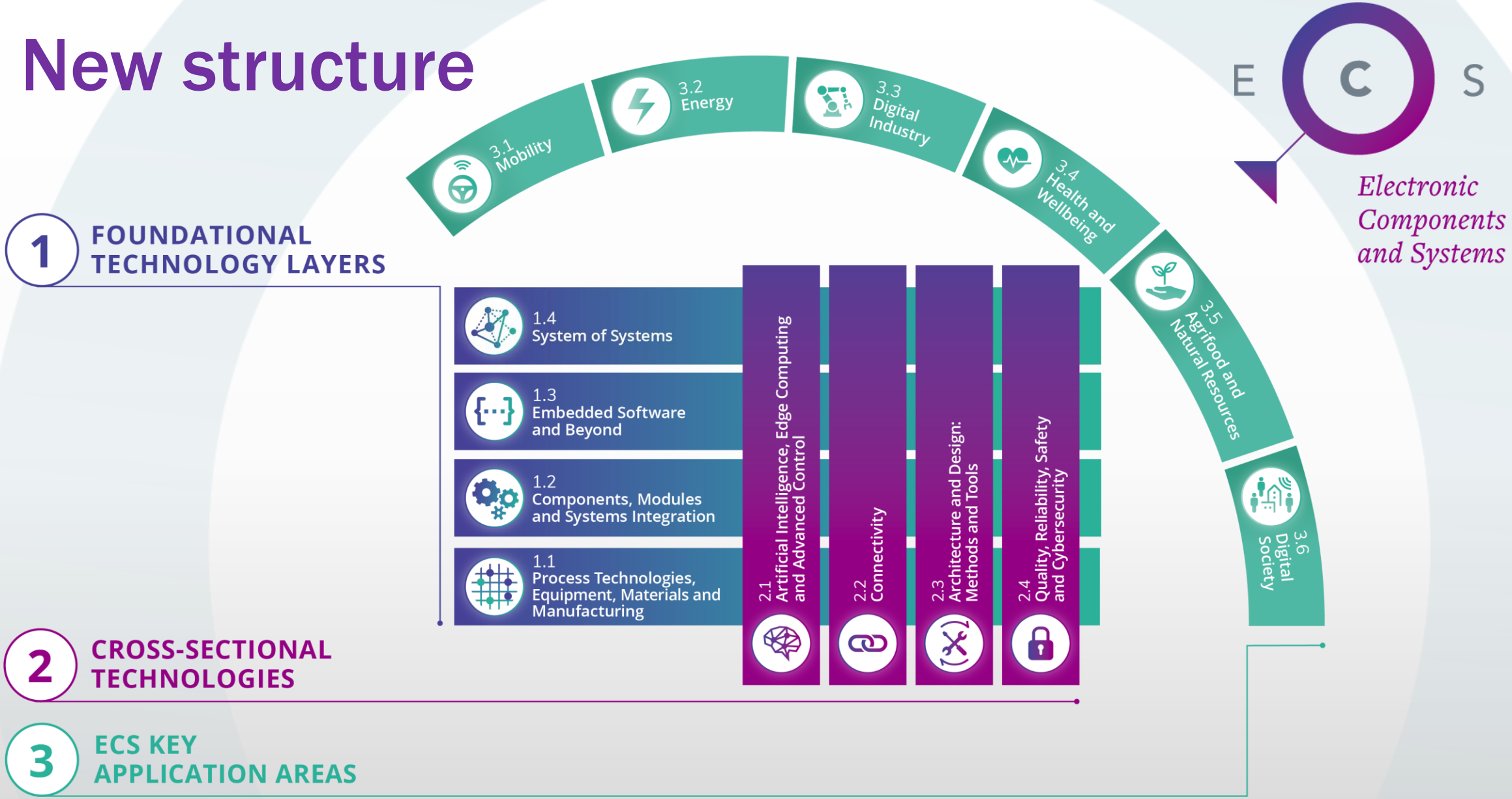
Executive Summary

To be published soon!

New structure



EU Main Objectives taken up by SRIA

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- Boost industrial competitiveness through interdisciplinary technology innovations

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

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

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

EU Main Objectives in SRIA Chapters

Industrial Competitiveness	EU Sovereignity	Sustainability and Green Deal	European Digital Era
Boost industrial competitiveness through interdisciplinary technology innovations	**Ensure EU sovereignity through secure, safe and reliable ECS supporting key European application domains**	**Establish and strengthen sustainable and resilient ECS value chains supporting tge Green Deal (Short text for roadmap: "sustainable and resilient ECS value chain")**	**Unleash the full potential of intelligent and autonomous ECS-based systems for the European Digital Era**
1.1.2 Novel devices and circuits that enable advanced functionality	1.4.3 Composability of embedded and cyber-physical systems in SoS	1.1.4 World-leading and sustainable semiconductor equipment and manufacturing technologies	1.1.1 Advanced compute, memory and compute-in-memory concepts
1.1.3 Advanced heterogeneous integration and packaging solutions	2.2.1 Strengthening EU connectivity technology portfolio in order to maintain leadership, secure sovereignty and offer an independent supply chain	1.2.4 Decarbonisation and Recyclability	1.1.2 Novel devices and circuits that enable advanced functionality
1.1.4 World-leading and sustainable semiconductor equipment and manufacturing technologies	2.2.4 Architectures and reference implementations of interoperable, secure, scalable, smart and evolvable IoT and SoS connectivity	1.3.1 Efficient Engineering of Embedded Software	1.3.4 Embedding Data Analytics and Artificial Intelligence
1.2.2 Materials	2.3.2 Managing new functionality in safe, secure, and trustable systems	1.3.5 Green Deal and Embedded Software	2.1.1 Increasing the energy efficiency of computing systems
1.2.3 Technologies, Manufacturing and Integration Processes	2.4.1 Ensuring HW quality and reliability	1.4.2 SoS interoperability	2.1.2 Managing the increasing complexity of systems
1.4.5 Open “system of embedded and cyber-physical systems” platforms	2.4.2 Ensuring dependability in connected software	2.1.1 Increasing the energy efficiency of computing systems	2.1.3 Supporting the increasing lifespan of devices and systems
2.1.1 Increasing the energy efficiency of computing systems	2.4.3 Ensuring cyber-security and privacy	2.1.3 Supporting the increasing lifespan of devices and systems	2.1.4 Ensuring European sustainability in AI, edge computing and advanced control
2.2.1 Strengthening EU connectivity technology portfolio in order to maintain leadership, secure sovereignty and offer an independent supply chain	2.4.5 Human Systems Integration	2.1.4 Ensuring European sustainability in AI, edge computing and advanced control	2.2.3 Autonomous interoperability translation for communication protocol, data encoding, compression, security and information semantics
2.2.2 Investigate innovative connectivity technology (new spectrum or medium) and new approach to improve existing one in order to maintain EU long term leadership	3.1.2 Challenge 2 (safety): Enable affordable safe and environment neutral light Mobility (Bikes, tricycles, wheelchairs, small drones, …) and mobile machinery (as smart farming)	2.2.1 Strengthening EU connectivity technology portfolio in order to maintain leadership, secure sovereignty and offer an independent supply chain	2.2.4 Architectures and reference implementations of interoperable, secure, scalable, smart and evolvable IoT and SoS connectivity
2.3.2 Managing new functionality in safe, secure, and trustable systems	3.1.4 Challenge 4 (validation): Provide tools and methods for validation & certification of safety, security and comfort of embedded intelligence in mobility	2.2.4 Architectures and reference implementations of interoperable, secure, scalable, smart and evolvable IoT and SoS connectivity	2.3.1 Extending Development Processes and Frameworks (to handle connected, intelligent, autonomous, evolvable systems)
2.3.4 Managing Diversity	3.2.2 Energy Management from On-Site to Distribution & Transmission Systems	2.4.4 Ensuring of safety and resilience	2.4.5 Human Systems Integration
2.4.5 Human Systems Integration	3.2.3 Achieving Clean, Efficient & Resilient Urban/ Regional Energy Supply	2.4.5 Human Systems Integration	3.1.3 Challenge 3 (automation): Enable affordable, automated and connected mobility for passengers and freight on road, rail, air and water
3.1.5 Challenge 5 (real-time data handling): Achieve real-time data handling for multimodal mobility and related services.	3.4.1 Enable digital health platforms based upon P4 healthcare	3.1.1 Challenge 1 (climate and energy): Enable electrification & sustainable alternative fuels for CO2 neutral mobility	3.1.5 Challenge 5 (real-time data handling): Achieve real-time data handling for multimodal mobility and related services.
3.2.2 Energy Management from On-Site to Distribution & Transmission Systems	3.4.2 Enable the shift to value-based healthcare, enhancing access to 4Ps game changing technologies	3.1.2 Challenge 2 (safety): Enable affordable safe and environment neutral light Mobility (Bikes, tricycles, wheelchairs, small drones, …) and mobile machinery (as smart farming)	3.2.1 Smart & Efficient - Managing Energy Generation, Conversion, and Storage Systems
3.2.4 Cross-Sectional Tasks for Energy System Monitoring & Control	3.4.3 Support the development of home as the central location of the patient, building a more integrated care delivery system	3.1.3 Challenge 3 (automation): Enable affordable, automated and connected mobility for passengers and freight on road, rail, air and water	3.3.1 Responsive and smart production
3.3.5 Digital twins, mixed or augmented reality, telepresence	3.5.1 Food Security	3.2.1 Smart & Efficient - Managing Energy Generation, Conversion, and Storage Systems	3.3.3 Artificial Intelligence in Digital Industry
3.4.1 Enable digital health platforms based upon P4 healthcare	3.5.2 Food Safety	3.2.3 Achieving Clean, Efficient & Resilient Urban/ Regional Energy Supply	3.3.5 Digital twins, mixed or augmented reality, telepresence
3.4.2 Enable the shift to value-based healthcare, enhancing access to 4Ps game changing technologies	3.6.3 Facilitate inclusion and collective safety	3.3.1 Responsive and smart production	3.3.6 Autonomous systems, robotics
3.4.3 Support the development of home as the central location of the patient, building a more integrated care delivery system		3.3.2 Sustainable production	3.4.4 Enhance access to personalized and participative treatments for chronic and lifestyle related diseases
3.5.4 Water resource management		3.4.1 Enable digital health platforms based upon P4 healthcare	3.4.5 Ensure more healthy life years for an ageing population
13.5 Biodiversity restoration for Ecosystems Resilience, Conservation and Preservation		3.4.2 Enable the shift to value-based healthcare, enhancing access to 4Ps game changing technologies	
3.6.1 Facilitate individual self-fulfilment		3.4.3 Support the development of home as the central location of the patient, building a more integrated care delivery system	
3.6.2 Facilitate empowerment and resilience		3.4.4 Enhance access to personalized and participative treat [illegible] related diseases	
3.6.3 Facilitate inclusion and collective safety		3.4.5 Ensure more healthy life years for an ageing populatio	
3.6.4 Facilitate supportive infrastructure and a susta		3.5.3 Environmental protection and sustainable production	
		3.5.4 Water resource management	
		3.5.5 Biodiversity restoration for Ecosystems Resilience, Co	
		3.6.2 Facilitate empowerment and resilience	
		3.6.4 Facilitate supportive infrastructure and a sustainable e [illegible]	

An example

3.1.4.1 Electrification & sustainable alternative fuels
3.1.4.2 Affordable safe and environmentally neutral light mobility
3.1.4.3 Affordable, automated and connected mobility

2030	-37.5 % CO2 reduction vs. 2021
2040	Zero emission in cities
2050	Zero net emission

3.3.4.1 Responsive and smart production
3.3.4.2 Sustainable production

3.4.4.1 Digital health platform based upon P4 healthcare
3.4.4.2 Shift to value-based healthcare
3.4.4.3 Home as the central location of the patient
3.4.4.4 Personalised & participative treatments
3.4.4.5 Ensure more healthy life years for an ageing population

Timeline

MILESTONES TO BE REACHED VIA COLLABORATIVE RESEARCH PROJECTS ACROSS EUROPE

SHORT TERM (2021–2025)	MEDIUM TERM (2026–2030)	LONG TERM (2031 AND BEYOND)

Industrial competitiveness

- Additive manufacturing, rapid prototyping
- Remote engineering and operations, telepresence
- Modular multi-application architecture supporting AI and advanced sensing and control
- Time-critical functions moved to the cloud
- Cost- and effort-effective, continuous virtual ECS development and validation processes
- Advanced human-machine joint intelligence
- Certified trusted hardware and embedded software for autonomous systems
- Zero defect design and manufacturing and circular economy for ECS

EU sovereignty

- Leveraging open source or alternatives to develop advanced European AI edge solutions
- EU devices enabling 5G connectivity
- New self-learning methods to ensure safe operations of complex systems
- 6G connectivity RF and photonics devices
- 1 nm node semiconductor equipment
- End-to-end AI-based security
- Quantum and other novel paradigm technologies for computing, communication and sensing
- EU ecosystems for dependable SW
- Trustable AI-based IoT systems

Sustainability and Green Deal

- Materials enabling recycling and repair
- Energy-optimised EV urban mobility
- Supply-chain aware design flows
- Energy management towards tow/zero power
- Energy-optimised H_2 long-distance mobility
- New Power devices
- Organic, compostable and biodegradable materials
- Food Traceability over the whole value chain
- Reduction of cumulated carbon and cultivated land footprint by 20% in the next 20 years
- Emission-free cities
- From cradle to grave CO_2-neutral mobility

Europe's Digital Age

- IoT-based health care solutions
- Sensing and processing for clean, connected and automated vehicles
- Communication infrastructure to support self-organised communities
- Next-generation (patch-like) drug delivery systems part of the Internet of Medical Things
- Improved and new human-machine interfaces
- Validation and certification procedere for clean, connected and automated vehicles
- Organ-on-a-chip developments addressing rare diseases
- Real-time emotion sensing
- Instant information understanding between systems

Global Timelines

- "A journey of a thousand miles begins with a single step"
  - From Tao Tö King, circa 400 BC
- Selected milestones over three time periods
  - 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

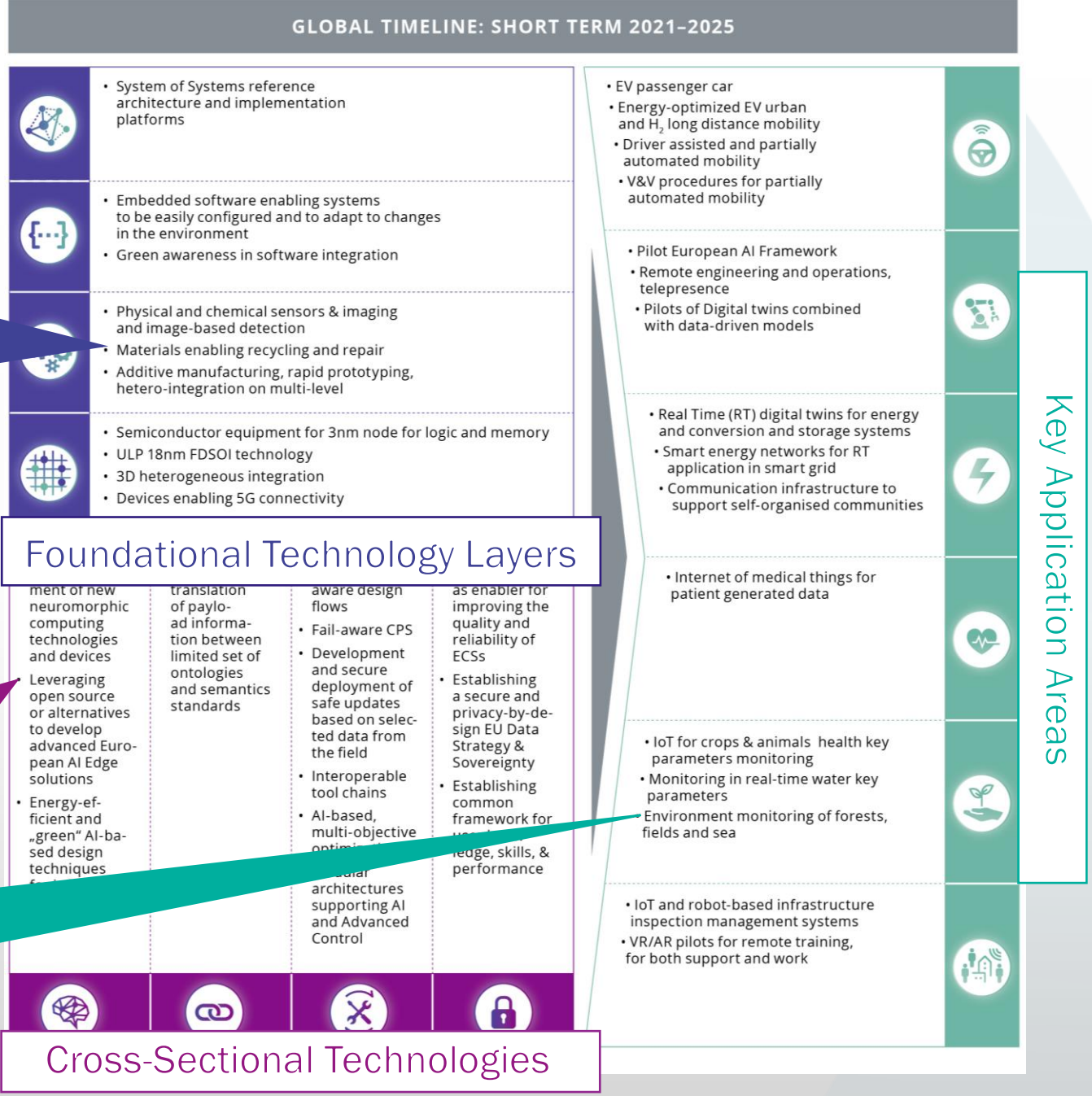
https://fr.wikipedia.org/wiki/Lao_Tseu

Global Timelines
Short term example

Materials enabling recycling and repair
Components, Modules and System Integration
Foundational Technology

Advanced AI edge solutions leveraging open source or alternative strategies
Artificial Intelligence, Edge Computing and Advanced Control
Cross-Sectional Technology

Widespread deployment of sensors to monitor forests, fields and oceans
Agrifood and Natural Resources
Key Application Area



Promoting Synergies

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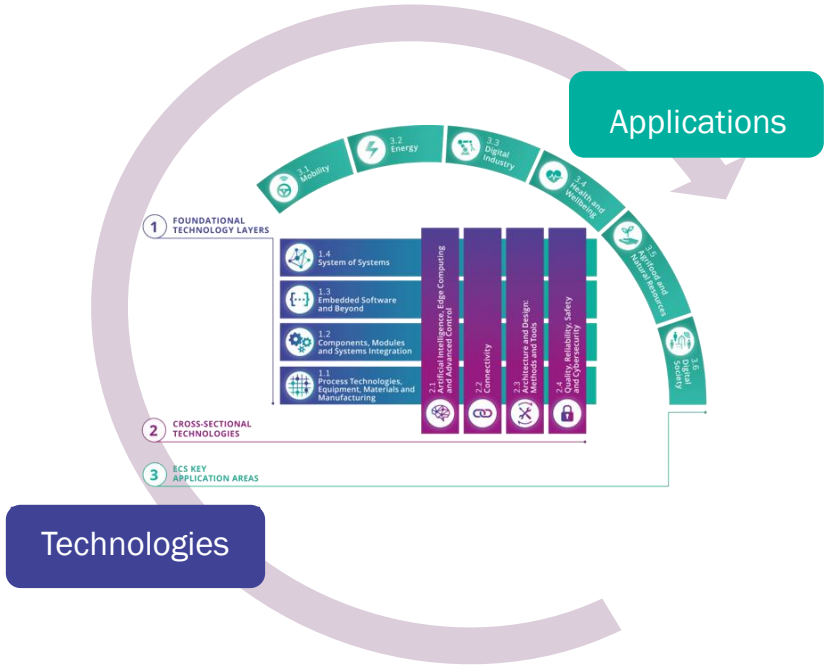
Within the SRIA

Potential new breakthroughs in applications



From application roadmaps to ECS technology requirements

ECS SRIA in the Global Landscape

SRIA 2021-27

And many others…

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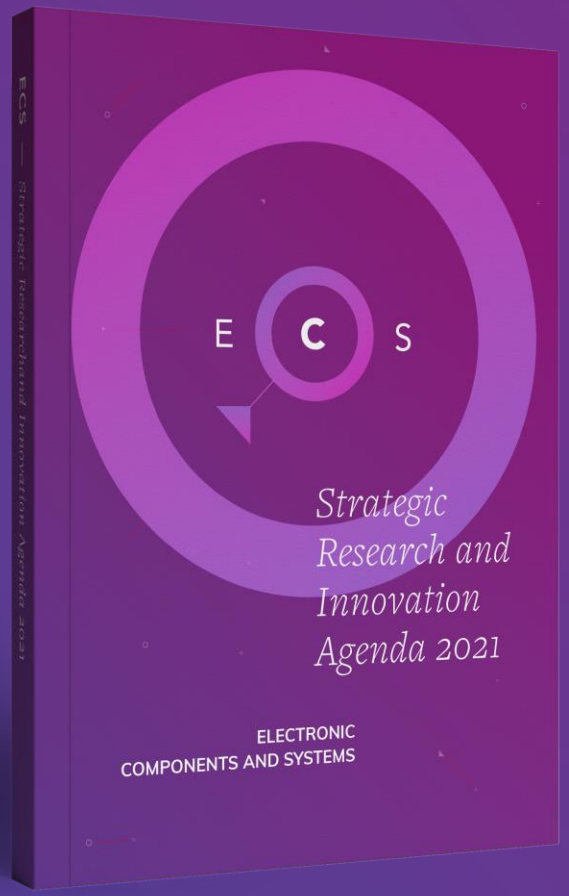

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Open for your feedback and contribution until **December 14th, 2020**

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