



ECSEL
Austria



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Status Strategic Research Agenda 2021

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ECSEL Austria Autumn Conference | Graz | 2019-11-27

Status Update & Planning



Creation of SRA 2021 started with meetings with Extended ECSEL SRA Core Team

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|-------------------|--------------------------------------|
| 27 September 2019 | Workshop in Paris |
| 9 October 2019 | Telco |
| 6 December 2019 | Extended Core-Team Meeting in Berlin |
- Final Structure to be proposed to all involved in SRA-discussions
 - First Ideas on potential Chapter Leaders

2021 :

- Final agreement on Structure – to be approved by 3IA's
- Final agreement on Chapter Leaders – to be approved by 3IA's
- Official kick-off for 2021 SRA with Core Team + Chapter Leaders
- Identification of Challenges per Chapter

Status Update & Planning



Extended Core Team :

- Elisabeth Steimetz (Chair), EPoSS
- Patrick Cogez (Vice-Chair), AENEAS
- Patrick Pype (Vice-Chair), NXP
- Renzo Dal Molin, Cairdac
- Marc Duranton, CEA
- Mart Graef, TU Delft
- Paul Merkus, TU Eindhoven
- Sven Rzepka, Fraunhofer ENAS
- Jürgen Niehaus, SafeTrans
- Jochen Langheim, ST Microelectronics
- Wolfgang Dettmann, Infineon
- Paolo Azzoni, Eurotech

New Structure of SRA 2021

Still work-in-progress

- Current view of discussions is given – not yet fully aligned / finalized

Two documents are being proposed :

- **First document (s. Part A): Executive Summary:** should serve as introduction to the ECS-SRA as well as stand-alone document for High-levels and decision makers;
- **Second document (s. Part B) : “Bottom up” SRA:** purpose to serve project managers of European collaborative projects and basis for future EU calls

No decision yet on “Long Term Chapter” if:

- summarized in a separate chapter,
- covered in each chapter
- or specific topics in introductory chapter.

Status of current discussion: Challenges for SRA

Societal needs

- Sustainability, climate change: zero emission, electrification; reducing energy consumption
- Societal inclusion, equality of European citizens in large cities and rural areas,
- Employment, excellence in research, education in the digital age
- Eldering society
- Well-being of citizens

European sovereignty /competitiveness and economic sustainability

- Globalization, independence of Europe for critical key hardware and software components
- Changing power/ interdependence
- Fragile multilateralism challenge
- Impact/ Market analysis; European competitiveness with China? USA?
- Increasing European capabilities in the sector: long-term developments;

Status of current discussion: Challenges for SRA

Make it happen (= Industry´s needs; messages to policy makers)

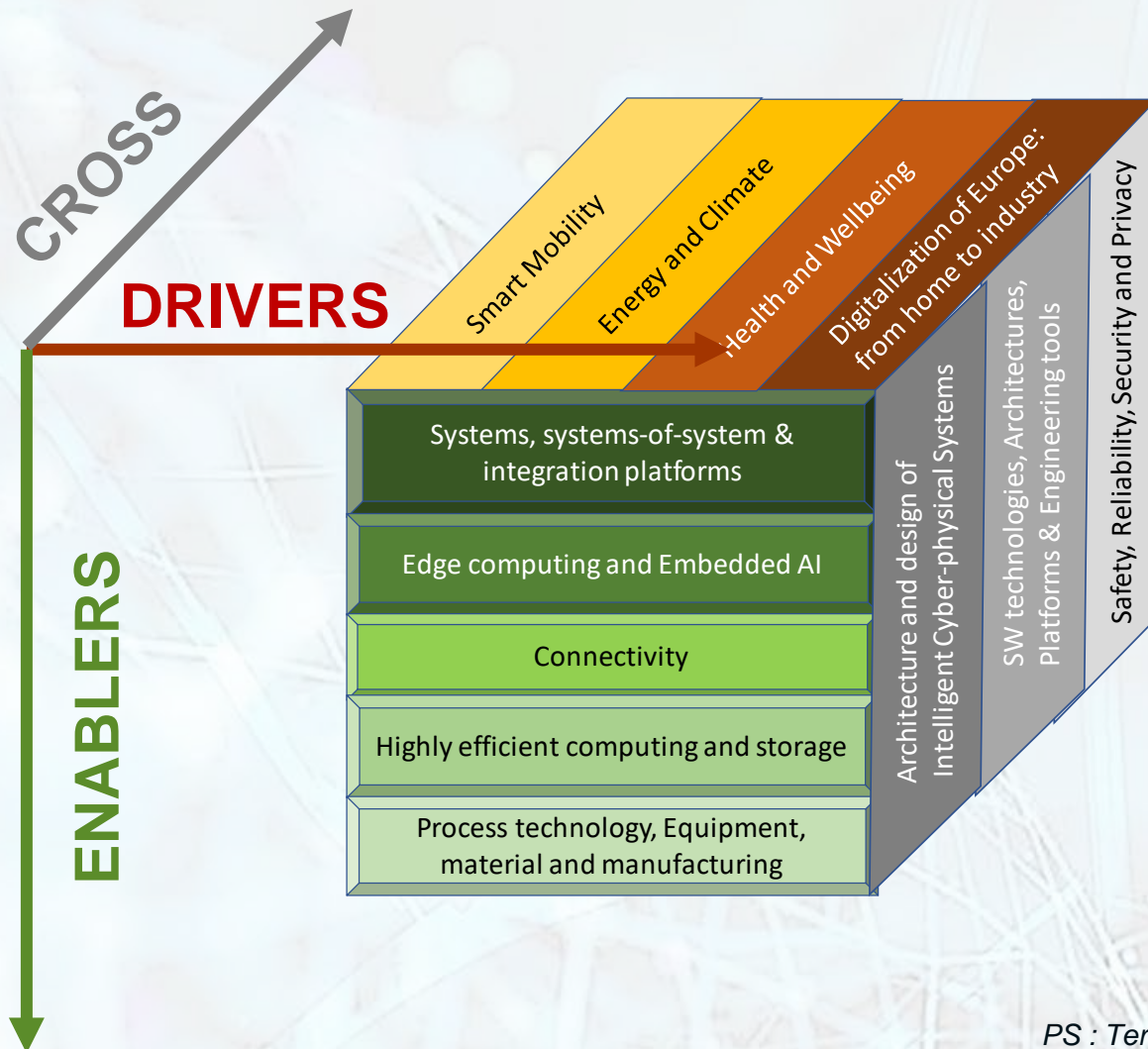
- Prioritization based on facts;
- Justification rational for the topics
- Quantification of industries needs and consequences “for not doing it”

Why this SRA? Position of the ECS-SRA in the Ecosystems:

- SRA for Horizon Europe, KDT-JU, PENTA, Euripides Calls
- Links to SRA of neighbouring communities
- Relationship to Lighthouses
- Relationship to IPCEI on Microelectronics/ Batteries and other

Status of current discussions

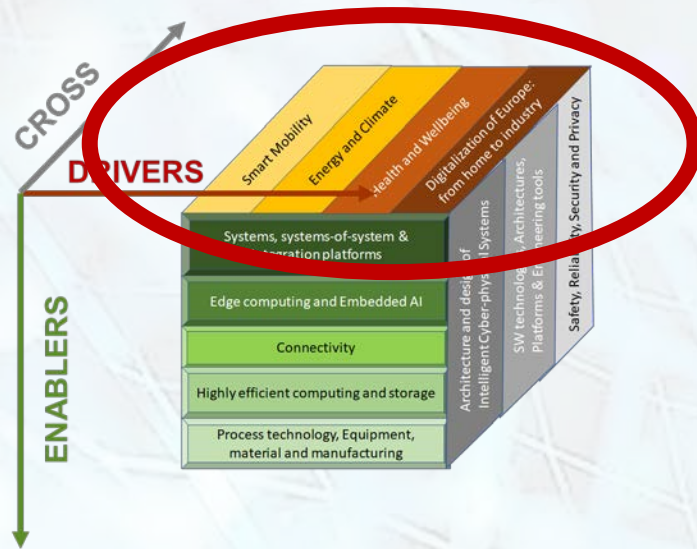
Structure of SRA 2021



- Application Chapters = **DRIVERS**
- Technology Chapters = **ENABLERS**
- Transversal Chapters = **CROSS-Technologies** (“glue”)

PS : Terminology on picture not yet aligned with latest discussion on terminology – still to be updated.

Status of current discussions Structure of SRA 2021



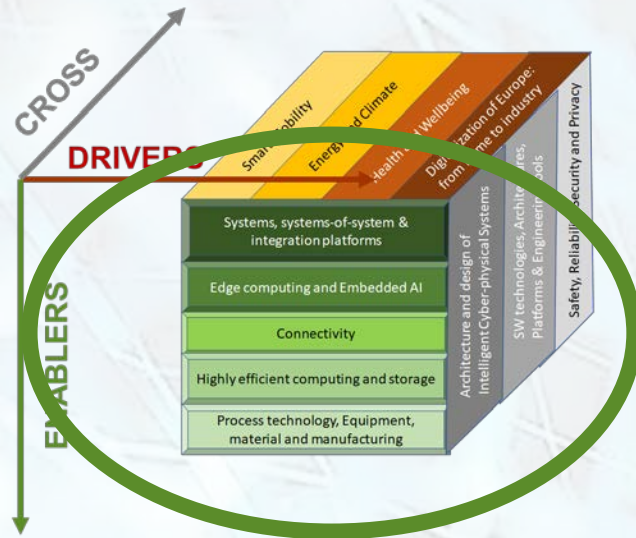
Application Chapters = DRIVERS

- Mobility
- Energy
- Industry
- Agrofood & Natural Resources
- Health
- Digital Society (digital home, smart cities, inclusion)

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Status of current discussions

Structure of SRA 2021

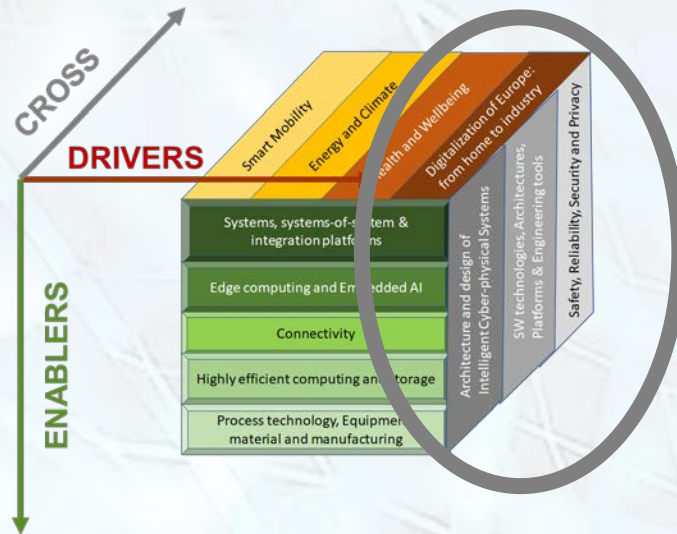


Technology Chapters = ENABLERS

- Equipment, Materials & Manufacturing
- Process Technologies (incl. photonics integration & flexible electronics)
- Components (sensors, actuators, imagers, power electronics, packaging)
- Modules and functional building blocks (incl. sensor nodes)
- Embedded SW technologies (including AI, model predictive control, multi-core processing, energy efficient processing)
- System Integration (incl. sensor node integration, edge computing)
- Systems of systems, architectures & integration platforms

PS : Terminology on picture not yet aligned with latest discussion on terminology – still to be updated.

Status of current discussions Structure of SRA 2021



Transversal Chapters = CROSS-Technologies “Glue”

- Embedded Artificial Intelligence
- Connectivity (incl. interoperability and network technologies like 5G or 6G)
- Architecture & design from components to systems (for functionality & performance)
- Quality, reliability, safety & security (secure components, systems and systems-of-systems)
- Cost efficient verification and validation tools and procedures (safety, reliability, security aspects to be considered)
- Highly efficient embedded computing (trade-off between energy consumption, processing power & offered functionalities)

PS : Terminology on picture not yet aligned with latest discussion on terminology – still to be updated.

- Timelines updated to span the period 2020-2029
- Technology developments required for Artificial Intelligence were added in all sections
- Integrated photonics and brief statement on flexible electronics added in introduction
- The reduction of energy consumption of ECS was stressed as key for digitalization and broad implementation of Artificial Intelligence
- In all documents additions with focus on software technologies were made

Inputs from Austrian Community

Results of first workshop in Austria (Oct 8th, 2019)



Application

- New/modification: Digital Life -> “Digital Life and Environment” or “Sustainable Environment and wellbeing” or “Environment for sustainable Life” . It Includes: sensing in environment, recycling, re-Use, circular economy, energy efficiency, life cycle design

Technology

- New topics
 - **Perception** (complex sensing, sensor fusion, AI in the sensor system)
 - **Control:**
 - **Networked control:** Networked control systems with a multitude of agents and data communication between them
 - **Distributed monitoring:** statistical or model-based for early prediction of failures of individual systems; information about spatially distributed agents to create a more accurate picture of the environment (e.g. the traffic situation in a network of autonomous vehicles).
 - **Automatic Optimization procedures for Networked and predictive control:** Based on the collected information (usage, environment, sensor data), big data analysis techniques can be used to predictively manipulate the operational strategy, e.g. to extend service life and/or an increase in energy efficiency
- Modifications of existing topics: Computing + edge AI instead of “Computing and Storage”

Inputs from Austrian Community

Additional Mid-term Content

ECS Process Technology, Equipment, Materials and Manufacturing:

- Materials - Modelling + Design
- Additive Manufacturing

Connectivity and Interoperability

- Dependable IoT Communication

Systems and components: Architecture, Design and Integration

- Modell based Design, Methods and Tools

An intense discussion took place whether “Systems and components: Architecture, Design and Integration” is too general or gives the necessary space

Inputs from Austrian Community

Long term topics (1 of 2)

Quantum

- Quantum memory
- Quantum sensing
- Quantum Communication
- Quantum Synchronisation

Photonics

- Sensing
- Computing
- Cryptography

Graphene (organic electronics)

Inputs from Austrian Community

Long term topics (2 of 2)

Artificial Intelligence

- Distributed AI
- Neuromorphic Computing
- AI-Hardware (energy optimized for use in edge computing)
- AI based on limited data
- Cost efficient training data for NN considering safety, privacy and ethics aspects
- Safety of AI based systems (test, verification and validation)
- Explainable AI



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Further input: please send it until Dec 20th, 2019 to
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Thank you !

Do you have questions?