During the ECS-SRA presentation, we will ask you to give us your feed-back via mobile phone or computer.

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ECS-SRA 2020 introduction & outlook on ECS-SRA 2021

E. Steimetz, EPoSS, ECS-SRA Chair

P. Cogez, AENEAS, ECS-SRA Vice-Chair

E C S

Electronic
Components
& Systems

ECS Strategic Research Agenda
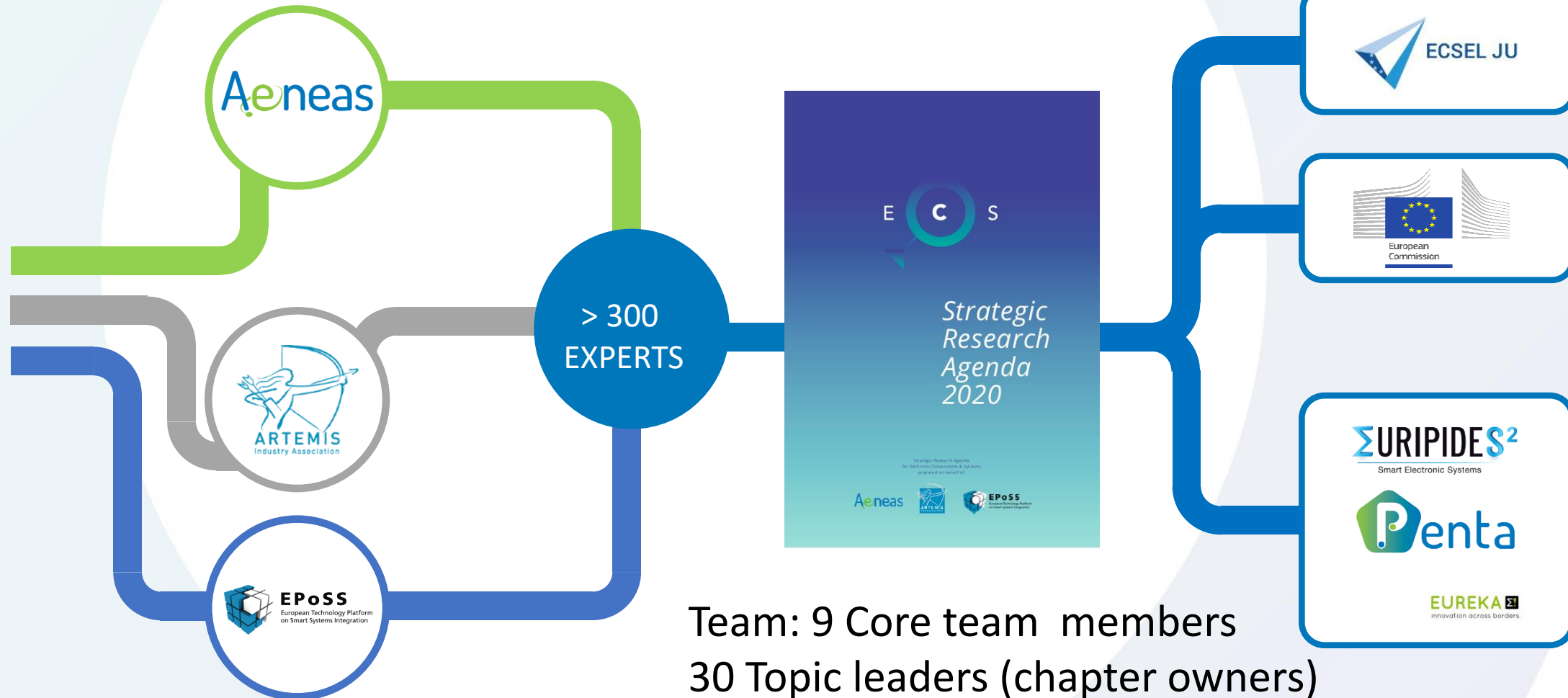# Covering the whole ECS value chain
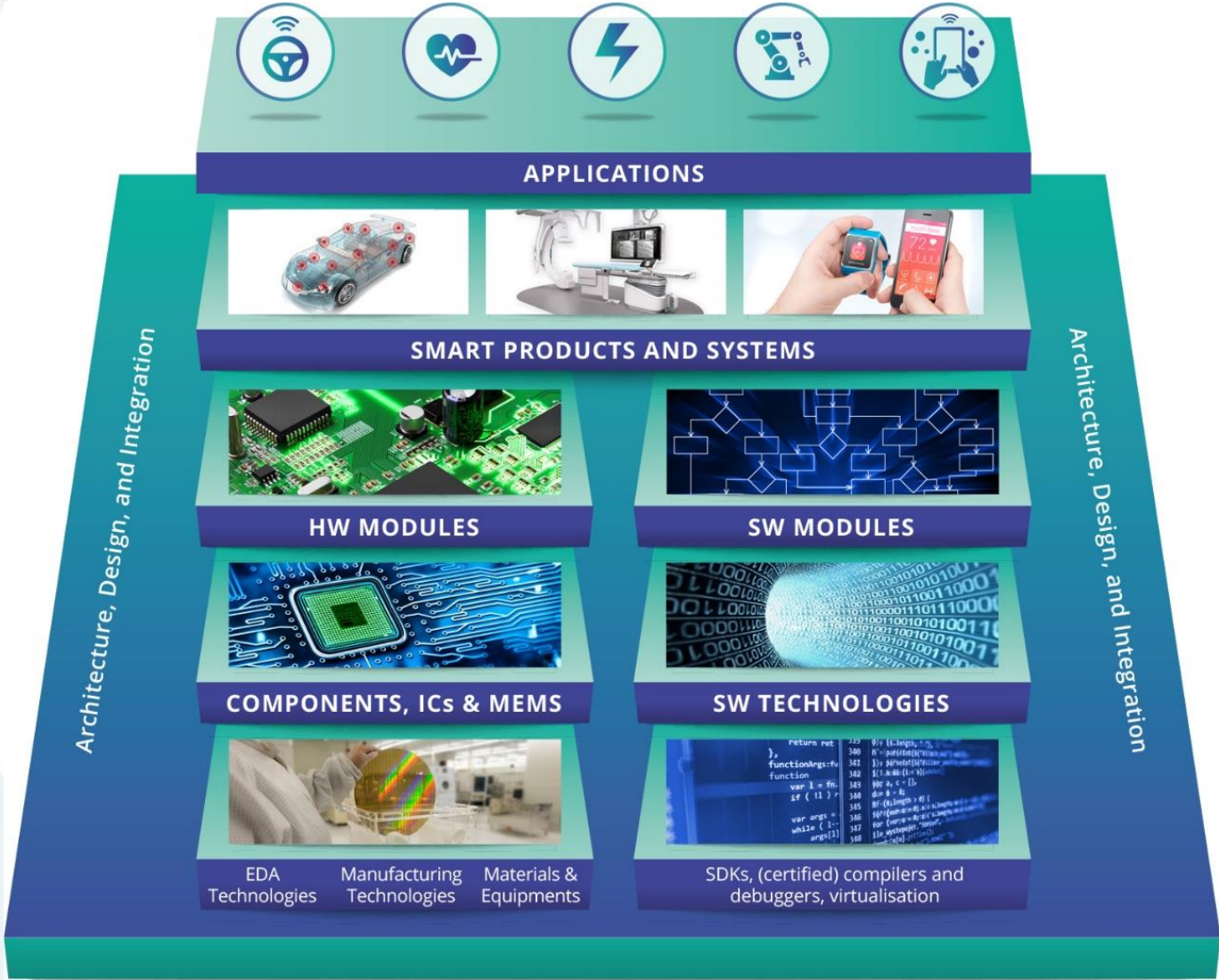
ECS-SRA 2020

- First ECS-SRA Edition was launched in January 2018

- The 2. up-date was published today

- A major update is scheduled for this year

- Why updates every year?
    - Industry is moving fast
    - It serves as input for the ECSEL MASP and WP and
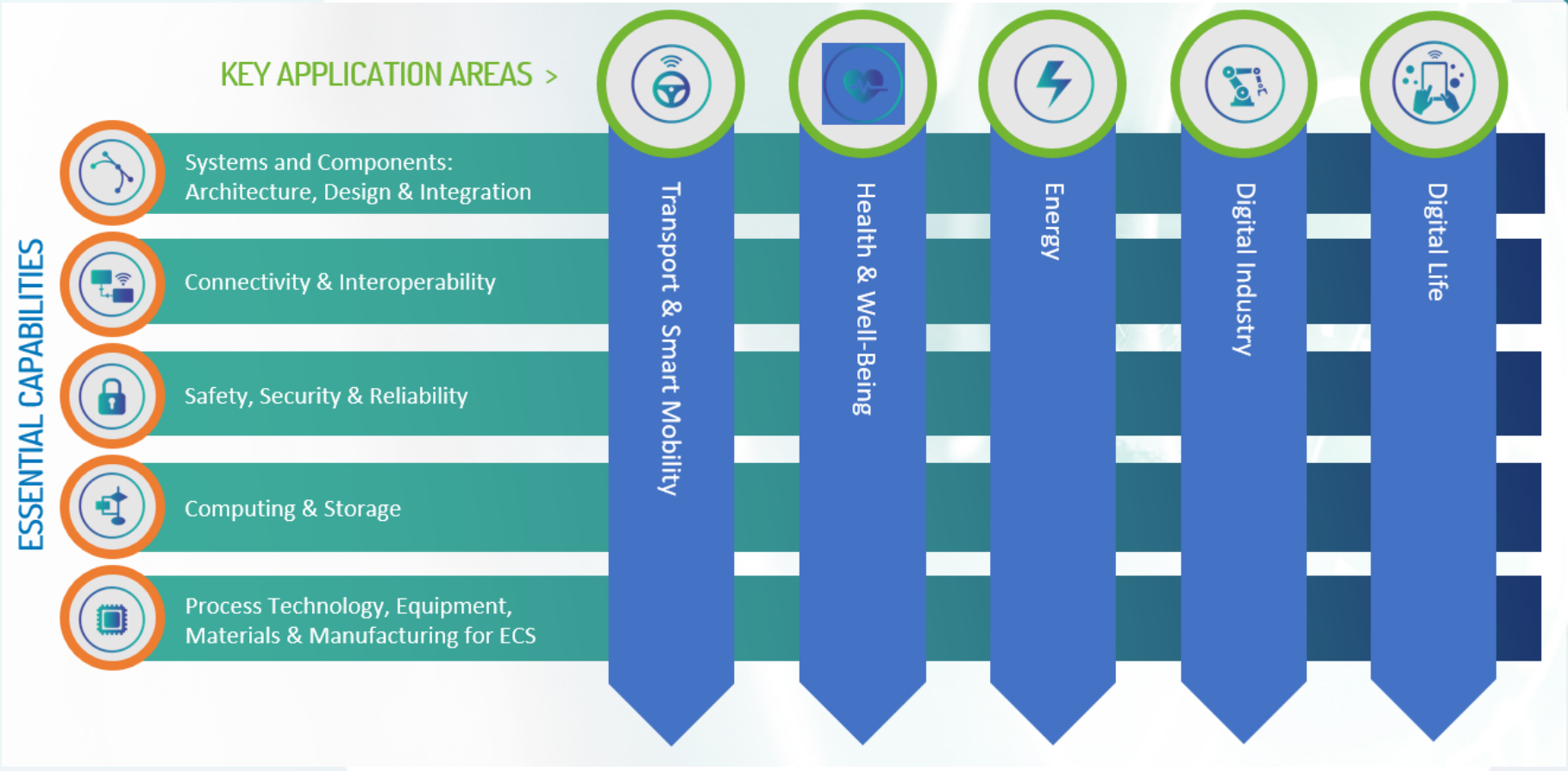   as SRA for EUREKA clusters PENTA and Euripides

ECS-SRA Process and Role

Team: 9 Core team members
30 Topic leaders (chapter owners)
275 contributors

ECS-SRA 2020: Chapters

KEY APPLICATION AREAS >

- Transport & Smart Mobility
- Health & Well-Being
- Energy
- Digital Industry
- Digital Life

ESSENTIAL CAPABILITIES

- Systems and Components: Architecture, Design & Integration
- Connectivity & Interoperability
- Safety, Security & Reliability
- Computing & Storage
- Process Technology, Equipment, Materials & Manufacturing for ECS

10 chapters plus „Long term vision" chapter

319 pages (excl. Annex)

Poll 1: ECS-SRA 2020

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ECS-SRA 2020

Main evolutions vs. the 2019 edition

General

- Timelines updated to span the period 2020-2029

- Integrated photonics added in introduction

- Technology developments required for Artificial Intelligence added in several chapters

- Reduction of energy consumption of ECS stressed as a key challenge for broad implementation of Artificial Intelligence and overall digitalisation

Key applications

1. Transport and Smart Mobility

- Additions :
  - Electrification contributing to limit climate change
  - Virtual & real-world verification & validation for automated vehicles
  - Efficient systems to convert electricity into hydrogen
  - High-priority on secure connected, cooperative and automated mobility and transportation

2. Health and Wellbeing

- Updated market information
- Integration of inputs from the ECSEL Lighthouse HEALTH.E

Key applications

3. Energy

- New topics added
    - Power consumption of communications networks
    - AI/Machine Learning and energy value chain: Potential impact and implementation barriers
    - Make it happen: Section on Decarbonisation added

4. Digital Industry

- Lighthouse Industry4.E CSA leading to definition of new major challenges
    - Developing digital twins, simulation models for the evaluation of industrial assets at all factory levels and over system or product life-cycles
    - AI-enabled cognitive, resilient, adaptable manufacturing
    - Developing digital platforms, application development frameworks that integrate sensors/actuators and systems
    - Human-centred manufacturing
    - Sustainable manufacturing in a circular economy
- Minor changes in the part about Digital Farming

Essential Capabilities

6. Systems and Components: Architecture, Design and Integration

- Overall revised chapter to improve readability
- Expanded AI treatment
- Added market data from Advancy report

7. Connectivity and Interoperability

- Topics 6G and 250 GHz – 325 GHz frequency band were added in Challenge 1
  - Strengthening the EU position on differentiated technologies and enabling it to capture higher value by moving to system/module level
- Challenges 2 and 3 have been updated
  - Autonomous interoperability translation for communication protocol, data encoding, security and information semantics
  - Architectures and reference implementations of interoperable, secure, scalable, smart and evolvable IoT and SoS connectivity

Essential Capabilities

9. Computing and Storage

Additions made regarding:

- Energy consumption (especially for data centers)
- Low power and ultra-low power intelligent computing (edge and deep edge computing)
- Development of model-driven software techniques
- Multi-domain/multi-paradigm design and analysis by holistic approaches, implying multi-disciplinary techniques and teams

Essential Capabilities

10. Process Technology, Equipment, Materials and Manufacturing for Electronic Components & Systems

- Rewording of major challenges
  - Develop advanced logic and memory technology for nanoscale integration and application-driven performance
  - Develop Technology for Heterogeneous System-on-Chip (SoC) Integration
  - Develop technology for Advanced Packaging and Heterogeneous System-in-Package (SiP) integration
  - Extend world leadership in Semiconductor Equipment, Materials and Manufacturing solutions
- Distinction between "More Moore" and "More than Moore" sectors by a more technology-based terminology
- Executive Summary insisting on technology sovereignty in view of the growing strategic importance of a local base for KET

Long term vision

- New computational models such as approximate computing, aspects of embedded and cyber-physical systems at the architectural or application level were added.

ECS-SRA 2021

Summary of the current status of discussions

ECS-SRA 2021 Baseline

- The focus of the ECS-SRA 2021 will still lay on ECS technologies as enablers for European centric applications
- It is a collaborative work of the 3As spanning the value chain from materials to complete system solutions for key European markets
- The ECS-SRA document should serve a basis for common European projects
- It should serve both: high level decision makers as well as project leaders applying for funding in European calls

ECS-SRA 2021: Proposed structure

Two documents are being proposed:

- First document: **"Top down" Strategy Document**: should serve as introduction to the ECS-SRA as well as stand-alone document for stakeholders and decision makers;

- Second document: **"Bottom up" Research Agenda**: purpose to serve project managers of European collaborative projects and be the basis for future EU calls

Strategy document

Topics to be covered in PART A:

1) Societal needs

2) European sovereignty /competitiveness and economic sustainability

3) How to make it happen (= Industry´s needs for realisation)

4) Position of ECS community in the Ecosystems

Part B: „bottom-up" SRA

- **ECS-SRA 2021 (Part B)** aims to lay the strategic basis for:
  - ECSEL 2/ KDT
  - ECS-related EUREKA clusters and
  - Horizon EUROPE calls for many years.

- It´s Structure must allow to cover all relevant ECS topics

It should cover:

- **Key Applications of ECS as "drivers"**
- **Technologies for ECS as "enablers"**
- **Transversal cross-sectional technology topics as "link"**

ECS-SRA 2021
Tentative structure and titles

(Systems of) / Complex Systems

Embedded software

Components and Modules

Process Technologies
Equipment, Materials & Manufacturing

Artificial Intelligence, Edge Computing & Advanced Control

Connectivity

Architecture and Design methods and tools

Quality Reliability, Safety & (Cyber-) Security

Cross-sectional technologies

Technology building blocks

MOBILITY

ENERGY

INDUSTRY

HEALTH

AGRIFOOD

DIGITAL SOCIETY

Key ECS application areas to meet societal needs

Poll 2: ECS-SRA 2021

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Thank you!

Please have a look at the ECS-SRA 2020 and give us your feed-back!

You want to contribute to the ECS-SRA 2021? Let us know!

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