

ECS-SRA

Electronic Components and Systems Strategic Research Agenda

Long Term Vision

 **ECS** Our
digital
future
2018

Organised by:
AENEAS, ARTEMIS-IA, EPoSS, ECSEL-JU &
European Commission

Associated organiser:
EUREKA



Long term vision for Electronic Components and Systems

Objective:

To identify basic research subjects (TRL1-2) that will need to be developed in the short term in order to enable the realisation of the European industrial roadmap in the medium term (5-10 years) and long term (>10 years).

Technology evolution and application requirements

Application requirements

Short Term

Medium Term

Long Term

Performance
Novel functionality
Cost reduction

Performance
Novel functionality
Cost reduction

Other disruptive applications based on technology evolution



Convergence



Gaps

Technology evolution

Figure of Merit
Novel functionality

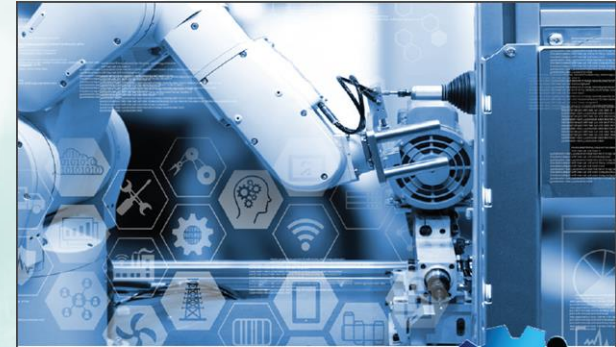
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Digital Industry

- SPIRE 2020 Roadmap
 - Replacement of fossil-based materials
 - Re-use of waste streams
 - Resource-efficient applications

- New production schemes:
 - Modular factories
 - End-user driven agile production
 - Hyper-connected factories



Industry4.E



**The ECSEL Lighthouse
Initiative in the field of Digital Industry**

Industry 4.E
Umbrella for all industry digitalization
related activities in the field of
electronic components and systems

Transport and Mobility

- EU policy:
 - Emissions from transport to be reduced with >60% below 1990 levels by 2050
 - “Vision Zero” long-term goal of zero road fatalities in the EU by 2050
- Scenarios:
 - Autonomous electrically driven vehicles
 - All road users connected
 - Fully integrated multi-modal traffic

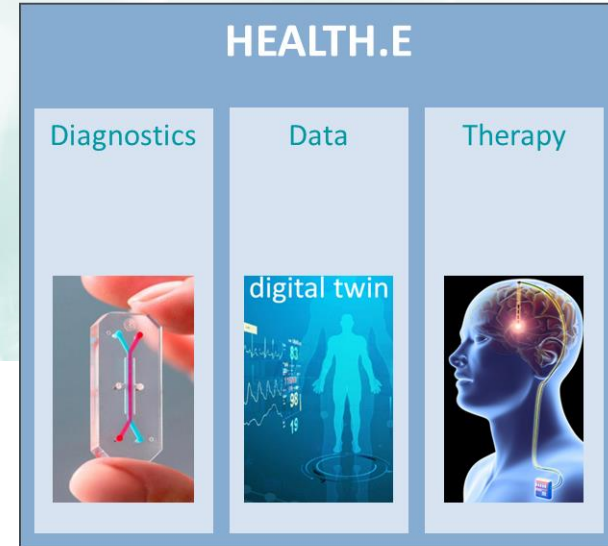
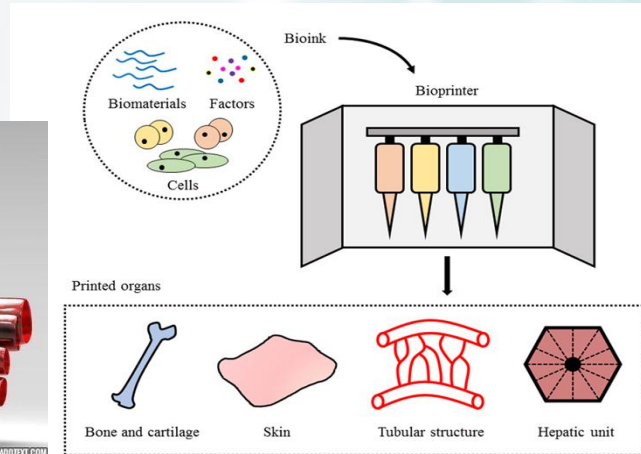
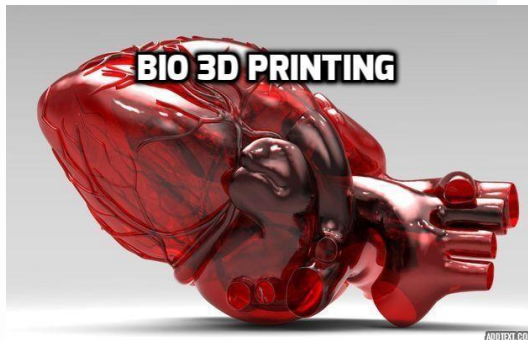


Mobility.E

Technology and infrastructure for electrically powered zero-emission / zero-accident vehicles

Health & Wellbeing

- Digital Medicine
 - Personalized medicine
 - 3D-bioprinting for bone grafts, scaffolds artificial organs...
 - Cyborgization

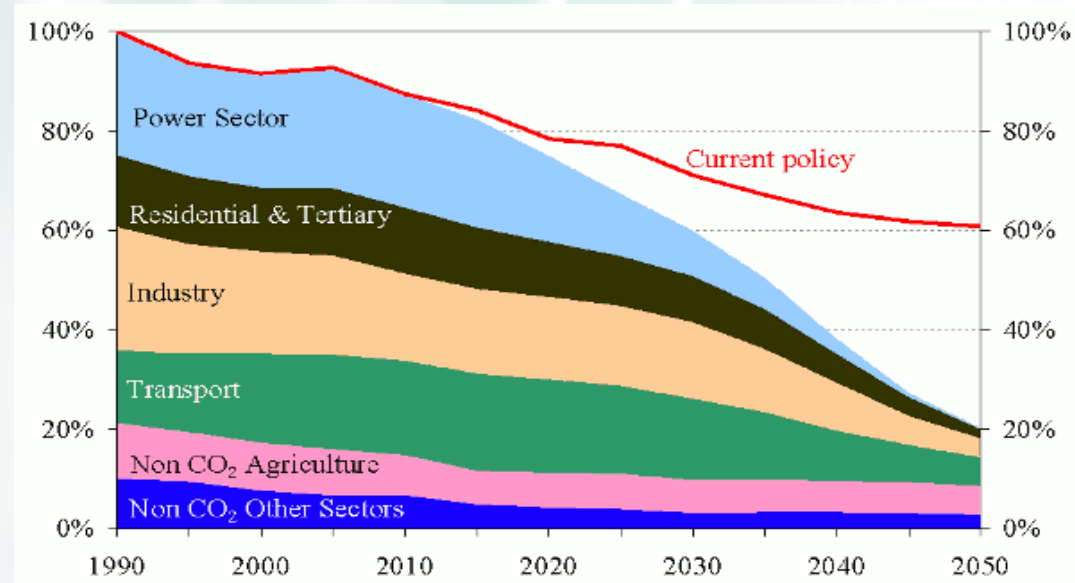


Health.E
 Accelerate innovation in medical devices by ECS-based technology platforms: *'Moore for Medical'*

Energy Management

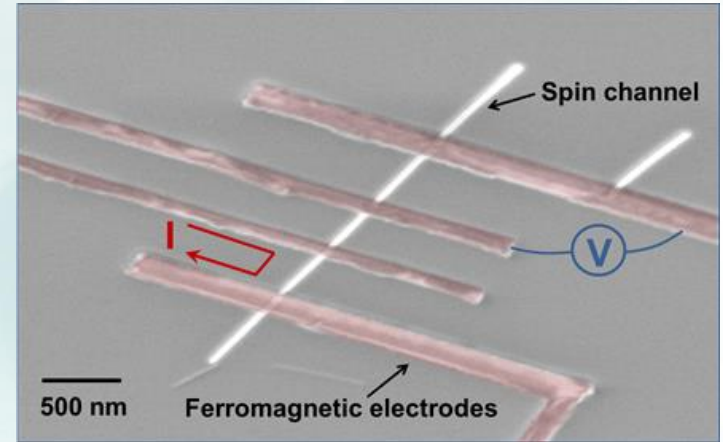
- Energy roadmap 2050
 - Ensuring sustainable power generation and energy conversion; complete decarbonisation of power sector
 - Achieving efficient community energy management
 - Reducing energy consumption
- Scenarios:
 - Long-term evolution of mid-term technological solutions
 - Market disruptions:
 - Completely decentralised system
 - Zero marginal-cost energy?

GHG Emissions reduction target 2050



New computing paradigms 'Beyond CMOS'

- Emerging High Performance Computing (HPC) technologies
 - Spintronics, neuromorphic computing, phononic computing, molecular electronics,...
- Quantum computing
 - Quantum sensing and metrology
 - Secure communication networks

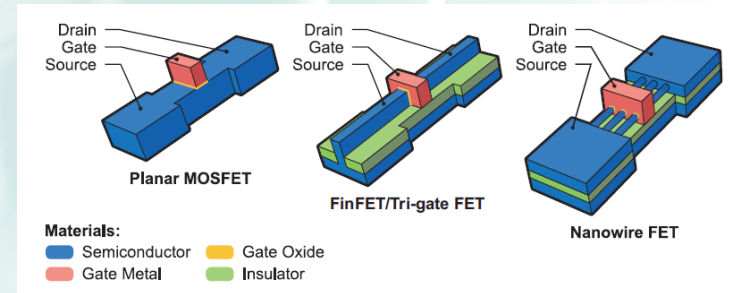


(Courtesy M. Costache (ICN2) / NEREID)



Process Technology, Equipment and Materials

- New materials and processing for high performance / ultra-low power terascale integration and autonomous nanosystems
 - 2D, 1D materials, nanowires
 - Novel switches: NCFET, TFET, NEMS-FET, CNT-FET, ...
 - Novel memories: OxRAM, MRAM, FeFET,...



(Courtesy NEREID)



NEREID Roadmap



Download or order your free copy!

NEREID

NanoElectronics Roadmap for Europe

Prefinal Roadmap available since September 3, 2018

From Nanodevices and Innovative Materials to System Integration

Download/Order your free copy at: <https://www.nereid-h2020.eu/roadmap>

III. Conclusion
II.8 Beyond-CMOS
II.7 Equipment & Manufacturing
II.6 System Design
II.5 Energy Harvesting/Storage
II.4 Smart Energy
II.3 Smart Sensors
II.2 Connectivity
II.1 Advanced Logic/memories
I. General

- NEREID: „Nanoelectronic Roadmap for Europe“
- available in December
- as PDF or printed copy
- Download or order at: www.nereid-h2020.eu/roadmap