5E TRANSVERSAL WORKING GROUP WORKSHOP

29 SEPTEMBER 2020

The Coordination and Support Action 5E has received funding from the European Community's Programme Horizon 2020 under GA Number: 825113

PART 1
Welcome

Petra Weiler, VDI/VDE-IT

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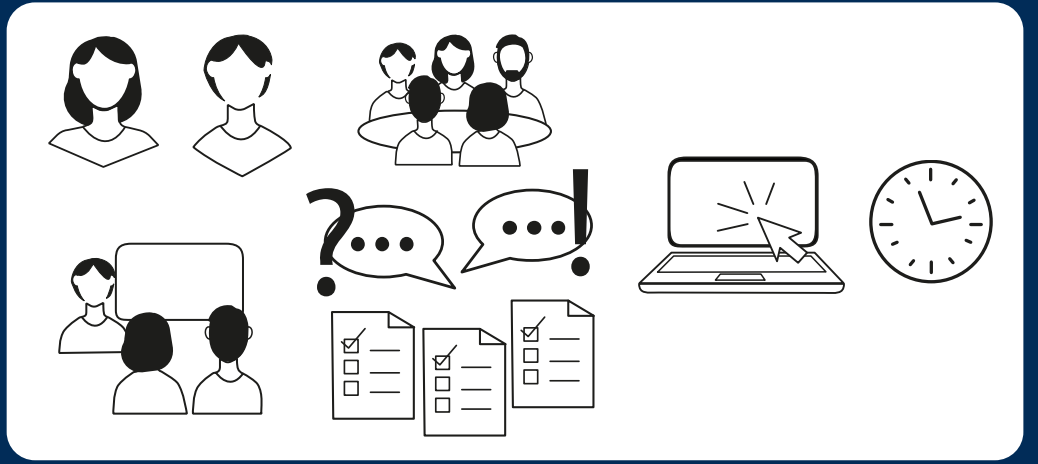
AGENDA & USEFUL INFORMATION

PART 1

- Welcome & Introduction → 10 min
- Presentation of 5E Joint Vision → 10 min
- Presentations of 5E Vision Papers → 4x5 min
- Questions & Answers → 10 min



PART 2

- Interactive Part – Live Survey → 30 min
- Wrap-up & Closing → 10 min

- The link for the Live Survey is posted in the Chat
- For each question
  - Read the question and the response options
  - Enter your response
  - Click on “submit”
  - Wait until after the results presentation before answering the next question
- A summary of the results will be provided to all participants after the workshop

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LIVE SURVEY USING MENTIMETER RESULTS WILL BE SHOWN LATER

- The link for the Live Survey is posted in the Chat or you can scan this QR code
- For each question
  - We introduce the question and response options
  - You make your choice and click on “submit”
  - We leave enough time for everyone to enter their responses
  - We switch to the results and give a brief overview
  - You wait until after the results presentation before answering the next question
- A summary of the results will be provided to all participants after the workshop
  → No need to take screenshots

https://www.menti.com/nteumswms6

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QUESTIONS

What is your expectation for today's workshop – in one word?

Which area of electronics are you closest to?

- (unconventional) Nanoelctronics - #NE
- Flexible, Organic & Printed Electronics - #FOPE
- Electronic Smart System - #ESS
- Other

What is your position in the value chain?

- Education & Training
- Private & public R&D
- Production & manufacturing
- Marketers & service providers
- Users
- Finance & economic developers
- Consultancy & cluster management
- Legislation & standardisation
- Other

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PART 1
Introduction

Nicolas Gouze, VDI/VDE-IT

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FROM 5E TRANSVERSAL WORKING GROUP WORKSHOP

- Create sustainable exchange platform to address long-term R&D&I topics and foster cross-fertilisation across technologies and processes
- Address horizontal topics of common interest related to innovation, opportunities and competitiveness
- Share experience and best practice
- Encourage communication and collaboration

TO 5E INTERACTIVE FEEDBACK WORKSHOP

- Presentation of
  - 5E Joint Vision based on the new concept of Functional Electronics
  - 5E Vision Papers on Energy, Autonomous Operation of Machines, Sensing, Circular Economy
- Collect expert feedback on
  - 5E Joint Vision
  - Concept of Functional Electronics
  - Technology-related challenges
  - Ecosystem-related challenges
  - 5E Vision Papers and their implementation
- Collect topics for 5E Transversal WG
  - Priorities for future R&D&I programmes
  - Focus on functionalities, in particular sensing

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OBJECTIVES

1. Support industrial perspectives of EU Electronics Ecosystems
2. Position Electronics as fundamental for digitisation
3. Foster collaboration and cross-fertilisation in Electronics

HOW

- **Federating a coherent European Electronics Community**
  Large-scale community building & networking, identifying areas of cross-fertilisation, addressing hurdles and highlighting joint opportunities
- **Develop a joint vision and implement a respective technology and application meta-roadmap that complements the EC strategy on electronics**
  Defining main priorities, future missions and actions, closing loops with other areas of digitalisation and demand-side industries, and cascading strategies on European, national and regional levels
- **Increasing outreach and visibility of European electronics**
  Along 3 key axes: industrial engagement, promising applications and internationalisation

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WITH YOU & FOR YOU

VISION PAPERS OF INNOVATION

Addressing the European Areas of Intervention

JOINT VISION

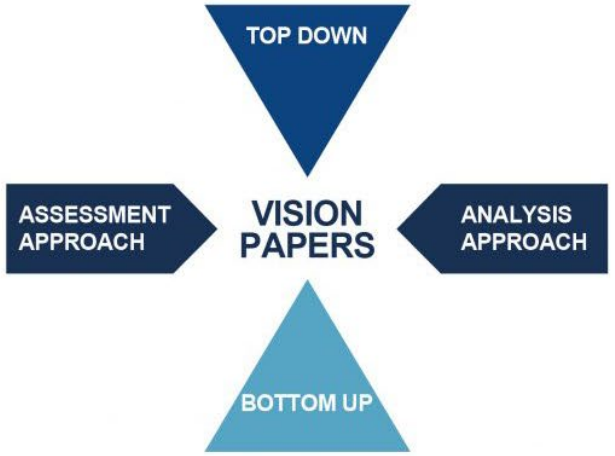
Of European Electronics Ecosystems

→ Validation and ranking of 39 opportunities
Identification of additional opportunities

→ 4 Community events
2 Workshops at EFECS and OE-A
1 Online Survey

150+ STAKEHOLDERS INVOLVED

3 VALIDATION PATHS



TOP10 OPPORTUNITIES

WOULD YOU LIKE TO LEARN MORE?
SCAN ME

39 OPPORTUNITIES

→ **Fact Sheets including**
Title
Technologies
Applications
Challenges
Opportunities

→ **DISCOVER MORE ON**
www.5e-project.eu

6 FUNCTIONALITIES

- Actuating
- Communicating
- Computing/Processing
- Energy Harvesting/Storage
- Sensing
- Signalling

13 APPLICATION SECTORS

- (Aero)Space
- Building/Construction
- Consumer Electronics
- Digital Manufacturing
- Energy
- Environment
- Food & Agriculture
- IoT/Smart Connected Objects
- Medical/Pharmaceutical/Life Science
- Natural Resources
- Packaging/Logistics
- Safety/Security
- Transport/Mobility/Automotive

11 SECTORIAL STATES OF PLAY

- Landscape Analysis
  Extraction of opportunities at the interfaces of at least 2 electronics areas

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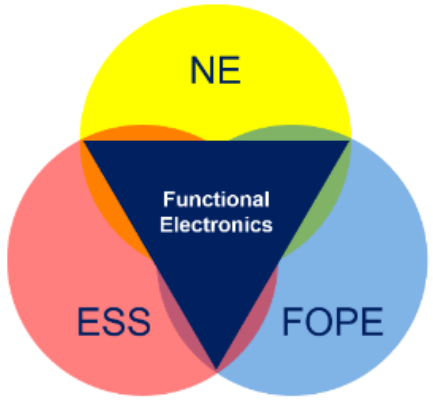
5E TANGIBLE IMPACT

FROM PROJECT RESULTS TO WORK PROGRAMME DRAFT

At the convergence of Unconventional Nanoelectronics (NE), Flexible, Organic & Printed Electronics (FOPE) and Electronic Smart Systems (ESS), the term '**Functional Electronics**' encompasses this ever-increasing capability to integrate key digital technologies with cognitive functions, shifting from purely physical integration to functional integration. Smarter (hybrid) electronic components and systems will become viable notably at high structural density on and in novel substrates (including, but not limited to, flexible, organic, printed) and structural systems (e.g. textiles, plastics, laminates, glass, steel).

Functional Electronics will generate additional value from their use that is presently not realisable by using any of the electronics forms independently, enabling new and efficient eco-design approaches at product, process and business model levels. They will have capability to capture & manage multi-physics data and contextual information in real time, with high sensitivity, selectivity and reliability as well as being networked, autonomous and complemented by bespoke software (incl. AI) solutions. Functional Electronics allow for their seamless integration in everyday objects and thereby enable the full realisation of their sustainability benefits in a broad spectrum of new applications.



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PART 1
A Joint Vision for the European Electronics Ecosystems: Shifting from Physical to Functional Electronics

Sywert Brongersma, IMEC NL

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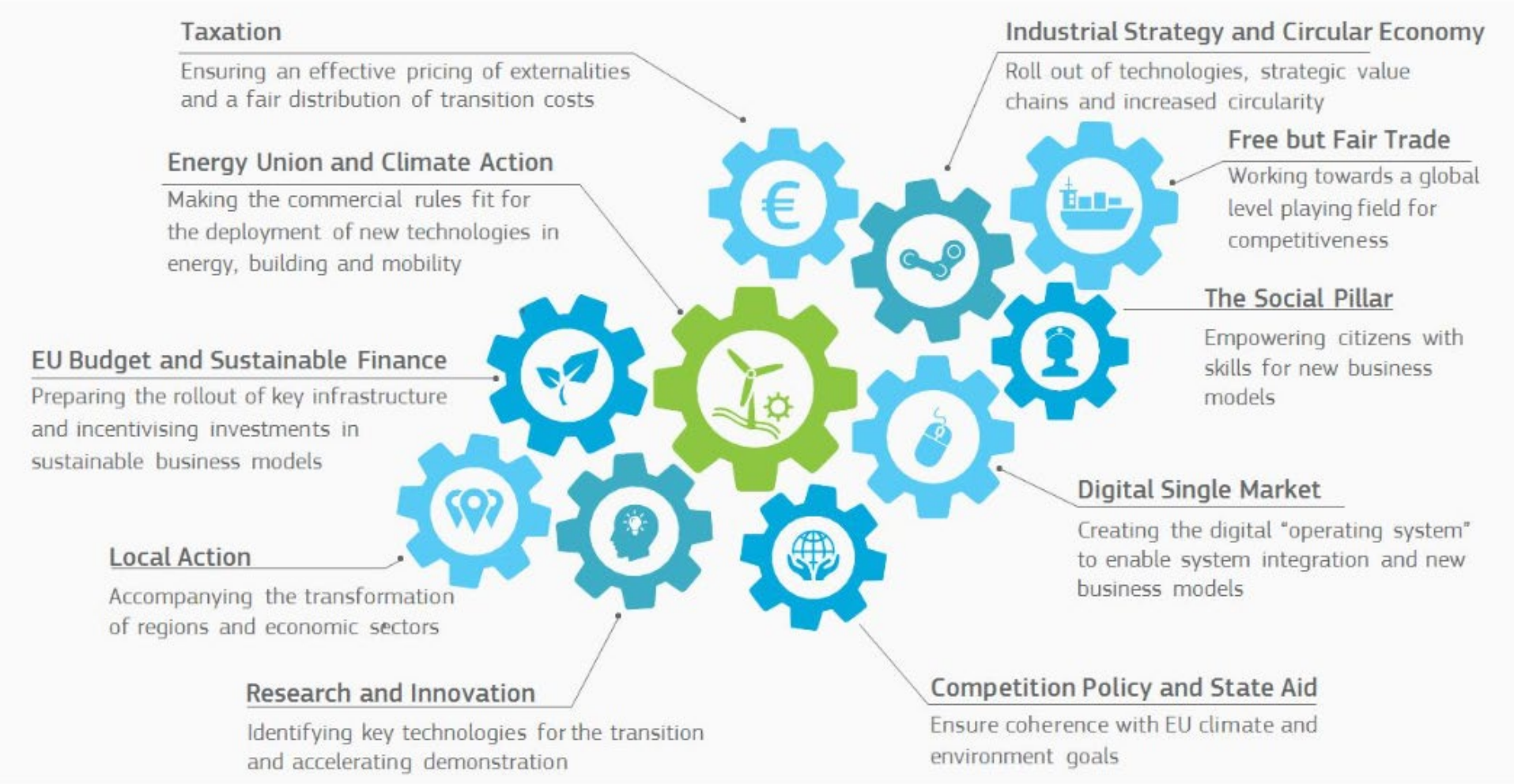
VISION OF THE EUROPEAN COMMISSION:



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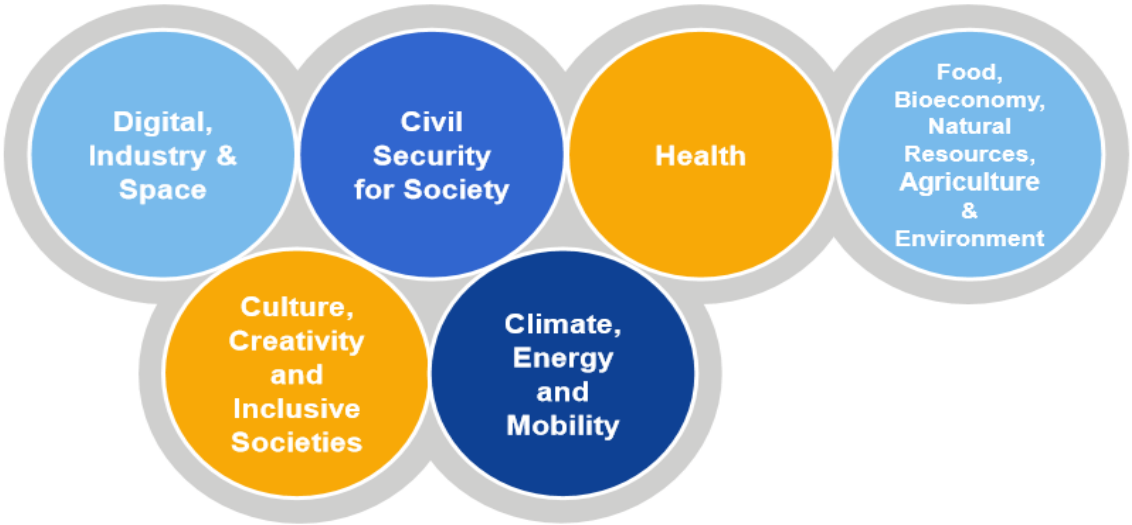
6 CLUSTERS AS PRIORITIES IN HORIZON EUROPE PILLAR 2

Global Challenges & European Industrial Competitiveness: boosting key technologies and solutions underpinning EU policies & Sustainable Development Goals

Commission proposal for budget: € 52.7 billion



Clusters in 'Global Challenges and European Industrial Competitiveness'

Clusters	Areas of intervention	
Health	• Health throughout the life course • Non-communicable and rare diseases • Tools, technologies and digital solutions for health and care, including personalised medicine	• Environmental and social health determinants • Infectious diseases, including poverty-related and neglected disease • Health care systems
Culture, creativity and inclusive society	• Democracy and Governance • Social and economic transformations	• Culture, cultural heritage and creativity
Civil security for society	• Disaster-resilient societies • Protection and Security	• Cybersecurity
Digital, Industry and space	• Manufacturing technologies • Advanced materials • Next generation internet • Circular industries • Space, including Earth Observation • Emerging enabling technologies	• Key digital technologies, including quantum technologies • Artificial Intelligence and robotics • Advanced computing and Big Data • Low-carbon and clean industry • Emerging enabling technologies
Climate, Energy and Mobility	• Climate science and solutions • Energy systems and grids • Communities and cities • Industrial competitiveness in transport • Smart mobility	• Energy supply • Buildings and industrial facilities in energy transition • Clean, safe and accessible transport and mobility • Energy storage
Food, bioeconomy, natural resources, agriculture and environment	• Environmental observation • Agriculture, forestry and rural areas • Circular systems • Food systems	• Biodiversity and natural resources • Seas, oceans and inland waters • Bio-based innovation systems in the EU Bioeconomy

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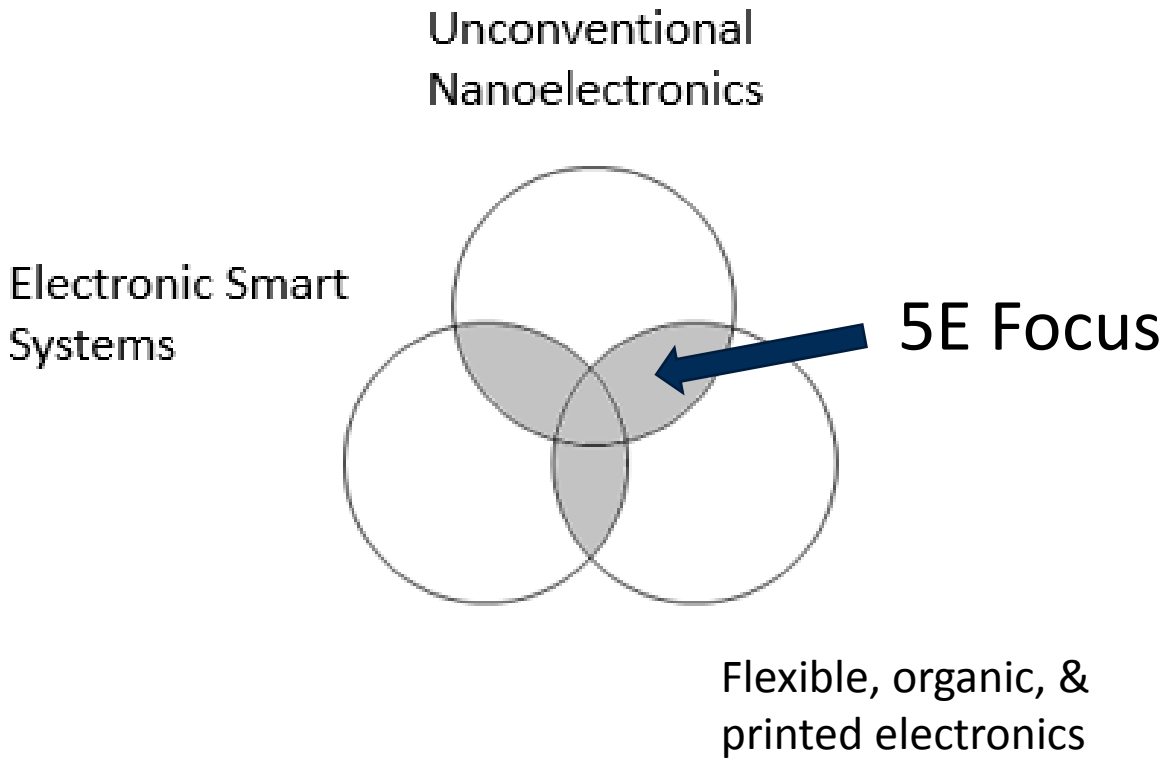
A NEXT GENERATION OF SOLUTIONS CAN BUILD ON EUROPE'S EXPERTISE IN:

Electronics as a transversal enabler



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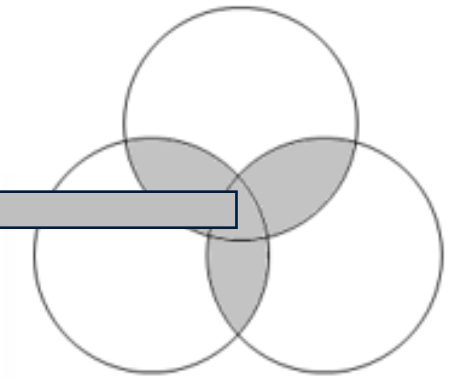
Identify Federating Opportunities

6 Product's functionalities vs. 13 Sectors of applications	(AERO)SPACE	BUILDING / CONSTRUCTION	CONSUMER ELECTRONICS	DIGITAL MANUFACTURING	ENERGY	ENVIRONMENT	FOOD & AGRICULTURE	IOT/SMART CONNECTED OBJECTS	MEDICAL / PHARMACEUTICAL / LIFE	NATURAL RESOURCES	PACKAGING / LOGISTICS	SAFETY / SECURITY
ACTUATING												
COMMUNICATING												
COMPUTING / PROCESSING / DATA STORAGE												
ENERGY HARVESTING / STORAGE												
SENSING												
SIGNALLING (OPTICAL IMAGING, LIGHTING)												



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Based on public Information

4.1 Strategic Research Agendas

Area 1	Area 2	Area 3
		♦ EPoSS SRA 2017 link ♦ Augmented SRA 2015 link ♦ EPoSS SRA 2013 link
Boosting Electronics Value Chains in Europe – June 2018 Link SRA 2019 link		

4.2 Position papers

Area 1	Area 2	Area 3
♦ International Focus Teams' Roadmap Reports (IRDS, 2017): "Application benchmarking" / "Environmental, Safety, Health, and Sustainability" / "More Moore"; ♦ Report Risk Governance and R&I Priorities in Nanotechnologies: a focus on food, health and the energy sector	♦ OEA brochure (7th edition)	♦ EPoSS Position Paper on Automation: Transport link ♦ EPoSS Position Paper on Automation: Hospital link ♦ EPoSS Pos Automation: N ♦ Internationa

4.3 Roadmaps

Area 1	Area 2	Area 3
♦ International Roadmap for Devices and Systems (IRDS™) 2017 Edition ♦ NEREID NanoElectronics Roadmap	♦ OEA roadmap (7th edition);	♦ For EPoSS, roadmaps are included in the EPoSS SRAs and in the ECS-SR

4.4 Market studies

Area 1	Area 2	Area 3
♦ Medical Devices Market Driver (IRDS, 2017) ♦ ZVEI Mikroelektronik – Trendanalyse bis 2022 (in German) link	♦ Business climate survey (oct 2018; 3 surveys per year) ♦ Flexible, Printed and Organic Electronics 2019-2029: Forecasts, Players & Opportunities, IDTECHEX 2018"	♦ EPoSS Response to the Self-Assessment Exercise Launched by the European Commission for Renewed Recognition as European Technology Platform (September 2013)

4.5 Literature

Literature sources cover conferences, papers and workshops publications.

Area 1	Area 2	Area 3
♦ EC Workshop report 'Artificial intelligence, low-power computing and acceleration' ♦ edaWorkshop and ADTC (European Nanoelectronics Applications, Design & Technology Conference) ♦ European	♦ EC Workshop report 12/2018 ♦ TSensor Summits and corresponding Trillion sensor roadmap --> Promotes flexible hybrid systems as enabler for IoT solutions link ♦ Yearly Pre-symposium at Sensor Expo, San Jose, on "Paper	♦ 'Health, well-being and medical technologies' EC workshop report link ♦ 'Robotics, automation and autonomous systems (industry 4.0 and beyond)' EC workshop report link ♦ 'Energy management, including

4.6 EU funding programmes

The main EU funding programmes sustaining R&I activities on electronics are:

Area 1	Area 2	Area 3
	♦ H2020	♦ H2020 ♦ ECSEL ♦ EURIPIDES (EUREKA)

4.7 Websites

Area 1	Area 2	Area 3
♦ IEEE link	♦ OE-A association link	♦ Smart Systems Knowledge Gateway link ♦ Smart Systems Trademark website with showcases link ♦ inSSIght website with videos, webinars link

4.8 International/EU regulations, directives and standards

Area 1	Area 2	Area 3
ACH, EU Sustainable velopment Strategy[1], HS on lead, EU conflict eral restriction, DEEE ycling uncil Directive on the al protection of ographies of niconductor products.	REACH, TSCA, RoHS, EMV (201430/EU), Packaging & packaging waste, WEE, Battery directive, Low voltage directive (2006/95/EC), JEDEC, ECIA standards, ASTM standards, Industry standards, Laws	♦ List of standardisation committees and activities of relevance for Area 3 per application sector, technologies link ♦ Council regulation establishing the ECSEL joint undertaking ♦ EMCD (Electromagnetic Compatibility Directive) ♦ LVD (Low Voltage Directive) ♦ RED (Radio Equipment Directive)

4.9 Key opinion leaders

Key opinion leaders are defined as entities, industrial association, working groups and task forces.

Area 1	Area 2	Area 3
♦ SiNANO Institute, European Academic and Scientific Association for Nanoelectronics ♦ AENEAS: Association for European NanoElectronics ActivitieS ♦ ENCOS (European	♦ OE-A with 5 WGs (EU) ♦ FLEXTECH (US) ♦ TSensors workgroup (Janusz Bryzek, Steve Walsh, Roger Grace)"	♦ EPoSS (with its Working Groups and members) ♦ Industry: Bosch, Siemens, ST, I NXP, AVL, Continental, Thales, G Vermon, Murata, Roche, I&M, BLM FESTO ♦ RTOs: Ikerlan, Hahn-Schickard, Fraunhofer, CEA, IMEC, Tyndall, F CSEM, VTT, SINTEF, CNM, FEM

4.10 Other (e.g. EC consultations, videos…)

Area 1	Area 2	Area 3
NA	♦ EU consultation Dec '18 & Report May '19 issuing 5 main recommendations	♦ EPoSS Response to MNBS consultation ♦ EPoSS Response to H2020 consultation: EPoSS Position on the Green Paper "From Challenges to Opportunities: Towards a Common Strategic Framework for EU Research and Innovation Funding" link ♦ inSSIght Trademark Showcases link ♦ inSSIght Videos link ♦ inSSIght Webinars link ♦ Smart Systems Knowledge Gateway link ♦ Smart Systems Showcases link

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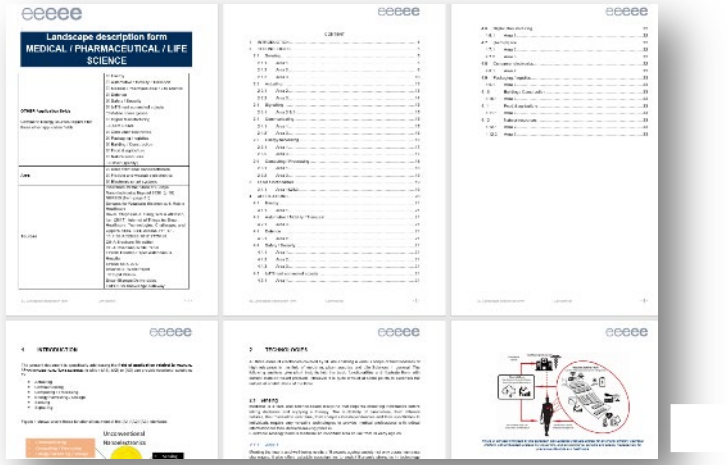
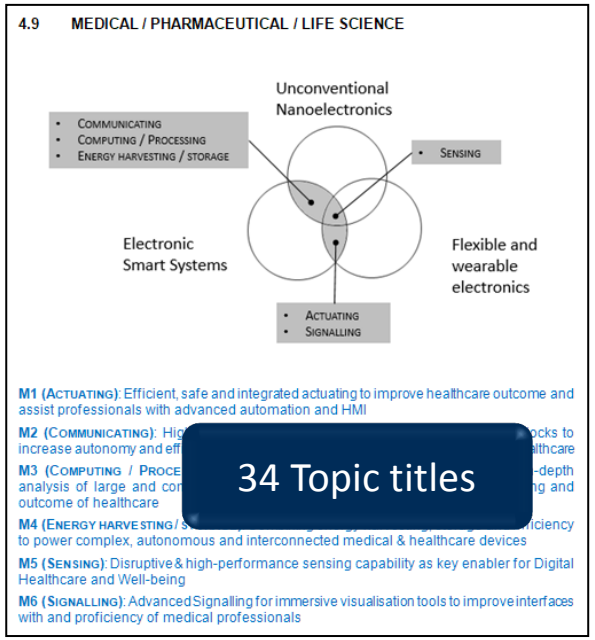
11 Sectorial States of Play



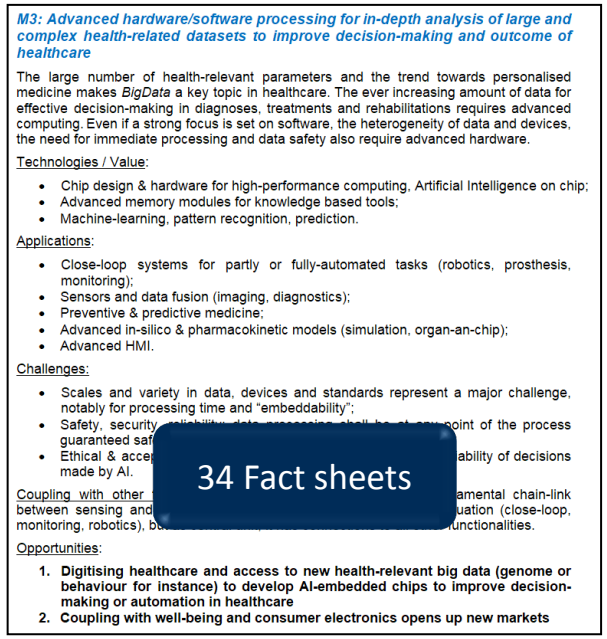
To create a catalogue of opportunities

List of topics for each sector



34 Topic titles

Fact sheet for each topic



34 Fact sheets

CATALOGUE

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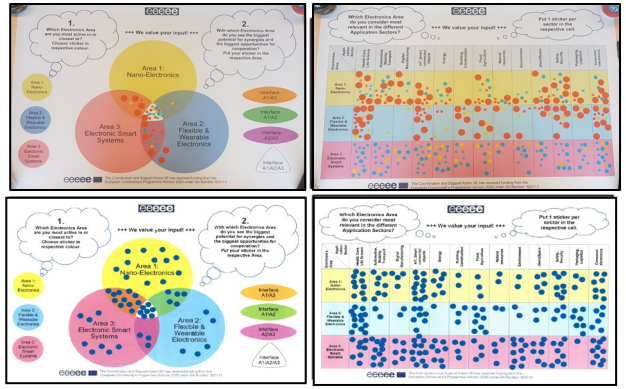
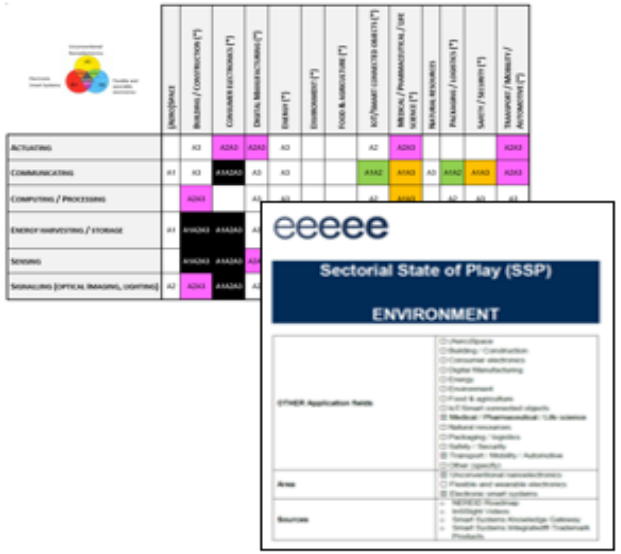
Validated through external Consultation

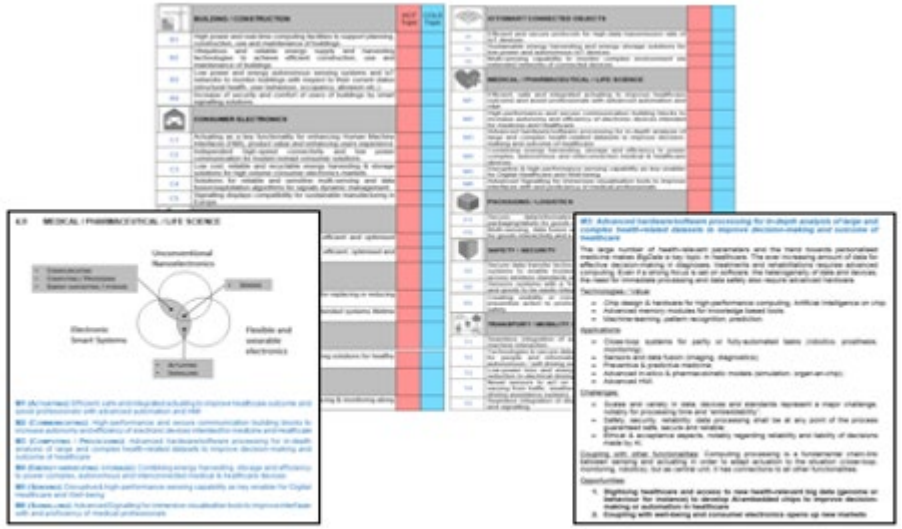


Interface analysis

> 150 Experts
In several Workshops
at international events



State of Play



Hot – Cold Ranking

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	BUILDING / CONSTRUCTION
B1	High power and real-time computing facilities to support planning, construction, use and maintenance of buildings
B2	Ubiquitous and reliable energy supply and harvesting technologies to achieve efficient construction, use and maintenance of buildings
B3	Low power and energy autonomous sensing systems and IoT networks to monitor buildings with respect to their current status (structural he occupancy, abrasion etc.)
B4	Increase of security and comfort of users of buildings by smart s
	CONSUMER ELECTRONICS
C1	Actuating as a key functionality for enhancing Human Mac product value and enhancing users experience
C2	Independent high speed connectivity and low power communica consumer solutions
C3	Low cost, reliable and recyclable energy harvesting & storage so consumer electronics markets
C4	Solutions for reliable and sensitive multi-sensing and data fusion for signals dynamic management
C5	Signalling displays compatibility for sustainable manufacturing i
	DIGITAL MANUFACTURING
D1	Actuating as key functionality for safe, efficient and optimised p industry 4.0
D2	Next generation sensor systems for safe, efficient, optimi manufacturing
	ENERGY
N1	High yield energy harvesting approaches for replacing or reducir
N2	Flexible energy storage solutions with extended systems lif including secondary use
	ENVIRONMENT
E1	Gas, pollutant, particle and waste monitoring solutions for healt living environments
	FOOD & AGRICULTURE
F1	Sensing for quality, safety and security tracing & monitoring alor

	IOT/SMART CONNECTED OBJECTS
I1	Efficient and secure protocols for high-data transmission rate of IoT devices
I1	Sustainable energy harvesting and energy storage solutions for low-power and autonomous IoT devices
I3	Multi-sensing capability to monitor complex environment via extended networks of connected devices
	MEDICAL / PHARMACEUTICAL / LIFE SCIENCE
M1	Efficient, safe and integrated actuating to improve healthcare outcome and assist professionals with advanced automation and HMI
M2	High-performance and secure communication building blocks to increase autonomy and efficiency of electronic devices intended for medicine and Healthcare
M3	Advanced hardware/software processing for in-depth analysis of large and complex health-related datasets to improve decision-making and outcome of healthcare
M4	Combining energy harvesting, storage and efficiency to power complex, autonomous and interconnected medical & healthcare devices
M5	Disruptive & high-performance sensing capability as key enabler for Digital Healthcare and Well-being
M6	Advanced Signalling for immersive visualisation tools to improve interfaces with and proficiency of medical professionals
	PACKAGING / LOGISTICS
P1	Secure data/information wireless transmission in packaging/labels for goods interconnectivity and e-services
P2	Multi-sensing, data fusion and management in packaging/labels for goods interactivity and e-services
	SAFETY / SECURITY
S1	Secure data transfer technologies for flexible and adaptable IoT systems to enable trusted solutions in data communication, across wireless standards and applications
S2	Sensors systems with a "trusted label" for protection of people and goods to be easily integrated into products
S3	Creating visibility or convey information as informative or preventive action to promote effective operation and physical safety
	TRANSPORT / MOBILITY / AUTOMOTIVE
T1	Seamless integration of actuators in car interiors for human machine interaction
T2	Technologies to secure data transfer and enable trusted solutions for people and information in car2car communicating for autonomous / self-driving vehicles
T3	Low-power loss and energy harvesting for emission and CO_2 reduction in electrical driving
T4	Novel sensors to act on changing situations in surrounding, varying from traffic, weather, … to assist in ADAS (autonomous driving assistance system), safety and power consumption
T5	Seamless integration of displays for human machine interaction and signalling

To obtain a consolidated list of opportunities

All available on the 5E website

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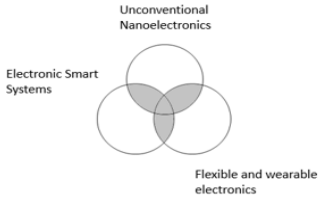
That can be matched with the Global Challenges



	(Aero)Space	Building / Construction	Consumer electronics	Digital Manufacturing	Energy	Environment	Food & agriculture	IoT/Smart connected objects	Medical / Pharmaceutical / Life science	Natural resources	Packaging / logistics	Safety / Security	Transport / Mobility / Automotive
Actuating			■	■					■				■
Communicating			■					■	■		■	■	■
Computing / Processing / data storage		■		■	■				■				■
Energy harvesting / conversion / storage		■	■		■			■	■				■
Sensing	■	■	■	■		■	■	■	■		■	■	■
Signalling (optical imaging, lighting)		■	■						■			■	■

Sweet Spots for Innovation

Clusters in 'Global Challenges and European Industrial Competitiveness'

Clusters	Areas of intervention	
Health	• Health throughout the life course • Non-communicable and rare diseases • Tools, technologies and digital solutions for health and care, including personalised medicine	• Environmental and social health determinants • Infectious diseases, including poverty-related and neglected disease • Health care systems
Culture, creativity and inclusive society	• Democracy and Governance • Social and economic transformations	• Culture, cultural heritage and creativity
Civil security for society	• Disaster-resilient societies • Protection and Security	• Cybersecurity
Digital, Industry and space	• Manufacturing technologies • Advanced materials • Next generation internet • Circular industries • Space, including Earth Observation • Emerging enabling technologies	• Key digital technologies, including quantum technologies • Artificial Intelligence and robotics • Advanced computing and Big Data • Low-carbon and clean industry • Emerging enabling technologies
Climate, Energy and Mobility	• Climate science and solutions • Energy systems and grids • Communities and cities • Industrial competitiveness in transport • Smart mobility	• Energy supply • Buildings and industrial facilities in energy transition • Clean, safe and accessible transport and mobility • Energy storage
Food, bioeconomy, natural resources, agriculture and environment	• Environmental observation • Agriculture, forestry and rural areas • Circular systems • Food systems	• Biodiversity and natural resources • Seas, oceans and inland waters • Bio-based innovation systems in the EU Bioeconomy

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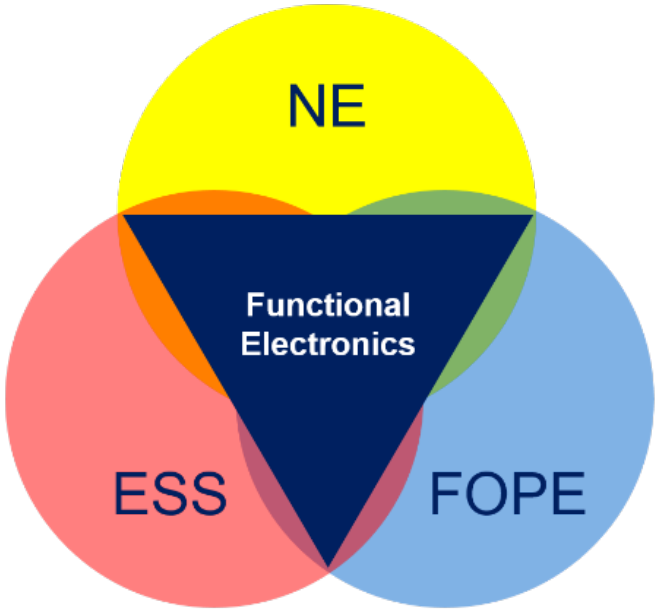
Functional electronics
as transversal enabler & differentiator
for Europe's digital transformation

To identify sweet spots for innovation where functional electronics provides solutions

A vision for Functional Electronics

- Shift from physical to functional integration (cognitive)
- Use of novel substrates (flexible, organic, printed) and structural systems (textiles, plastics, laminates, glass, steel)
- Eco-design approaches at product, process and business model levels



- Real time capture & management of multi-physics data and contextual information (high sensitivity, selectivity and reliability)
- Networked, autonomous operations, complemented by software solutions (incl. AI)
- Seamless integration in everyday objects in a broad spectrum of new applications

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Functional electronics will provide key solutions to global societal challenges

Described in Vision Papers

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Vision paper
on the role and impact
of functional electronics
on the transition towards
a circular economy

May 2020

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Vision paper:
Sensing the future

Sensors development and the role of Functional Electronics for the digitalisation of European industries and societies

June 2020

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Vision Paper
on 'Functional Electronics'
as Enabler for Autonomous Operation of Machines

July 2020

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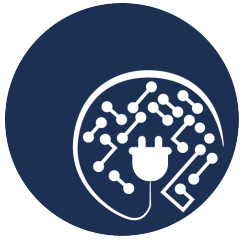

Vision Paper:
Functional electronics enabled energy solutions for the digitalisation of European industries and societies

Vision papers,
available online
for public consultation

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PART 1
Presentations of 5E Vision Papers

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THE 5E VISION PAPERS ON FUNCTIONAL ELECTRONICS

Energy

Elise Saoutieff, CEA Leti

Autonomous Operation of Machines

Stephan Karmann, Hahn-Schickard

Sensing

Corné Rentrop, TNO

Circular Economy

Nicolas Gouze, VDI/VDE-IT

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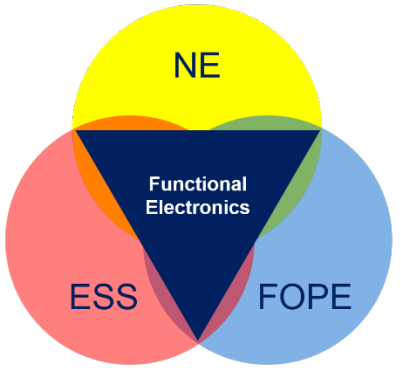
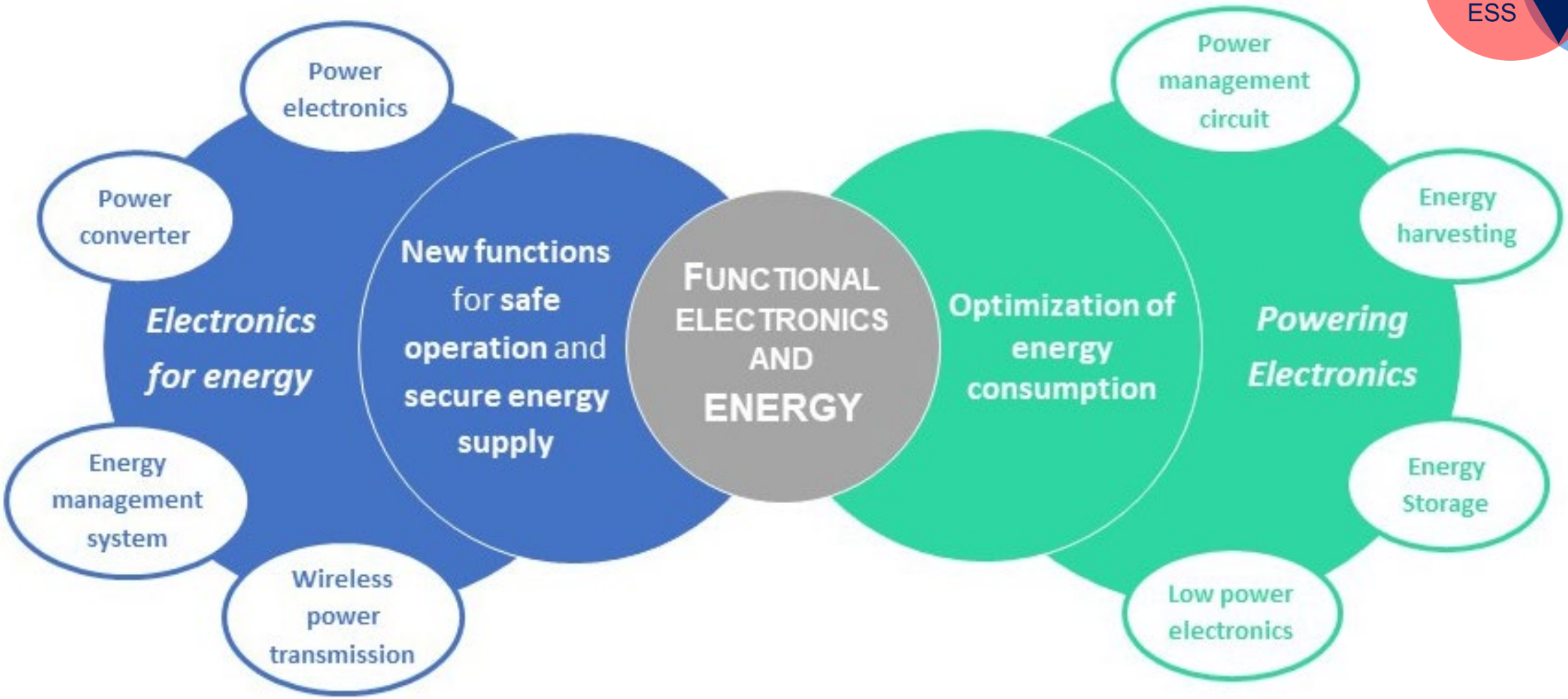
FUNCTIONAL ELECTRONICS ENABLED ENERGY SOLUTIONS FOR THE DIGITALISATION OF EUROPEAN INDUSTRIES AND SOCIETIES





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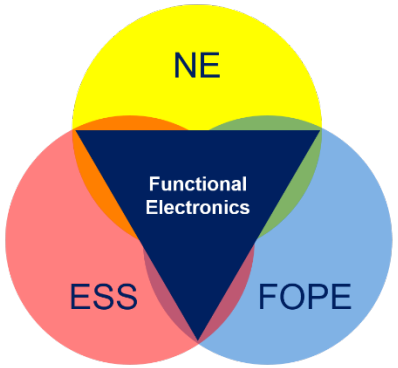
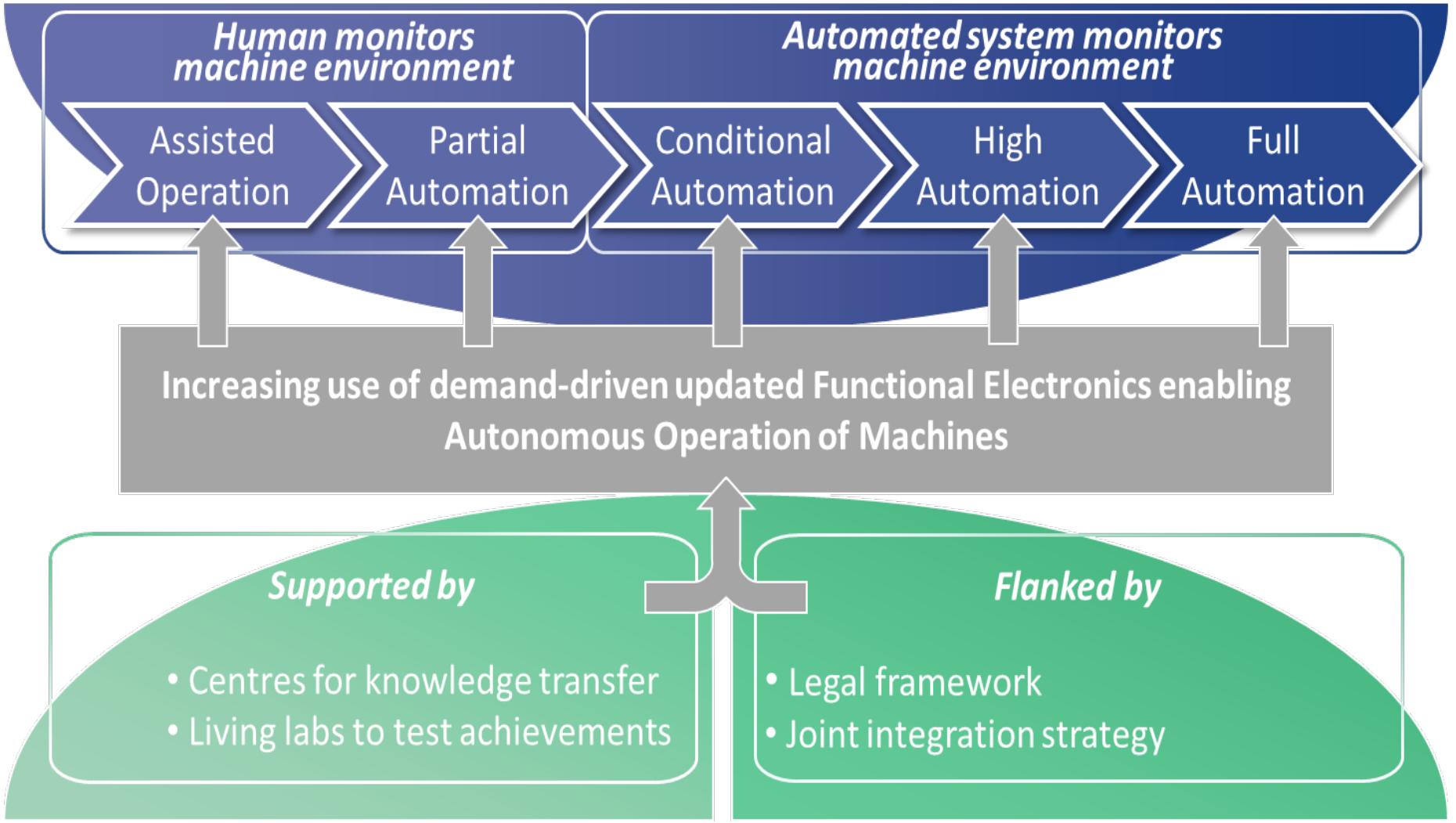
FUNCTIONAL ELECTRONICS AS ENABLER FOR AUTONOMOUS OPERATION OF MACHINES





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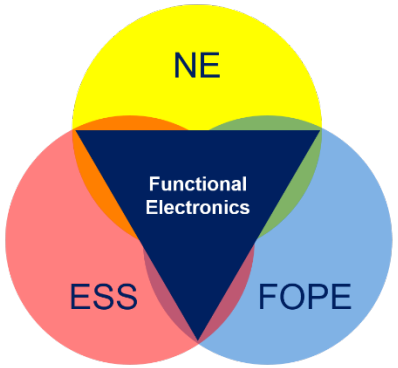
ADVANCED SENSING SOLUTIONS FOR UBIQUITOUS USE ACROSS SECTORS - TRANSVERSAL ENABLERS & DIFFERENTIATORS OF EUROPEAN DIGITAL TRANSFORMATION



Sensing Landscape

- Re-active towards pro-active
- Fast changing conditions
- Fast changing occurrences

Distributed Sensing

- High density monitoring
- Large area coverage
- Product integrated

Cross-Sectoral Application

- Safety
- IoT
- Urban monitoring
- Smart grid
- Infrastructure
- Self driving cars

Technical Challenges

- Beyond algorithms
- Reliable
- Accurate
- Situation based
- Awareness
- Long lifetime products
- Remote fatigue monitoring

Electronics Roadmap

- AI
- Big data
- Smart systems
- Sensor Swarms
- A trillion sensors

eeeee

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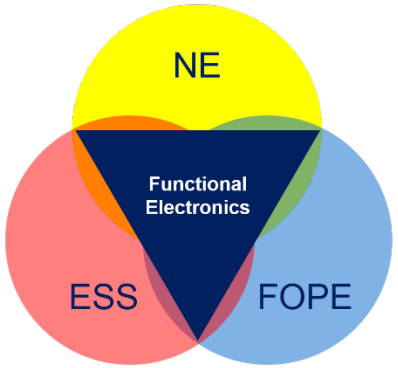
ROLE & IMPACT OF FUNCTIONAL ELECTRONICS ON THE TRANSITION TOWARDS A CIRCULAR ECONOMY



A SOUND INTEGRATION FOR AN EFFICIENT TWINING OF GREEN AND DIGITAL TRANSITIONS

THE EUROPEAN GREEN DEAL
New Circular Economy Action Plan

SHAPING EUROPE'S DIGITAL FUTURE
New Industrial Strategy for Europe

HOLISTIC IMPACTS ASSESSMENT

CLEAN MATERIALS CYCLES

CIRCULAR DATA SPACE

ECODESIGN APPROACHES

PRODUCT PASSPORT

CIRCULAR ELECTRONICS INITIATIVE

SMART MAINTENANCE

SUSTAINABLE PRODUCT POLICY FRAMEWORK

NEW BUSINESS MODELS

Unlock digital potential to maximise product value

Develop safe, sustainable & low-carbon solutions

FUNCTIONAL ELECTRONICS

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PART 1
Questions & Answers

Moderated by
Petra Weiler, Nicolas Gouze, VDI/VDE-IT

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PART 2
Interactive Part – Live Survey

Facilitated by
Petra Weiler, Nicolas Gouze, VDI/VDE-IT

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REMINDER ON LIVE SURVEY RESULTS OF Q1, 2, 3

- The link for the Live Survey is posted in the Chat or you can scan this QR code
- For each question
  - We introduce the question and response options
  - You make your choice and click on “submit”
  - We leave enough time for everyone to enter their responses
  - We switch to the results and give a brief overview
  - You wait until after the results presentation before answering the next question
- A summary of the results will be provided to all participants after the workshop
  → No need to take screenshots

https://www.menti.com/nteumswms6

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QUESTIONS

- **Do you share the vision for Functional Electronics developed in the 5E project?**
  1 Not at all / 5 Completely

- **How important are the following features in the concept?**
  1 Not Important / 3 Very Important
  - Shift from physical to functional integration
  - Use of novel substrates and structural systems
  - Eco-design approaches at product, process and business model levels
  - Real time capture and management of multi-physics data and generation of contextual information
  - Networked, autonomous operation, complemented by software (incl. AI) solutions
  - Seamless integration in everyday objects in a broad spectrum of new applications

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QUESTIONS

What are the biggest technology-related challenges that the European electronics industries are facing?

You may choose up to 3 options

- Bridging the technology gap – delivering next generation electronics
- Manufacturing capacities
- Sovereignty, securing value chains, access to resources, data protection
- Access to pilots
- Rethinking electronics design
- Cross-fertilisation, cooperation with other neighbouring sectors (HPC, AI, Photonics, Robotics)
- Standards and interoperability
- Competitiveness of European electronics Industry
- Private investment
- Public investment
- Access to skilled workforce
- Market access
- International cooperation

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QUESTIONS

Which of the 4 Vision Papers are you supporting?

You may choose up to 4 options

- Role and impact of “Functional Electronics” on the transition towards a circular economy
- “Functional Electronics” enabled energy solutions for the digitalisation of European industries and societies
- Sensors development and the role of “Functional Electronics” for the digitalisation of European industries and societies
- “Functional Electronics” as Enabler for Autonomous Operation of Machines
- None

Which timescale do you consider as realistic for the implementation of each Vision Paper?

From 2 years to > 10 years

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QUESTIONS

- **Ideas for further Vision Papers related to Functional Electronics – in one word?**

- **Which topics, transversal to electronics area, should be in the focus of future R&I programmes?**

  You may choose up to 4 options

  - Integration
  - Functionalities
  - Technologies
  - Manufacturing processes
  - Design
  - Security / reliability
  - User-friendlness / ergonomics
  - Reducing environmental footprint of electronics products

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QUESTIONS

Which functionalities are most transversal to all electronics areas?

You may choose up to 3 options

- Actuating
- Communicating
- Computing / Processing / Data storage
- Energy harvesting / conversion/storage
- Sensing
- Signalling (optical imaging, lighting)

To which functionalities should sensing definitely be combined to increase the value of future products?

You may choose up to 2 options

- Actuating
- Communicating
- Computing / Processing / Data storage
- Energy harvesting / conversion/storage
- Sensing
- Signalling (optical imaging, lighting)

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QUESTIONS

- **Do you have a feedback or recommendation for the 5E project – in one word?**
- **How are you feeling after this workshop – in one word?**

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Wrap-up & Conclusions

Petra Weiler, VDI/VDE-IT

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THANK YOU

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