



Key Digital Technologies 2020 and Beyond

***Colette Maloney
HoU Competitive Electronics Industry, DG CONNECT
European Commission***

- President-elect Ursula von der Leyen political priorities



“ensure that Europe fully grasps the potential of the digital age and strengthens its industry and innovation capacity”

Strengthening Europe’s technological leadership and sovereignty.



The EU approach: A trustful digital transformation benefitting the whole society and economy

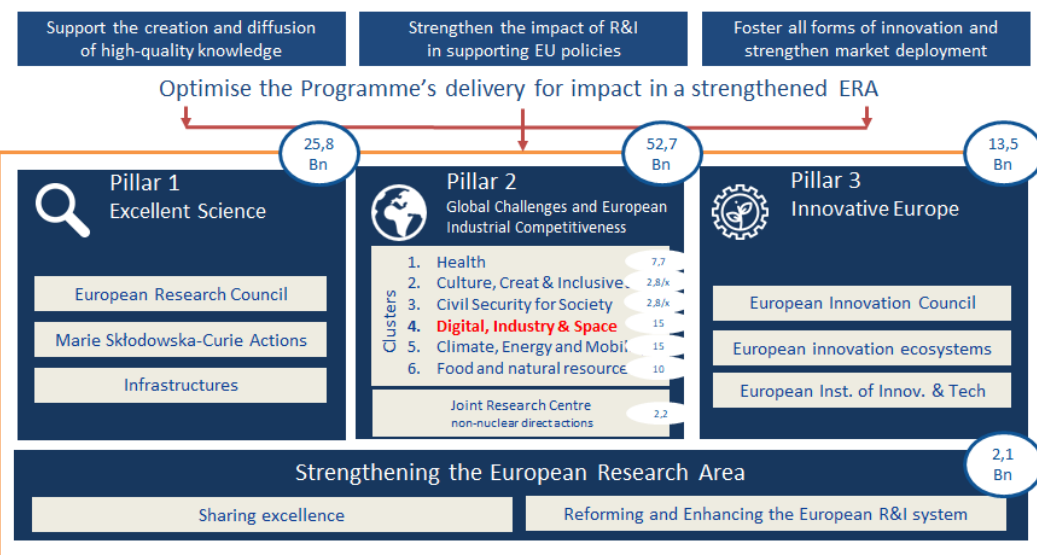
- Digital sovereignty
 - Trustful AI that empowers, a strong digital supply chain, available, accessible Data spaces, Cybersecurity
- Digital for a stronger and resilient economy
 - Trustworthy digital solutions: Platforms, Blockchain, Digital Identity, ..
 - Wider uptake across the economy, Skills and talents
- Digital for society
 - Transformation of health, mobility, culture, education, governments,..
 - Tackling disinformation and safeguarding democracy
- Digital for planet
 - Green digital
 - Digital for “greening” the economy and society

Horizon Europe programme

- Support the creation and diffusion of high-quality knowledge
- Strengthen the impact of R&I in supporting EU policies
- Foster all forms of innovation and strengthen market deployment

What?

Why?



European leadership on Digital:

- Competitive key digital technologies
- Develop and retain edge know-how
- Increase digital supply choice
- Develop strategic "value-chains"
- Digital transformation: early uptake at pan-European level
- Addressing Global Development Goals (Health, Climate, ...)

Impact:

- Societal benefits through digital transformation
- Competitiveness of European Industry across sectors
- European and Global policy priorities: jobs, health, climate



Digital-centric R&I Intervention Areas

- Key Digital Technologies
- Artificial Intelligence and Robotics
- Next Generation Internet
- Advanced Computing and Big Data
- Cybersecurity

4.2.2. Key Digital Technologies

- *Maintaining and autonomously developing strong design and production capacities in essential digital technologies such as micro- and nano-electronics, microsystems, photonics, software and cyber-physical systems, and their integration as well as advanced materials for these applications will be essential for a competitive citizen-centered and social EU.*

Broad Lines

- – Micro- and nano-electronics, including design and processing concepts, components and manufacturing equipment responding to the specific requirements of digital transformation and global challenges, in terms of performance functionality, energy and material consumption and integration;
- – Efficient and secure sensing and actuating technologies and their co-integration with computational units as the enabler of industry and the Internet of Things, including innovative solutions on flexible and conformable materials for human-friendly interacting objects;
- – Technologies as complements or alternatives to nano-electronics, such as integrated quantum computing, transmission and sensing as well as neuromorphic computing components and spintronics;
- – Computing architectures and accelerators, low-power processors for a wide range of applications including neuromorphic computing powering artificial intelligence applications, edge computing, digitisation of industry, big data and cloud computing, smart energy and connected and automated mobility;
- – Computing hardware designs delivering strong guarantees of trusted execution, with built-in privacy and security protection measures for input/output data, quantum computing as well as processing instructions and adequate human machine interfaces;
- – Photonics technologies enabling applications with breakthrough advances in functionality, integration and performance;
- – System and control engineering technologies to support flexible, evolvable and fully autonomous systems for trustworthy applications interacting with the physical world and humans, including in industrial and safety critical domains;
- – Software technologies enhancing software quality, cybersecurity and reliability with improved service life, increasing development productivity, and introducing built-in artificial intelligence and resilience in software and their architecture;
- – Emerging technologies expanding digital technologies.

- Institutionalised Partnership
 - Key Digital Technologies from semiconductors to software
- Coprogrammed Partnership
 - Photonics
- Horizon Europe workprogramme
 - Calls for proposals

Partnerships:

- strategic roadmaps from R&D to deployment
- clear commitment from partners

- Institutionalised Partnership
 - Key Digital Technologies from semiconductors to software
- Cofunded Partnership
 - Photonics
- Horizon Europe workprogramme
 - Calls for proposals

Partnerships:

- strategic roadmaps from R&D to deployment
- clear commitment from partners



KDTs underpin the digital transformation of industry and society, and EU policies

- KDTs of the future are semiconductor-based, include electronics, photonics, software and systems integration with links to advanced computing & communications, artificial intelligence & cybersecurity

KDTs are essential for the competitiveness and sovereignty of European industries, incl. automotive & aeronautics, manufacturing & energy, defense & security, and subject to intense global competition

- Europe needs to master the essential hardware, software and systems integration to guarantee privacy, security, integrity of data and energy efficiency, and drive innovation in existing and future market segments

Problems/Issues:

- Rapid change for the electronics industry including big data which in turn requires: analytics, reduced computing time and energy-efficiency;
- End of Moore's Law: future “logic” devices, Fabless-Foundry vs Integrated Device Manufacturer;
- Linking physical and digital worlds to improve: supply and management of energy, intelligence and automation in production, personalised healthcare;
- Automation and cybersecurity: physical cognitive “devices” need to be resilient to hacks, cyber attacks;
- International developments: China/Asia/US increasing investments (and monopolies);
- Skyrocketing costs, very strong (shrink of) players, more vertical industries, new computing paradigms;

It seems essential to:

- strengthen the JU in view of evolving international, industrial and technological contexts
- ensure an appropriate streamlining of technology development, upstream to the research and innovation currently performed in ECSEL
- strengthen cooperation with other partnerships
- consider options to improve the attractiveness of the instrument to small companies and research organisations
- significantly reduce administrative burden on applicants and beneficiaries

- *new computing paradigms; edge-computing esp. for AI; areas where Europe will need to be more self-reliant*
- *intensify efforts rather than spread them too broadly;*
- *loosen the boundaries around h/w and s/w:*
 - *beyond microelectronics to (some!) photonics and to higher layers of software beyond embedded software;*
 - *integrated, not isolated, context;*
- *integrated photonics; silicon photonics;*
- *embedded software at hardware level; platform software at middleware level; intelligent software;*

- Preparation of impact assessment (for JUs)
 - at various levels
- Preparation of proposal with members (all partnerships)
 - Industry, RTOs academia (through IAs) and Member States
- Discussion with Member States to align efforts and improve the experience for applicants and beneficiaries
 - streamlining and harmonisation
- Consultations

EVC* Implementation Plan

A strategy for Electronics



Capitalize on STRENGTHS	Address WEAKNESSES
<ul style="list-style-type: none"> • Accelerate innovation through cooperation across value chains/networks: automotive, industrial, health & care, aerospace/defence - (JU) • Exploit capabilities in sensors, low-power and security for IoT and Industry 4.0 	<ul style="list-style-type: none"> • Pool resources around Design to exploit IPs by lowering barriers for low-volumes • Task-force to increase supply of skilled workforce • Favour support to local manufacturing capacity (IPCEI)
Seize OPPORTUNITIES	Minimize THREATS
<ul style="list-style-type: none"> • Leverage on strengths in low-power and embedded systems for AI on the edge • Create a EU platform for deployment of next generation computing (e.g. neuromorphic and quantum) 	<ul style="list-style-type: none"> • Program for EU autonomy in strategic components (defence, aerospace, security, HPC, etc) • Mechanism to scrutinize Foreign Direct Investments





ECSEL JU 1.2 B€ from EU + €1.2 B€ from national authorities + > 2.4 B€ from industry
= 5 B€ from 2014-2020

- B€ 0.75 remains to be invested in 2020 – think ahead;
- Today's focus vs tomorrow's needs - *AI driving technology; shift to edge-computing; emerging computing paradigms (neuromorphic; robust supply chains, etc* - make strategic choices?
- Today's administrative reality - *30 different contracts, funding schemes and eligibility rules* - vs tomorrow's needs. **Simplification is a must!**



18.12.2018 : Commission approves **1.75 B€** funding by DE, FR, IT, UK to project unlocking additional **6 B€** in private investment

- Covers R&I and First Industrial Deployment → expand manufacturing footprint;
- Component offer covers a range of functionalities for emerging applications (electric/autonomous vehicles, IoT);
- Prepare now for a future project: build up capacity in edge-AI?

KDT at centre of the political agenda

- *Challenging global context*
 - *increased protectionism, massive investments, export control, technology access restrictions*
- *Emerging opportunities with potential to evolve into mainstream markets*
 - *AI, edge computing, advanced digital manufacturing, design/IP competences (networking, security,...)*
- *Technological sovereignty*
 - *HP/LP processors, high-count gate FPGA, smart sensor-based systems, soft/hard technologies for AI*
- *The value in the value-chains*
 - *joint developments towards key applications*

Be ambitious! Begin now!

Thank You!