NETWORLD2020
STAKEHOLDERS WORKSHOP
ECSEL JU AND KDT PARTNERSHIP

Dr.ir. Yves GIGASE
Head of Programmes
ECSEL JU

Dresden, 2/10/2019

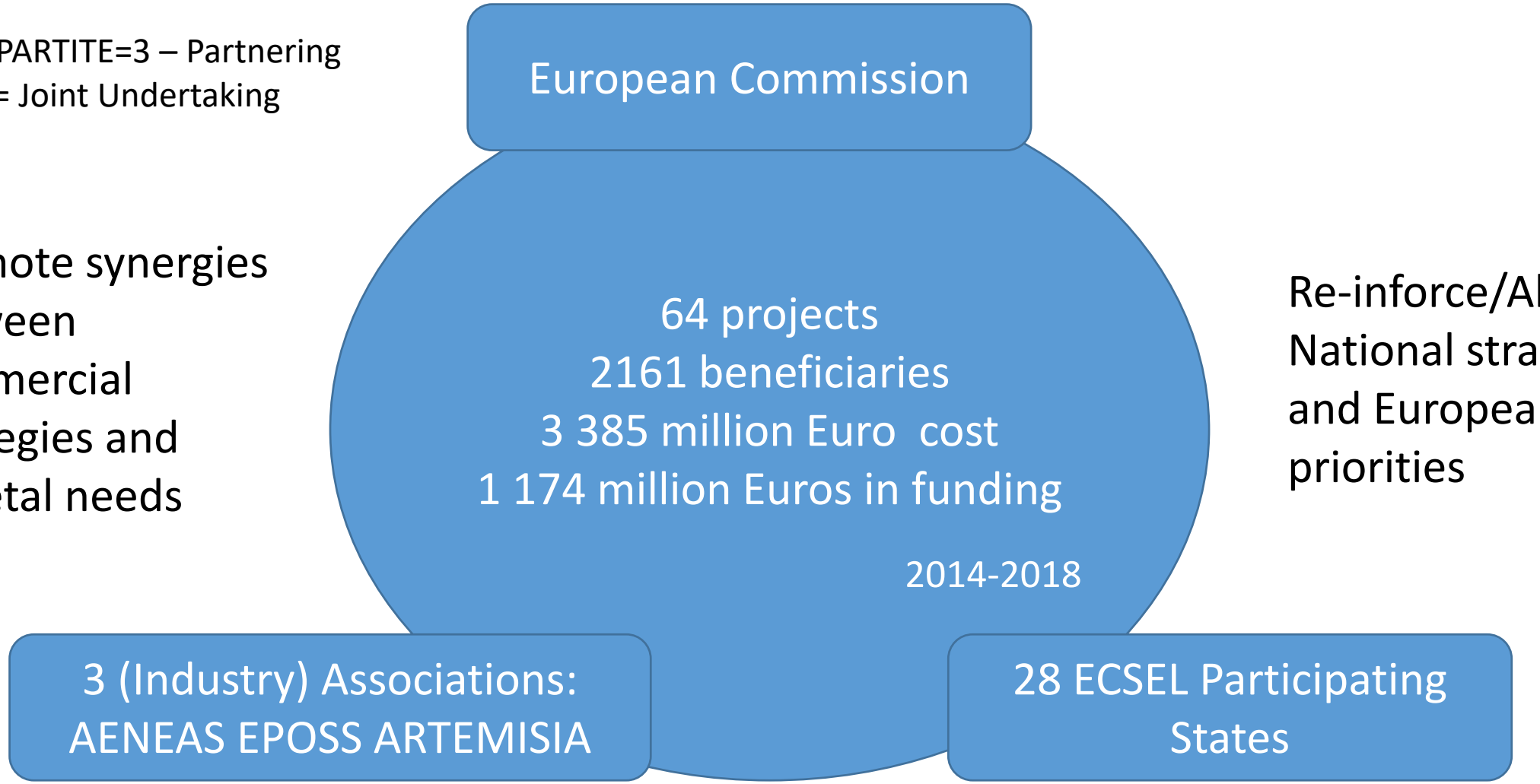
1. **What is ECSEL?**
    1. **Governance**
    2. **Portfolio**
    3. **Calls**
    4. **ECS Community**
2. What does ECSEL mean for the 5G-community?
3. What will come next?

Key Digital Technologies JU (KDT)

- KDT will look a lot like the ECSEL JU

ECSEL : A UNIQUE MODEL TO PROMOTE EUROPEAN INNOVATION

TRIPARTITE=3 – Partnering
JU = Joint Undertaking



Promote synergies between commercial strategies and societal needs

Re-inforce/Align National strategies and European priorities

JU: COMMON GOVERNANCE + COMMON FUNDING

WP
SRA

Governing Board
ECSEL Members
(Public Authorities, Private Members)

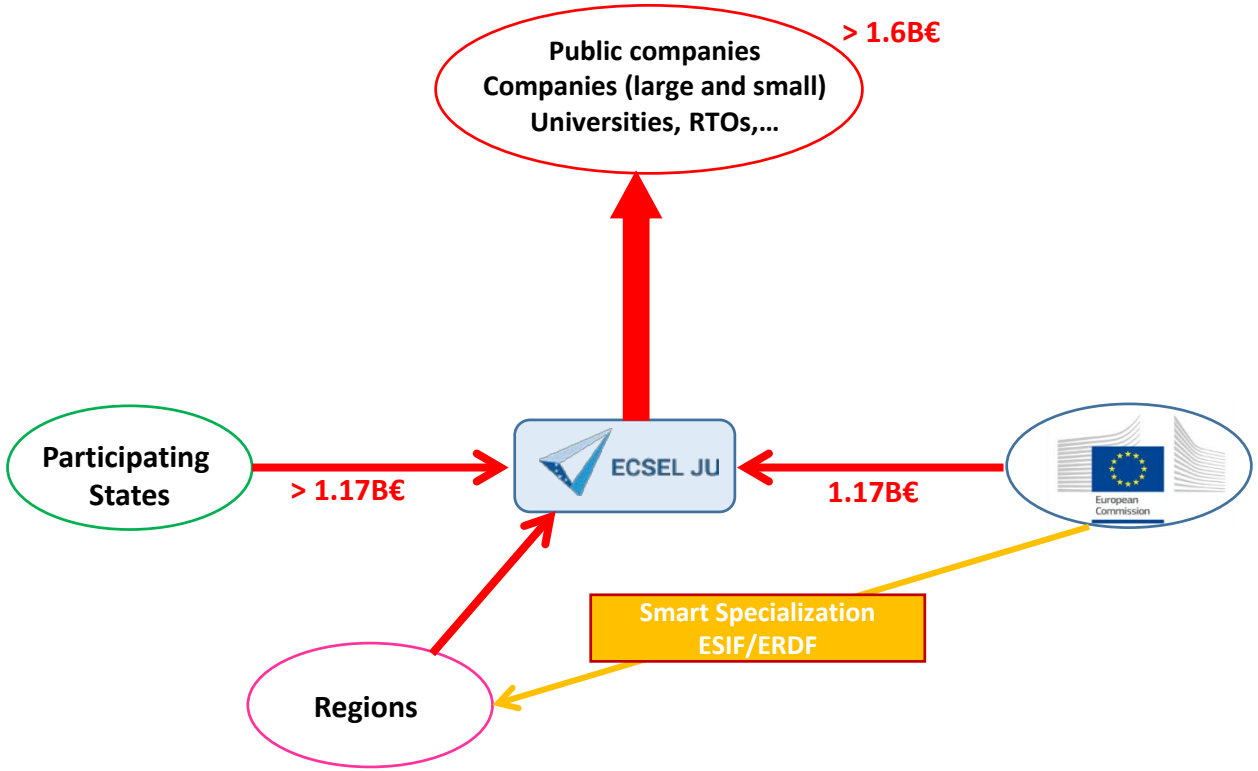
Executive Director
Programme Office

Call

Public Authorities Board
European Commission,
ECSEL Participating States

SRA

Private Members Board
AENEAS, ARTEMIS-IA, EPoSS

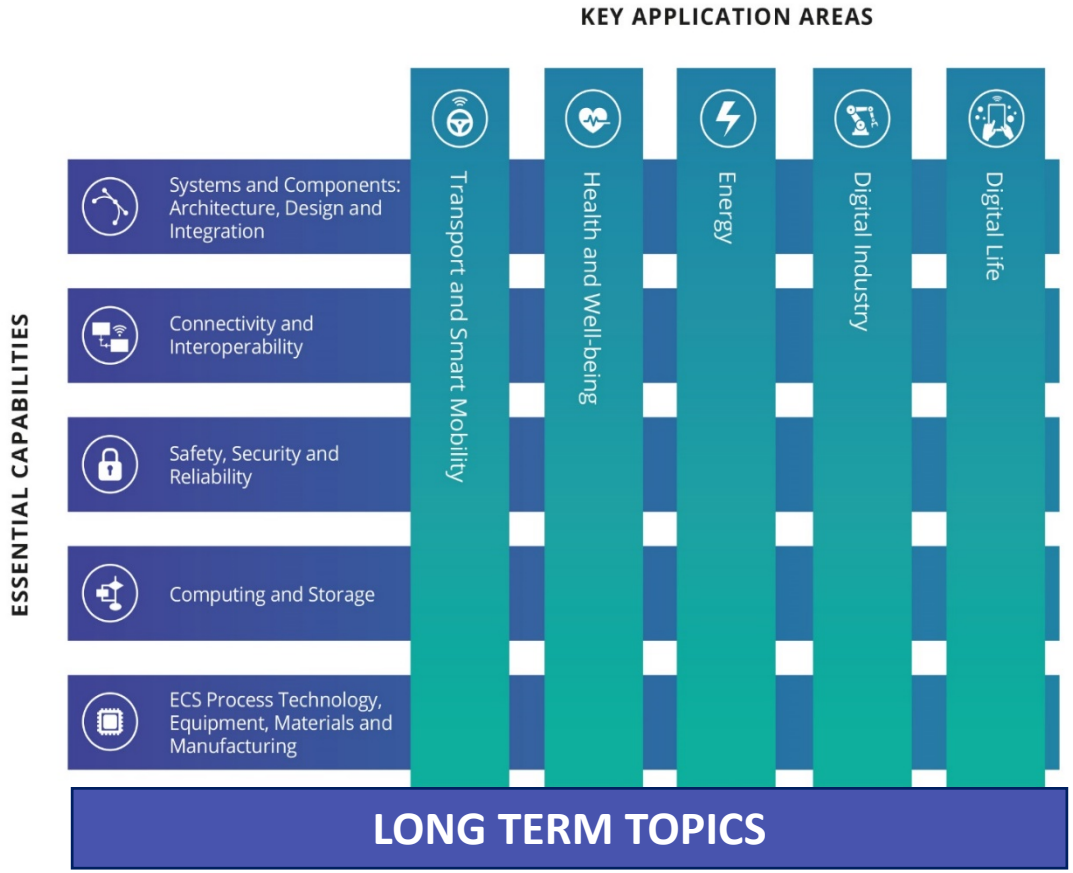


Contributions EU:EPS:Benefiaries in 1:1:2 proportion

ECSEL Participating States: EU Member States and Israel, Norway, Switzerland and Turkey
Also participating: US, Canada, Taiwan, Brasil

A common strategy: Strategic Research Agenda (SRA)

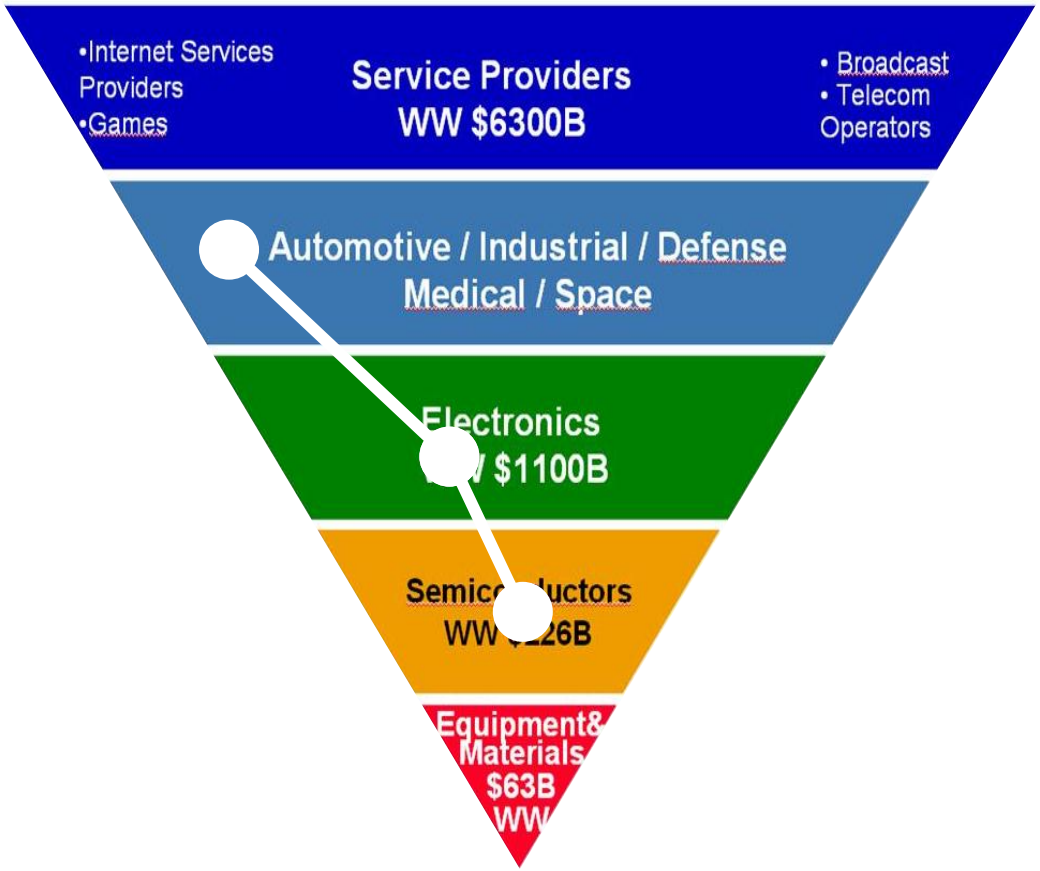
- 3 Industry Associations
  - AENEAS
  - ARTEMIS-IA
  - EPoSS
- Other activities of the 3IA
  - EFECS
  - Brokerage events
  - Matchmaking
- SRA is adopted by the Governing Board: SRA becomes MASP
- A revision of the SRA to prepare KDT is foreseen



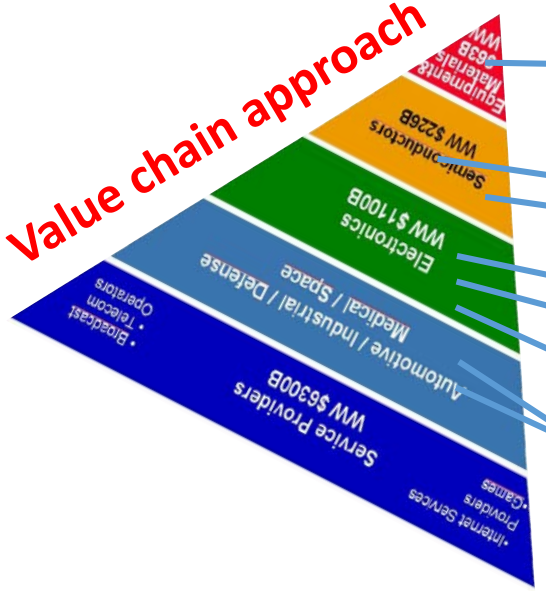
ECSEL cooperating with other programmes

ECSEL projects reach out to programmes outside of ECSEL: **value chain** stakeholders, other associations or programmes, etc by:

- Developing standards
- Using roadmaps and priorities of other organisations
- Integrating communities outside ECSEL in the ECSEL value chains
- Developing key enabling technologies enabling technologies of other programmes/ sectors

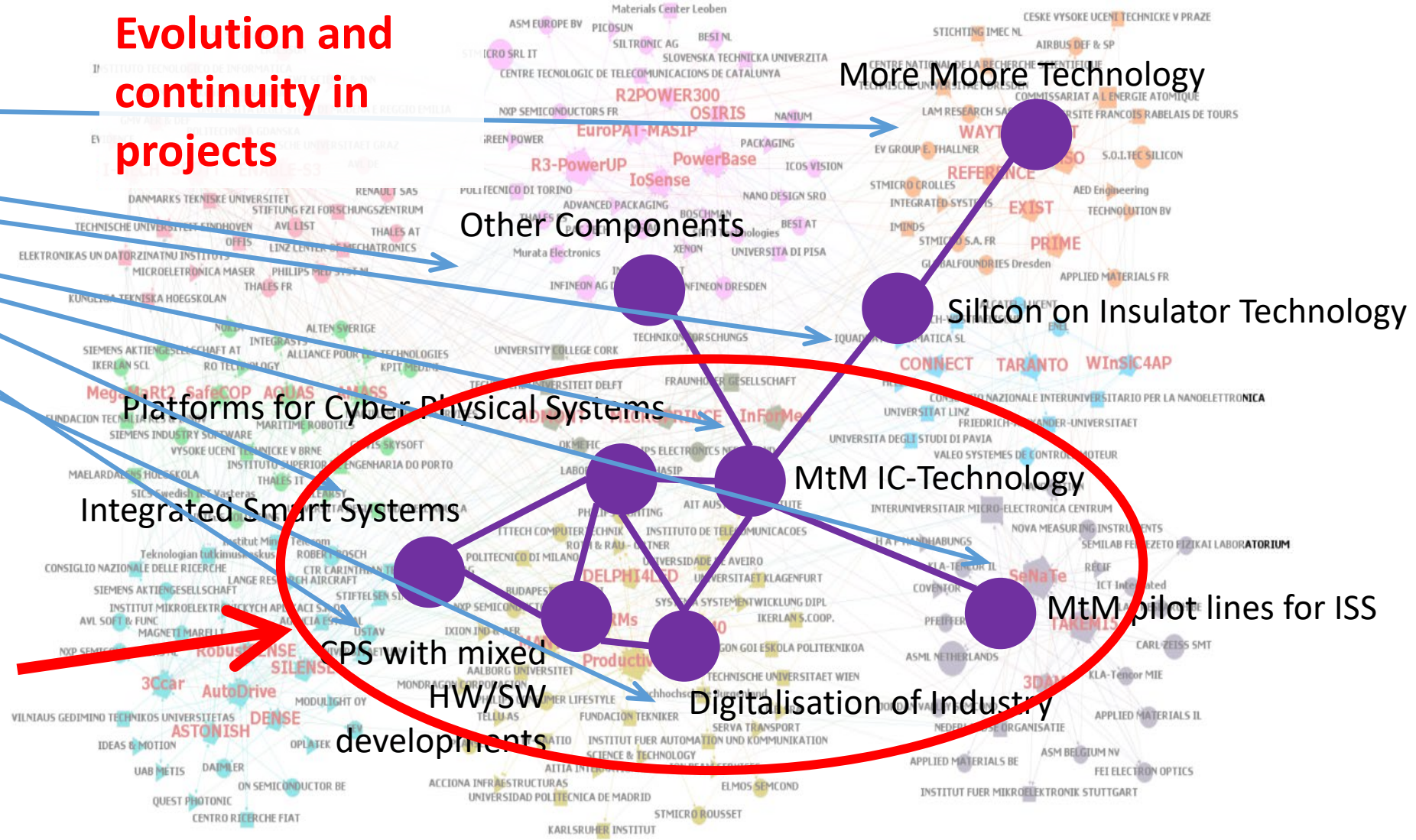


ECSEL: NETWORKS OF PARTNERS AND PROJECTS



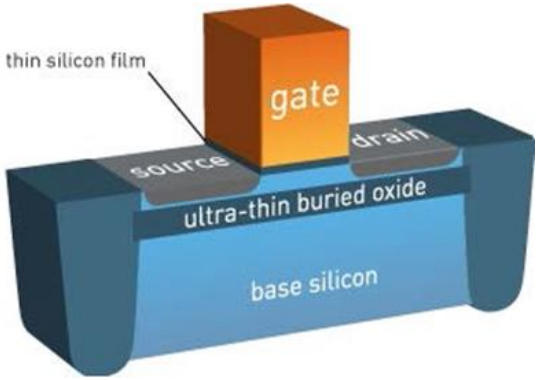
Evolution and continuity in projects

Evolution also visible in the interactions between clusters



EXAMPLE: Cluster: Silicon on Insulator technology

Fully Depleted Silicon on Insulator: EU changing the rules of the game for edge computing, IoT, always-on applications, radars, … **made in Europe !**



Call 2017 ECSEL **Ocean12** lowest power processor
Call 2015 ECSEL **Reference** 4G/4G+ & 5G
Call 2014 ECSEL **Ways2gofast** 22 nm ultra low power
Call 2013 ECSEL **Things2Do** FDSOI process/design
Call 2012 ENIAC **Places2Be** 28nm FDSOI industrialisation

Important Projects Common European Interest

Examples

Infineon Austria invests 1,6 B € over 6 years on a new 300 mm fab for power semiconductors: 400 employees and 1,8 B€ additional sales. (May 2018)

ST-Italy is building a 300mm Si-fab and a 200mm SiC fab for power components and circuits.

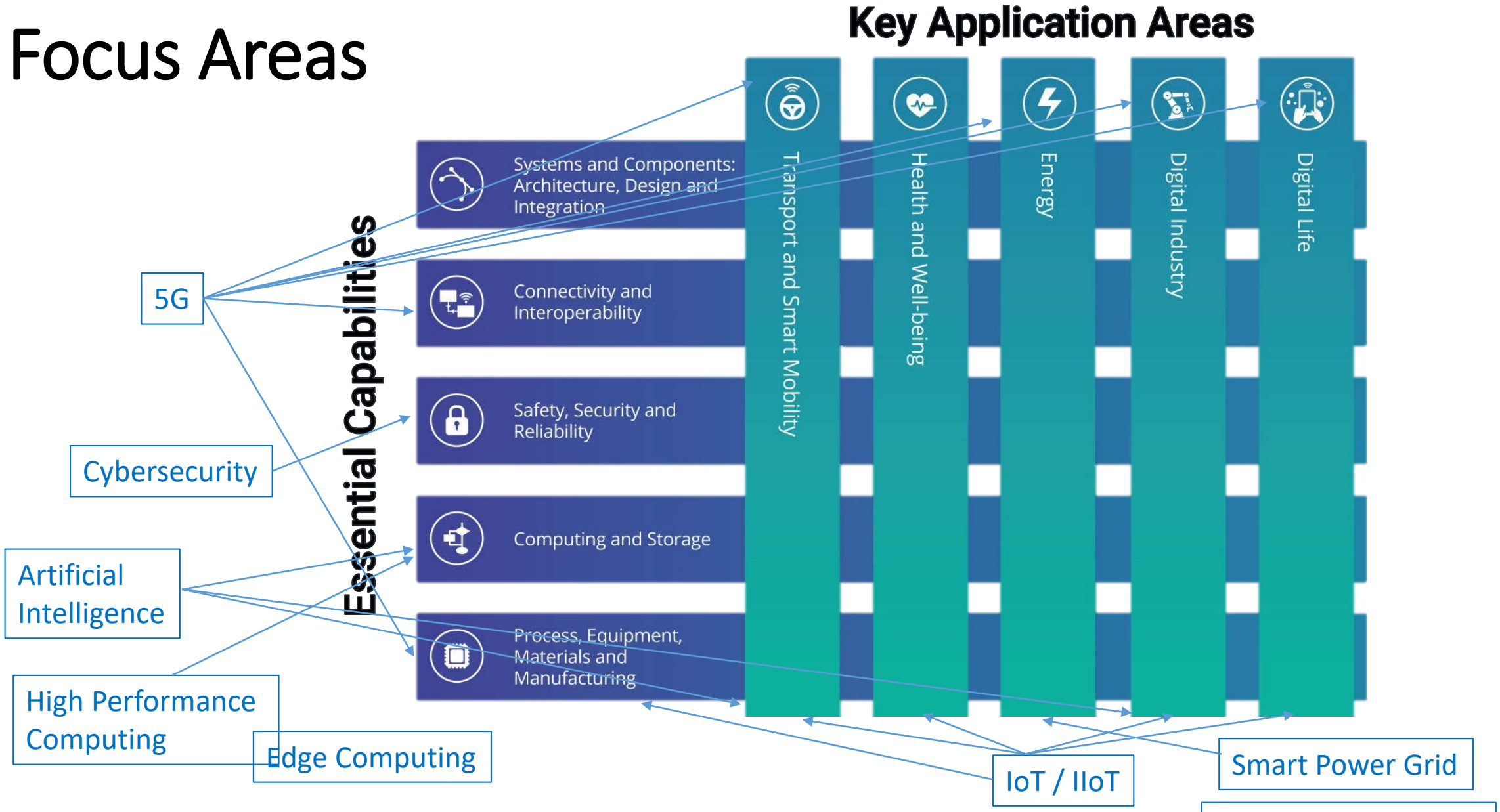
ECSEL Calls

- Yearly
- Two phase PO + FPP
- Schedule
  - Launch: February
  - Deadline FPP: September
  - Selection by PAB: November
  - GA signature: May Y+1
- 1x RIA and 1x IA calls (all topics open)
- Special topics
- In 2020: common call with IMI JU


ARTEMIS
October 2009 NO.5
ECSEL JU
ECSEL ARE
PEOPLE, ORGANIZATIONS AND PROJECTS
BUT ALSO
PUBLIC AUTHORITIES
ASSOCIATIONS
EVENTS
Smart metering of any device
Benchmark your energy consumption
ARTEMIS
Multi-Annual Strategic Plan
And
Research Agenda
2009

1. What is ECSEL?
2. **What does ECSEL mean for the 5G-community?**
    1. **MASP**
    2. **Cooperation aspects of ECSEL**
    3. **Examples of projects**
    4. **Lighthouse initiatives**
3. What will come next?

Focus Areas


Key Application Areas
Essential Capabilities
Systems and Components: Architecture, Design and Integration
Connectivity and Interoperability
Safety, Security and Reliability
Computing and Storage
Process, Equipment, Materials and Manufacturing
Transport and Smart Mobility
Health and Well-being
Energy
Digital Industry
Digital Life
5G
Cybersecurity
Artificial Intelligence
High Performance Computing
Edge Computing
IoT / IIoT
Smart Power Grid
Neuromorphic computing
LONG TERM TOPICS
Quantum computing

ECSEL JU MASP-2019 and 5G

- Recognition of the importance of 5G for the ECSEL community

  In particular, **it is essential for the European ECS industry to be at the forefront of the 5G research and innovation**, both to reap the benefits of this future huge market and to allow Europe to leverage this technology for an improved competitive position. More generally, Europe must remain at the forefront of the Next Generation Internet, which requires the development of advanced technologies for faster access, higher capacity, ubiquitous connectivity, energy saving and virtualised network / network management.

- Crucial role of public instances in 5G investments

  Connectivity will be based on multiple protocols and standards, as e.g. camera's, vision systems, radar, Lidar, C2X 820.11p (G5), NFC, 5G, etc. **In cooperation with the public authority's necessary investments to provide 5G** (and probably future generation) telecoms in all but the most remote or rural areas **is crucial**.

- Importance of the energy consumption issue

  In order to avoid explosion of energy consumption of the communication networks, energy per transmitted data unit needs to be cut drastically. **In the 5G development**, **the target is set to limit the energy per transmitted bit to 1/10th of today's level**.

  High priority topic: Efficient adaptive power management for 5G wireless network.

- 5G is essential for the digitalization policies of the Union

  Disruption can happen as wireless sensors/actuators and new field connectivity solutions are needed with industrial IInternet. Edge and Cloud-based computing and integration will change the value chain. One challenge is to use these computing facilities in a fast and dynamic way.

  High priority: Prepare for the era of 5G in communication technology, and especially its manufacturing and engineering dimension.

MASP Chapter: CONNECTIVITY AND INTEROPERABILITY

- Recognition of the competitive advantage

  Moreover, in order to bring added value and differentiation in comparison with US and Asian competitors, **European industry has to secure the access to any innovative hardware or software technology enabling the development of complex connected systems** (which will help to capture more value by targeting higher end or more innovative applications).

- Europe is strong in components but the module makers that capture value are in US and Asia

  In order to enable the emergence of a European champion delivering a connectivity module/solution, the **key game changer will comprise enabling the necessary ecosystem required to develop an innovative connectivity system leveraging both heterogeneous integration schemes and derivative semiconductor processes already available in Europe**.

- Educational challenge

  The availability of engineers having interoperability and dynamic integration competencies is currently limited mainly due to limited academic research and education on SoS problems, so **a joint industrial and academic effort is vital to rapidly increase the availability of such competencies**.

- Game changers for advancements in interoperability and integrability to maintain the European lead
  - IoT interoperability, SoS integration technology and engineering tools reducing connectivity developments cost by 80%
  - Open interoperability and integration frameworks and platforms.
  - **Ease of integration of new and secure IoT hardware and radio solutions like 5G**.

High priority areas for Connectivity and Interoperability

- Major Challenge 1: Meeting future connectivity requirements leveraging heterogeneous technologies
  - 5G technologies from IoT to backend (HW, control, envelope tracking, system integration …)
  - Evaluation of a new frequency band (5G, > 100 GHz ...)
  - Evaluation of new medium (RF/mmW signal propagation over plastic, single mode optical waveguide using laminated polymer platform ...)
  - Enabling a European ecosystem able to support heterogeneous integration (multi die System in Package, advanced assembly capability, advanced substrate manufacturing ...)
- Major Challenge 2: Enabling nearly lossless interoperability across protocols, encodings and semantics
  - Semantics interoperability
  - Autonomous translation of protocols, encodings and semantics.
  - Enabling of IoT and SoS evolvability over time and technology generations
  - Integration with security aspects of Major Challenge 3, see below.
- Major Challenge 3: Ensuring Secure Connectivity and Interoperability
  - Security semantics
  - Autonomous security translation in connectivity chains and networks
  - Enabling of IoT and SoS security evolvability over time and technology generations

Some examples of projects involving 5G

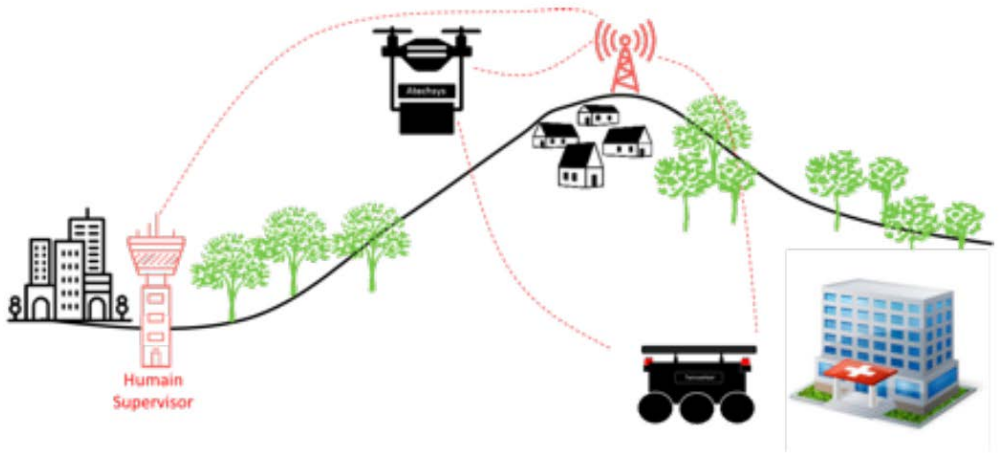
Comp4Drones (2018, 53 partners, 27MEuro cost)

Framework of key enabling technologies for safe and autonomous drones' applications: drone platform with a wide range of integrated sensors (navigation sensors, image & spectral sensors) for transport applications, smart systems focus on essential communication features for a drone:

(1) position indication,
(2) instructions reception,
(3) coordination with other flying objects, and
(4) allowing traffic management.
(5) Neural network accelerators in FPGA.

Development of smart systems
Answering a need identified in the SESAR JU
Standards
Development of eco system based on open platform

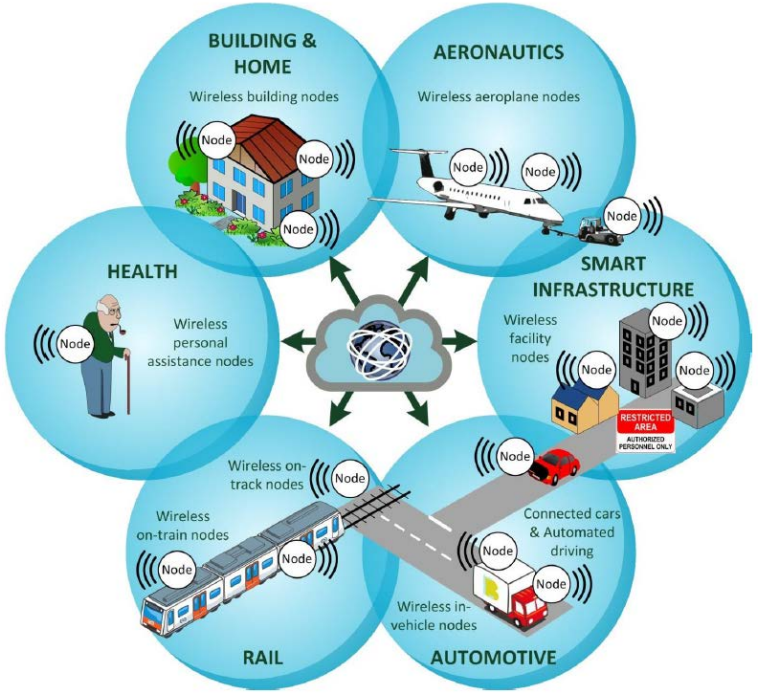
The demonstrator of hospital parcel delivery will be carried out in Latvia, where LMT thanks to its 5G network and developed components be able to ensure the safe and secure connection between the operators and the drones and droids.



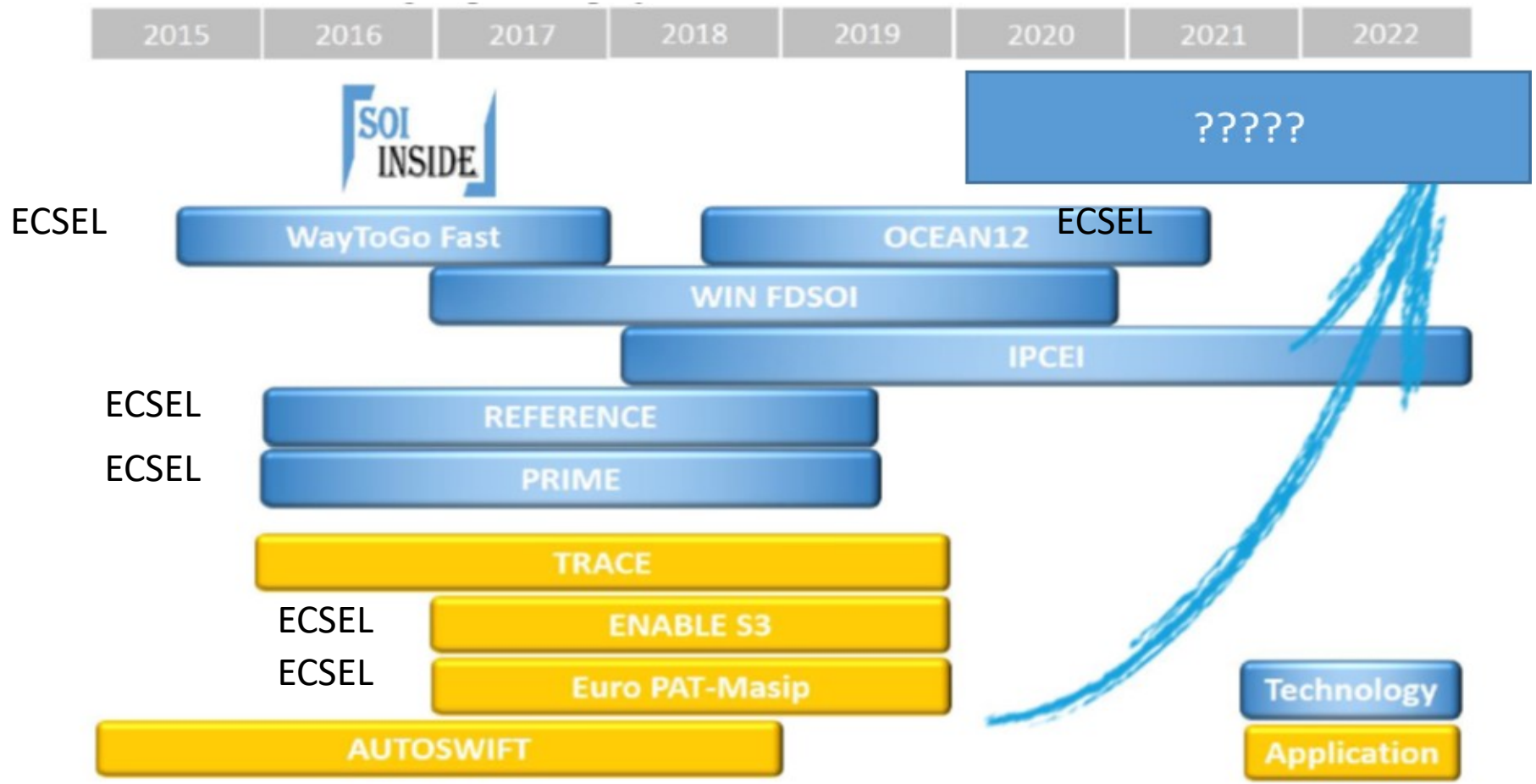
SCOTT (2016, 57 partners, 39MEuro cost)

Secure COnnected Trustable Things

One of the objectives: Evaluate compatibility and interoperability with other reference standards and architectures, validating the global applicability of SCOTT reference architecture (HLA). (incl.5G)

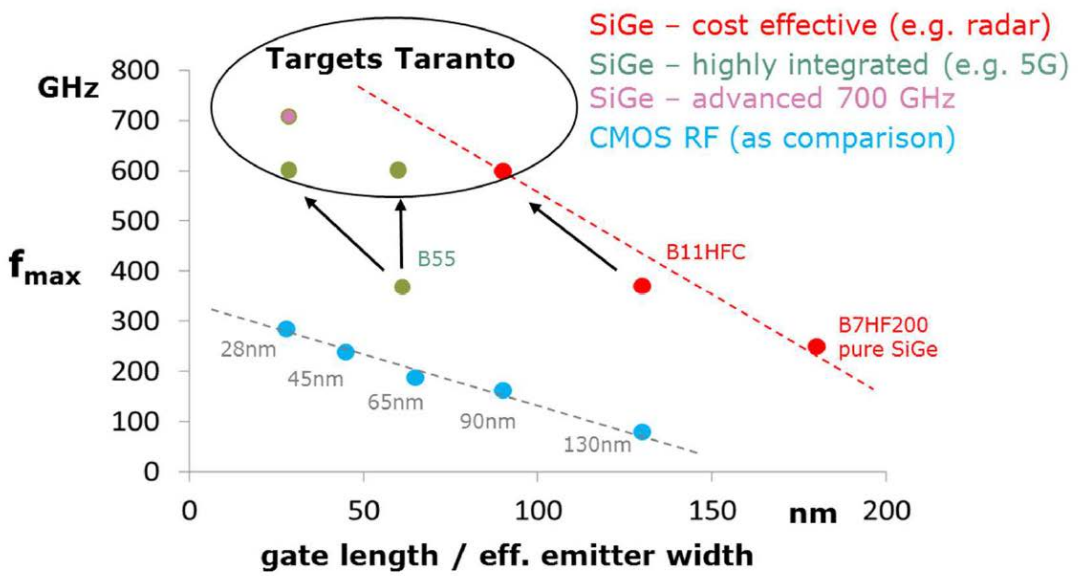


RF-SOI


2015
2016
2017
2018
2019
2020
2021
2022
SOI INSIDE
?????
ECSEL
WayToGo Fast
OCEAN12
ECSEL
WIN FDSOI
IPCEI
ECSEL
REFERENCE
ECSEL
PRIME
TRACE
ECSEL
ENABLE S3
ECSEL
Euro PAT-Masip
AUTOSWIFT
Technology
Application

Taranto (2016, 33 partners, 42MEuro cost)

Tow**AR**ds **A**dvanced bicmos **N**ano**T**echnology platforms for rf to thz applicati**O**ns



UltimateGaN (2018,26 partners, 48MEuro cost)

Research for GaN technologies, devices and applications to address the challenges of the future GaN roadmap

- project proposal with strong involvement of the vertical supply chain
- spans expertise and partners from raw material research, process innovation and assembly innovation.
- envisioned Use Cases will be validated and exploited in compact power application domains representing **enhanced smart systems for health, mobility, communication, sensors,..**

Objectives:

1. Research on vertical power GaN processes and devices pushing performance beyond current state-of-the-art
2. Research on lateral GaN technologies and devices to achieve best in class power density and efficiency while optimizing cost vs. performance
3. **Bringing GaN on Silicon radio frequency (RF) performance close to GaN on Silicon Carbide thus enabling an affordable 5G rollout.**
4. Breaking the packaging limits – size, electrical and thermal constraints – for high performance GaN power products
5. Close the reliability and defect density gap for most innovative GaN devices
6. Demonstrate European leadership in high performance power electronics and RF application domains

Demonstrators:

1. Extremely efficient server power supply enabling lower energy consumption in data centres (5G: digitalisation backbone)
2. Benchmark Photovoltaic inverters in terms of efficiency and size to foster the use of renewable energies (Smart Grids: energy backbone)
3. **Affordable 5G-Amplifiers up to mm-wave enabling a faster 5G rollout (5G: digitalisation backbone)**
4. GaN enabled ultra-fast switching LIDAR application to enable autonomous driving (Smart Mobility)
5. Highest efficiency µ-Grid-converters and On-Board Chargers (Smart Grids; Smart Mobility)

But is that enough? Why work together?

As a programme can we achieve more impact?

(DISSEMINATION)

✓ **EXPLOITATION OF THE INNOVATION** → **PROJECT LEVEL**

MORE IMPACT?

✓ **CREATE SYNERGIES BETWEEN COMMUNITIES** → **META PROJECT LEVEL LIGHTHOUSE INITIATIVES**

(Partnership Cooperation Tool)

LIGHTHOUSE INITIATIVES

MOBILITY.E

INDUSTRY4.E

HEALTH.E

A container of coordinated activities coming from different programmes using their synergy to achieve overarching common goals.

Lighthouse initiatives ≠ Lighthouse projects!!!

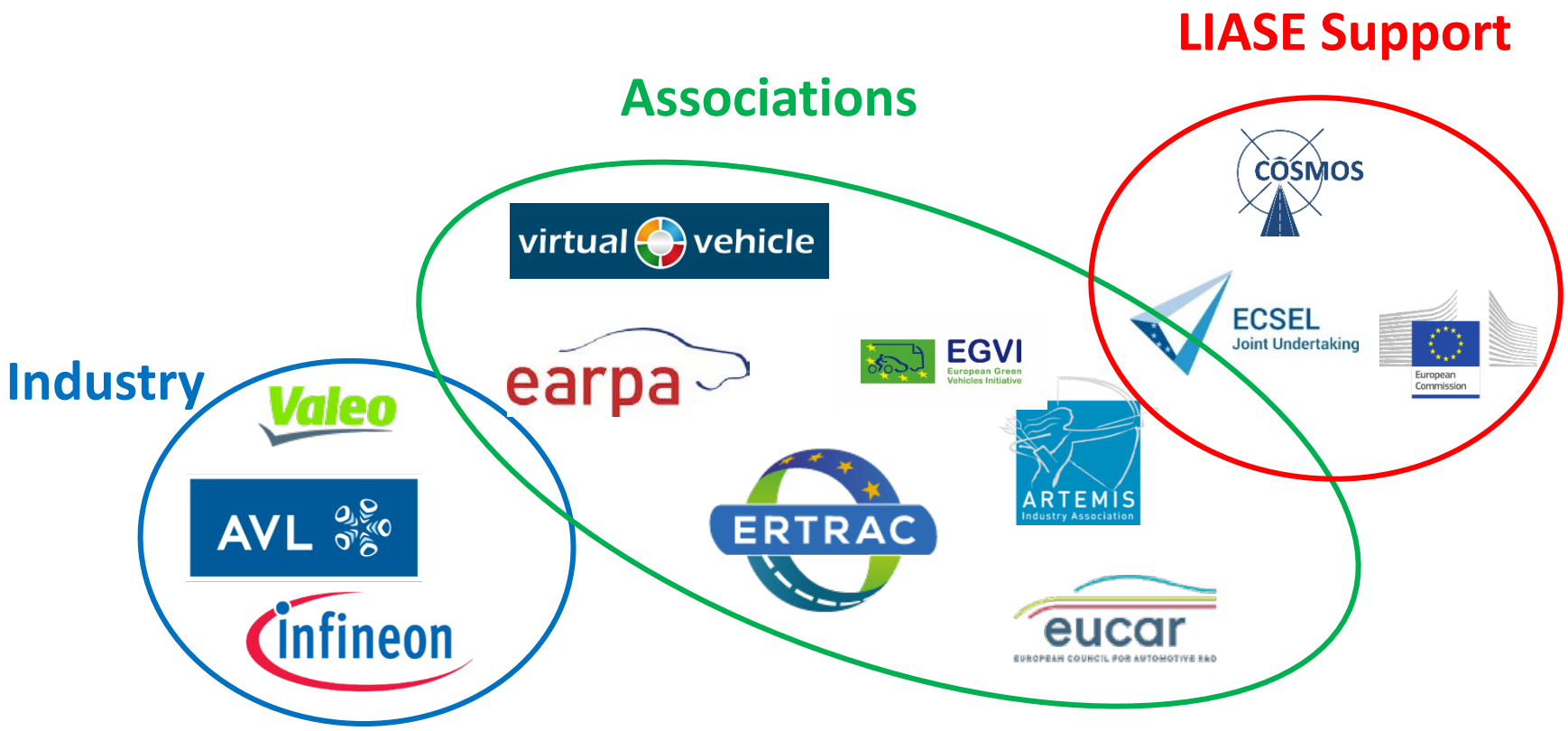
MOBILITY.E LIGHTHOUSE INITIATIVE

ECSEL projects active in Mobility.E

- Total cost: 700M€
- Total funding: 330M€
- Number of participants: 356
- Distributed over 26 countries

Mobility.E LIASE

Clean Connected Autonomous Mobility



LIASE=Lighthouse Initiative Advisory Service

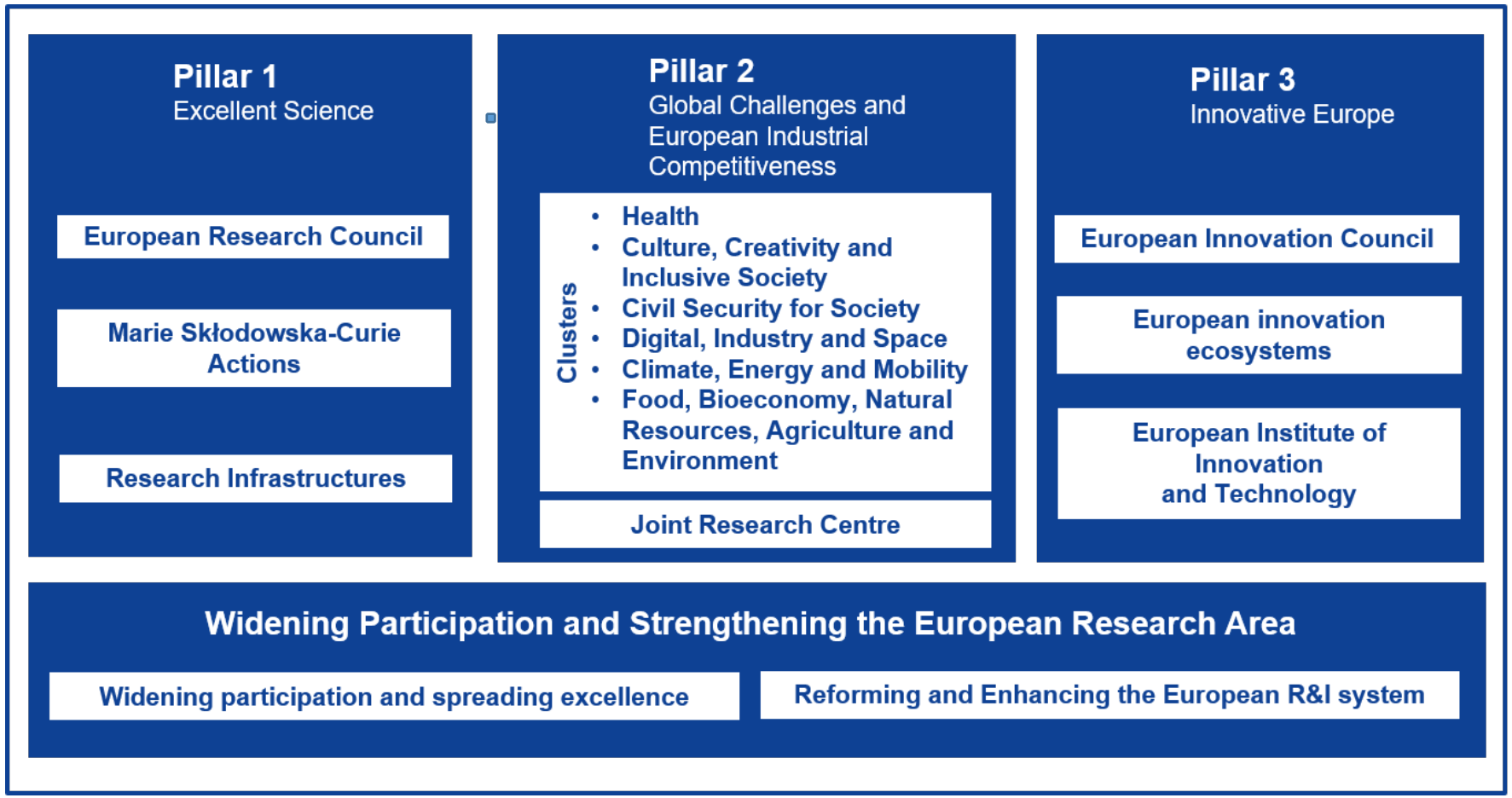
5G Ecosystem Expansion

Yole 2017

True for most other topics such as Health, Mobility,..

1. What is ECSEL?
2. What does ECSEL mean for the 5G-community?
3. **What will come next?**
    1. **Key Digital Technologies JU**
    2. **Digital Europe**

Horizon Europe: evolution not revolution



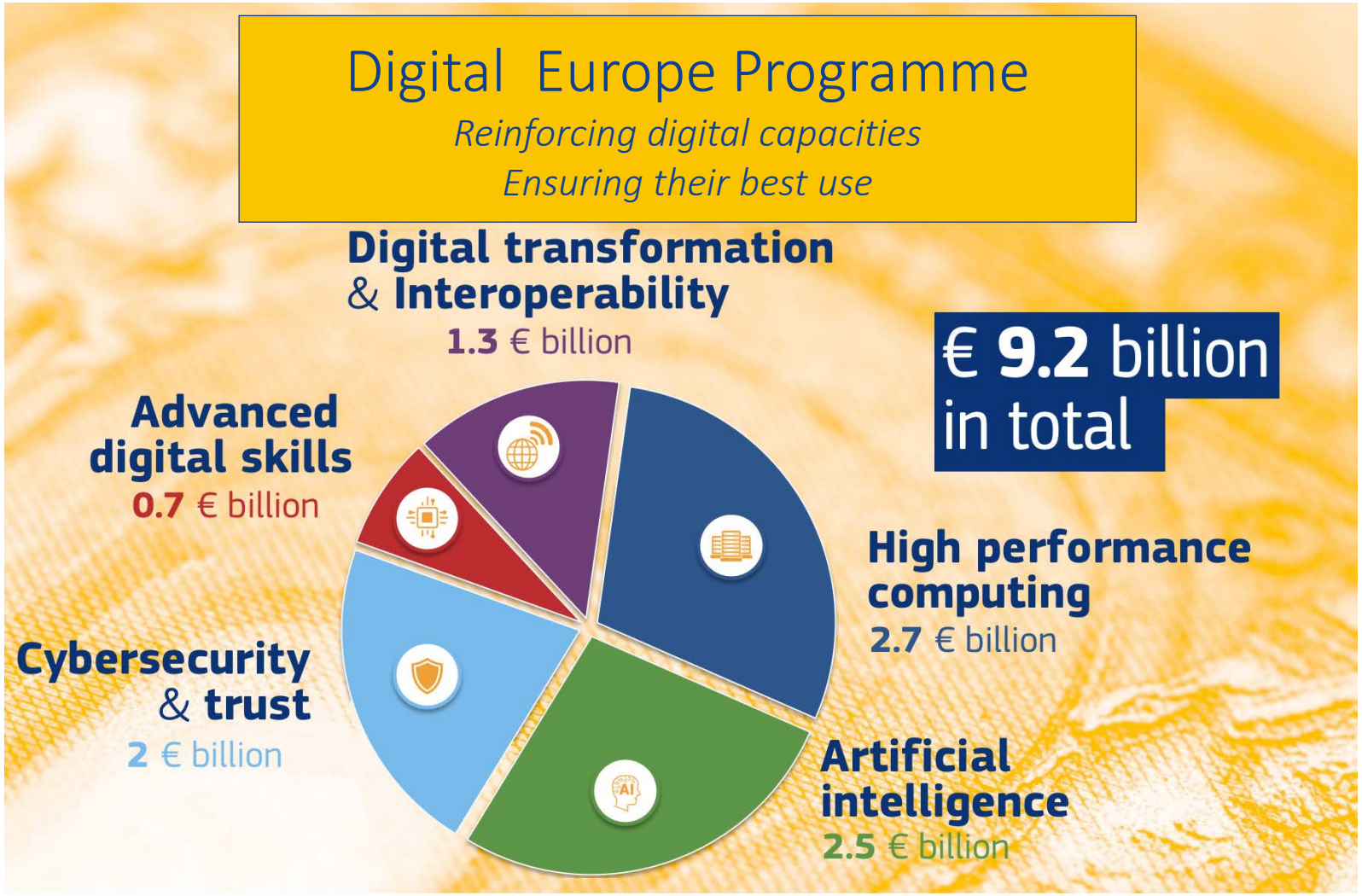
Preliminary structure

European Commission

Key Digital Technology

- A lot like ECSEL JU + a touch of Photonics and Software (?)
- Article 187 TFEU: These partnerships will only be implemented where other parts of the Horizon Europe programme would not achieve the objectives desired or expected impacts.

Digital Europe programme – What?



#EUBudget
#DigitalEurope

European Commission

END