EU Funding: Industry4.0 Focus and Challenges of the ECSEL Joint Undertaking

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Head of Programmes
ECSEL JU

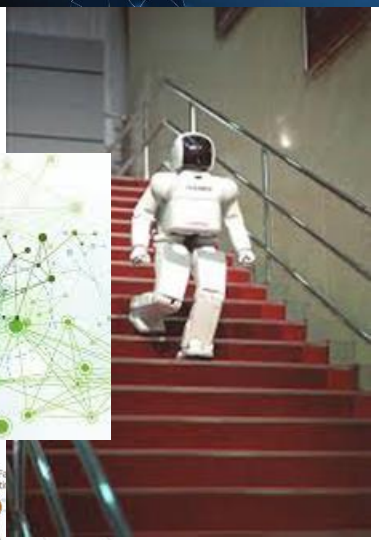
Brno, 8/10/2019

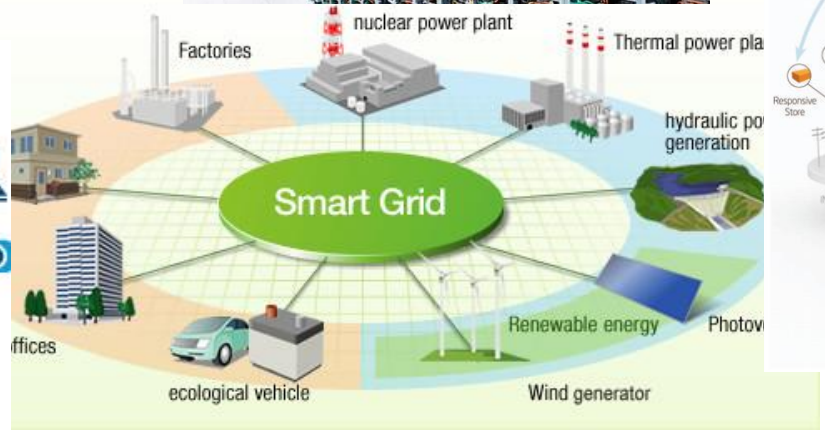
ELECTRONICS HAS PROFOUNDLY CHANGED OUR SOCIETY

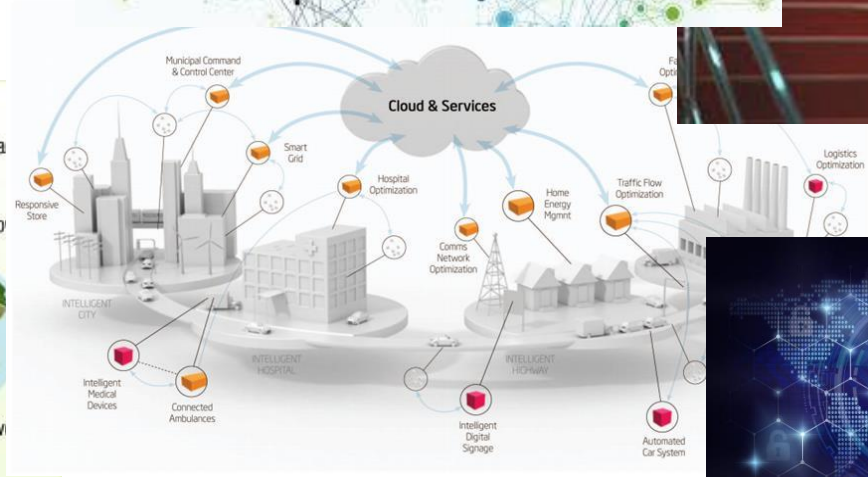
Electronic Components and Systems are Pervasive

Key Enabling Technology

ECSEL PREPARES FOR THE FUTURE





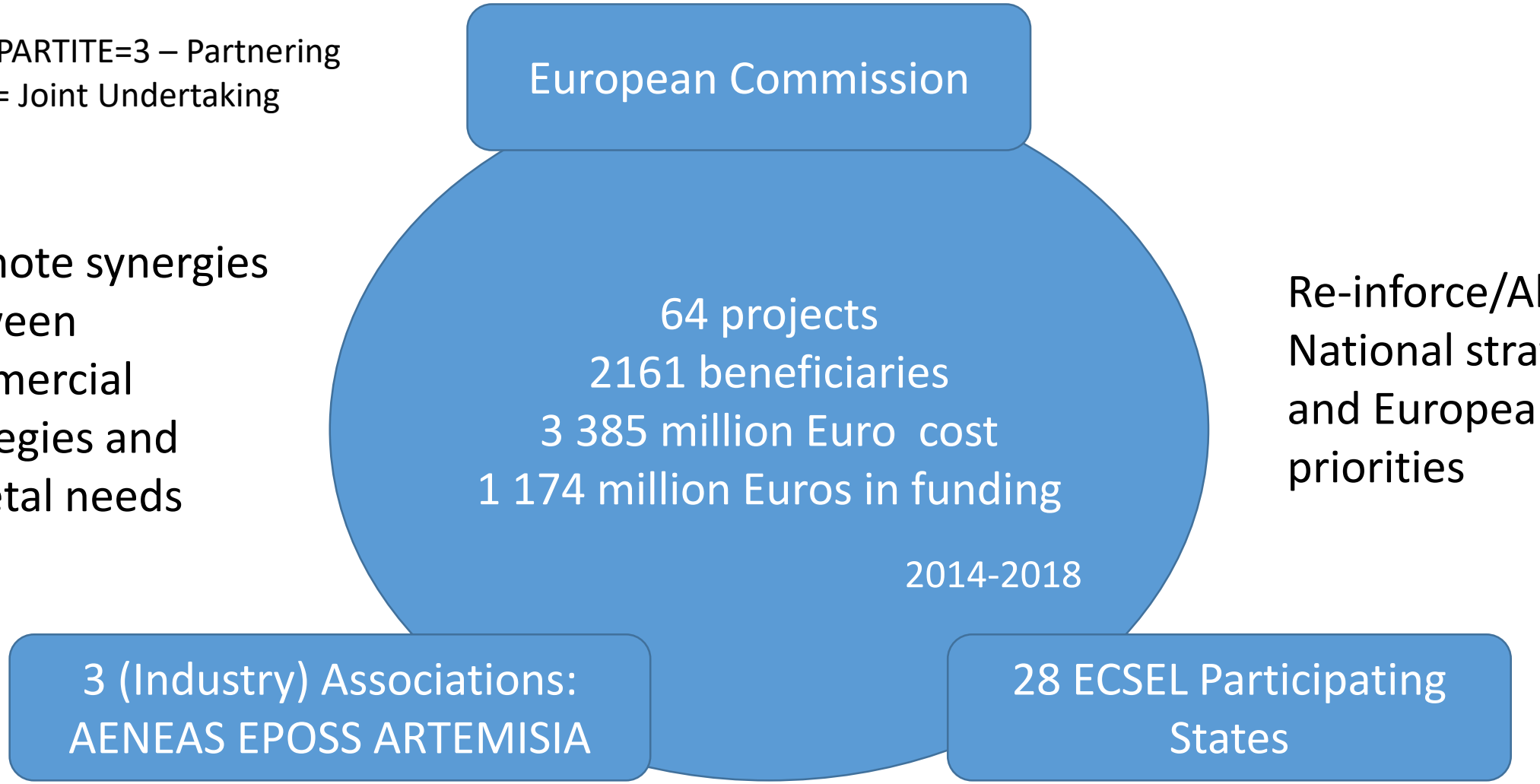


Electronic **C**omponents and **S**ystems for **E**uropean **L**eadership

1. **What is ECSEL?**
    1. **Governance**
    2. **Calls**
    3. **ECS Community**
2. ECSEL and Industry 4.0
3. ECSEL and the Czech participation
4. What will come next?

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)

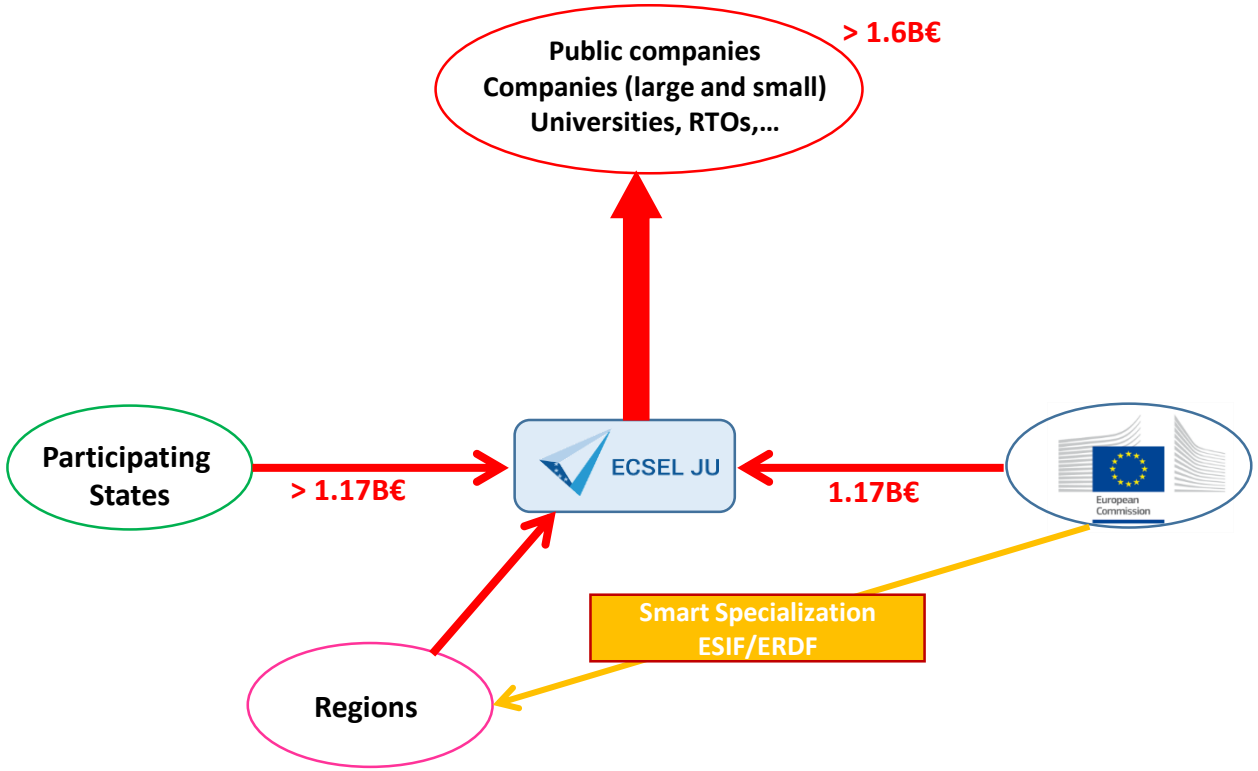
Executive Director
Programme Office

Call

Public Authorities Board
European Commission,
ECSEL Participating States

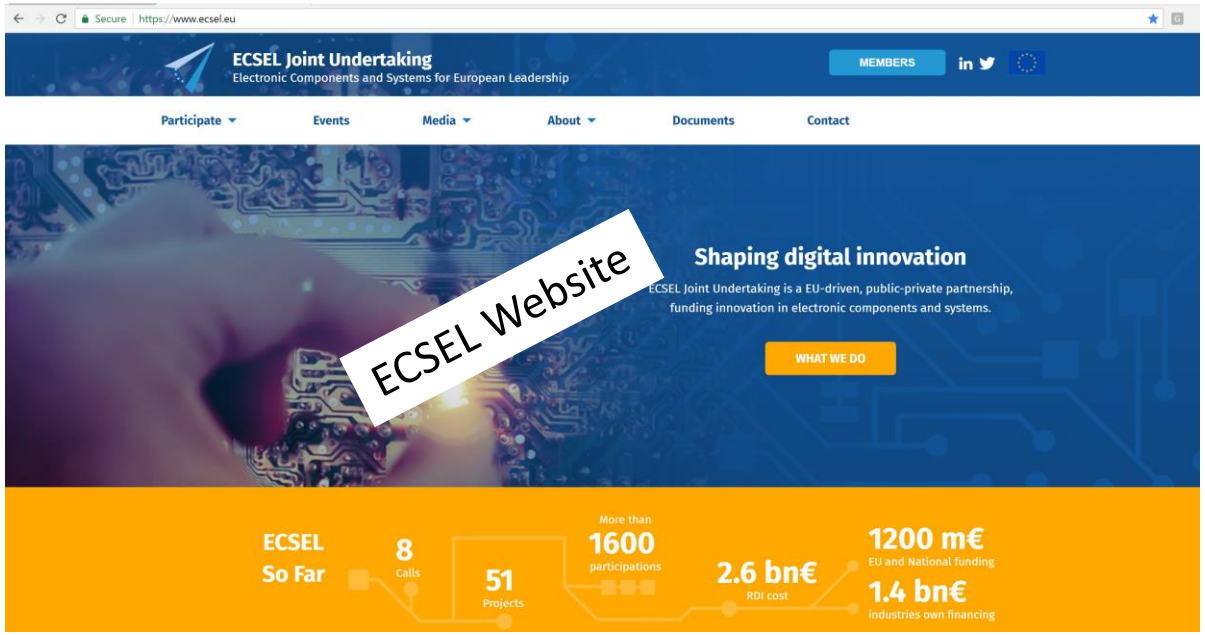
SRA

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


ECSEL Joint Undertaking
Electronic Components and Systems for European Leadership
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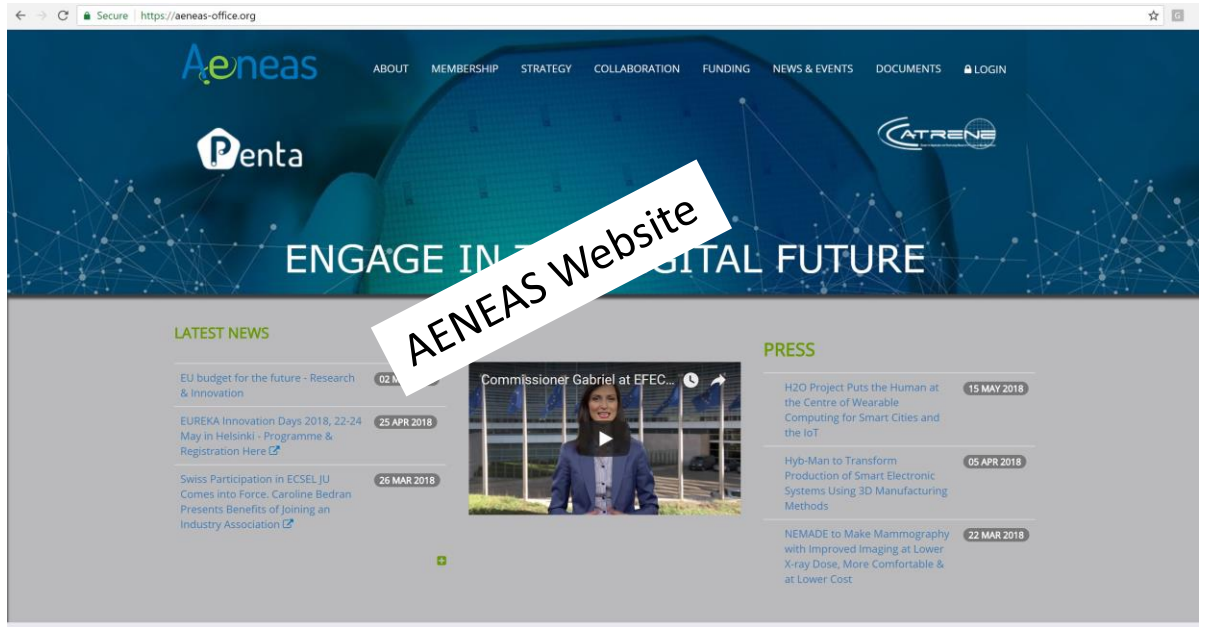
Participate
Events
Media
About
Documents
Contact
Shaping digital innovation
ECSEL Joint Undertaking is a EU-driven, public-private partnership, funding innovation in electronic components and systems.
WHAT WE DO
ECSEL So Far
8 Calls
51 Projects
More than 1600 participations
2.6 bn€ RDI cost
1200 m€ EU and National funding
1.4 bn€ industries own financing
ECSEL Website


Aeneas
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ENGAGE IN
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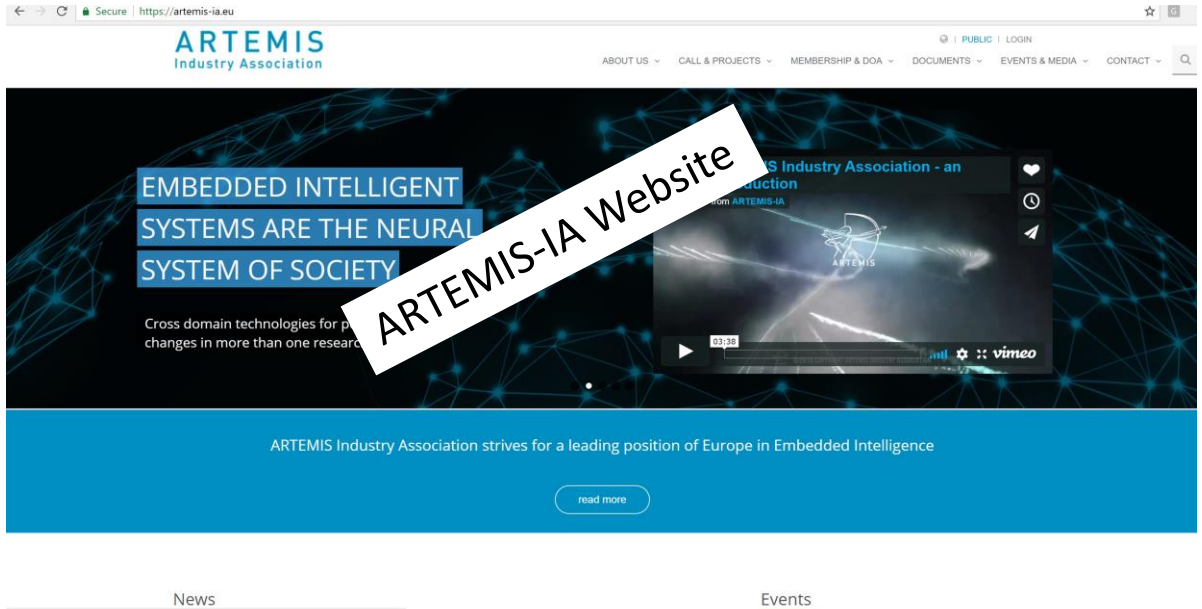
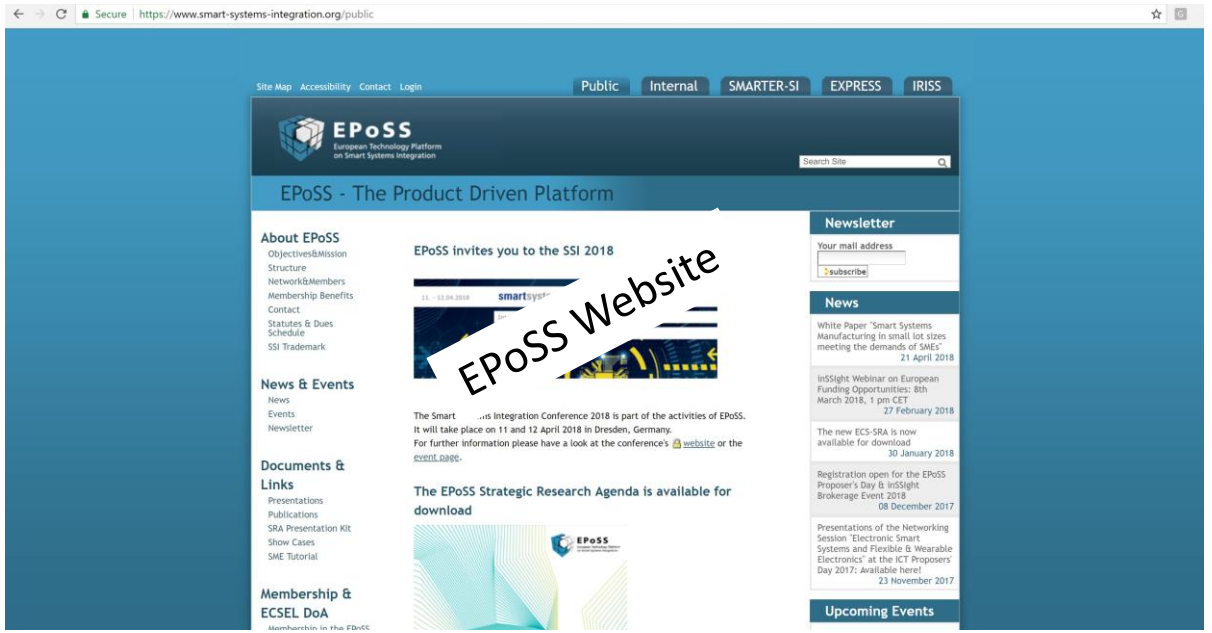
LATEST NEWS
EU budget for the future - Research & Innovation
EUREKA Innovation Days 2018, 22-24 May in Helsinki - Programme & Registration Here
25 APR 2018
Swiss Participation in ECSEL JU Comes into Force. Caroline Bedran Presents Benefits of Joining an Industry Association
26 MAR 2018
Commissioner Gabriel at EFEC...
PRESS
H2O Project Puts the Human at the Centre of Wearable Computing for Smart Cities and the IoT
15 MAY 2018
Hyb-Man to Transform Production of Smart Electronic Systems Using 3D Manufacturing Methods
05 APR 2018
NEMADE to Make Mammography with Improved Imaging at Lower X-ray Dose, More Comfortable & at Lower Cost
22 MAR 2018
AENEAS Website


ARTEMIS
Industry Association
ABOUT US
CALL & PROJECTS
MEMBERSHIP & DOA
DOCUMENTS
EVENTS & MEDIA
CONTACT
EMBEDDED INTELLIGENT SYSTEMS ARE THE NEURAL SYSTEM OF SOCIETY
Cross domain technologies for p
changes in more than one researc
S Industry Association - an
duction
ARTEMIS-IA Website
ARTEMIS Industry Association strives for a leading position of Europe in Embedded Intelligence
read more
News
Events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IRISS
EPoSS
European Technology Platform on Smart Systems Integration
EPoSS - The Product Driven Platform
About EPoSS
Objectives&Mission
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Membership Benefits
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Statutes & Dues Schedule
SSI Trademark
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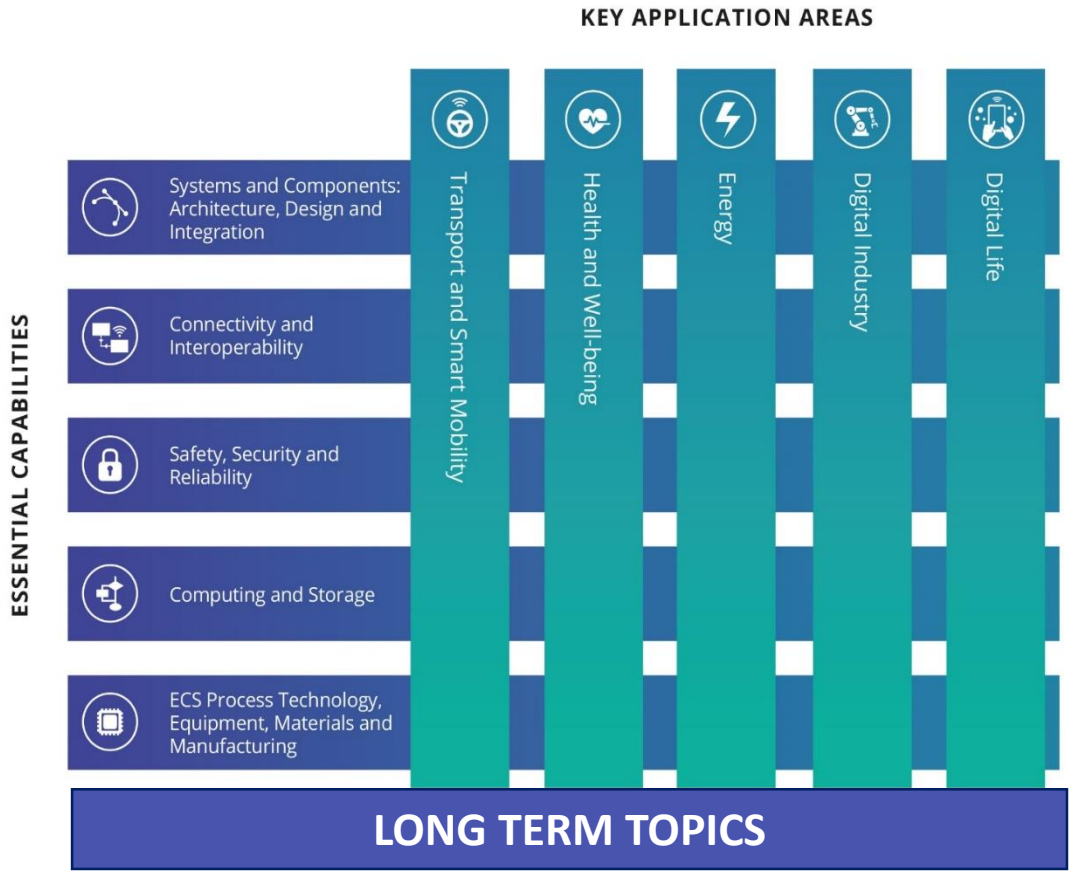
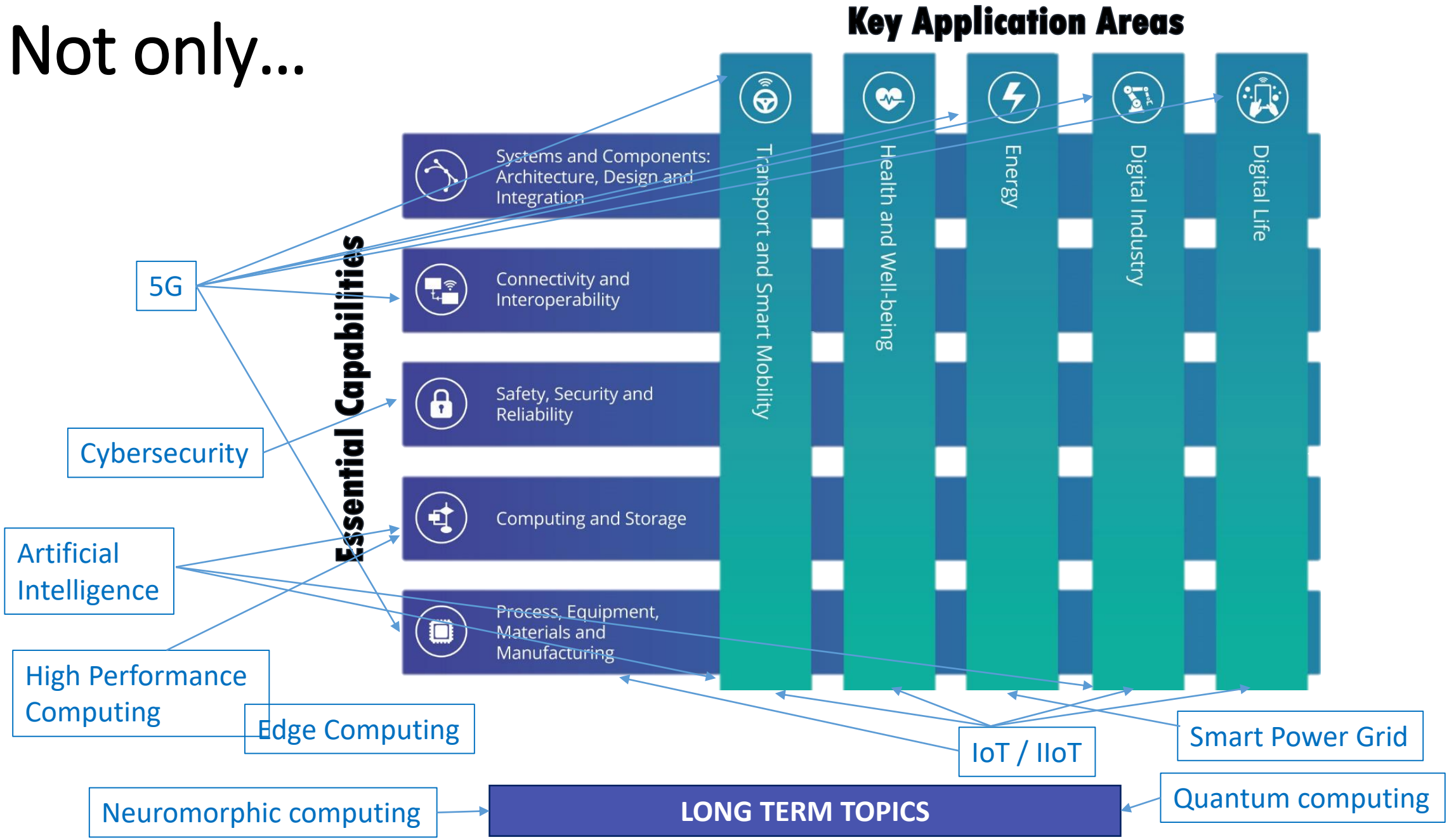
Events
Newsletter
Documents & Links
Presentations
Publications
SRA Presentation Kit
Show Cases
SME Tutorial
Membership & ECSEL DoA
EPoSS invites you to the SSI 2018
The Smart ...rs Integration Conference 2018 is part of the activities of EPoSS.
It will take place on 11 and 12 April 2018 in Dresden, Germany.
For further information please have a look at the conference's website or the event page.
The EPoSS Strategic Research Agenda is available for download
Newsletter
Your mail address
subscribe
News
White Paper "Smart Systems Manufacturing in small lot sizes meeting the demands of SMEs"
21 April 2018
InSSight Webinar on European Funding Opportunities: 8th March 2018, 1 pm CET
27 February 2018
The new ECS-SRA is now available for download
30 January 2018
Registration open for the EPoSS Proposer's Day & InSSight Brokerage Event 2018
08 December 2017
Presentations of the Networking Session "Electronic Smart Systems and Flexible & Wearable Electronics" at the ICT Proposers' Day 2017: available here!
23 November 2017
Upcoming Events
EPoSS Website

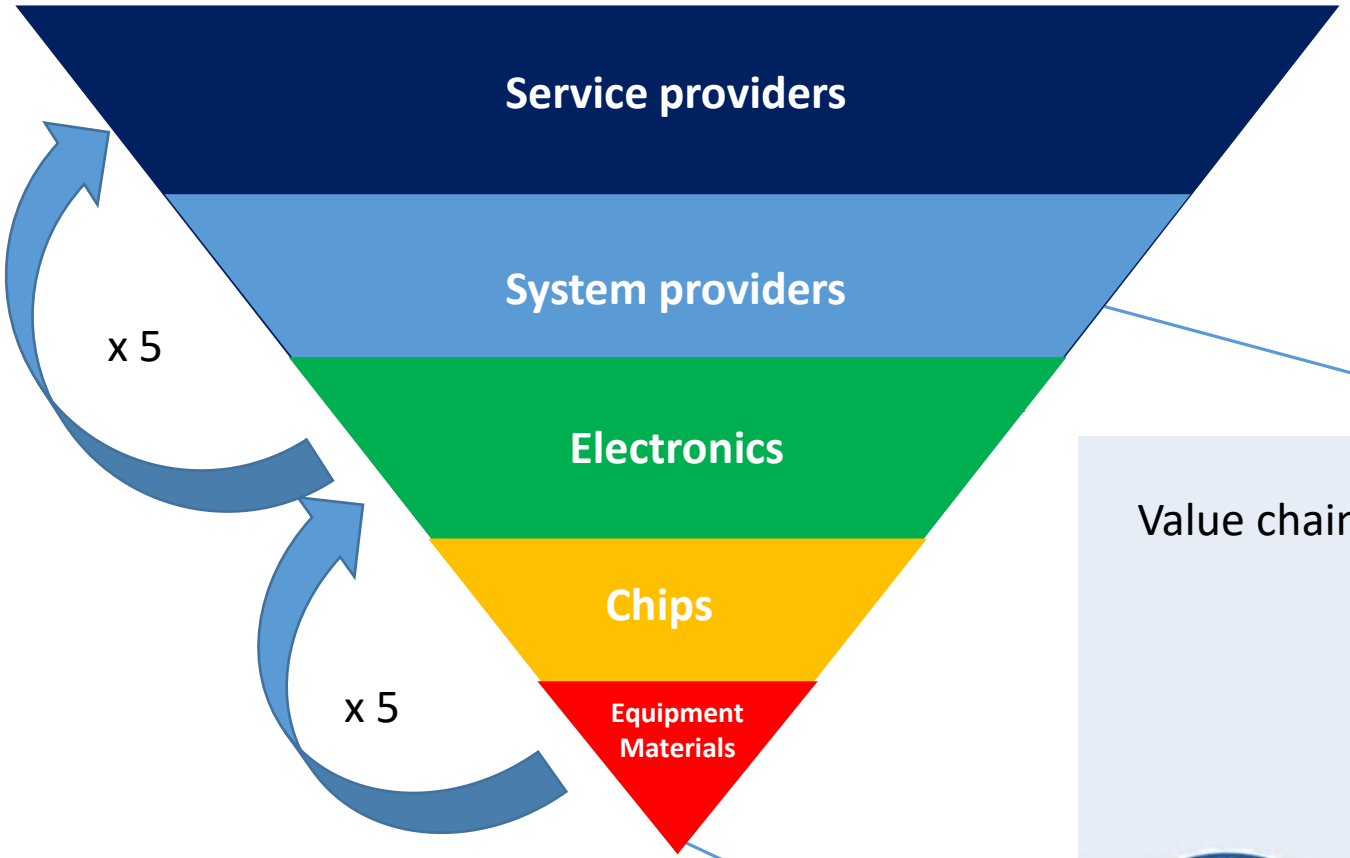
A common strategy: Strategic Research Agenda (SRA)

- 3 Industry Associations (not only also SMEs, Universities, RTOs)
  - AENEAS
  - ARTEMIS-IA
  - EPoSS
- SRA is adopted by the Governing Board: SRA becomes MASP
- A revision of the SRA to prepare KDT is foreseen

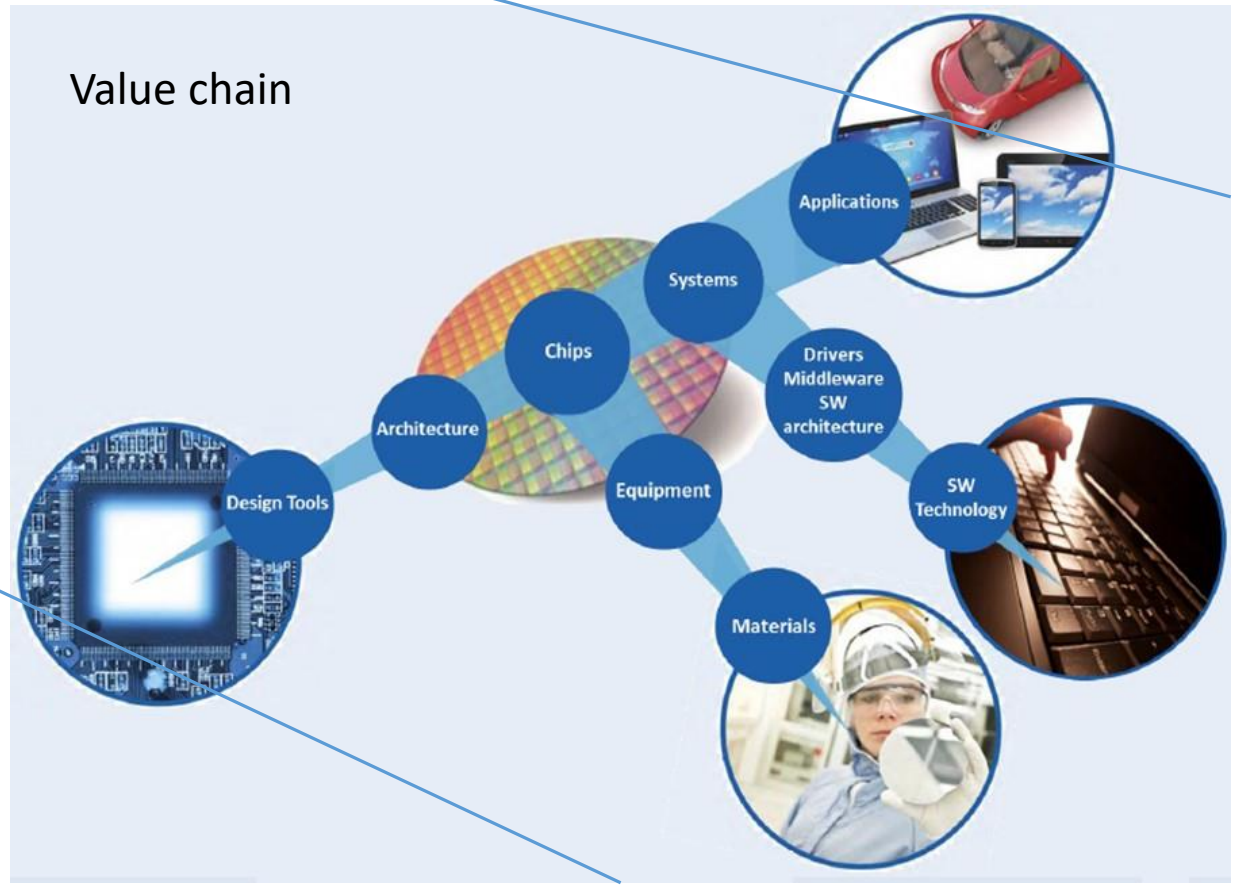


Not only…


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

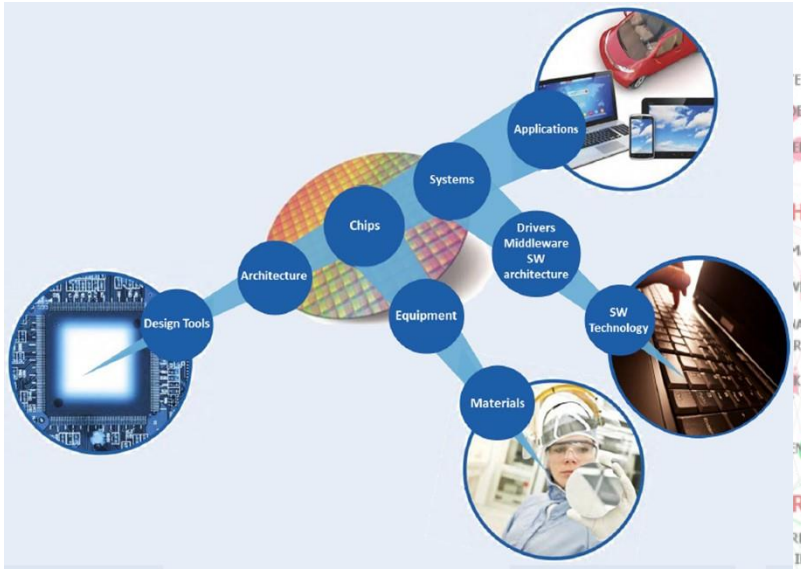


Leverage in value

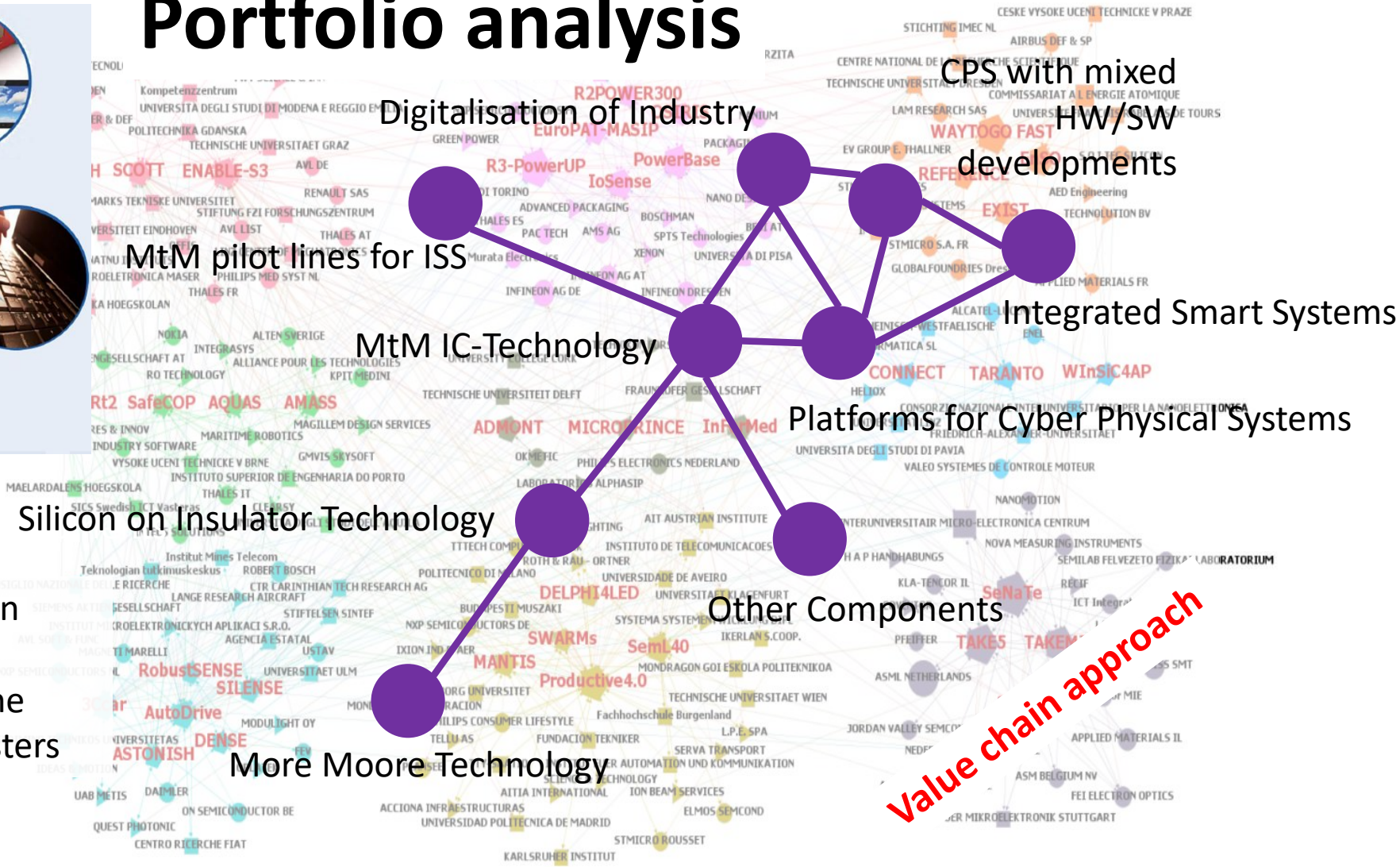


ECSEL: NETWORKS OF PARTNERS AND PROJECTS

Portfolio analysis



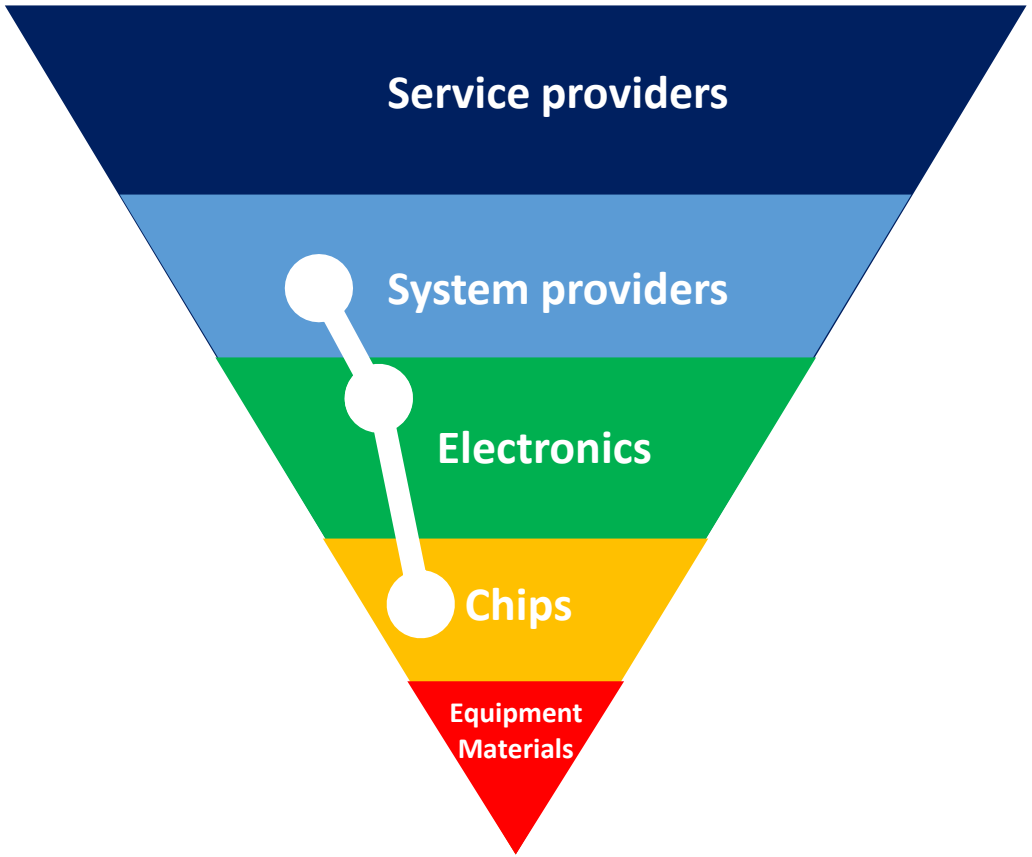
- Evolution and continuity in projects
- Evolution also visible in the interactions between clusters



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



3Ccar	DENSE	WInSiC4AP	HiPERFORM
EXIST	PRIME	EuroPAT-MASIP	PRYSTINE
MANTIS	REFERENCE	MICROPRINCE	SECREDAS
OSIRIS	SafeCOP	Productive4.0	AI4DI
RobustSENSE	ENABLE-S3	R3-PowerUP	Applause
SWARMs	EnSO	SCOTT	Arrowhead Tools
ADMONT	IoSense	TAKEMI5	Comp4Drones
InForMed	SemI40	iDev40	CPS4EU
PowerBase	TAKE5	OCEAN12	Heliaus
R2POWER300	AQUAS	POSITION-II	MadeIn4
SeNaTe	AutoDrive	REACTION	NewControl
WAYTOGOFAST	CONNECT	TAPES3	Pin3S
3DAM	I-MECH	WAKeMeUP	PowerToPower
AMASS	MegaMaRt2	5G_GaN2	TEMPO
ASTONISH	SILENSE	AFarCloud	UltimateGaN
DELPHI4LED	TARANTO	FITOPTIVIS	ViZta

23812 PERSONMONTHS

(2014-2018)

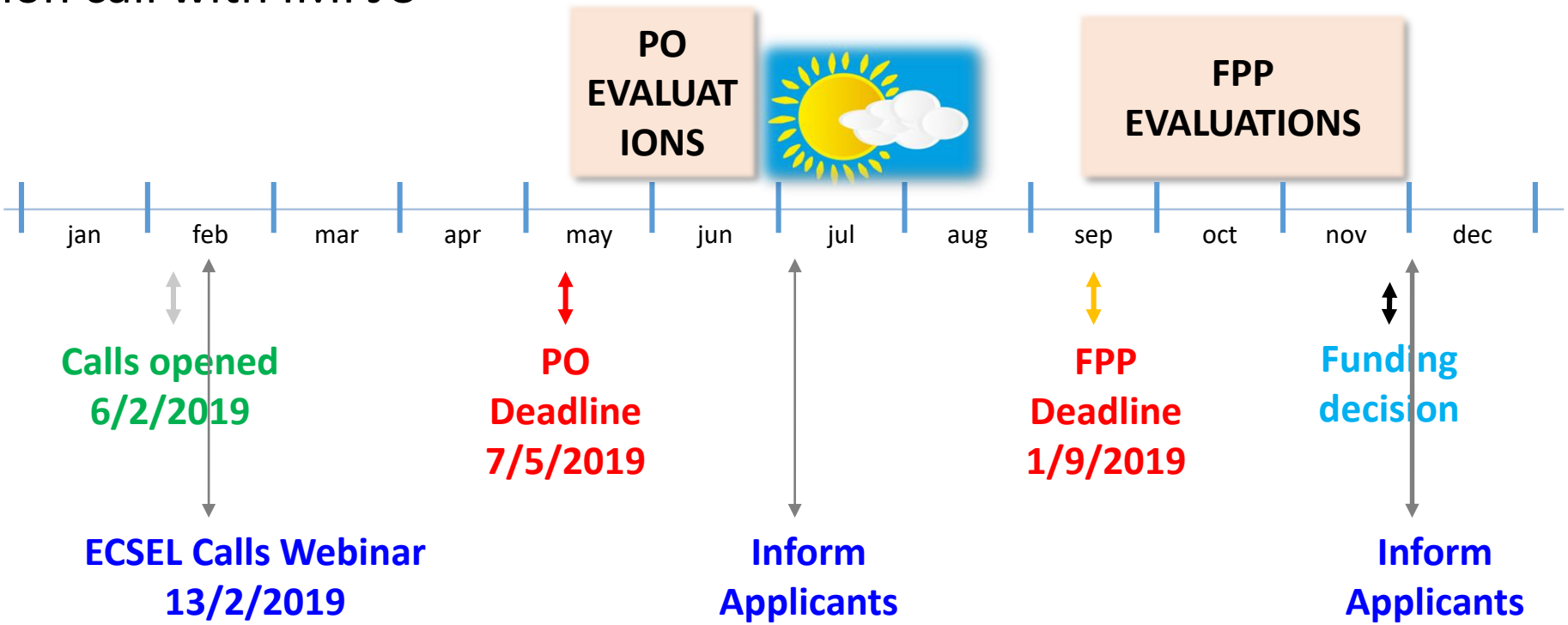
ECSEL Calls for proposals

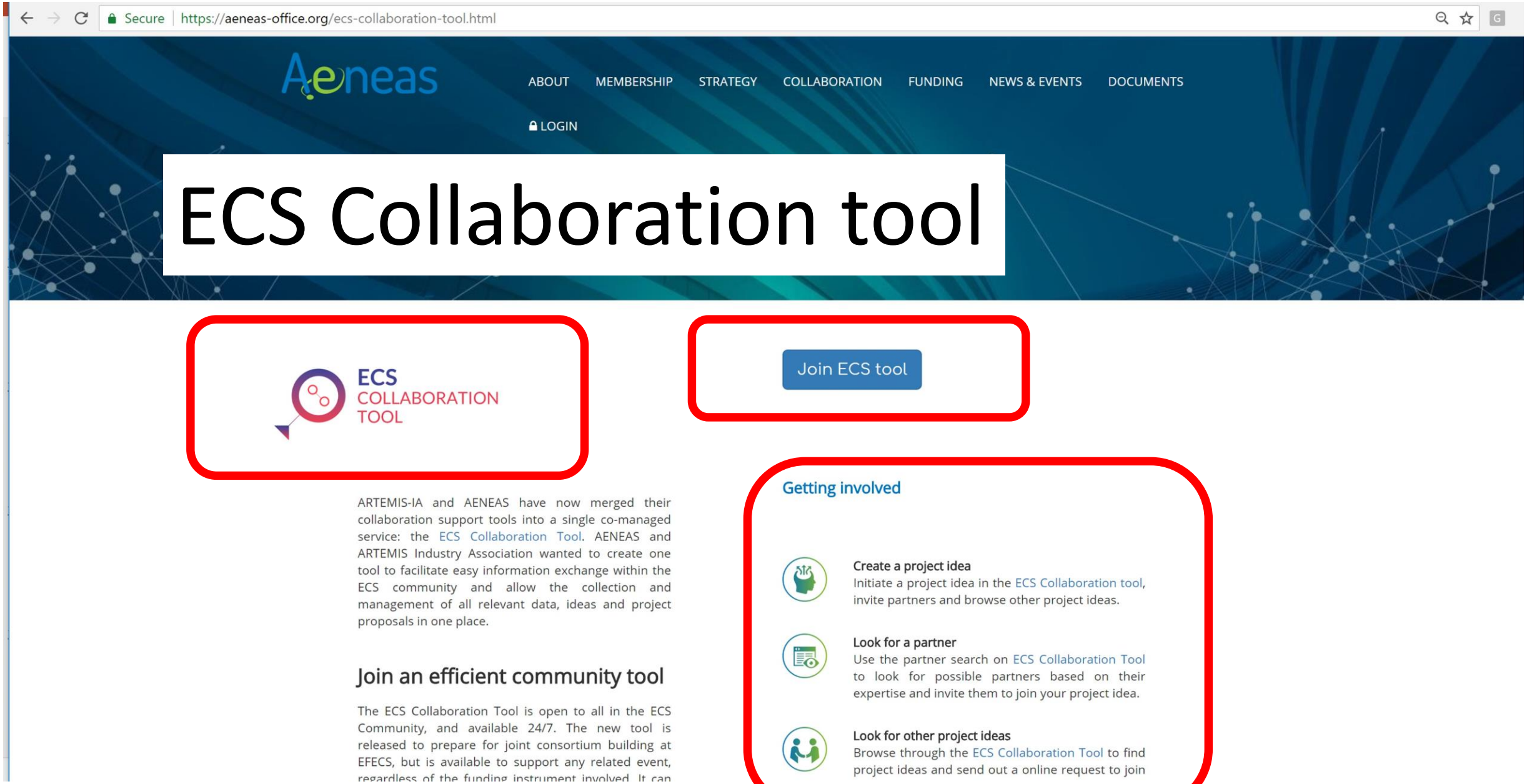
EVERY YEAR:

- 1x RIA and 1x IA calls (all topics open)
- + Special topics, special call
- In 2020: common call with IMI JU

How to participate?

Example:
Calls 2019

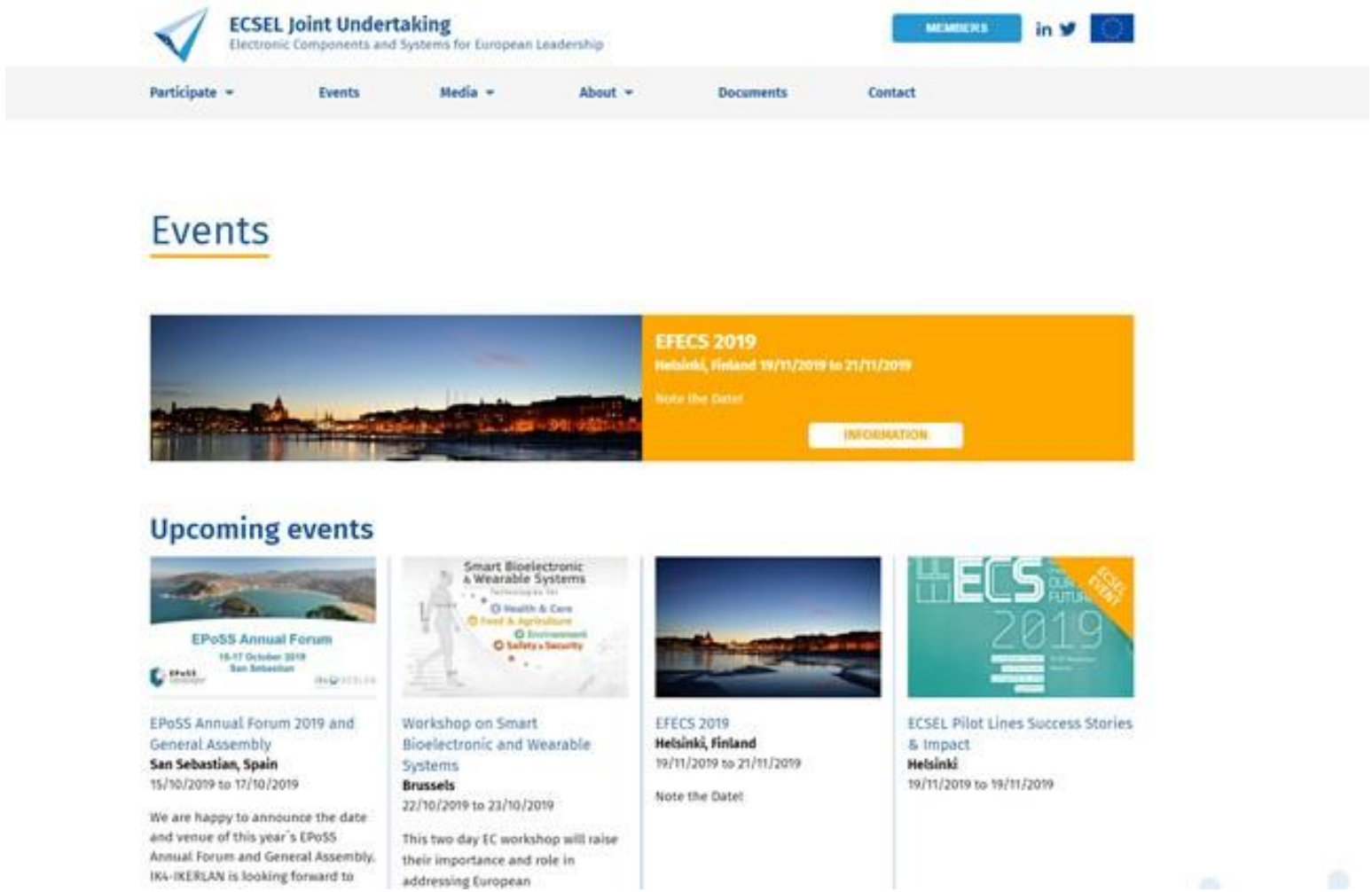




ECS Collaboration tool

Attend the Events

- Conferences: EFECS
- Workshops
- Brokerage events
- ECSEL Symposium
- etc



ECSEL ARE
PEOPLE, ORGANIZATIONS AND PROJECTS
BUT ALSO
PUBLIC AUTHORITIES
ASSOCIATIONS
EVENTS

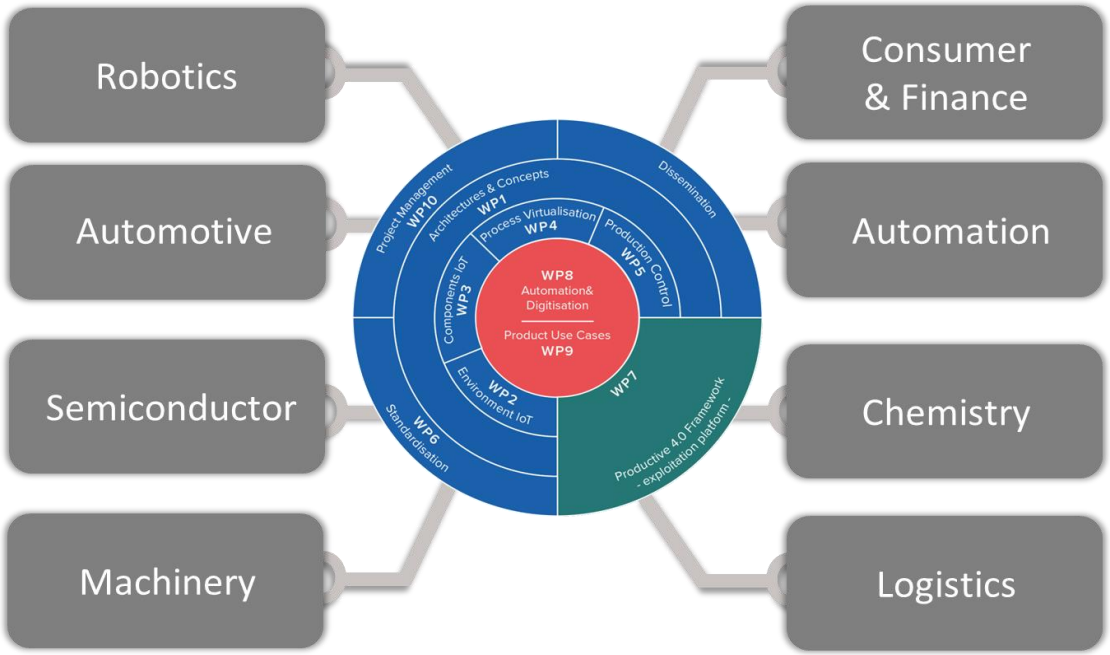
1. What is ECSEL?
2. **ECSEL and Industry 4.0**
    1. **Examples of projects**
    2. **Lighthouse initiative: Industry 4.E**
3. ECSEL and the Czech participation
4. What will come next?

11 out of 64 projects work on Industry4.0

PRODUCTIVE 4.0 (2016, 115 partners, 105MEuro cost)

Productive 4.0

Significant improvement in digitalizing the European industry by means of electronics and ICT.
- aiming at suitability for everyday application
- various industrial domains with same approach of digitalization.



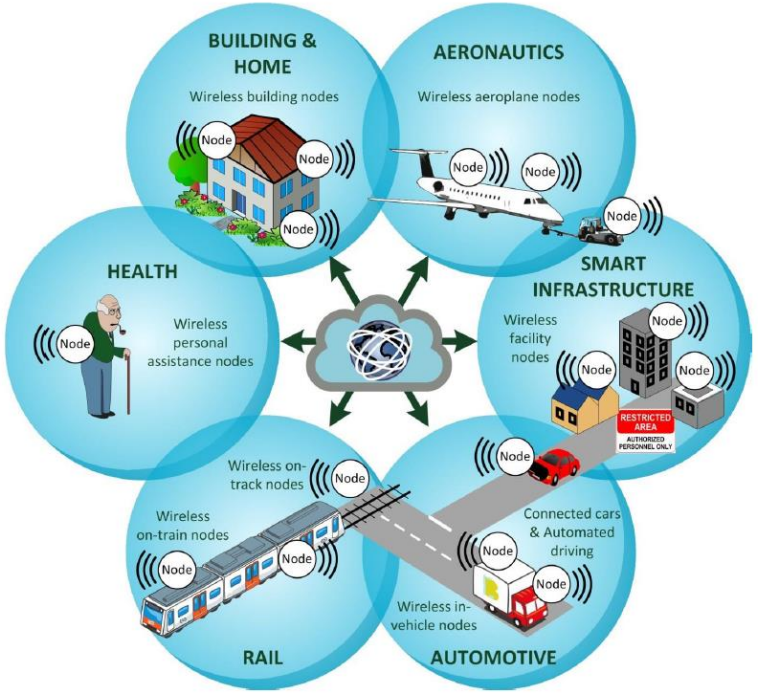
Key partners: BMW, Philips, Infineon, ABB, NXP, STM, BOSCH, Thales, AVL, VOLVO, CEA, BetterSolutions, IMA, KIT, AIT, FhG, Sysgo, DANOBAT, MONDRAGON, ERICSSON, VTT, SINTEF, LTU, LFOUNDRY ,TNO, TTTech, Siltronic, VIF and many more..

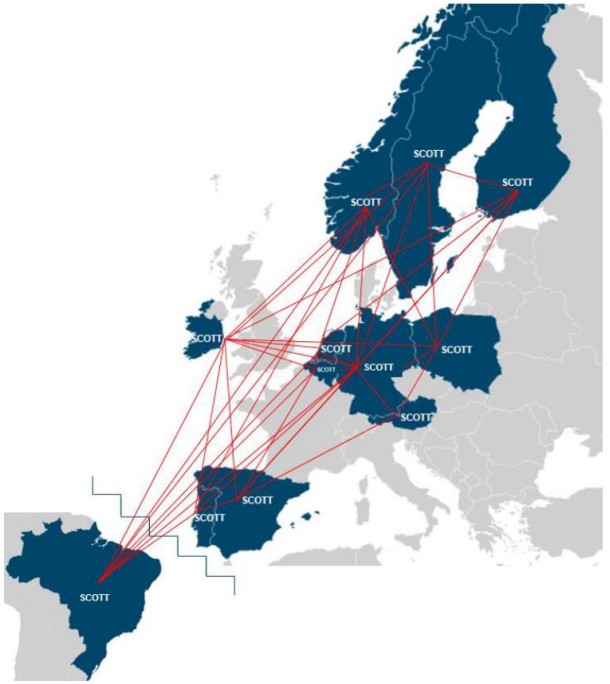
ELECTRONICS AND ICT AS ENABLER FOR DIGITAL INDUSTRY AND OPTIMIZED SUPPLY CHAIN MANAGEMENT COVERING THE ENTIRE PRODUCT LIFECYCLE

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)





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!!!

Industry4.E

LIASE

- Andrew Lynch (IMR)
- EFFRA (Chris Decubbere)
- Eduardo Beltran (Mondragon Corporation)
- Knut Hufeld (Infineon DE)
- Olli Ventä (VTT)

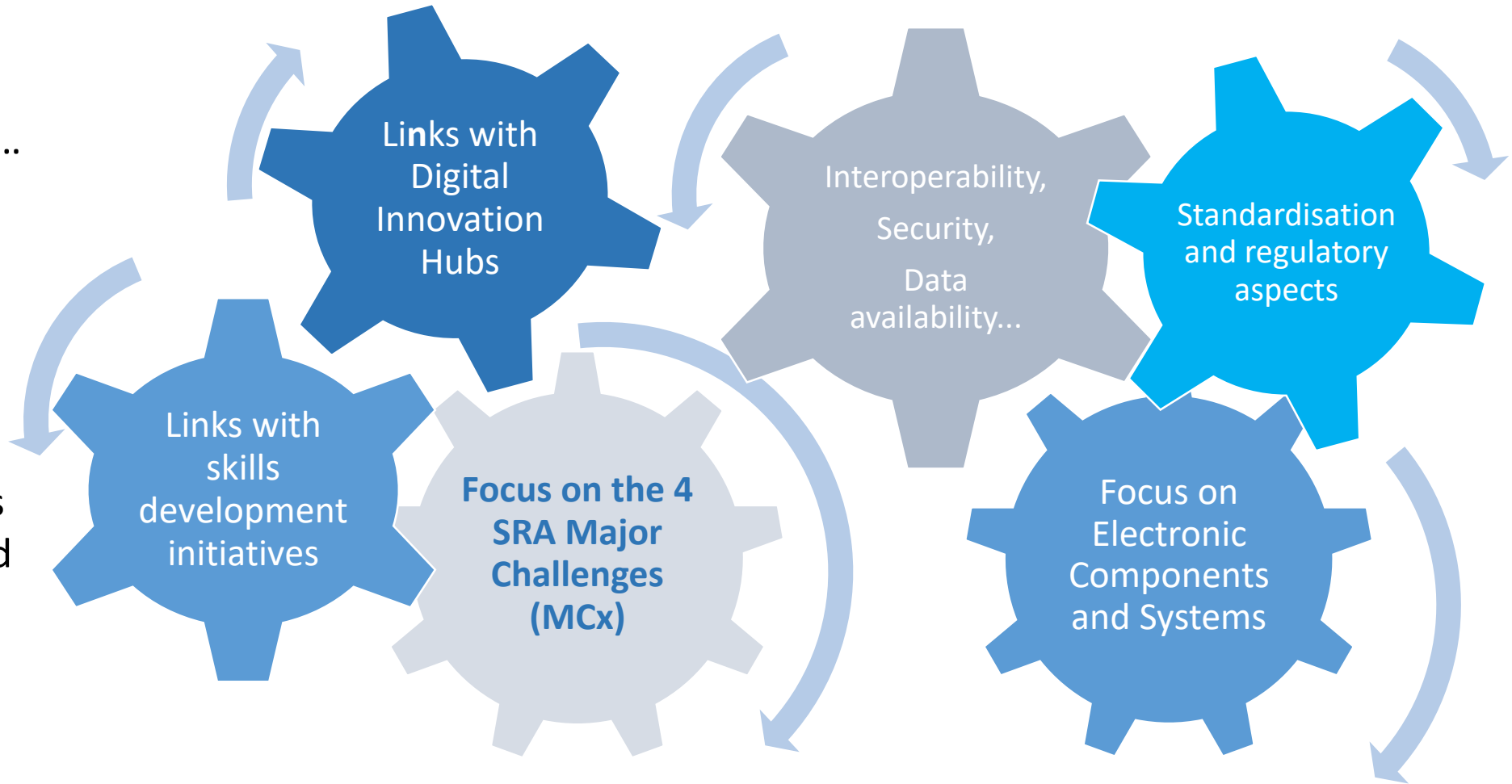
Support

- ECSEL Office
- DG Connect
- CSA_Industry4.E

Factories of the Future
Public Private Partnership

Industry4.E: R&D&I + cross-cutting aspects

MC1: Developing Digital twins, simulation models…
MC2: Implementing AI and machine learning…
MC3: Generalizing conditions monitoring…
MC4: Developing digital platforms, application development frameworks that integrate sensors and systems



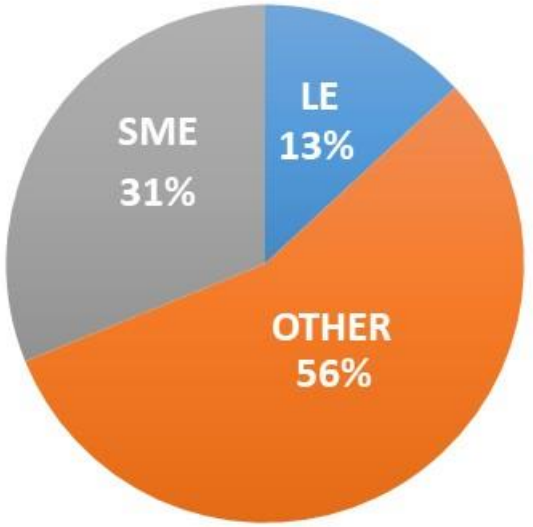
Evaluate overlap/complementarity
with other running or future programmes/activities

1. What is ECSEL?
2. ECSEL and Industry 4.0
3. **ECSEL and the Czech participation**
4. What will come next?

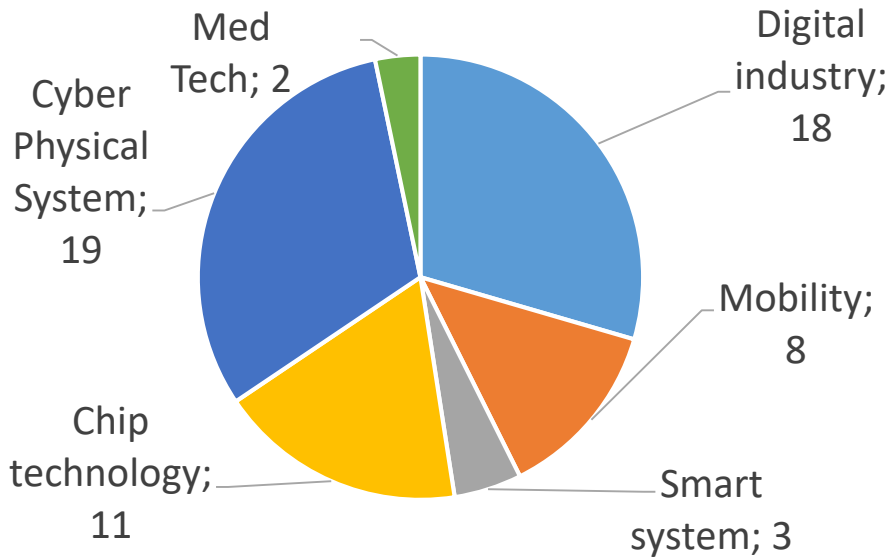
Czech participation to ECSEL JU

- Projects: 23 (CZ participation in 37% of the selected ECSEL projects!) (I'll discuss the 8 most recent)
- Partners: 6 Large companies, 8 universities, 7 SMEs
- Funding: EU funding: 8.3M€, National funding: 11.1M€, Total cost: 26.7M€
- ENIAC ARTEMIS
- National rules

Participation of CZ organizations



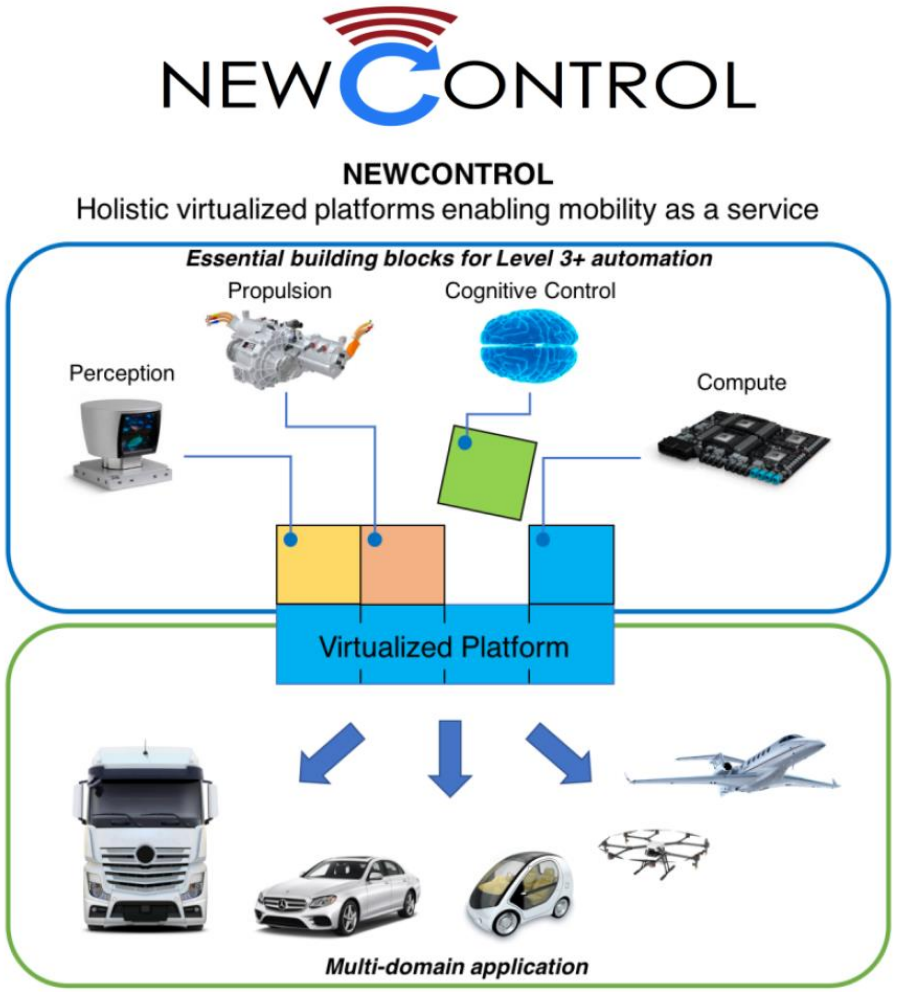
Participation of CZ organizations as a function of topic



NewControl (2018, 48 partners, 43MEuro cost)

Title: Integrated, Fail-Operational, Cognitive Perception, Planning and Control Systems for Highly Automated Vehicles
Topic: Mobility
Czech participants:

- **IMA (INSTITUT MIKROELEKTRONICKYCH APLIKACI S.R.O., SME):** develop Car Access Control Unit involving mobile application, in-vehicle interfaces and secure communication layer to infrastructure. Fail-operational authentication algorithms for access control will be developed.
- **BUT (Brno University of Technology):** development of control and monitoring algorithms for highly efficient powertrain and LIDAR data processing. The contribution covers algorithms development and implementation on embedded controller hardware. The team will provide key expertise in advanced control and signal processing algorithms and their implementation in industry-used embedded systems with application in automotive technologies and robotics.



COMP4DRONES (2018, 53 partners, 27MEuro cost)

Title: Framework of key enabling technologies for safe and autonomous drones' applications
Topic: CPS Cooperation with SESAR JU
Czech participants:

- **BUT**
- **UWB (University of West Bohemia):** provide tools and methods for modelling simulation and control of drones at various levels and could add value to the project in modelling and simulation of various drone architectures, also dealing with redundant architectures.
- **HON (Honeywell International):** methods and tools for automated formal verification of requirements and system design of artificial intelligence-based system. The goal is to develop a use case **Artificial Intelligence Based Adaptive Diagnostics of Electromotors** and verify it using traditional verification techniques (mainly testing) as well as using proposed formal verification approach.
- **SM (Smart-Motion, SME):** Mechanical engineering, mechanical simulation, engineering support
- **MU (Masaryk University):** Evaluate applicability and benefits of formal verification tool for aerospace case study Artificial Intelligence Based Adaptive Diagnostics of Electromotors.

Figure 7 - Wide Crop production multiple tasks Demonstrator

AI4DI (2018, 41 partners, 30MEuro cost)

Title: Artificial Intelligence for Digitalizing Industry
Topic: **Digital Industry** AI
Czech Participants:

- **BUT**: key contribution in AI algorithms for mechatronic systems fault detection and robot navigation
- **IMA**: providing IoT sensors, actuators and gateway within warehouse/production environment put on human and machines/objects. Human Machine interaction takes place. Artificial Intelligence code implemented at the edge of the devices enables device independency when interfaces to upper systems fail while HM services are retained.

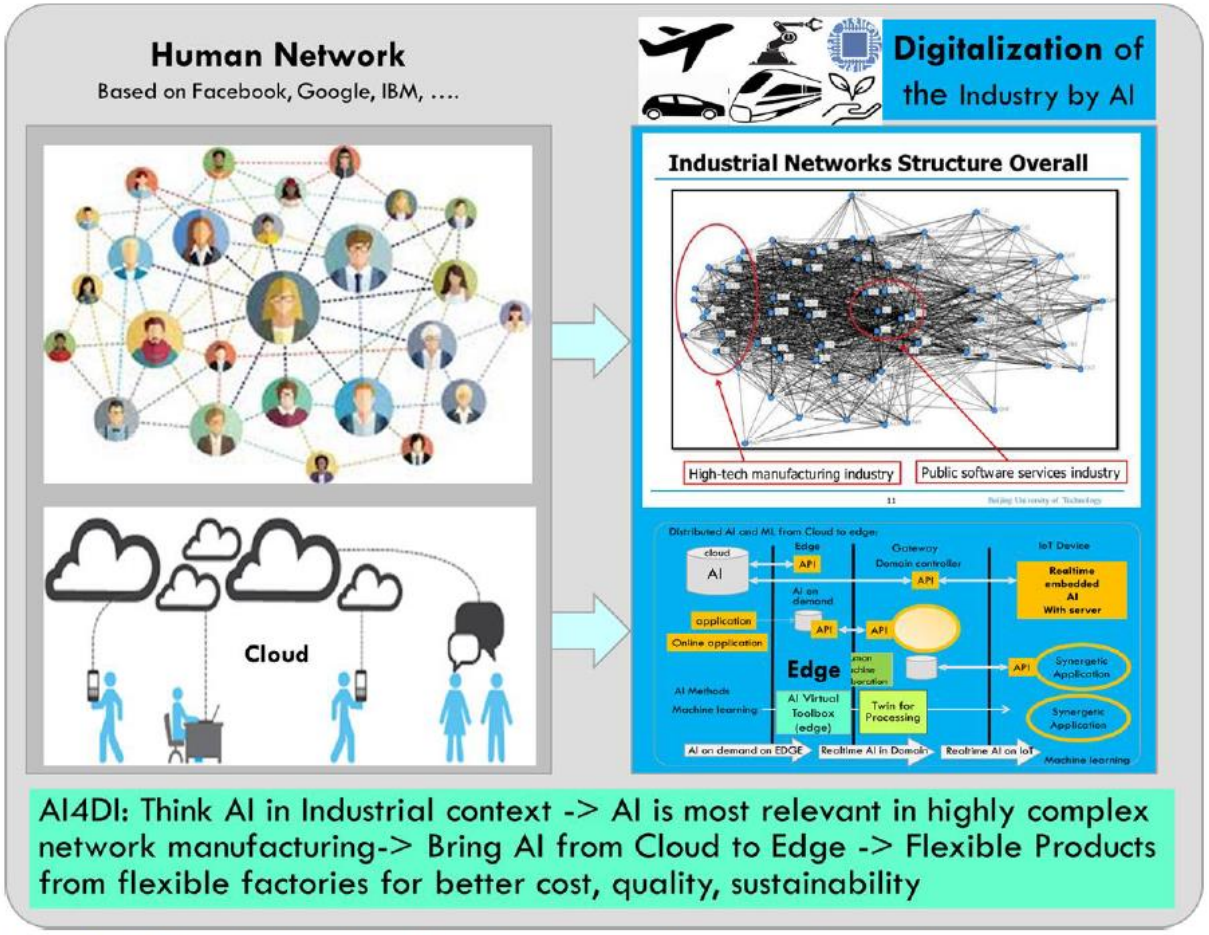
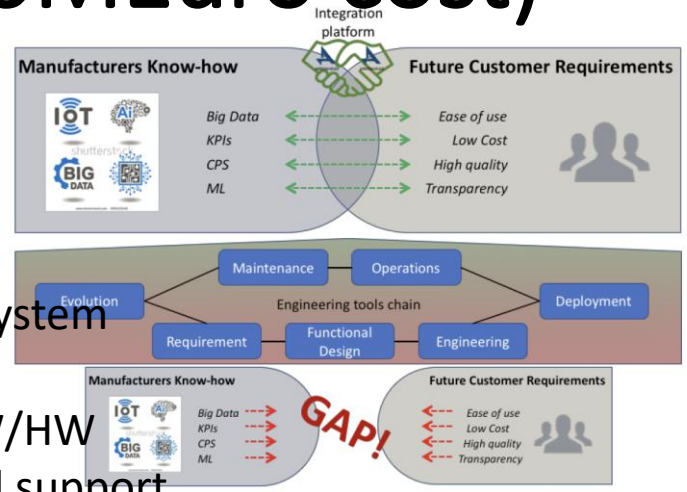


Figure 5: AI from cloud to edge and from human networks to industrial networks

Arrowhead Tools (2018, 90 partners, 90MEuro cost)



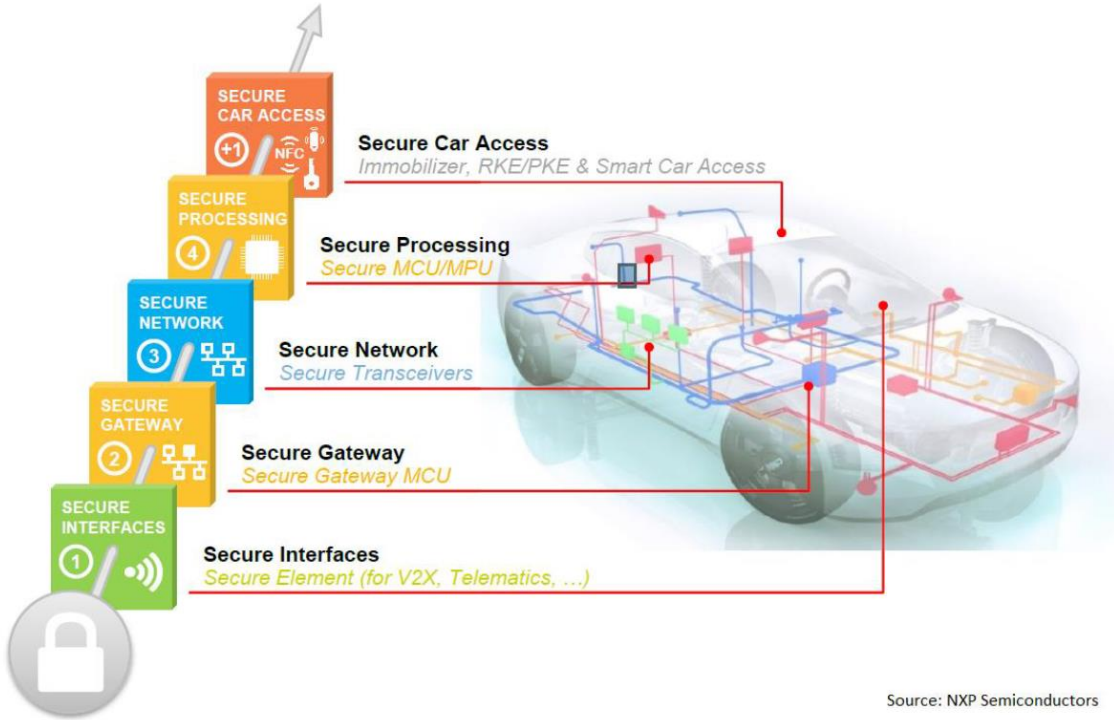
Title: Arrowhead Tools for Engineering of Digitalisation Solutions
Topic: CPS **Digital Industry**
Czech Participants:

- **HON**: methods and tools for automated formal verication of requirements and system design.
- **UTIA (Institute of Information Theory and Automation, University):** develop SW/HW board/project delivery tools for wide range of industrial computing nodes, board support packages for specific commercially supported design flow toolchain for the family of 16 nm UltraScale MP-SoC devices on multiple industrial grade carrier boards.
- **MU (Masaryk University):** development of algorithms, methods, and practical tools for program analysis and varication
- **BUT**: provide their experience with methods of ensuring software and hardware safety, including various kinds of automated static formal verification approaches as well as systematic testing and dynamic analysis capable of extrapolating results of testing and predicting possible failures even when they do not manifest during testing.
- **CVUT (Czech Technical University in Prague):** development tools for embedded real-time and safety-critical systems with a focus on automotive industry
- **CAMEA, spol. s r.o.**

SECREDAS (2017, 69 partners, 51MEuro cost)

Title: Product **Se**curity for **Cr**oss Domain R**e**liable **D**ependable **A**utomated **S**ystems
Topic: CPS Cybersecurity
Czech participants:

- **BUT**: contribute with authentication infrastructure to support evaluation of authentication supplicants and the primary contribution will be in development of robust secure supplicant code supporting RADIUS/DIAMETER protocols.
- **IMA**: create robust dynamic car access system based mixture of recent smart enablers. The innovative concept will be based on various identifiers, access right cross-check, dynamic on line authentication and profiling by using BUT authentication server. Once the access check-in will be successfully accomplished, the authenticated identity of the driver will be liaison via standard SECREDAS Gateway to the in-vehicle system.



Source: NXP Semiconductors

FITOPTIVIS (2017, 31 partners, 22MEuro cost)

Title: From the cloud to the edge - smart IntegraTion and OPtimisation Technologies for highly efficient Image and VIdeo processing Systems
Topic: CPS Imaging
Czech participants:

- **CAM (CAMEA) :** embedded video processing, specifically design and experimental research in embedded combination of FPGA and CPUs.
- **CUNI (UNIVERZITA KARLOVA):** specifying, modeling and developing components and models allowing for design-time and runtime adaptation in an edge-cloud enabled deployment.
- **REX (REX Controls s.r.o.):** Native support of the developed intelligent industrial camera sensor proposed by UWB in real-time control system
- **BUT**: embedded video processing, specifically object detection, recognition, and decsription.
- **UWB (ZAPADOCESKA UNIVERZITA V PLZNI):** Design and development of industrial camera sensor with integrated mathematical model of dynamics of the observed object
- **UTIA (USTAV TEORIE INFORMACE A AUTOMATIZACE AV CR VVI):** provide support mainly for Zynq Ultrascale+ 16 nm MPSOC design time resources and generic video processing IP cores and support for the board support packages enabling use of the commercial SDSoC design flow in the custom industrial system on modules with the 16nm MPSOC Zynq devices

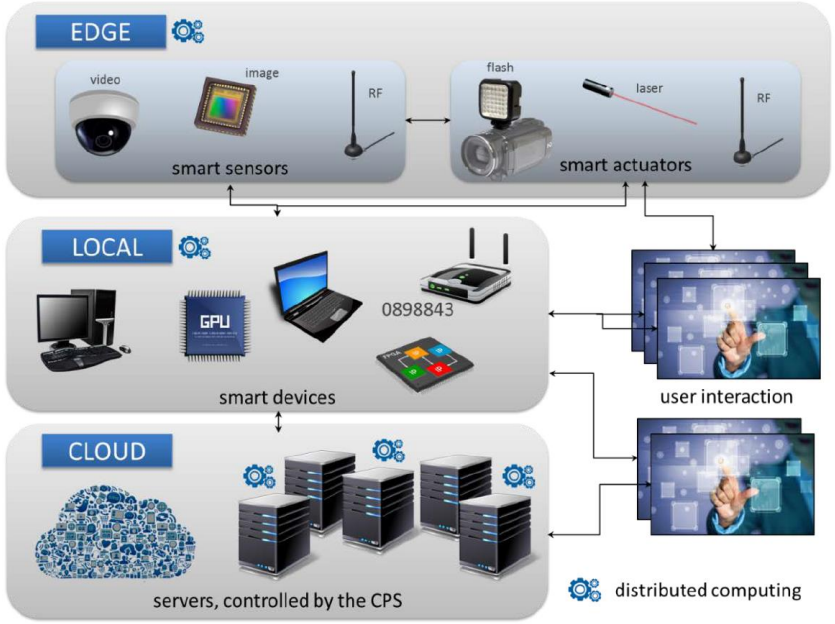
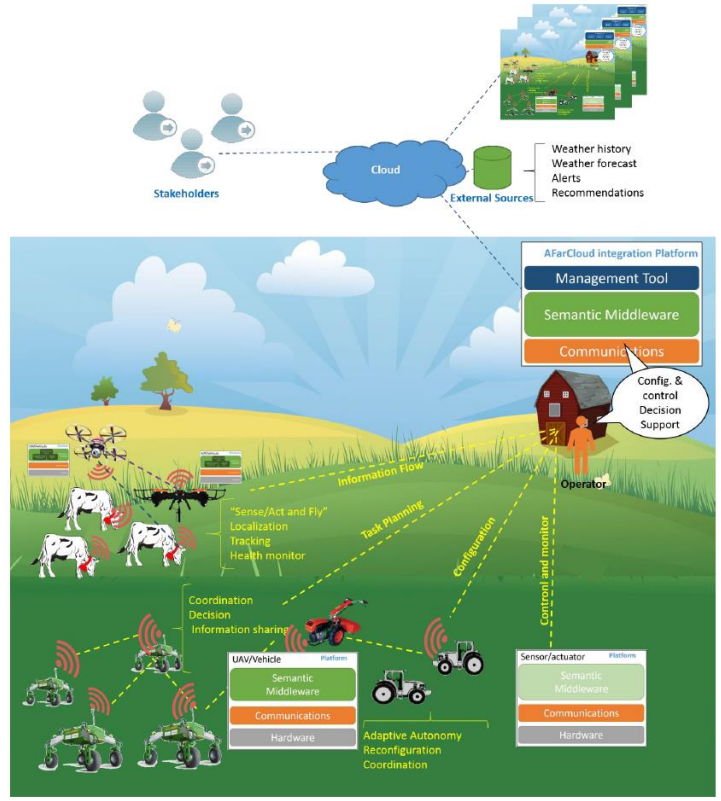


Figure 1 - FitOptiVis generic configuration of imaging and video pipelines in CPS

A Far Cloud (2017, 60 partners, 28MEuro cost)

Title: Aggregate FARming in the CLOUD
Topic: **Digital Industry** Agronomy
Czech participants:

- **IMA:** contribute in smart and secure identification, Identity management, system integration and sensors network implementation for IoT, provide basic data mining on gathered sensor data (correlation, profiling) for follow up applications.
- **UWB:** focus on specific aspect of livestock scenarios, namely development of additional sensory layer and data analysis SW modules for decision making layer
- **IAS (VYZKUMNY USTAV ZIVOCISNE VYROBY V.V.I. UHRINEVES):** contribute to sensor specifications, test of sensors provided by partner UWB for livestock health monitoring in dairy cows trial will contribute to overall architecture specification, namely from livestock point of view
- **CUNI:** modelling the agricultural system as a dynamic and evolving architecture of IoT and computational subsystems in an edge-cloud and smart coordination of such subsystems
- **LESP (LESPROJEKT SLUZBY SRO):** contribute to the analysis of use cases, design of architecture, implementation of tools formanagemnt of observation and also to the pilots in Czech and Latvia



WakeMeUp (2017, 18 partners, 96MEuro cost)

Title: **W**afers for **A**utomotive and other **Ke**y applications using **Me**mories, embedded in **U**lsi **P**rocessors
Topic: Chip Technology (SOI)
Czech participants:

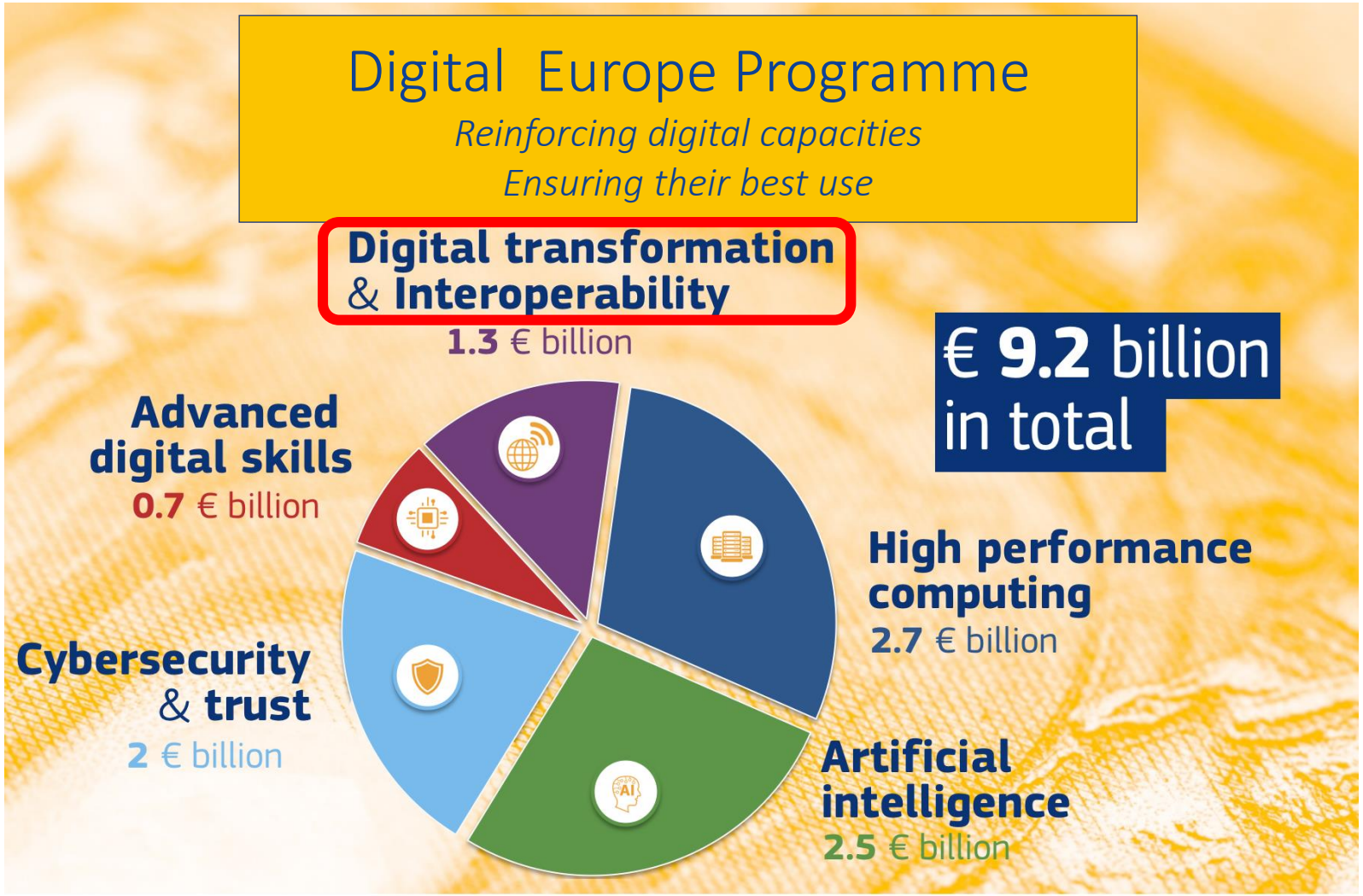
- UTIA: develop SW stack and demos for low-power image processing WAKeMeUP SoC system with adaptation of the modified system level compiler toolchain
- IMA: involved in project tasks *T4.3 Embedded SW development* and *T5.2 Secure and General Purpose Application and System platform*.

1. What is ECSEL?
2. ECSEL and Industry 4.0
3. ECSEL and the Czech participation
4. **What will come next?**
    1. **Key Digital Technologies JU**
    2. **Digital Europe**

Horizon Europe: evolution not revolution

European Commission

Digital Europe programme



#EUBudget
#DigitalEurope

European Commission

END