Infineon Technologies AG

ECSEL Joint Undertaking Advisory Group Meeting

Istanbul, 18 Feb 2020

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Infineon Technologies AG
Campeon, Neubiberg near Munich, Germany

Financial Year 2019
Revenue Split by Segment
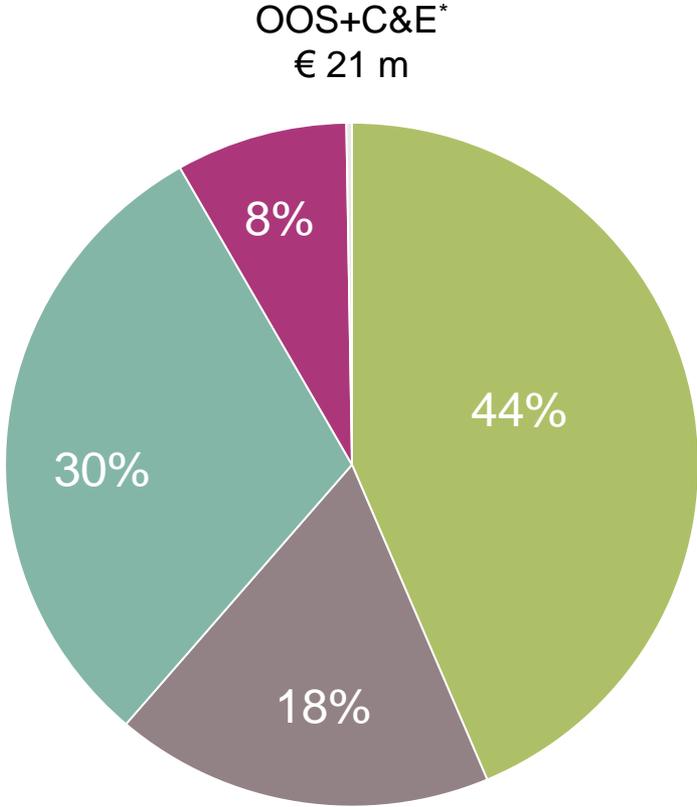
FY 2019 Revenue: € 8,029 m

Digital Security Solutions

€ 642 m

Power Management & Multimarket

€ 2,445 m

OOS+C&E*
€ 21 m

8%

44%

30%

18%

Automotive

€ 3,503 m

Industrial Power Control

€ 1,418 m

* Other Operating Segments; Corporate & Eliminations
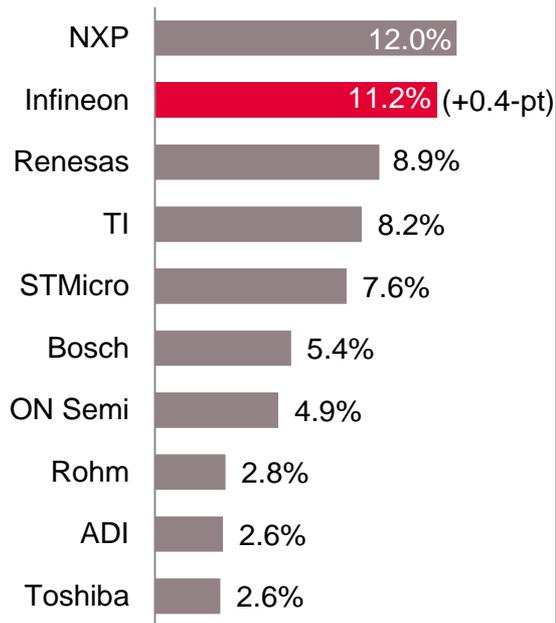
Infineon gained market share in all target markets

Automotive semiconductors

total market in 2018: $37.7bn

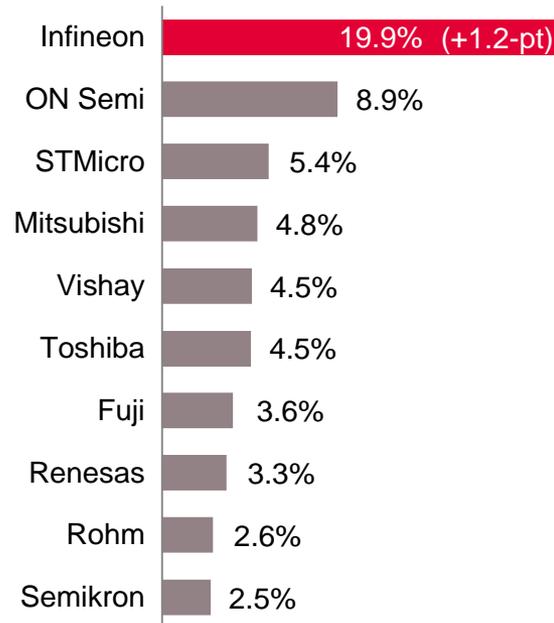|	
NXP	12.0%
Infineon	11.2% (+0.4-pt)
Renesas	8.9%
TI	8.2%
STMicro	7.6%
Bosch	5.4%
ON Semi	4.9%
Rohm	2.8%
ADI	2.6%
Toshiba	2.6%

Source: Strategy Analytics, "2018 Automotive Semiconductor Vendor Share", April 2019

Power discretes and modules

total market in 2018: $21.0bn

|	
Infineon	19.9% (+1.2-pt)
ON Semi	8.9%
STMicro	5.4%
Mitsubishi	4.8%
Vishay	4.5%
Toshiba	4.5%
Fuji	3.6%
Renesas	3.3%
Rohm	2.6%
Semikron	2.5%

Source: Based on or includes content supplied by Informa Tech (former IHS Markit Technology), "Power Semiconductor Market Share Database – 2018", September 2019

Security ICs

total market in 2018: $3.2bn

NXP	24.8%
Infineon	24.3% (+0.1-pt)
Samsung	17.4%
STMicro	10.1%
CEC Huada	8.5%
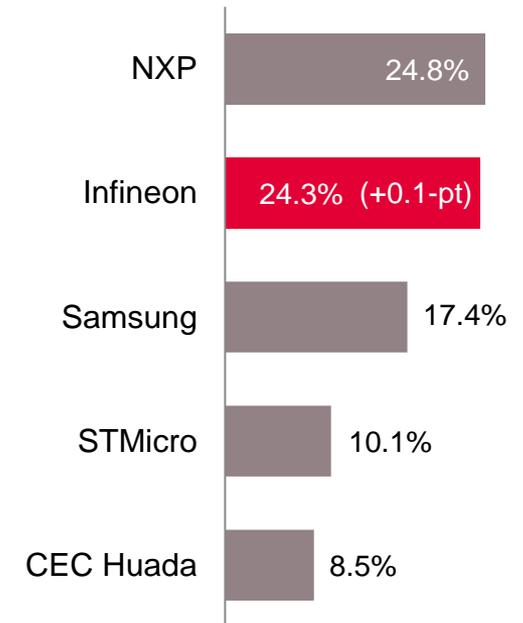
Source: ABI Research, "Smart card & secure ICs", September 2019

Industrial Power Control:
We empower a world of unlimited energy

Generation	Transmission	Consumption
› Wind	› HVDC Transmission	› Home Appliances
› Photovoltaic		› Drives
› Energy storage		› Robotics
		› Industrial Automation
		› Industrial Power Supply
		› CAV
		› EV Charging
		› Traction
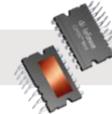
Automotive: We shape the future of mobility with microelectronics enabling clean, safe, smart cars

Clean

› Clean combustion engines
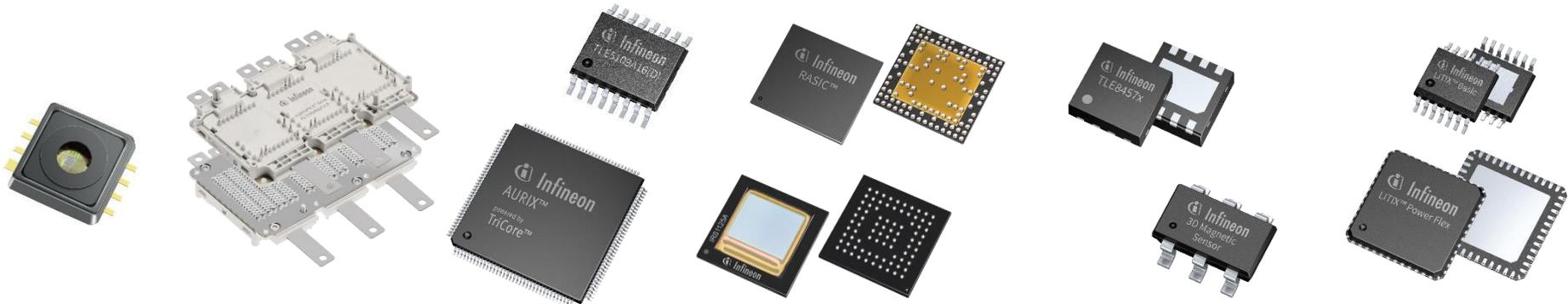
› Efficient energy management

› Electrified drivetrain

Safe

› Occupant and pedestrian protection

› Collision avoidance

› Advanced driver assistance

Smart

› Individual convenience

› Secure connectivity, data integrity and privacy

Digital Security Solutions:
We deliver security for the connected world

Smart Cards

- › Smart card payment
- › Electronic passports and ID documents
- › SIM cards for mobile communication
- › Transport ticketing

Embedded Security

- › Mobile security
- › Information and communications technology security
- › Industrial security
- › Automotive security
- › IoT security

Power Management & Multimarket: We drive leading-edge power management, sensing and data transfer capabilities

Energy Efficiency

IoT & Big Data

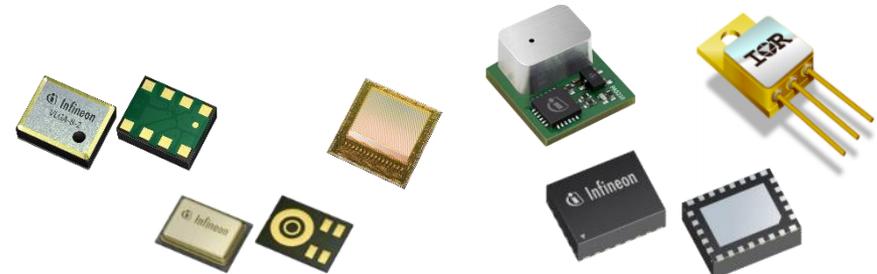| Charging	Battery powered	Lighting	Data Centers	5G	Intuitive Sensing	Mobile devices

Energy Efficiency
> Silicon and wide bandgap switches
> Power ICs
> Integrated controller

IoT & Big Data
> RF switches
> MEMS microphones
> Environmental sensors
> Time of Flight imagers

> Radar ICs
> Pressure sensors
> High Reliability products

Our global Research and Development activities

About 12 percent

of Infineon's annual revenue goes into Research and Development (R&D). In fiscal year 2019, R&D investments amounted to 945 million euros.

7,755 R&D employees

worldwide develop new products, technologies and platforms as well as new manufacturing technologies.

26,570 patents in the overall portfolio

show a high level of innovative strength and long-term competitiveness. In fiscal year 2019 alone, Infineon registered 1,760 new patents.

Numerous innovative ecosystems

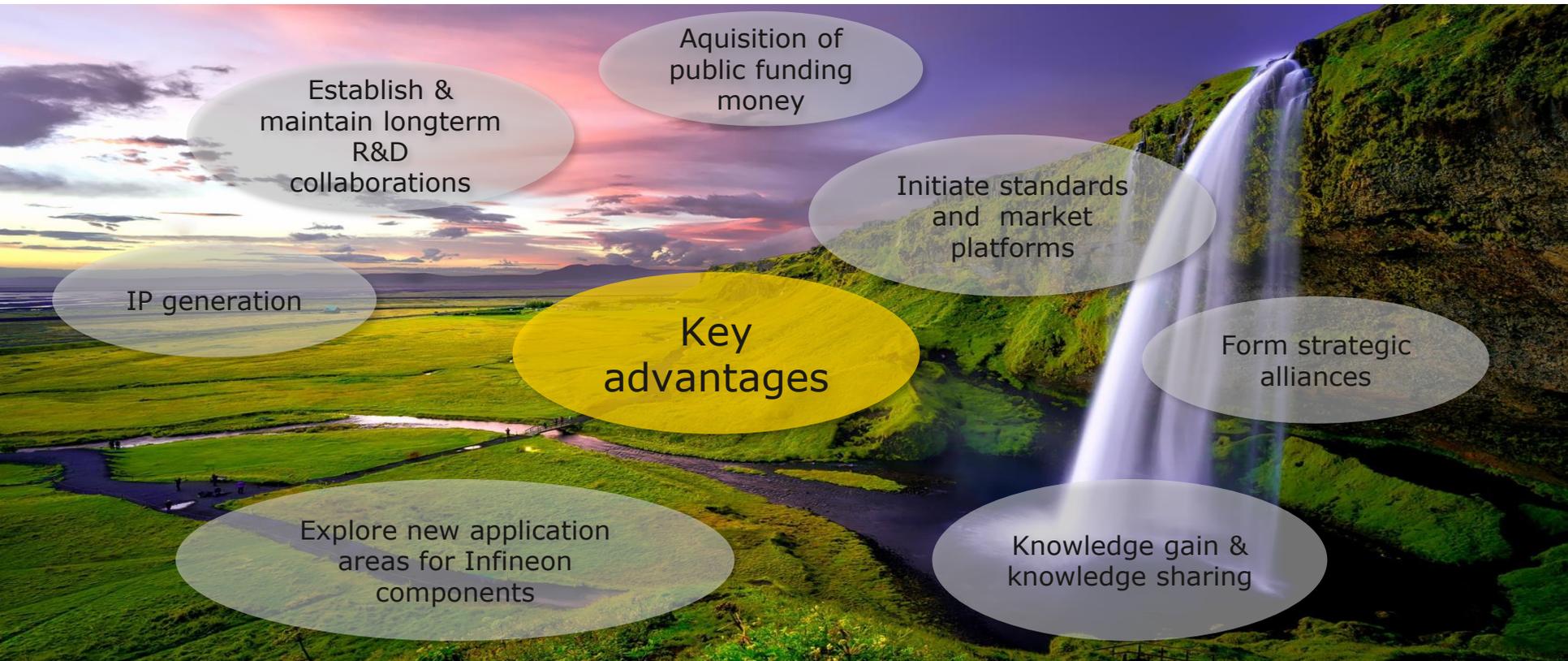with tech companies, universities and research institutes are of great importance to Infineon.
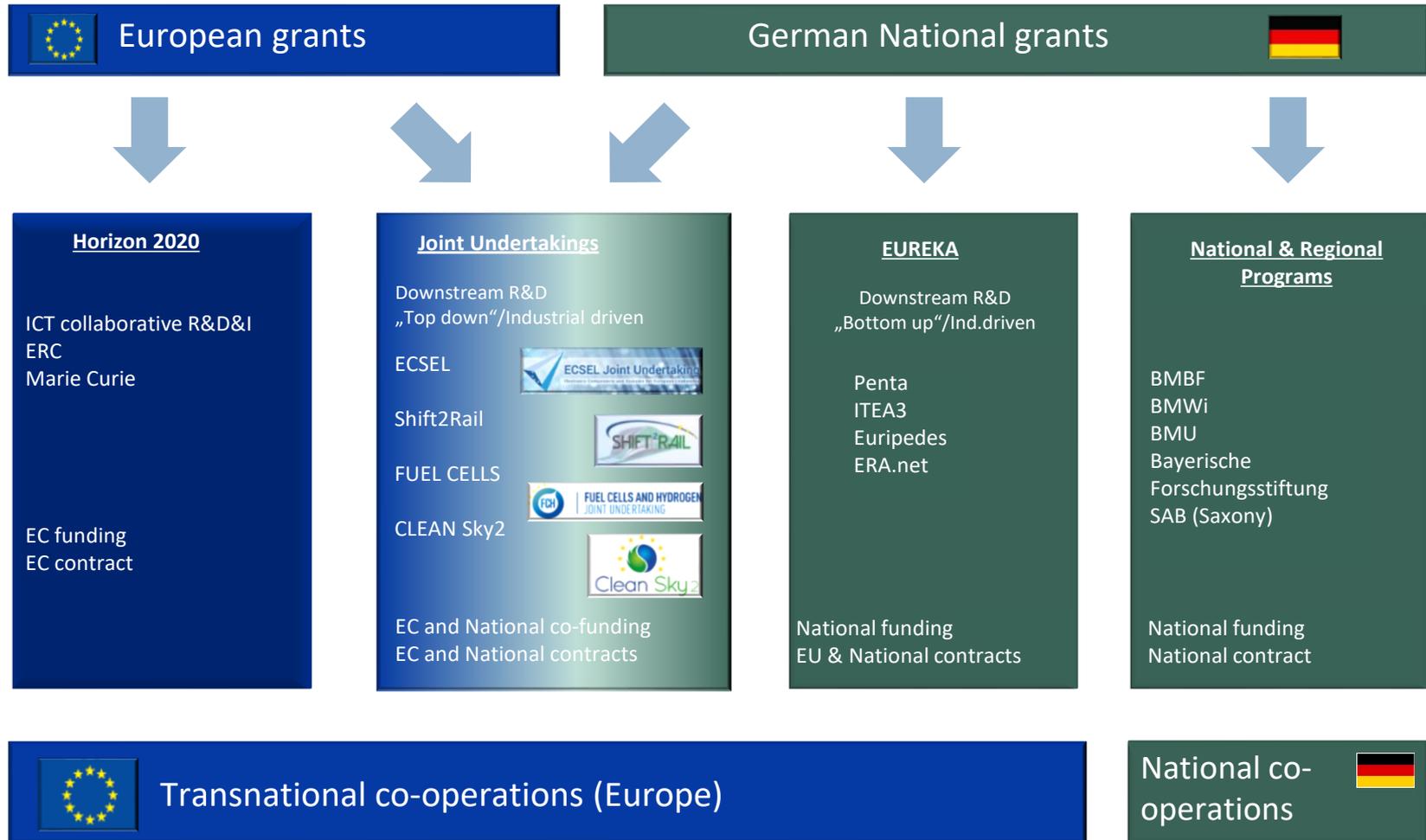
37 sites in 15 countries:	
Americas	Chandler, El Segundo, Leominster, Mesa, Milpitas, San José, Andover and Warwick (all USA)
Asia	Beijing and Xi'an (both China); Bangalore (India); Tokyo (Japan), Seoul (Korea); Ipoh, Kulim, Melaka (all Malaysia); Muntinlupa (Philippine); Singapore
Europe	Graz, Linz and Villach (all Austria); Herlev (Denmark); Augsburg, Dresden, Duisburg, Erlangen, Karlsruhe, Neubiberg near Munich, Regensburg and Warstein (all Germany); Le Puy-Sainte-Réparade (France); Bristol and Reigate (both Great Britain); Padua and Pavia (both Italy); Nijmegen (The Netherlands); Bucharest (Romania)

As of September 2019

Motivation R&D funding projects

Aquisition of public funding money

Establish & maintain longterm R&D collaborations

Initiate standards and market platforms

IP generation

Key advantages

Form strategic alliances

Explore new application areas for Infineon components

Knowledge gain & knowledge sharing

European funding landscape

European grants 🇪🇺		**German National grants** 🇩🇪	

Horizon 2020

ICT collaborative R&D&I
ERC
Marie Curie

EC funding
EC contract

Joint Undertakings

Downstream R&D
„Top down"/Industrial driven

ECSEL

Shift2Rail

FUEL CELLS

CLEAN Sky2

EC and National co-funding
EC and National contracts

EUREKA

Downstream R&D
„Bottom up"/Ind.driven

Penta
ITEA3
Euripedes
ERA.net

National funding
EU & National contracts

National & Regional Programs

BMBF
BMWi
BMU
Bayerische
Forschungsstiftung
SAB (Saxony)

National funding
National contract

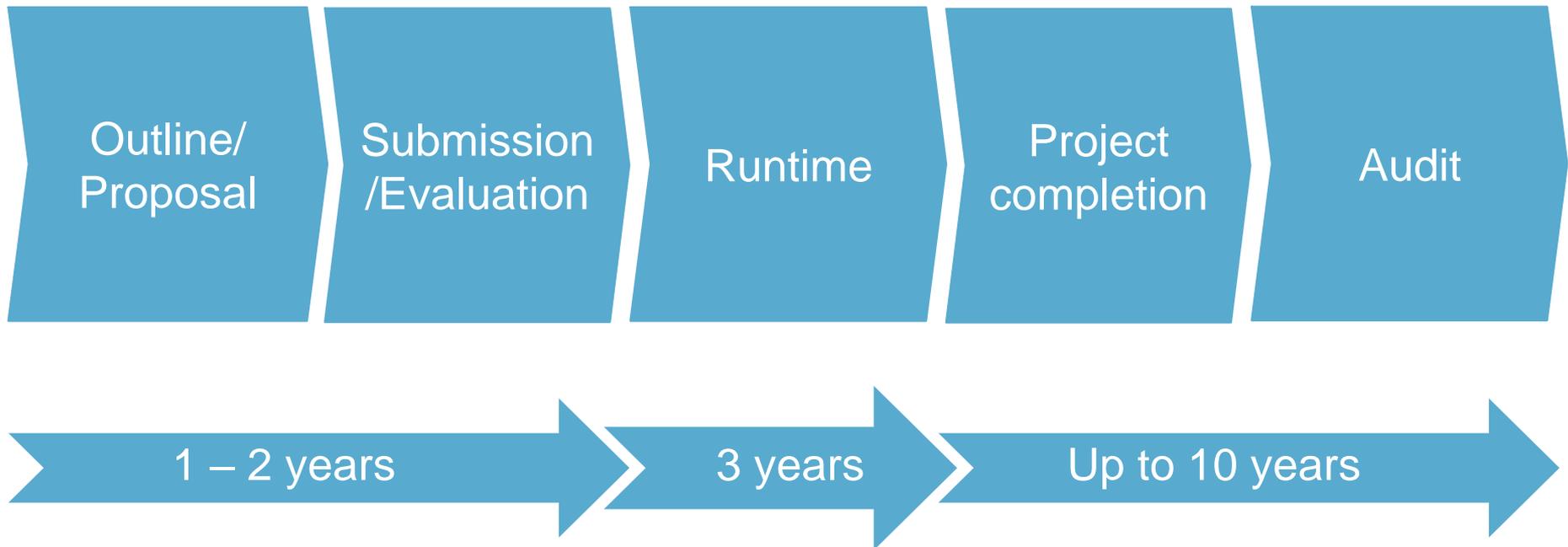🇪🇺 Transnational co-operations (Europe)

National co-operations 🇩🇪

ECS SRA – a basis for Collaborative Projects

General approach to set up a project

Life cycle of a funded research project

| Outline/ Proposal | Submission /Evaluation | Runtime | Project completion | Audit |

| 1 – 2 years | 3 years | Up to 10 years |

Current funding setup at Infineon
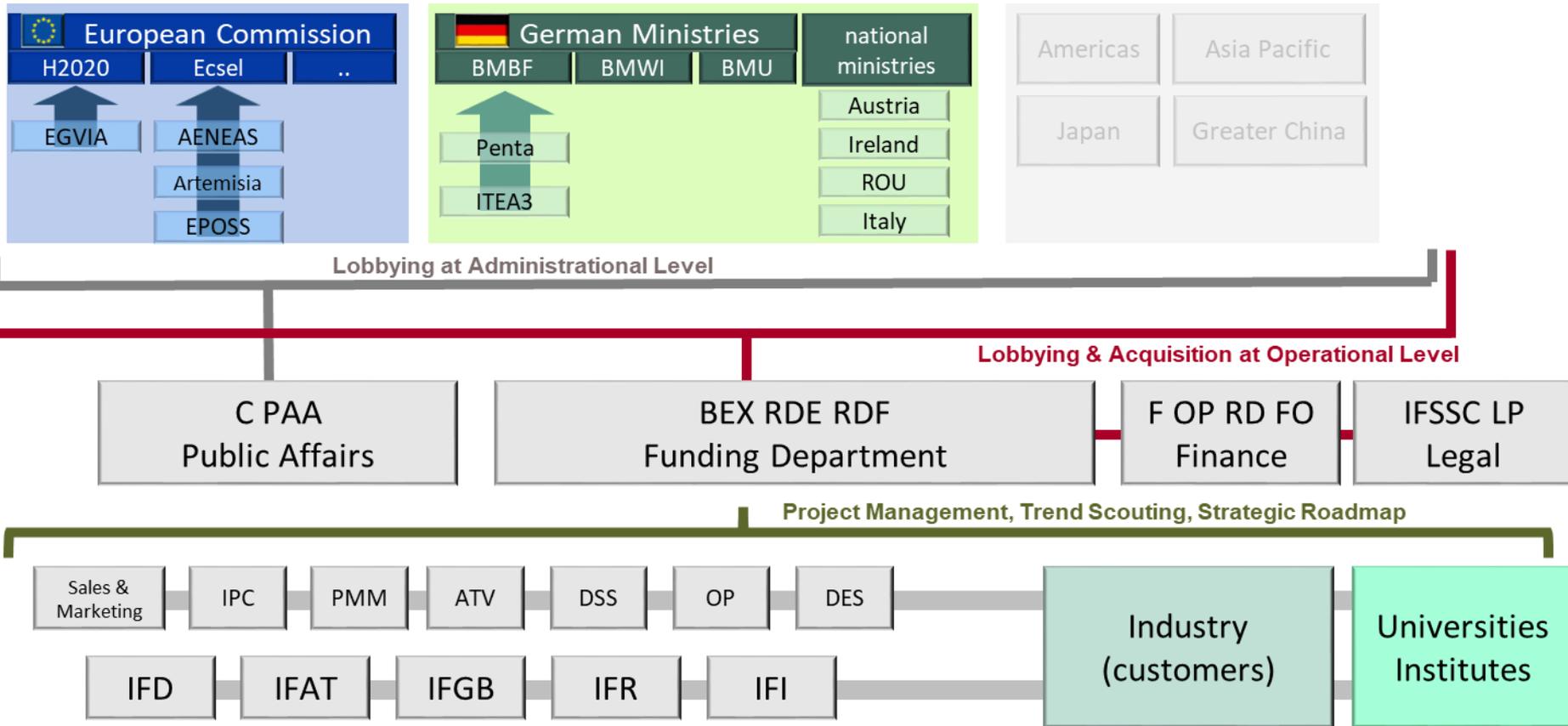
Motivation for funded projects

What's needed?

- a committed team
- structured approach
- a good portion of luck

Stick to your own creative ideas !!!

General approach to set up a project

establish a suitable environment

- Build a core team
- Establish the tool environment (document exchange server, web conferences)
- Create necessary templates (contacts, partner contributions, PO, FPP, task structure, ressources, presentations, …)
- Establish a working procedure
- Define responsibilities and a time schedule

General approach to set up a project

Conservative cost estimation:

- preparation phase: at least 1 year

- 2HC at co-ordinator;

- 3PM per core member (5) ;

- 1PM per partner (50) ;

- 1PM =15k€ → 89PM → 1,335Mio€

Challenges

- focus on the technological and scientific topics

- submission of a high quality proposal

- Short preparation time for FPP

- increased competition for limited funding resources

- unsatisfactory funding conditions

- conflicting interests at national and European level

- too much regulation

- evaluation based on paper only

- SME involvement

unfortunately things are getting more and more complex

Trends in ECSEL projects

- *Holistic system approach*

- *Research along the entire supply chain*

- *Covering the entire product life cycle*

- *Involve partners globally*

| Research | System Development | Implementation/ Manufacturing | Product In-use | Recycling |
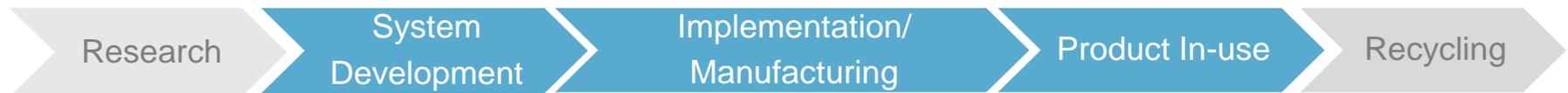
The largest European R&D project ever

Productive4.0 - Electronics and ICT as enabler for digital industry and optimized supply chain management covering the entire product lifecycle

ECSEL JU

Co-ordinator: Infineon

Consortium: 108 partners
                from 19 countries

Among: Philips, ABB, BMW, Lfoundry, NXP, Danobat, Mondragon, FhG..

Total Budget :   €106 million

Net Funding Infineon: €6,7 million
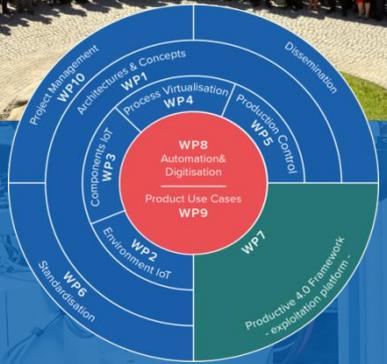
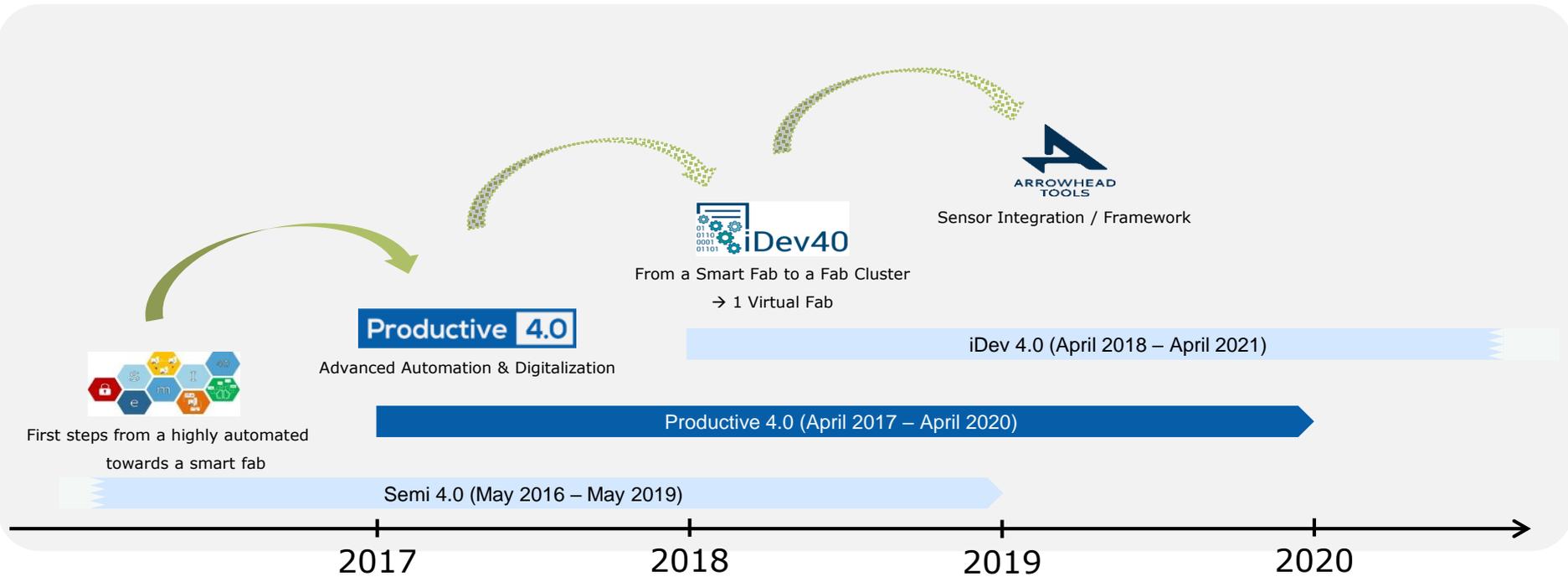A hands-on approach of digitalising the European industry with focus on the three pillars:

- Digital production (DP)
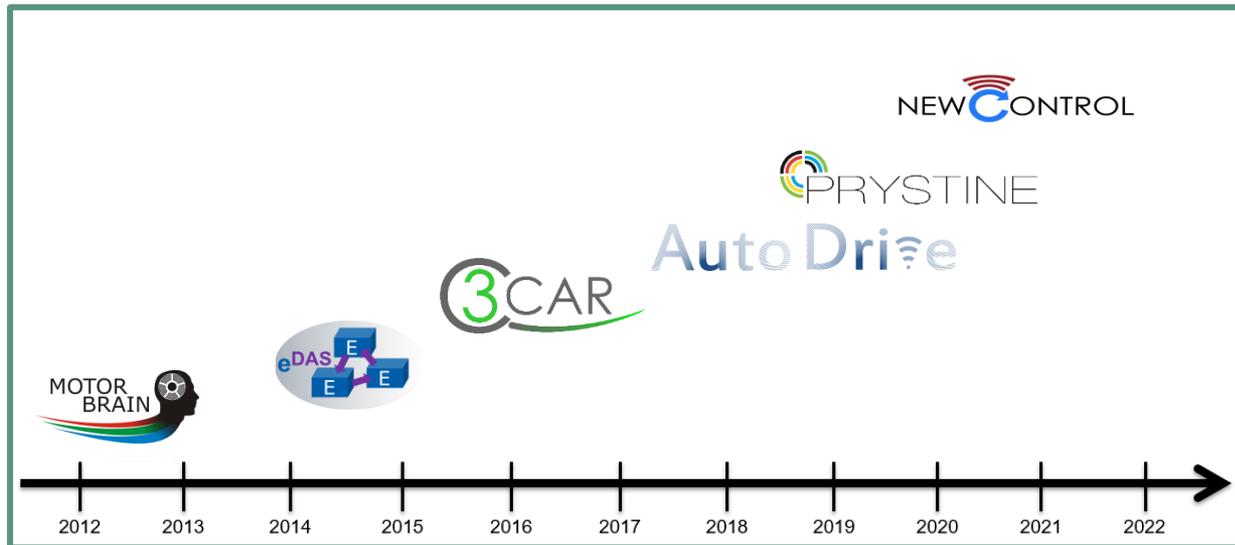- Supply Chain Networks (SCN)
- Product Life Cycle Management (PLM)

productive40.eu

videoclip

towards smart fabs

First steps from a highly automated towards a smart fab

Productive 4.0
Advanced Automation & Digitalization

iDev40
From a Smart Fab to a Fab Cluster
→ 1 Virtual Fab

ARROWHEAD TOOLS
Sensor Integration / Framework

iDev 4.0 (April 2018 – April 2021)

Productive 4.0 (April 2017 – April 2020)

Semi 4.0 (May 2016 – May 2019)

2017   2018   2019   2020

Mobility Ecosystem
from e-mobility to highly automated vehicles

Timeline (2012–2022) with projects: MOTOR BRAIN, eDAS, 3CAR, AutoDrive, PRYSTINE, NEWCONTROL

Nanoelectronics for **Electric Vehicle** Intelligent Failsafe Power Train

energy powered by smart **D**esign meaningful **A**rchitecture connected **S**ystems

Nanoelectronics as key enabler for the 3rd & 4th generation of **electric vehicles**

Advancing fail-aware, fail-safe, and fail-operational electronic components, systems, and architectures for **fully automated driving**…

Programmable **Sy**stems for **I**ntelligence in Automobi**l**es

Integrated, Fail-Operational, Cognitive Perception, Planning and Control Systems for **Highly Automated Vehicles**

Currently working on

EPI - European Processor Initiative - High Performance Computing

Consortium: 23 partners
among: Barcelona Supercomputing Center
              CEA LETI, BullAtos, BMW, Forth,
              FZ Jülich, Fraunhofer, Elektrobit

Total Budget :   €80 million

Infineon, Co-ordinator,Automotive Stream'

Net Funding Infineon: €8,6 million   (phase1/2)
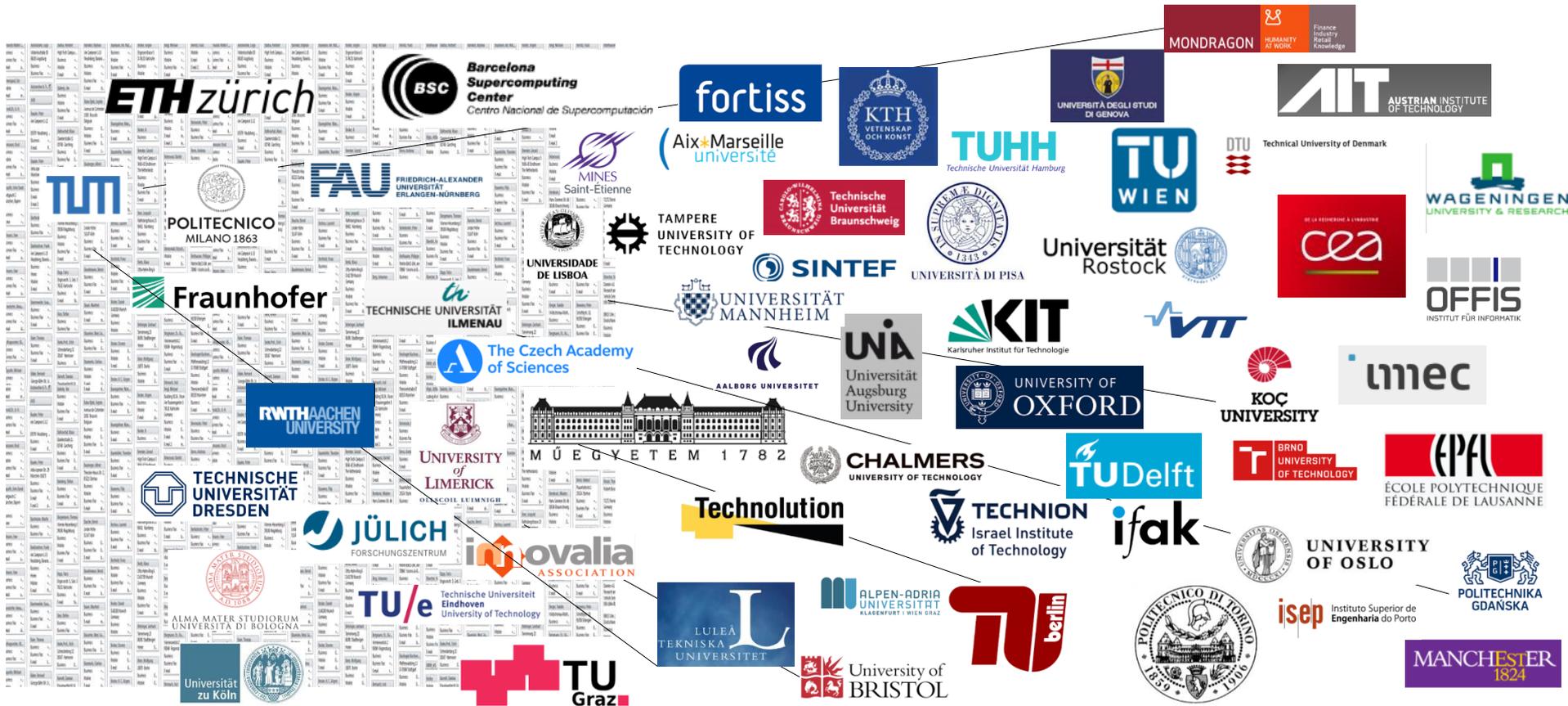
Expected total: €13-14 million

Automotive eHPC platform , 1st reference implementation in SGA1
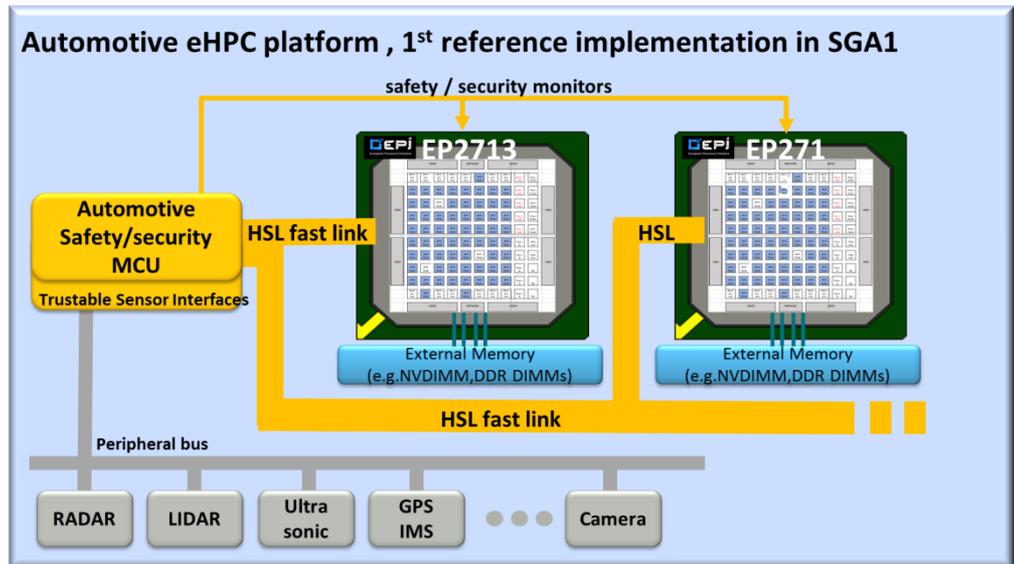
Global competition on the fastest computer

Well-connected to European industry

..plenty of interesting research areas to discover..

– Digitalization of industry

– High Performance Computing & Edge Computing

– Artificial Intelligence

– Highly automated and Autonomous Driving

– the whole area of Service Robotics, just to mention a few..

Thank you very much for your kind attention!

Do not hesitate to contact me:

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Part of your life. Part of tomorrow.