

# Public-Private Partnership in Automotive Research and Education

## *Case Studies from EU-funded Projects*



Valentin Ivanov

*EU Project Coordinator*

*Automotive Engineering Group, TU Ilmenau, Germany*

# Main EU Funding Instruments for Automotive R&D

## Horizon 2020 Smart, Green and Integrated Transport

Innovation actions (100% reimbursement by EC)

Research and Innovation actions (70% reimbursement by EC)

Specific programmes for SMEs

- *Specific topics defined by EC every year*
- *Industry-academia consortia from EU and associated countries*
- *Three-years-projects as a rule*
- *Funding of direct costs + overhead*

## Marie Skłodowska-Curie Actions

Training Networks

Research and Innovation Staff Exchange

- *Bottom-up approach*
- *Industry-academia consortia from EU, associated and many third countries*
- *Four-years-projects as a rule*
- *Funding of personal and institutional costs*

## Joint Undertakings (JU)

ECSEL Electronic Components and Systems

FCH Fuel Cells and Hydrogen

...

- *Specific topics defined by JU every year*
- *Industry-academia consortia from several EU countries*
- *Mixed funding from EU, national authorities and internal sources*

# Case I: Project EVC1000

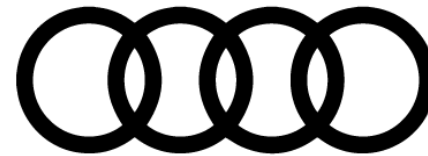
## EVC1000 - Electric Vehicle Components for 1000 km daily trips

- EU Funding Topic: Integrated, brand-independent architectures, components and systems for next generation electrified vehicles optimised for the infrastructure (Innovation Actions)
- Overall budget € 6 772 944, EU Contribution € 5 149 429
- Duration 2019-2021



## Consortium

- AVL List (Coordinator) - Austria
- AUDI - Germany
- JAC - Italy
- Brembo - Italy
- Elaphe - Slovenia
- Ideas & Motion - Italy
- Tenneco - Belgium
- Fraunhofer Society - Germany
- TU Ilmenau - Germany
- University of Surrey - UK



# Case I: Project EVC1000

## Target Impact

- 2 vehicle segment addressed
- > 2.3 Mio vehicles produced per year
- €4.5 billion turnover for component sales and engineering services per year
- Addressing Europe and China market with European technologies
- Smart Systems Integrated® trademark
- Cross-domain applications “Green Vehicles meet ICT”



## New Technologies

- In-wheel motors (110 kW) with 30% motor power loss reduction and 30% cost reduction
- Centralised electric wheel drive (eWD<sup>2</sup>) with superior level of functional integration
- Active suspension system with plug-and-play integration to the in-wheel electric drivetrains
- Mixed electro-hydraulic / electro-mechanical brake-by-wire system

## Case II: Project XILforEV

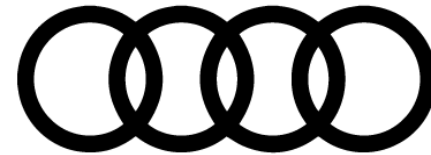
### XILforEV - Connected and Shared X-in-the-loop Environment for Electric Vehicles Development

- EU Funding Topic: *Virtual product development and production of all types of electrified vehicles and components (Research and Innovation Actions)*
- EU Funding **€ 3 575 079**
- Duration 2019-2021



### Consortium

- TU Ilmenau - Germany
- AUDI - Germany
- Elaphe - Slovenia
- Instituto Tecnológico de Aragon – Spain
- Siemens Industry Software – Belgium / France
- Tenneco – Belgium
- University of Tokyo – Japan (associated)



# Case II: Project XILforEV

## Target

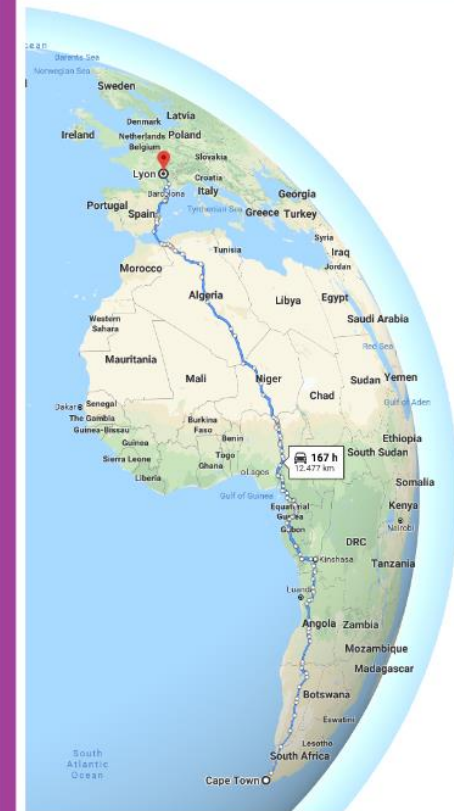
- Complex experimental environment for designing electric vehicles and their systems, which connects **test platforms and setups from different domains** and situated in **different geographical locations**



## Design challenges of modern vehicles:

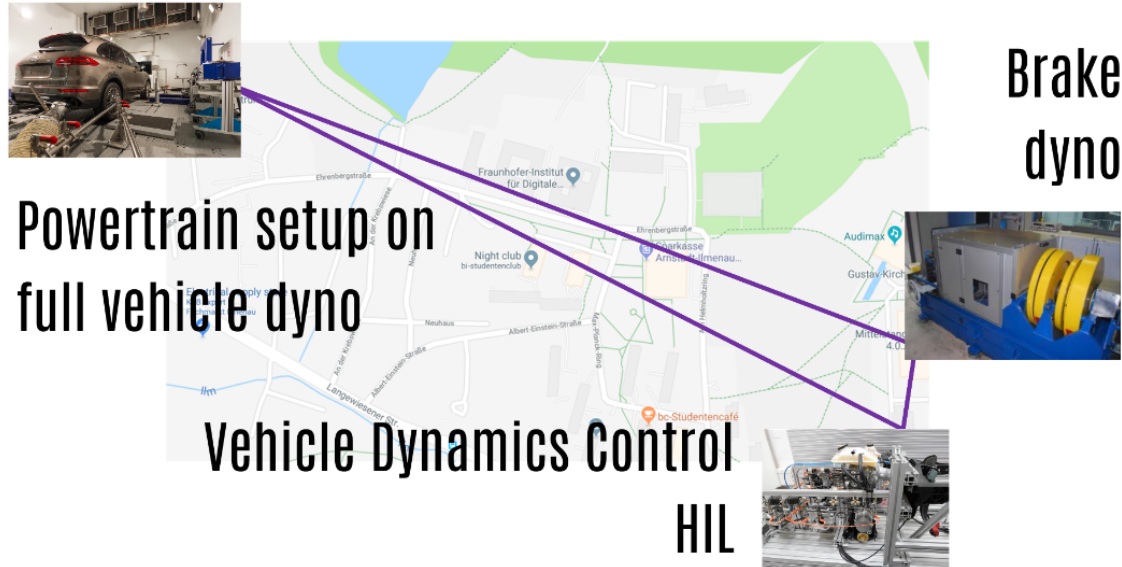
- More complex on-board software than in aircraft
- Increase of attach rate of intelligent vehicle systems (8% in 2015 vs. 109% in 2025)
- Vaste pre-production test programme (> 14 billion km, or about 570 000 round trips between Lyon and Cape Town)

Sources: US GAO, Toyota, HIS Inc.



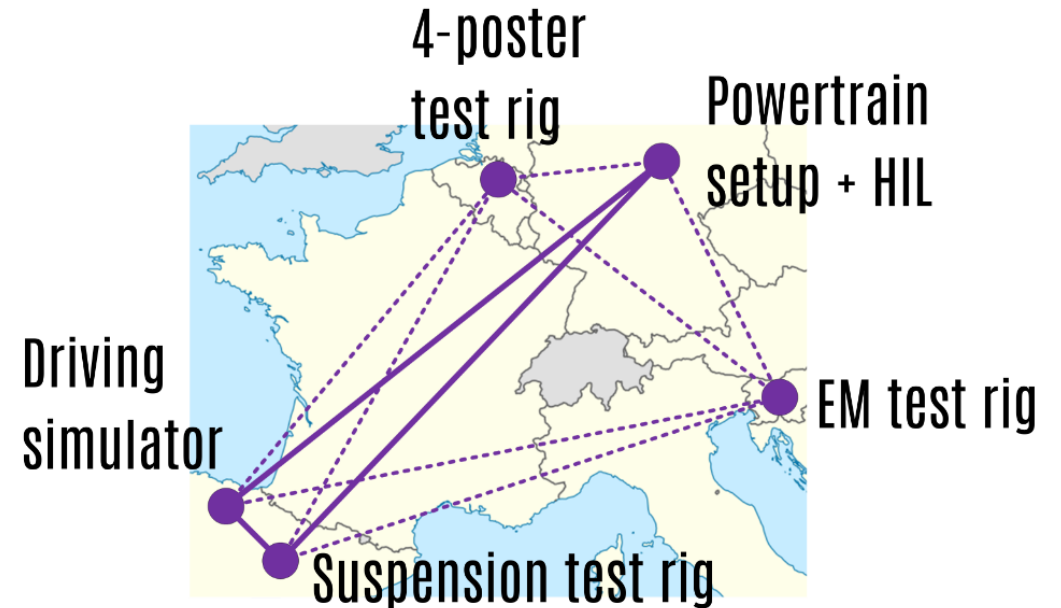
# Case II: Project XILforEV

## Distributed local



- Test setups are distributed within the narrow location using local communication means as optic line
- XILforEV case: Test setups are located in three buildings within the TUIL campus (distance > 1 km)

## Distributed remote



- Test setups are distributed between different geographical locations with the Internet connection
- XILforEV case: Main test setups in Germany (Ilmenau), Spain (Ermua and Zaragoza); secondary - in Slovenia (Ljubljana) and Belgium (Saint Truiden)

# Case III: ITEAM Network

## ITEAM - Interdisciplinary Training Network in Multi-Actuated Ground Vehicles

- EU Funding Topic: *Marie Skłodowska-Curie Innovative Training Networks*
- EU Funding € 3 833 413
- Duration 2016-2019



## EU Funding Content

- 15 full-time research fellow positions for 3 years + Mobility and management costs
- Job position assumes the work on individual research projects and possible PhD enrolment
- Each fellow must take intersectoral secondments (several months of working by one of the partners)

### Consortium: Industry and SMEs

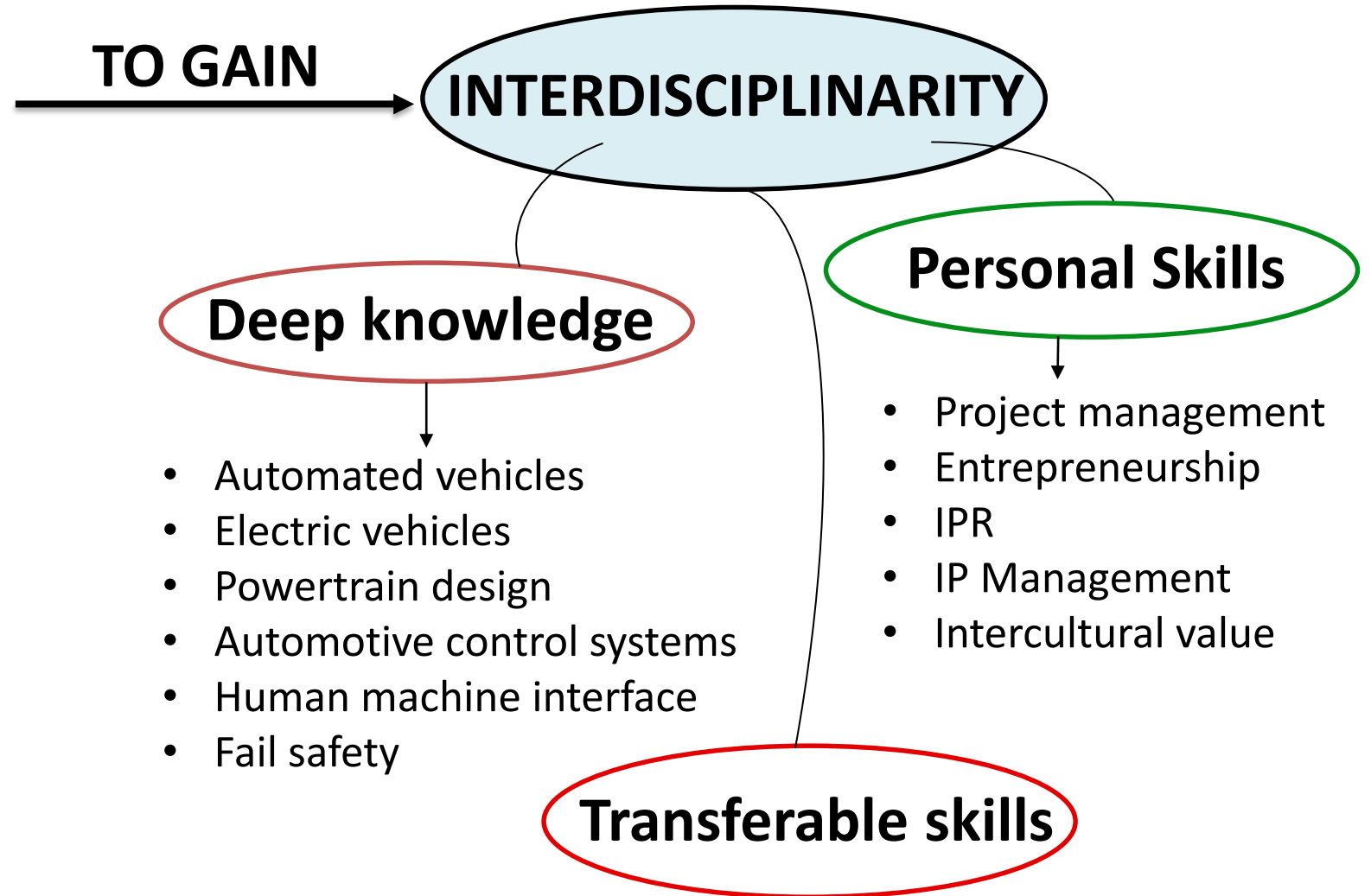
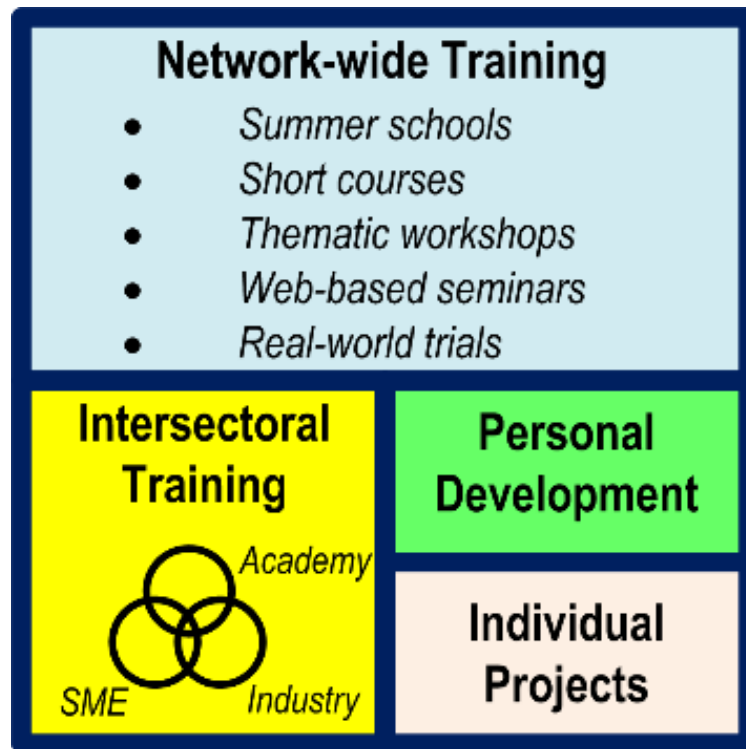


### Consortium: Academy





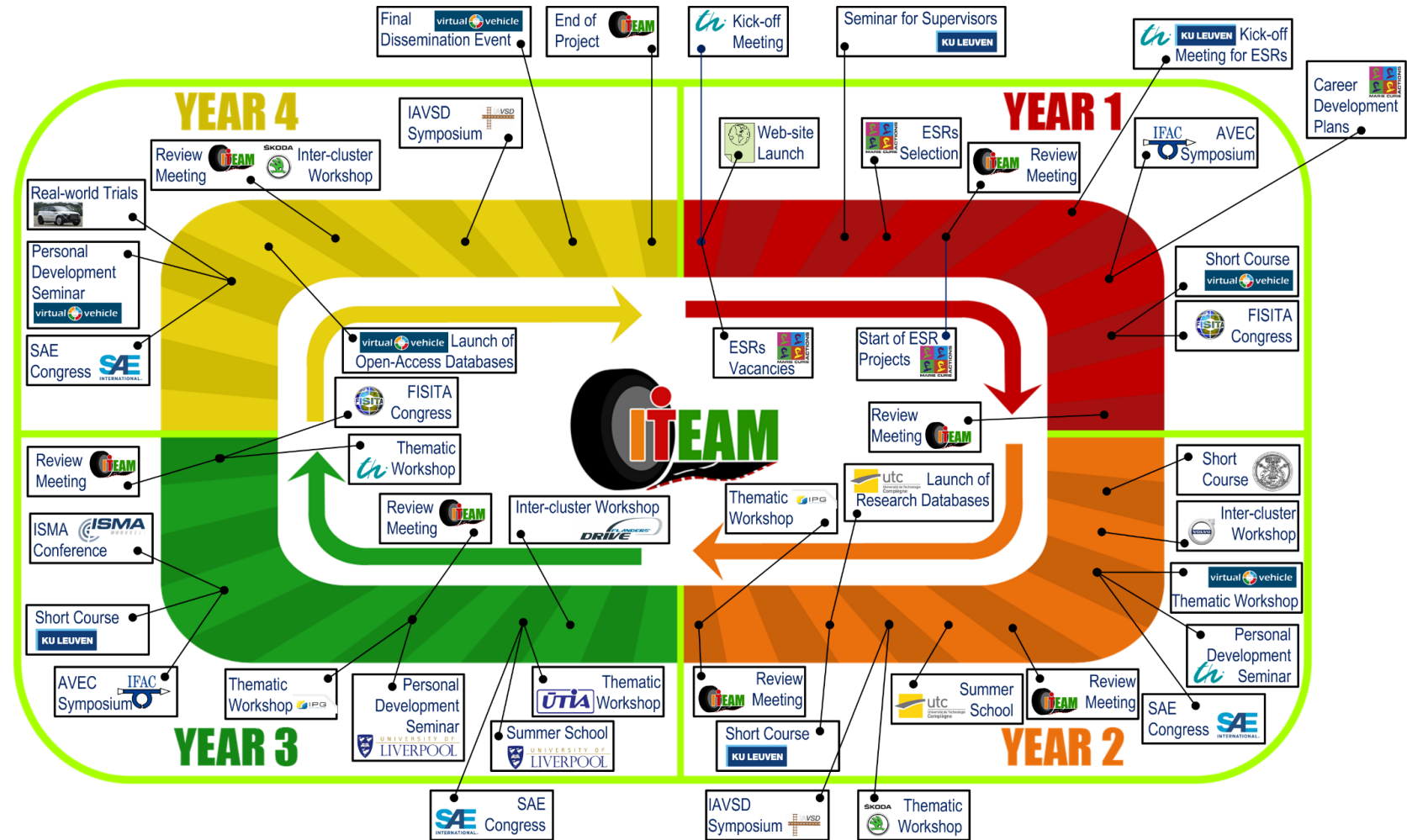
# Case III: ITEAM Network



# Case III: ITEAM Network

## Achieved Targets

- Creation of **strong R&D group** making determinant contributions to next generations of multi-actuated ground vehicles
- Advancement of **postgraduate education** in the area of environment- and user-friendly ground vehicle technologies
- Reinforcement of cooperation between academia and industry to **improve career perspectives** of talented graduates in both public and private sectors



Example of Time Schedule

## Summary: Lessons learned

---

### **Public-Private Partnership Tools provide**

- Easier access to academic know-how for industry (to improve competitiveness)
- Easier access to experimental facilities for academy (to prove ideas)
- Creation of joint IP
- Opportunity for development of concept and niche technologies
- Tailored education and training of researcher-practitioners



*The presented projects have received funding from the European Union's Horizon 2020 research and innovation programme under the Grant Agreements Nos. 675999, 824333, and 824250*