INDUSTRY PERSPECTIVE ON COLLABORATIVE RESEARCH

EFECS – Brussels, Dec. 6th

List, Georg

AVL List GmbH

WHO IS AVL?
SOLUTIONS FOR ALL CUSTOMER SEGMENTS

Passenger Cars

2-Wheelers

Racing

Construction

Agriculture

Commercial Vehicle

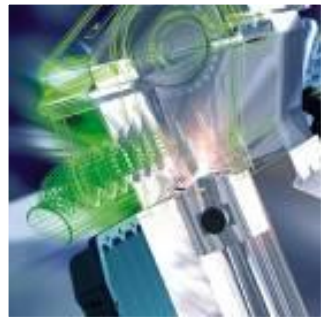
Locomotive

Marine

Power Plants

Powertrain Engineering

Development Platform



Simulation & Testing

ENTERPRISE DEVELOPMENT AUTOMOTIVE

RESEARCH 10% of turnover in-house R&D

INNOVATION 1500 granted patents

STAFF

8.600 employees

65% engineers and scientists

GLOBAL FOOTPRINT

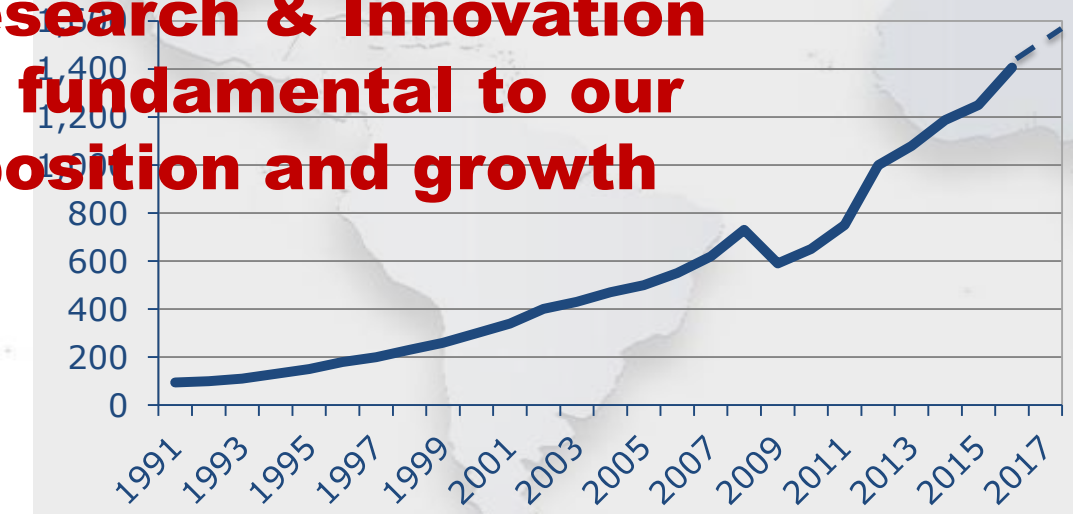
30 engineering locations
- **>220** testbeds
- Global customer support network

EXPERIENCE
65 years !

5 powertrain elements

GROWTH

Research & Innovation is fundamental to our position and growth



SALES

1995:
0.15 billion €

2016:
1.40 billion €

Plan 2017:
1.52 billion €

ONE PARTNER

AVL NETWORK OF TECHNICAL CENTERS

HQ Graz, **AUT**

Steyr, **AUT**

Graz, **AUT**

Budapest, **HUN**

Istanbul, **TUR**

Neuenstadt, **GER**

Regensburg, **GER**

Remscheid, **GER**

Munich, **GER**

Ingolstadt, **GER**

Stuttgart, **GER**

Gotenborg, **SWE**

Södertälje,**SWE**

Haninge, **SWE**

Basildon, **UK**

Coventry, **UK**

Paris, **FRA**

Plymouth, **USA**

Lake Forest, **USA**

Ann Arbor, **USA**

Sao Paulo, **BRA**

Shanghai, **CHN**

Tianjin, **CHN**

Delhi-Gurgaon, **IND**

Tokyo, **JPN**

Seoul, **KOR**

Europe
Austria*
France
Germany
Great Britain
Hungary
Sweden
Turkey
Italy

North America
USA

Asia
China
India
Japan
Korea

South America
Brazil

Europe: >10 Tech Centers

Americas: 4 Tech Centers

Asia: 6 Tech Centers

Europe is a key region for innovation @ AVL

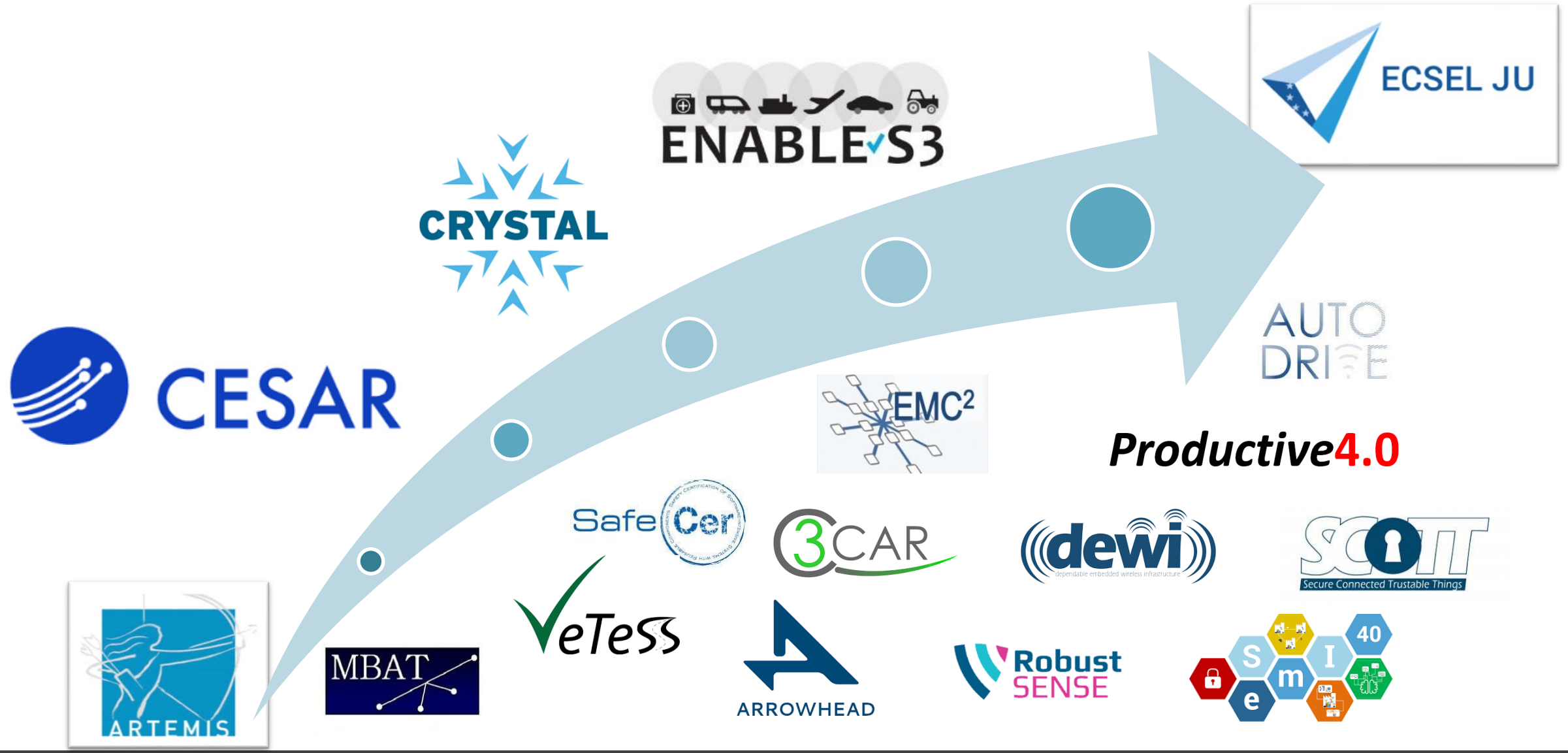
+ another 9 Engineering Offices

*Headquarters in Graz

THE AUTOMOTIVE (R)EVOLU

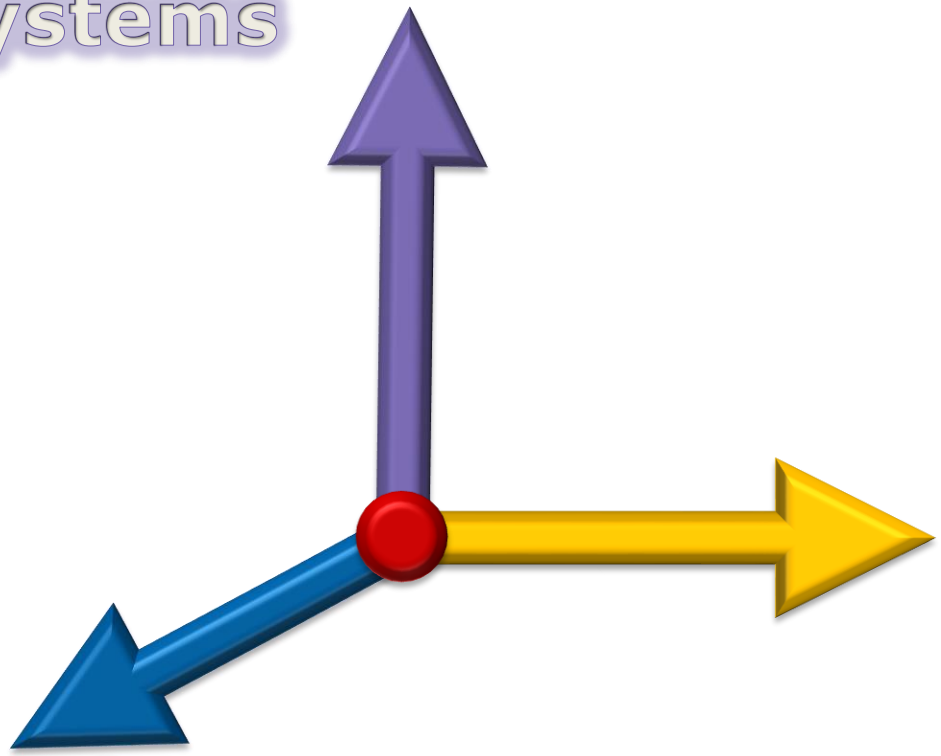
Source: Excerpt from BMW´s „The Next 100 Years"

AVL IS COMMITTED TO ARTEMIS AND ECSEL



WHY DO WE DO COLLABORATIVE RESEARCH?

2. Convergence Hardware-Software-Systems

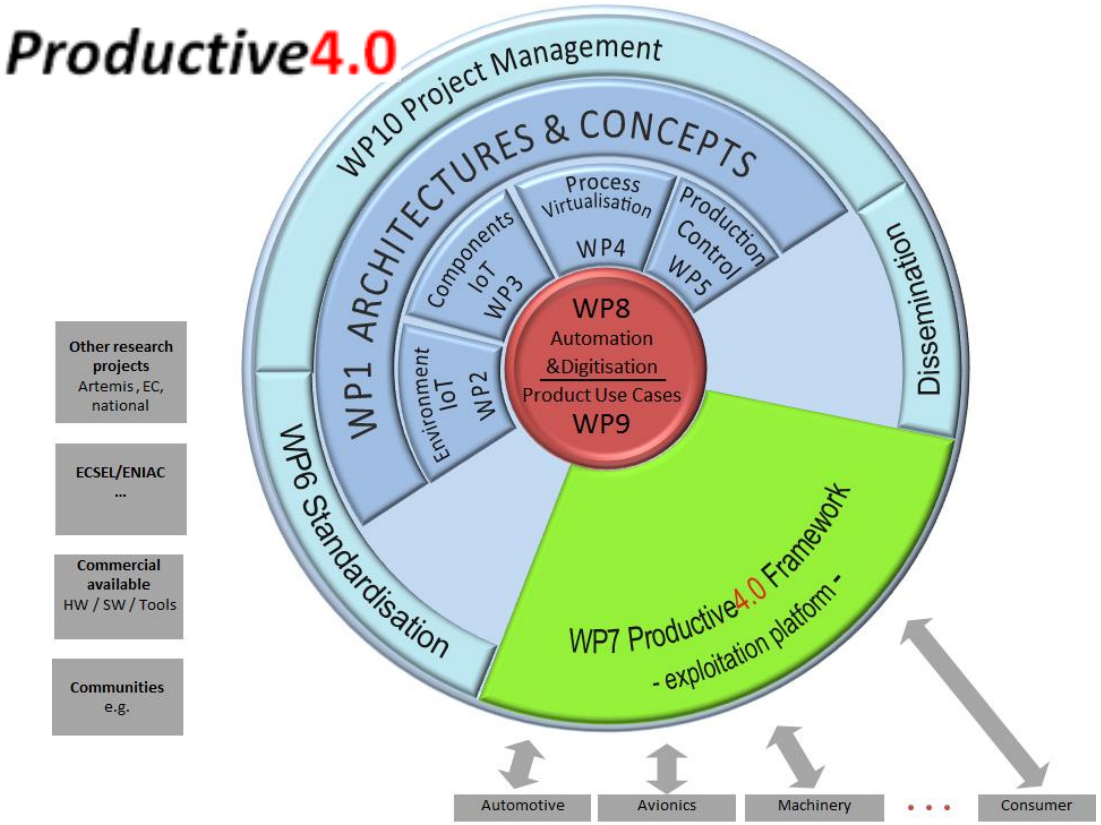


1. Collaborative Eco-System

3. AVL innovation positioning

3 DIMENSIONS OF BENEFITS

1. Collaborative Eco-System



Partners

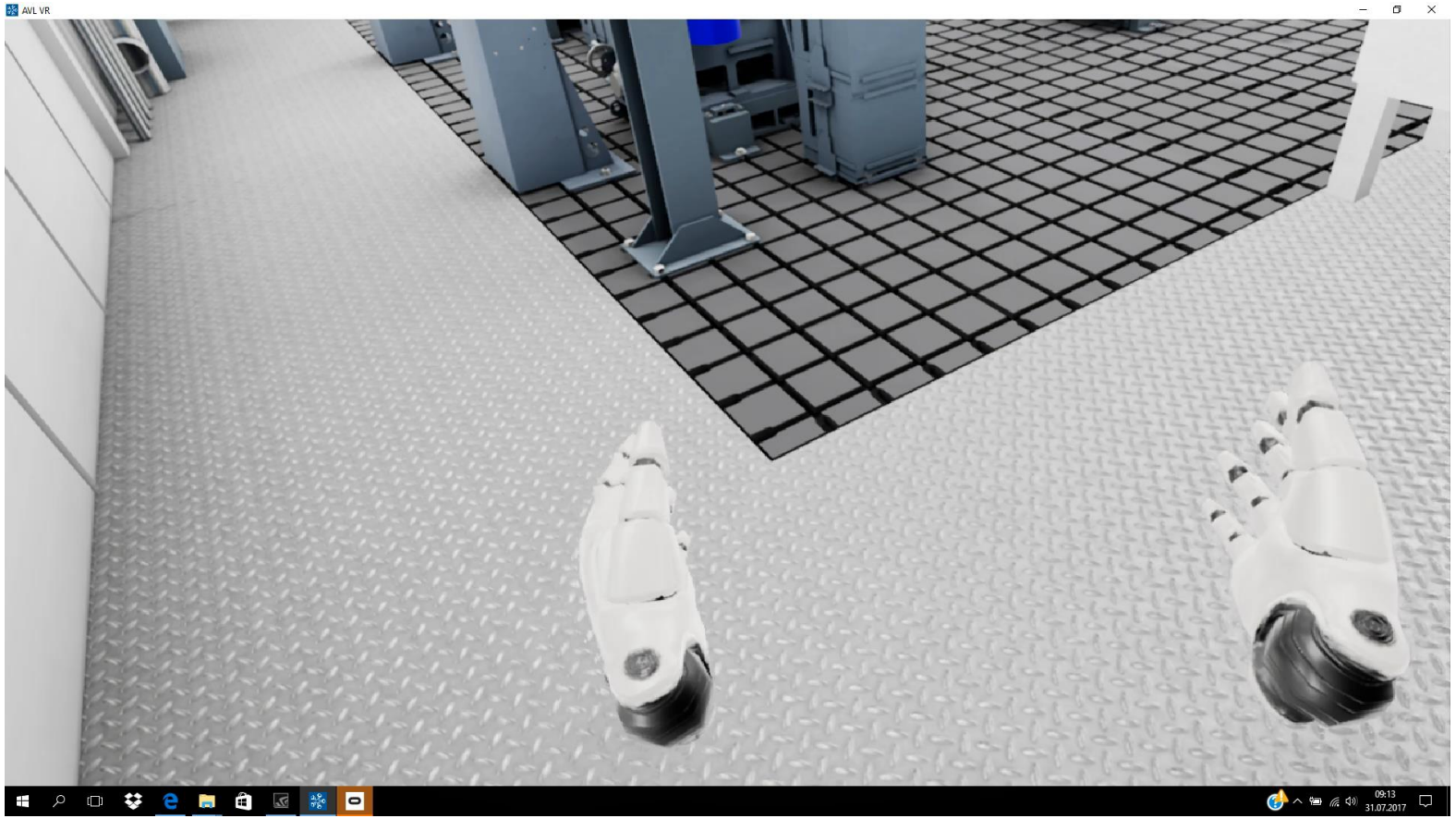
- KIT, AIT – scientific partners
- BMW, Bosch – value chain partners
- … & many others

Topics

- Data Analytics & Data Management for continuous product improvement
- Cost optimization of digital product & production requirements
- Smart services for test equipment

WHERE WOULD WE TAP INTO AN ECO-SYSTEM: TESTFIELD OF THE FUTURE

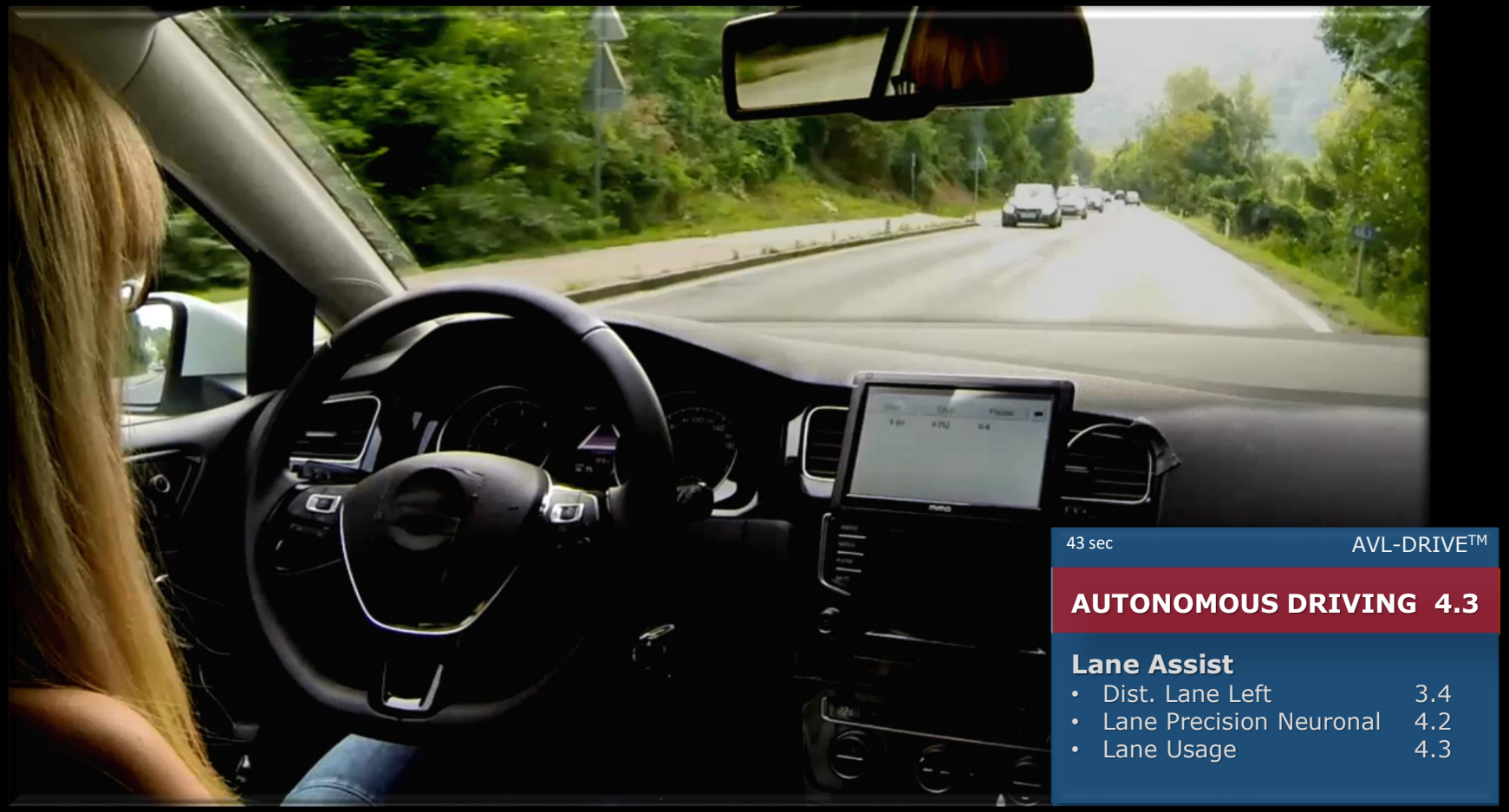
Digital Twin & AR to e.g. develop & optimize workflows



3 DIMENSIONS OF BENEFITS

2. Convergence Hardware – Software – Systems

DR	Evaluation
9 - 10	excellent
8 - 9	good
7 - 8	satisfying
6 - 7	acceptable
5 - 6	poor
4 - 5	unacceptable
3 - 4	defective
2 - 3	unsafe operation
1 - 2	no operation

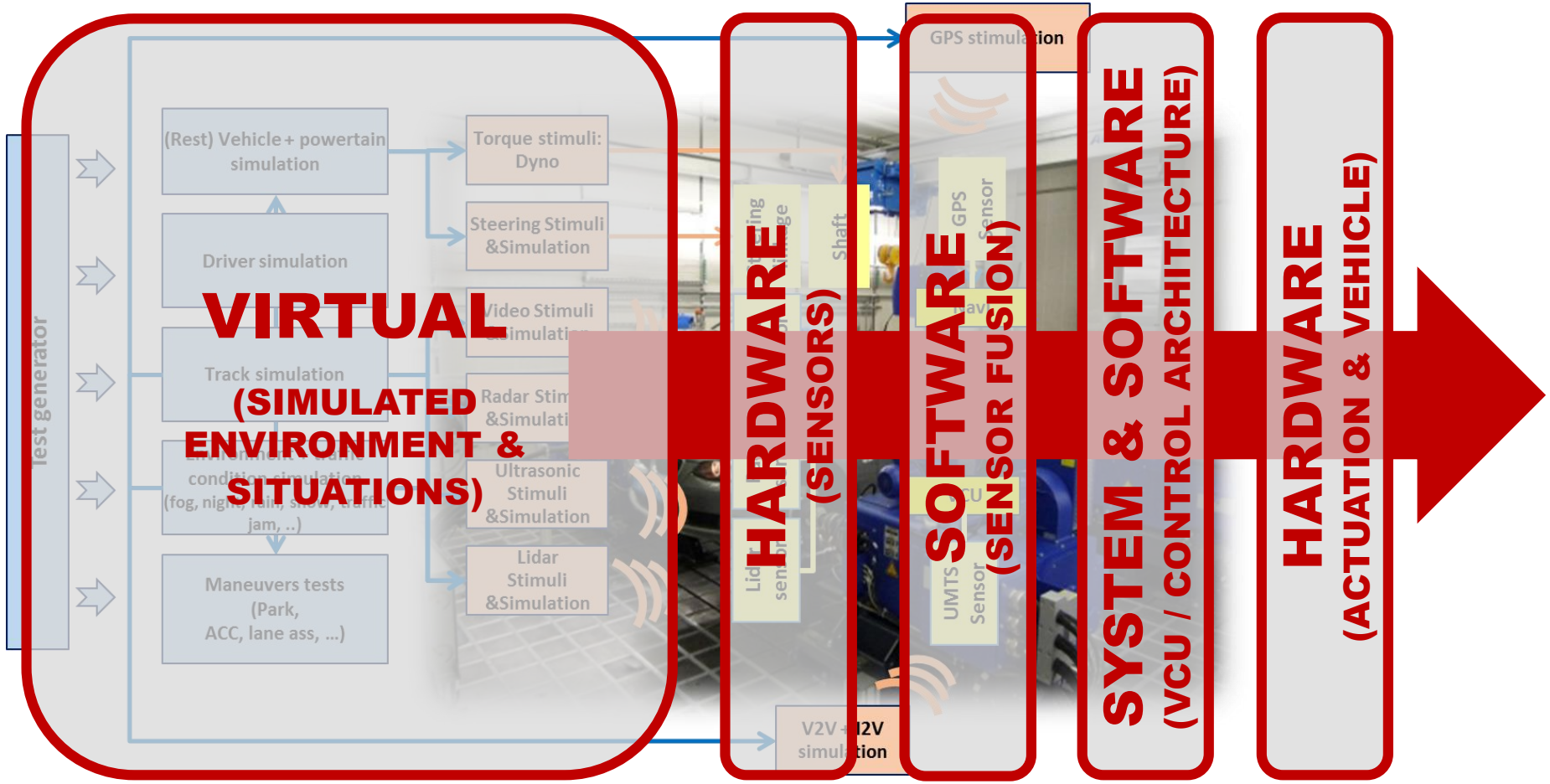


High driving quality is precondition for safe feeling & user acceptance

SOFTWARE & SYSTEMS NEED HARDWARE – SOLUTIONS REQUIRE COLLABORATION

Virtual and semi-virtual testing and verification of highly automated systems.

ENABLE-S3



74 partners
€68M budget
AVL as Global Project Coordinator

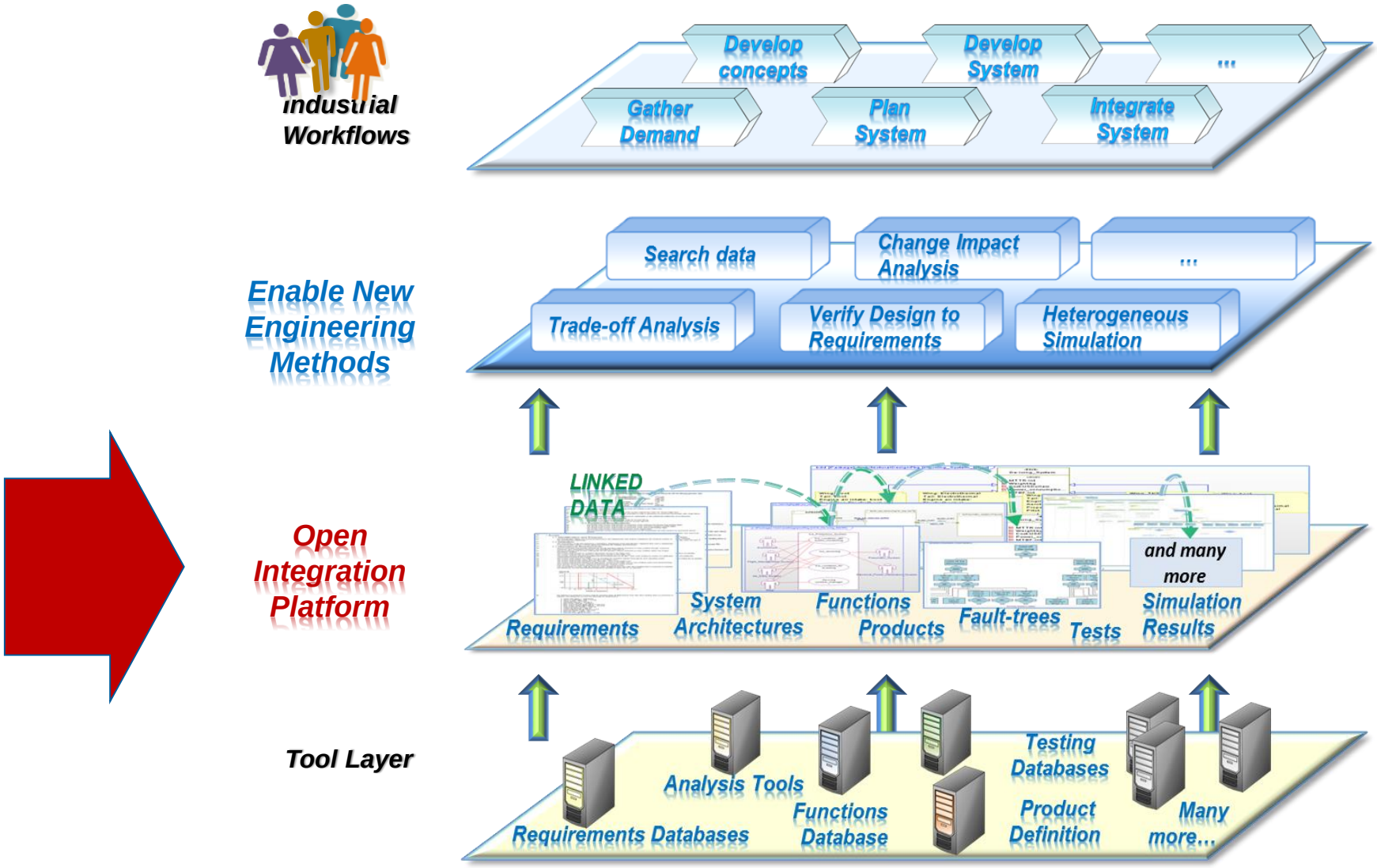
THREE PILLARS FOR SUCCESS

3. AVL innovation positioning

68 partners
€82M budget
AVL as Global Project Coordinator

- **European key players** from different industrial domains
- Large companies developing embedded systems act as **technology users**
- Large tool providers, SMEs and researchers as **technology providers**

THE CRYSTAL VISION



AVL STRATEGY

Model.CONNECT™

Testbed.CONNECT™

THERE ARE CHALLENGES, HOWEVER

Innovation – managing the complexity

- Software complexity & interoperability, e.g. Cloud- platforms – Apps – Embedded SW – AI
- Non-synchronized lifecycles of technology layers accelerates dynamic & churn
- Propensity towards multidomain research – risk of loss of focus, lack of industry interest

Creating and maintaining the innovation ecosystem

- Diverging interests of stakeholders (e.g. chip manufacturer, sensors, software, car OEMs)
- Competition in business versus collaboration in research (pre-competitive vs. “coopetition”)

Appropriate funding scheme

- Ensure attractiveness for all participants (large companies like car OEMs, SMEs and RTOs)
- Find an appropriate reimbursement scheme for coordination efforts of large projects

AGAIN … WHY DO WE DO COLLABORATIVE RESEARCH AT AVL?

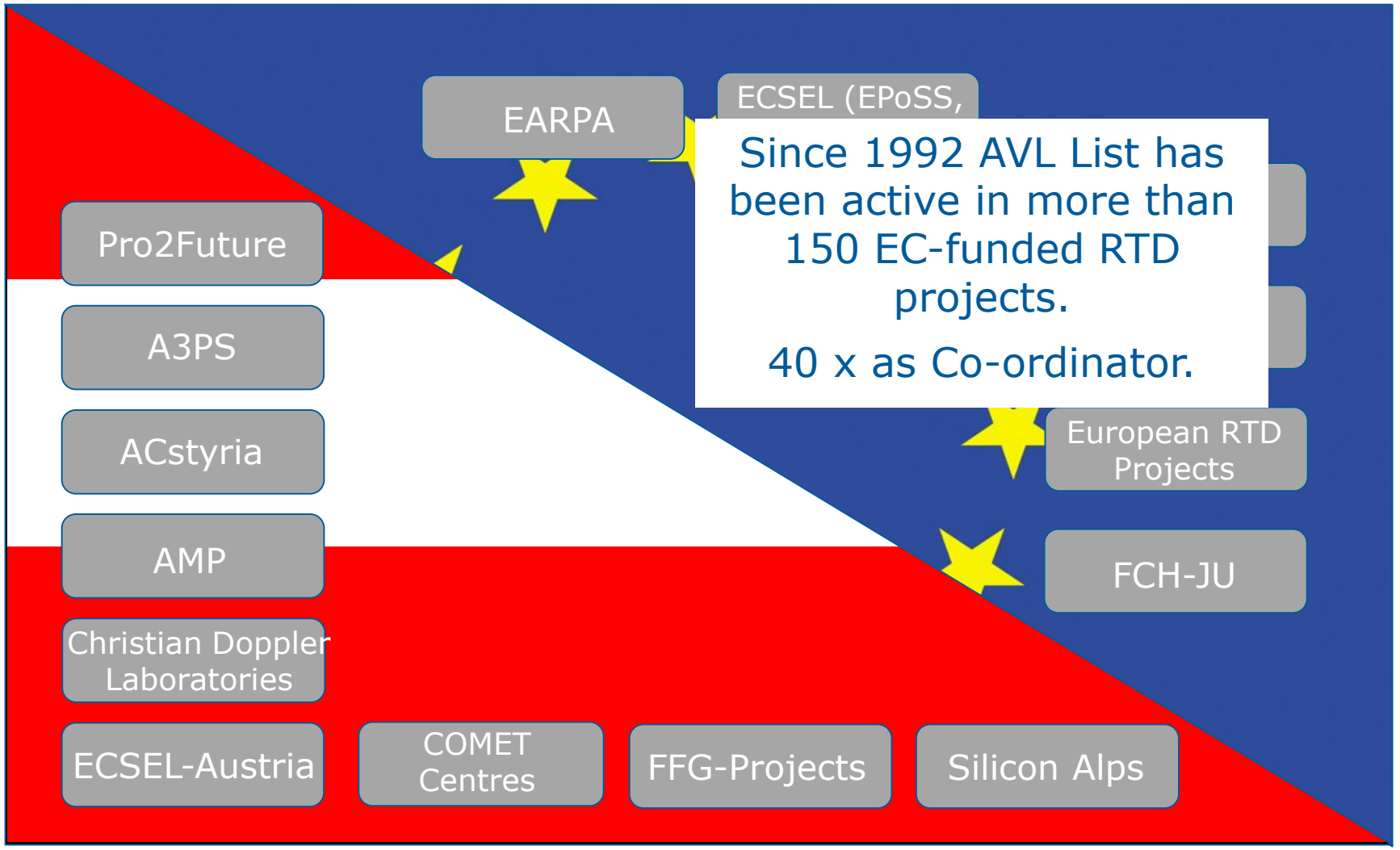
1. Collaborative Eco-System

2. Convergence Hardware-Software-Systems

3. AVL innovation positioning

- **Risk free, inspiring, highly competent, pre-competitive environment**
- **Work with customers & partners building relationships**
- **Based on research results, develop tools for innovative methods**
- **Provide tools to research partners to apply in solution of their use cases**
- **Financial co-investment & support to pass TRL hurdle and share burden**

COOPERATION & MULTI-FIRM RESEARCH IN AUSTRIAN & EUROPEAN NETWORKS



THANK YOU

AVL

www.avl.com