Although, the day-to-day challenges faced by the European automotive industry are well known and omnipresent in the media. We at EUCAR, are looking far ahead into the future of mobility, as we want to address the challenges of tomorrow. Through the work done by the research departments of our member companies, as well as EUCAR’s joint innovation projects, we are developing medium- and long-term mobility solutions for Europe.

That is also why we do not focus on the improvement of existing technologies or vehicles, nor on short-term solutions to current problems with air quality in urban areas for example. Together with our partners in industry, politics and society, we concentrate instead on the long-term aspects of mobility. This work not only relates to our customers and employees, as we are developing mobility solutions for all Europeans, whether they are directly or indirectly part of the mobility ecosystem.

Hence our objective at EUCAR is to show that our European concepts and solutions for tomorrow's mobility contribute towards improving the quality of life on a global level. In other words, we want to make our key objectives tangible to people.
• EUCAR is clearly committed to the COP 21 Paris Climate Agreement.
• One of EUCAR’s key objectives is to reduce emissions to zero, especially in urban environments.
• In our view, future mobility should be congestion-free and become multimodal through the integration of different transport modes, both private and public.
• EUCAR strives for a future in which Europeans are able to travel longer distances in comfort and with low emissions, also allowing them to seamlessly cross the borders of EU countries.
• Through our work, we at EUCAR are ensuring that future automotive development and production remains in Europe while also preserving our technological leadership in global terms.

EUCAR, the European Council for automotive R&D, plays an active part in finding holistic solutions for all Europeans to the mobility challenges of tomorrow. Considering that the automotive sector also generates more than 13 million direct and indirect EU jobs, we are an integral part of European society.

We are committed to Europe!

Gerd Schuster
EUCAR CHAIRMAN 2018
SENIOR VICE PRESIDENT RESEARCH, NEW TECHNOLOGY AND INNOVATION, BMW GROUP
THE EUCAR STRATEGY FOR RESEARCH & INNOVATION

COMMERCIAL VEHICLES

SAFE & INTEGRATED MOBILITY

SUSTAINABLE PROPULSION

AFFORDABILITY & COMPETITIVENESS
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SAFE & INTEGRATED MOBILITY

THE EUCAR STRATEGIC VISION

Smart and safe vehicles for all purposes, integrated into a secure and intelligent transport system, progressing towards seamless mobility for all, maximum efficiency and ever-fewer accidents.
SAFETY
Vehicles that protect their passengers, avoid accidents and dialogue safely with their drivers. Communications that enable cooperative safety for all road users. Safe application of increasing vehicle automation.

TRANSPORT / TRAVEL SYSTEM
An integrated system that provides comprehensive real-time actionable data, facilitates modal transitions and manages traffic for maximum mobility, efficiency and optimum use of infrastructure.

TRAFFIC EFFICIENCY
Substantially increased efficiency of passenger and goods traffic measured by time available for other purposes, consumption of individual vehicles and whole system efficiency.

VALUE ADDED CUSTOMER SERVICES
Highly valuable services, available to drivers and customers, that enhance the driving and mobility performance and experience, and provide additional business opportunities.

ICT & TELEMATICS
Vehicles that are integrated with the electronic information cloud, enabling a complete system approach for smart vehicles and intelligent transport.
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<td>Dr. Werner Ritter</td>
</tr>
<tr>
<td></td>
<td>Daimler AG</td>
</tr>
<tr>
<td><strong>CONTACT</strong></td>
<td><a href="mailto:werner.r.ritter@daimler.com">werner.r.ritter@daimler.com</a></td>
</tr>
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<td><strong>PARTNERS</strong></td>
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</tr>
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<td>Daimler, Fiat Chrysler Automobiles.</td>
</tr>
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<td></td>
<td>Other: AVL List, AVL DE, Bosch, CTAG, EICT, Fico Mirrors SA, Fraunhofer FOKUS, FZI, Modulight, Oplatek, Sick, University Ulm, VTT.</td>
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SAFE & INTEGRATED MOBILITY

RobustSENSE

Robust and Reliable Environment Sensing and Situation Prediction

MOTIVATION AND OBJECTIVES
RobustSENSE developed a robust and reliable sensor platform for automated and assisted driving capable of adapting to harsh conditions like snow, rain or sun-flare, and single sensor failures. Today’s systems decide in a binary manner on function availability. In case of a disturbance the system fails. RobustSENSE improved sensor technologies and advanced the methods for sensor signal processing and sensor data fusion. Based on an integrated system approach RobustSENSE added redundancy on sensor and processing level.

PROJECT PLAN, MILESTONES AND DELIVERABLES

TECHNICAL APPROACH
RobustSENSE focused on prototyping a system platform that is capable of self-monitoring and information fusion. Each component continuously monitors its own performance and delivers this information to the other modules. Based on the current reliability of the sensors, the overall performance of the driving assistance system will be adapted and might – e.g. in case of bad weather – be reduced consequently to the safe range. Thus ensuring continued system functioning – albeit with reduced performance.
RobustSENSE

CONTINUOUS WORK OF THE ROBUSTSENSE SENSOR PLATFORM

ACHIEVEMENTS

• Defined general system architecture, interfaces between components and to sensor fusion modules, validation criteria for sensors
• Enhanced sensors performance with new 1500nm LiDAR prototype
• Developed overall performance and reliability monitoring assessment module
• Showed a Proof of concept of the RobustSENSE platform focusing on key elements applied to different existing systems and functions
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| COORDINATOR | Dr. Werner Ritter  
Daimler AG |
| CONTACT     | werner.r.ritter@daimler.com |
| PARTNERS    | EUCAR members: Daimler, Renault Group.  
Other: Autoliv, Cerema, Hitachi, Ibeo, Innoluce,  
Modulight, Oplatek, TU Tampere, Uv Ulm,  
Vaisala, VTT, XENICS. |
SAFE & INTEGRATED MOBILITY

DENSE

aDverse wEather eNvironmental Sensing systEm

MOTIVATION AND OBJECTIVES
Reliable detection of vehicles’ surroundings is absolutely necessary for higher automation levels. Currently used sensors in the automotive domain show significant performance decreases under adverse weather conditions.
DENSE overall objective is to design, develop, and validate an all weather sensor suite for driver assistance and automated driving to enable operation especially in adverse weather like rain, snow and fog.

PROJECT PLAN, MILESTONES AND DELIVERABLES

TECHNICAL APPROACH
The new sensor suite is based on a smart integration of three different technologies: High resolution radar (MIMO Radar), gated short wave infrared camera (SWIR) with pulsed laser illumination and short-wave infrared LiDAR (SWIR LiDAR). The sensor suite has to consist of a combination of these sensors due to redundancy requirements. Neither one of the sensors alone manages variable visibility conditions especially under high safety requirements for autonomous driving. In addition a mobile road state sensor will allow for the assessment of road surface conditions.
DENSE finished the specifications and system architecture as well as first baseline tests. It is now focussing on the development of

- Radar concept for operating in 77-81 GHz automotive band
- Short Wave Infrared (SWIR) gated camera sensor and illumination
- Short Wave Infrared LiDAR as well as
- Road State Sensor
- Signal enhancement and fusion algorithms
SAFE & INTEGRATED MOBILITY

BUDGET
€68 million

FUNDING
€36 million

START
September 2017

DURATION
48 months

CALL
ART-02-2016

CONTRACT N°
723051

COORDINATOR
Aria Etemad
Volkswagen AG

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PARTNERS
EUCAR members:
Volkswagen Group, BMW Group, Fiat Chrysler Automobiles, Daimler, Ford of Europa, Jaguar Land Rover, Opel Automobiles, PSA Peugeot Citroën, Renault Group, Toyota Motor Europe, Volvo Cars.

Other: 23 partners from well-known academia and research centres, as well as highly successful industries.

www.L3Pilot.eu
L3Pilot

Piloting Automated Driving on European Roads

MOTIVATION AND OBJECTIVES
L3Pilot tests the viability of Automated Driving as a safe and efficient means of transportation. The project focuses on large-scale piloting of SAE Level 3 functions, with additional assessment of some Level 4 functions. The functionality of the systems used is exposed to variable conditions in 10 European countries, 100 vehicles and 1,000 test drivers. The tested functions cover a wide range from parking to overtaking, and urban intersection driving.

EXPECTED IMPACT
The stringent user-centric approach of L3Pilot will lead to the optimal design and handling of Automated Driving functions and will generate knowledge about the most effective way of implementing these systems. Furthermore, it will contribute to knowledge about L4 function developments, and potential pitfalls while driving automatically.

TECHNICAL APPROACH
• Create a standardised Europe-wide piloting environment for Automated Driving
• Define a common FESTA methodology and implement it on the test sites
• Coordinate pilot activities to acquire the required data
• Conduct Automated Driving tests in northern, central and south-western Europe, including cross-border activities
• Evaluate automated driving functions and connected automation
L3Pilot

PILOT REGIONS AND CROSS-BORDER TESTING

ACHIEVEMENTS

• European testing environment for Automated Driving created
• Valid data on impact of Automated Driving on safety and traffic efficiency
• Code of Practice for Automated Driving providing guidelines for systematic development of automated driving functions
• Evaluation of user experience and acceptance of the technology
• New service and innovation potentials
SAFE & INTEGRATED MOBILITY

BUDGET

€9.6 million

FUNDING

€9 million

START

September 2016

DURATION

42 months

CALL

H2020-MG-3.6a-2015

CONTRACT N°

688900

COORDINATOR

Anna Anund
VTI

CONTACT

anna.anund@vti.se

PARTNERS

EUCAR members:
Ford of Europe, Scania (Volkswagen Group).

Other: VTI, CERTH, DUCATI, EPFL, Autoliv,
Continental, DAINEST, DENSO, HERE, Valeo,
DLR, IDIADA, IFSTTAR, SU, CTL, Fraunhofer-IAO,
NUIG, RWTH, SEYE, FORTH, TUC, Uv Patras,
UU, ACASA, HUMANIST, OC, OGUV, VEDECOM

www.adasandme.com
ADAS&ME

Adaptive ADAS to support incapacitated drivers mitigate effectively risks through tailor made HMI under automation

MOTIVATION AND OBJECTIVES
ADAS&ME develops Advanced Driver Assistance Systems (ADAS) that incorporate driver/rider state, situational/ environmental context and adaptive interaction, to automatically transfer control between vehicle and driver/rider and thus ensure safer and more efficient road usage for all vehicle types (conventional and electric car, truck, bus, motorcycle).

EXPECTED IMPACT
• Improved efficiency, environmental impact, road safety and traffic flow through better use of the existing infrastructure capacity
• Reduction of the automated driving systems’ development costs
• Enhanced robustness and performance of sensor and data analysis systems, optimised HMI and transition strategies

TECHNICAL APPROACH
The holistic approach of ADAS&ME considers automated driving/riding along with information on driver/rider state, to develop optimised HMI and support strategies, where automated and partly automated driving/riding is seen as, both an influencing factor, and a tool to affect driver/rider state.
Achievements

- Adaptive architecture and technical implementation for all main systems/components & all Use Cases developed and published
- Data collection for all targeted driver/riders states: sleepiness, visual distraction, rest, stress, thermal fatigue and emotions
- Multimodal adaptive HMI framework and personalised driver/riders profiles
| **BUDGET** | €63.4 million |
| **FUNDING** | €33 million |
| **START** | May 2016 |
| **DURATION** | 36 months |
| **CALL** | H2020-ECSEL-2015-2 |
| **CONTRACT N°** | 692455 |
| **COORDINATOR** | Andrea Leitner  
AVL List GMBH |
| **CONTACT** | enable-s3@avl.com |
| **PARTNERS** | EUCAR members:  
Renault Group, Toyota Motor Europe.  
Other: 69 partners from well-known academia and research centres, as well as highly successful industries. |
ENABLE-S3

European Initiative to Enable Validation for Highly Automated Safe and Secure Systems

MOTIVATION AND OBJECTIVES
ENABLE-S3 aims at significantly raising the level of dependability of automated systems and keeping the effort and costs for testing at a reasonable level. This will be achieved by providing a comprehensive modular verification and validation framework. Methods and bricks will be developed to reduce the required test effort across six industrial domains (Automotive, Aerospace, Rail, Maritime, Health, Farming), fostering cross-domain reuse and knowledge exchange.

EXPECTED IMPACT
Automated cyber-physical systems (ACPS) are disruptive technologies that have the potential to change society with all benefits and risks, representing a major market potential for European companies. ENABLE-S3 will add important missing verification and validation technology bricks required to ensure the dependability (safety and security) of ACPS at affordable costs. ENABLE-S3 outcomes will facilitate the market introduction of automated systems in Europe.

TECHNICAL APPROACH
ENABLE-S3 develops novel V&V technologies to assure the complex behaviour of highly automated systems is correct, reliable and in line with safety and domain-specific regulations. The technical approach covers the extraction of test scenarios (e.g. from road data), scenario-based V&V in virtual, semi-virtual, and real testing environments, environment and sensor models, sensor stimuli for MiL/SiL, HiL, ViL, integrated safety and security analysis approaches as well as test reduction of highly varying environmental conditions.
ENABLE-S3 SCENARIO BASED VIRTUAL V&V

ACHIEVEMENTS

• Definition of 12 use cases to derive requirements for the test systems and demonstration of results
• Standardization activities for interface and scenario descriptions. Extraction of test scenarios (e.g. from vehicle road data, etc.)
• Approach for scenario-based verification & validation in virtual, semi-virtual, and real testing environments
• Environment and sensor models as well as sensor stimuli for MiL/SiL, HiL, ViL
**Scout**

| **BUDGET** | €1.0 million |
| **FUNDING** | €1.0 million |
| **START** | July 2016 |
| **DURATION** | 24 months |
| **CALL** | H2020-MG-3.6b-2015 |
| **CONTRACT N°** | 713843 |
| **COORDINATOR** | Gereon Meyer  
VDI/VDE-IT |
| **CONTACT** | gereon.meyer@vdivde-it.de |
| **PARTNERS** | EUCAR members:  
BMW Group, Fiat Chrysler Automobiles,  
Renault Group.  
Other: VDI/VDE IT, Robert Bosch, NXP, Telecom Italia, NEC, RWTH Aachen, Fraunhofer, CLEPA, SERNAUTO |

www.connectedautomateddriving.eu/about-us/scout/
SAFE & INTEGRATED MOBILITY

SCOUT

Safe and Connected Automation in Road Transport

**MOTIVATION AND OBJECTIVES**
The Coordination and Support Action (CSA) “Safe and COnnected AUtomatication in Road Transport” (SCOUT) aims at identifying pathways for an accelerated proliferation of safe and connected high-degree automated driving in Europe, taking into account user needs and expectations, technical and non-technical gaps and risks, viable business models as well as international cooperation and competition.

**EXPECTED IMPACT**
Creating coherence between the development cycles in vehicle technology, telecom infrastructure and digital backbone development, roadmap creation will lead to implementation strategies in connected and automated driving on SAE level 4/5 in favor of European excellence and competencies as a result of a SWOT-analysis, and put particular emphasis on the linkage of the automotive and telecom industries.

**TECHNICAL APPROACH**
- Analysis of the state-of-the-art in the development of highly-automated driving (SAE Level 4/5) and development of a vision for 2030
- SWOT analysis of the development taking into account technical, economic, legal, societal and human factors (5-Layer-approach)
- Development of use case-specific roadmaps for connected and automated driving in line with a comprehensive investigation methodology based on the 5-Layer approach
SCOUT

ACHIEVEMENTS

• Comprehensive overview of the state-of-the-art in connected and automated driving in Europe, Vision for the further development until 2030
• Specific or individual roadmaps for selected use cases
• Comprehensive roadmap development methodology for connected and automated driving
• European Stakeholder Network
| **BUDGET** | €3.0 million |
| **FUNDING** | €3.0 million |
| **START** | October 2016 |
| **DURATION** | 24 months |
| **CALL** | CSA/H2020 ART-06-2016 |
| **CONTRACT N°** | 724086 |
| **COORDINATOR** | Stephane Dreher  
ERTICO – ITS Europe |
| **CONTACT** | s.dreher@mail.ertico.com |
| **PARTNERS** | EUCAR members:  
BMW Group, Fiat Chrysler Automobiles,  
Renault Group, Volvo Cars.  
Other: 36 partners from well-known academia and research centres, as well as highly successful industries. |

www.connectedautomateddriving.eu
MOTIVATION AND OBJECTIVES
The CARTRE Coordination and Support Action aims at accelerating the development and deployment of Automated Road Transport in Europe. It facilitates information exchange between stakeholders and the development of clearer and more consistent policies of EU Member States in collaboration with industry players and research to ensure that automated road transport systems and services are deployed in a coherent and compatible way at EU level.

EXPECTED IMPACT
CARTRE contributes to the EU policy goals in terms of road safety, reduced congestion, energy efficiency and air quality and ensures the leading role of European industry in the global market to boost sustainable growth and create jobs. CARTRE brings different ART stakeholder groups closer and supports consensus-building eventually leading to the definition of harmonized views and solutions for the deployment of CAD in Europe.

TECHNICAL APPROACH
• Develop and maintain a wide network of ART stakeholders from research, industry and public sector
• Develop common views, a data exchange solution, methodologies and position papers on challenges and research needs for CAD
• Support the EC for the organisation of the EU CAD Conferences and international exchanges (EU-US-Japan Trilateral ART Working Group)
• Contribute to the definition of the STRIA CAD RoadMap
ACHIEVEMENTS

- Contributions to the development of the STRIA roadmap and the ERTRAC Strategic Research Agenda
- Co-organisation of the First European Conference on Connected and Automated Driving in 2017 and the CAD Symposium in Vienna in 2018
- Development of a CAD Data exchange framework and strategy
- Development of an impact assessment framework and KPIs
- Knowledgebase on EC funded and national CAD Projects in Europe
SAFE & INTEGRATED MOBILITY

BUDGET
€6.9 million

FUNDING
€6.9 million

START
May 2015

DURATION
42 months

CALL
H2020-MG3.4-2014

CONTRACT N°
634149

COORDINATOR
Andrés Aparicio
Applus IDIADA

CONTACT
aaparicio@idiada.com

PARTNERS
EUCAR members:
Audi (Volkswagen Group), BMW Group, Daimler,
Toyota Motor Europe, Volvo Cars.

Other: IDIADA, BAS, Continental, Chalmers,
BME, IFSTTAR, TNO, Bosch, VTI, Uv.
Nottingham, Uv. Amsterdam, 4activeSystems.

www.prospect-project.eu
PROSPECT
PROactive Safety for PEdestrians and CyclisTs

MOTIVATION AND OBJECTIVES
Accidents involving pedestrians and cyclists are still a very important issue for road safety. The Autonomous Emergency Braking (AEB) systems that avoid/mitigate Vulnerable Road Users (VRU) accidents are already on the market. The PROSPECT project aims to improve the effectiveness of active VRU safety systems by expanding the scope of addressed accident scenarios, improving the overall system performance (VRU sensing, situational analysis, intent recognition, etc.) and proposing extensive validation methodologies.

EXPECTED IMPACT
PROSPECT contributes to the generation of state-of-the-art knowledge and technical innovations i.e. methodologies and tools for testing and next generation AEB/AES systems. The results will enhance road safety, contributing to the ‘Vision Zero’ of no fatalities in road traffic. Test methodologies and tools shall be considered for Euro NCAP consumer testing AEB VRU systems with an aim to support the European Commission goal of halving the road toll by 2020.
PROSPECT

TECHNICAL APPROACH
PROSPECT comprises: better understanding of relevant VRU urban scenarios by means of statistical accident studies and naturalistic observations; improved VRU sensing by enlarged sensor coverage and situational analysis; advanced control strategies such as combined steering/braking; project demo-vehicles that integrate envisaged concepts; validation in realistic traffic scenarios, user acceptance tests and simulator experiments and test methodologies that will be proposed to Euro NCAP for standardization.

PROSPECT EXAMPLES OF RESULTS

PROSPECT demonstrator cars - sensor mounting positions and FOV

Audi Mobile driving simulator presentation and advanced articulated dummies

ACHIEVEMENTS
The concepts for sensors and control systems will be shown in three vehicle demonstrators, mobile driving simulator and tested using novel dummy specimen. The achievements of the project are:
• New sensor concepts and operation modes for AEB/AES VRU systems
• New generation of AEB/AES VRU systems fitted into passenger cars
• Test and assessment methods for Euro NCAP AEB/AES VRU systems
• Test tools for AEB/AES VRU development and testing
**SAFE & INTEGRATED MOBILITY**

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<td><strong>COORDINATOR</strong></td>
<td>Marcus Wisch, Federal Highway Research Institute (BASt)</td>
</tr>
<tr>
<td><strong>CONTACT</strong></td>
<td><a href="mailto:wisch@bast.de">wisch@bast.de</a></td>
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<td><strong>PARTNERS</strong></td>
<td>EUCAR members: Fiat Chrysler Automobiles, Ford of Europe. Other: Autoliv, BAS, Humanetics, IDIADA, LMU Munich, Transport Research Laboratory.</td>
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MOTIVATION AND OBJECTIVES
A reduction of 48% of all road fatalities was achieved in Europe in the past years. However, among all the road fatalities, the proportion of elderly is steadily increasing. In an ageing society, SENIORS aimed to improve the safe mobility of the elderly (and persons with overweight). Thus, this project primarily investigated and assessed the injury reduction that can be achieved through innovative and suitable tools as well as passive vehicle safety systems targeting the protection of the elderly.

EXPECTED IMPACT
SENIORS provided test tools, procedures and assessments to increase the level of road safety in near- to long-term especially for older car occupants, pedestrians and cyclists. These means will demand the still expected high potentials of passive vehicle safety systems lead also to the introduction of enhanced, adaptive restraint systems.

TECHNICAL APPROACH
SENIORS had four technical Work Packages (WP1 – WP4) which provided substantial knowledge throughout the project focusing on car occupants, pedestrians and cyclists. These WPs consider «Accidentology and behaviour of elderly in road traffic», «Biomechanics», «Test tool development» and the «Current protection and impact of new safety systems». The transfer of knowledge and results was guaranteed through cooperation with regulatory bodies, industry and consumer protection entities.
ACHIEVEMENTS

• Identification of anthropometric particularities of the elderly and their injury mechanisms compared with younger persons
• Identification of differences in the kinematics of differently aged groups in the pre-crash and crash phase
• Development and optimization of test tools, procedures and assessment methods in the area of passive vehicle safety regarding the needs of the elderly
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<td><strong>COORDINATOR</strong></td>
<td>Dr. Angelos Amditis, Institute of Communication and Computer Systems</td>
</tr>
<tr>
<td><strong>CONTACT</strong></td>
<td><a href="mailto:a.amditis@iccs.gr">a.amditis@iccs.gr</a></td>
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ICT4CART

Safety ENhanced Innovations for Older Road userS

MOTIVATION AND OBJECTIVES
The main goal of ICT4CART is to design, implement and test in real-life conditions a versatile ICT infrastructure that will enable the transition towards higher levels of automation (up to L4) addressing existing gaps and working with specific key ICT elements, namely hybrid connectivity, data management, cyber-security, data privacy and accurate localisation. ICT4CART builds on high-value use cases (urban and highway), which will be demonstrated and validated in real-life conditions at the test sites in Austria, Germany and Italy. Significant effort will be put also on cross-border interoperability, setting up a separate test site at the Italian-Austrian border.

EXPECTED IMPACT
Through its ICT infrastructure architecture, integrating a hybrid communications approach and mechanisms for seamless exchange of data, ICT4CART will address the ICT infrastructure related challenges to enable the transition towards advanced levels of road vehicle automation. The ICT4CART infrastructure architecture for connected and automated traffic is anticipated to create a leap in the European competitiveness of the transport industry, while new market opportunities will arise for a wide set of stakeholders.
ICT4CART

TECHNICAL APPROACH
ICT4CART adopts a hybrid communication approach where all the major wireless technologies, i.e. cellular, ITS G5 and LTE-V, are integrated. On top of that, a distributed IT environment for data aggregation and analytics will be implemented. Cyber-security and data privacy aspects will be duly considered throughout the whole ICT infrastructure. ICT4CART developments will be demonstrated and validated under real-life conditions at the test sites in Austria, Germany, Italy and across the Italian-Austria border.

HIGH-LEVEL ARCHITECTURE

ACHIEVEMENTS
• The project will officially launch its activities on September 2018. Initial achievements will be available after the first year of its runtime
SUSTAINABLE PROPULSION

THE EUCAR STRATEGIC VISION

Collaborative automotive R&I towards propulsion systems which are clean and energy-efficient over the full life cycle, with cost-effective technologies while maintaining customer priorities.
ICE BASED POWERTRAIN
Highly efficient and affordable powertrains with an internal combustion engine as the major propulsion unit, based on most advanced components, system architecture and operation strategies.

XEV* BASED POWERTRAIN
Highly efficient and affordable electrified powertrains, based on most advanced components and system architecture.

FUELS & INFRASTRUCTURE
Advanced fuels, including electricity, produced sustainably and under efficient processes including required infrastructure.

VEHICLE THERMAL & ELECTRIC ENERGY MANAGEMENT
Efficient management of thermal and electric energy flows in the vehicle.

*XEV+ HEV, PHEV, BEV and FCEV
**BUDGET**
€6.1 million

**FUNDING**
€5.8 million

**START**
May 2015

**DURATION**
44 months

**CALL**
H2020-GV-01-2014

**CONTRACT N°**
653331

**COORDINATOR**
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AIT Austrian Institute of Technology GmbH

**CONTACT**
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**PARTNERS**
EUCAR members: Fiat Chrysler Automobiles, IVECO, Toyota Motor Europe.

Other: VUB, JMBS, IFAT, UMICORE, LBE, Ikerlan, EVE, FhG, AVL, Valeo, Klimasysteme.

www.ecaiman.eu
eCAIMAN

Electrolyte, cathode and anode improvements for market-near next-generation lithium ion batteries

**MOTIVATION AND OBJECTIVES**
The objective of eCAIMAN is to bring European expertise together to develop a battery cell that can be produced in Europe and meets a broad range of end-user demands including increased energy density, reduced cost, safety aspects and scale-up manufacturing. The project will also investigate the integration in light, passenger, and heavy-duty vehicles, validate safety and reliability of the cells, and issue recommendations for standardization.

**EXPECTED IMPACT**
- Stimulate European innovation and capacity in the production of high-energy automotive Li-Ion cells
- Support proliferation of battery (PH)EVs through low-cost cutting-edge battery technology “made in Europe”
- Participate in EU standardization efforts, update test procedures for future high-voltage cells

**TECHNICAL APPROACH**
The objectives will be achieved through:
- Active Materials Development - Industrialising a 5V high-voltage spinel cathode material, a high-capacity composite anode material, and a stable high-voltage electrolyte
- Proof-of-Concept: Produce TRL6 large-scale automotive cells applying above materials and technology, and integration into modules
- Testing, Benchmarking and LCA
eCAIMAN

ECAIMAN COVERS MATERIALS DEVELOPMENT, SCALE-UP, TESTING AND LCA

ACHIEVEMENTS

• Cobalt-free 5V pouch cell with LNMO cathode, water-processable graphite anode and high-voltage electrolyte
• Flexible module design for integration into light, passenger and heavy-duty vehicles, including battery management system with active cell balancing
• High-capacity tin-dioxide anode as alternative material development (→ first cell with LNMO cathode/SnO2 anode demonstrated in coin cell)
• White paper on standardization issued together with FIVEVB and SPICY
SUSTAINABLE PROPULSION

BUDGET
€8.87 million

FUNDING
€7.15 million

START
October 2017

DURATION
42 months

CALL
GV-06-2017

CONTRACT N°
770019

COORDINATOR
CRF SCpA.

CONTACT
info@h2020-ghost.eu

PARTNERS
EUCAR members: Fiat Chrysler Automobiles, IVECO, Toyota Motor Europe.

Other: VUB, AVL, Infineon, Umicore, ENGIE, IK4 Ikerlan, EVE, Fraunhofer LBF and IISB, Valeo.

www.h2020-ghost.eu
The aim of the GHOST project is to contribute to enhancing the performance Battery Electric Vehicles (BEVs) and Plug-in Hybrid Electric Vehicles (P-HEVs) in terms of range, battery lifetime, functional safety and reliability. This will be achieved through a complete optimization of the electric, mechanical and thermal architecture of the on-board energy storage system.

The project aims to provide important contributions regarding innovative Battery System architectures based on next generation battery technologies, reducing the cost and complexity of the E/E architecture, while introducing improvements in terms of the energy density, efficiency, safety, scalability, and modularity.

- Design of a novel and modular battery system with higher-energy density
- Develop of mass producible innovative and integrated design solutions to reduce the battery integration cost through smart design
- Define of new test methodologies and procedures to evaluate reliability, safety and lifetime of different BS
- Design novel prototyping, manufacturing and dismantling techniques for next generation of lithium-ion BS
- Demonstrate solutions in two demonstrators (BEV bus with ultrafast partial charge capability and P-HEV) and one lab demonstrator (module level) for the post Lithium-Ion technology
GHOST

GHOST: DEVELOPING ADVANCED BATTERY SYSTEMS FOR ELECTRIFIED VEHICLES

ACHIEVEMENTS
Since the technologies developed in the project should have a significant impact on the performance of electrically chargeable vehicles (BEVs and P-HEVs), achieving these key innovations at affordable cost should strengthen the European technical and technological leadership in the field of Battery Systems which is crucial for electrified vehicles, and thus increase the competitiveness of European road vehicle manufacturers.
BUDGET
€9.0 million

FUNDING
€6.5 million

START
January 2014

DURATION
54 months

CALL
FP7-SST-2013-RTD-1

CONTRACT N°
605405

COORDINATOR
Dr. Angelos Amditis, Institute of communication & Computer Systems

CONTACT
a.amditis@iccs.gr

PARTNERS
EUCAR members: Fiat Chrysler Automobiles, Scania (Volkswagen Group), Volvo Group.

Other: ICCS, ERTICO, TRL, KTH, TNO, VeDeCom, CIRCE, QIE, IREN, FKA, TECNOSITAF, ENIDE, POLITO, UNIGE-DITEN, SAET, Sanef, CEA, ATA, AMET, MECT, TUB, Hitachi.
FABRIC

Feasibility analysis and development of on-road charging solutions for future electric vehicles

**MOTIVATION AND OBJECTIVES**

FABRIC investigated on-road wireless charging technologies as a means to alleviate users’ range concerns and to make electric vehicles (EVs) more attractive for longer journeys. Its main objectives were to develop prototype dynamic wireless charging solutions for EVs, evaluate their performance in real driving conditions, assess the impact on the transport infrastructure, the electricity network and the environment from the wide introduction of such systems and derive recommendations for large-scale deployment.

**EXPECTED IMPACT**

The FABRIC results will support the work of researchers, stakeholders, planners and policy makers in exploiting the potential of wireless dynamic charging technologies for electric vehicles, as a means to reduce the size and weight of batteries, to make charging more convenient for users and to make future EVs an even more attractive choice in relation to conventional vehicles.

**TECHNICAL APPROACH**

FABRIC has developed three prototype wireless charging solutions and support ICT which have been demonstrated at test sites in France and Italy. Support ICT applications were developed to optimize driving behaviour and system performance. Numerous test activities have been performed at the two test sites at several vehicle speeds, evaluating the system performance, including various misalignments between primary and secondary coils and under different weather conditions.
ACHIEVEMENTS

• The FABRIC prototype charging solutions have been successfully demonstrated on several occasions achieving in the French site concurrent charging at 20 kW of two vehicles at 100 km/h
• Dynamic wireless on-road charging seems feasible in the medium-term for urban buses and for long distance freight corridors
• The implementation of E-road systems is technically feasible but careful planning and gradual E-road deployment is needed
| **BUDGET** | €28.4 million |
| **FUNDING** | €21.1 million |
| **START** | May 2015 |
| **DURATION** | 36 months |
| **CALL** | GV-04-2014 |
| **CONTRACT N°** | 653468 |
| **COORDINATOR** | Guus Arts  
DAF Trucks N.V. |
| **CONTACT** | guus.arts@daftrucks.com |
| **PARTNERS** | EUCAR members: DAF Trucks, Daimler, Fiat Chrysler Automobiles, IVECO, MAN Truck and Bus (Volkswagen Group), Renault Group.  
Other: Bosch, ECS, GKN, JMBS, SDIBS, ETL, AVL, FEV, RIC, TEC, UNR, Fraunhofer, IKA, JRC, ViF, QMUL, TUE, HYDRO |
SUSTAINABLE PROPULSION

ECOCHAMPS

European COmpetitiveness in Commercial Hybrid and AutoMotive PowertrainS

MOTIVATION AND OBJECTIVES
Even though hybrid passenger cars are already in production, their market penetration is still relatively low. To increase user interest in hybrid vehicles, the ECOCHAMPS project has delivered efficient, compact, low weight, robust and cost effective hybrid powertrains for both passenger cars and commercial vehicles (buses, medium duty and heavy duty trucks) with increased functionality, improved performance, comfort, functional safety and emission levels below Euro 6 or VI.

EXPECTED IMPACT
Key innovations at affordable cost will strengthen the technological leadership in powertrain and system optimization, will establish a leading position in hybrid technology and increase the competitiveness of European road vehicle manufacturers. Equally importantly, the technology will have a strong impact on the reduction of CO₂ for road transport and improvements in air quality.

TECHNICAL APPROACH
ECOCHAMPS’s overall concept, approach and methodology of the work plan, is based on the following logical steps:
• Target setting
• Modularisation, standardisation and development of hybrid components leading to cost optimisation
• Design and build up the hybrid drivelines and vehicles
• Evaluate the demonstration vehicles
ACHIEVEMENTS
The innovations demonstrated in ECOCHAMPS have shown an improvement beyond the state-of-the-art of the cost/benefit ratio for hybrid powertrains. The technology is a stepping stone towards commercial exploitation in the near future. Among the many results, the powertrain efficiency has been improved by 20% for the class B vehicle, by 40% for the class C vehicle, by 30% for the medium duty application, by 18% for the city bus and by 17% for the heavy duty demonstrator, relative to their 2013 state-of-the-art base vehicles.
| **BUDGET** | €7.8 million |
| **FUNDING** | €7.8 million |
| **START** | October 2016 |
| **DURATION** | 36 months |
| **CALL** | H2020-GV-2015 |
| **CONTRACT N°** | 713794 |
| **COORDINATOR** | Dr. Angelos Amditis, Institute of Communication and Computer Systems |
| **CONTACT** | a.amditis@iccs.gr |
| **PARTNERS** | EUCAR members: BMW Group, Fiat Chrysler Automobiles, Renault Group. Other: ICCS, City of Barcelona, Broadbit, ERTICO, FKA, GIREVE, Hubject, IBM, ICOOR, IDIADA, IREN, SingularLogic, Tecnositaf, TomTom, TUB, Verbund, MOSAIC FACTOR. |
NeMo

Hyper-Network for electromobility

**MOTIVATION AND OBJECTIVES**
NeMo aims to make electromobility more attractive and facilitate its mass adoption, acting in a catalytic way across the entire energy management cycle of electromobility, including battery and smart grid recharging management. The project aims to facilitate increased service availability and the better planning and more secure electric grid operation, by making backend data and services accessible to the right actors and bringing down digital and physical barriers.

**EXPECTED IMPACT**
NeMo improves the attractiveness of EVs by: (1) providing EV users with a single method of identification, authorization and payment; (2) unifying charging infrastructures for all operators connected to its Hyper-Network; (3) providing access to a market of seamless innovative services; (4) establishing the means for integration of future smart-grid applications and services.

**TECHNICAL APPROACH**
The NeMo Hyper-Network is a distributed environment with open architecture based on standardised interfaces, in which all electromobility actors, physical (i.e. Charge Points, Power Grid, EVs) or digital (i.e. Charge Point Operators, Distribution System Operators, Service Providers, EV owners, etc.), can connect and interact seamlessly, exchanging data and providing improved electromobility ICT services.
NeMo

**NEMO HYPER-NETWORK FOR ELECTROMOBILITY**

**ACHIEVEMENTS**

- First version of the Hyper-Network is available. Service providers can register their existing services or create new complex electromobility services.
- Common Information Models and software agents for easy translation of data from and to proprietary formats are ready.
- The NeMo open Inter-Roaming protocol allows eRoaming platforms to exchange data and to make their data and services visible to other actors via the NeMo Hyper-Network.
BUDGET
€10.1 million

FUNDING
€8.3 million

START
October 2016

DURATION
48 months

CALL
H2020-GV-03-2016

CONTRACT N°
724087

COORDINATOR
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TNO

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PARTNERS
EUCAR members: FCA, IVECO, Volvo.

Other: TNO, VUB, Valeo, JSR MICRO, Bosch, ALTRA, Fraunhofer.

www.h2020-orca.eu
ORCA

Optimised real-world cost-competitive modular hybrid architecture for heavy duty vehicles

MOTIVATION AND OBJECTIVES
The overall objectives of the ORCA project are to reduce the Total Cost of Ownership (TCO) to the same as diesel vehicle TCO level, targeting over 10% system cost premium reduction; to improve the hybrid powertrain efficiency up to 5% through optimized renewable energy sources (RES) selection & sizing and by improving the energy and Internal Combustion Engine (ICE) management; to reduce the fuel consumption by 40%; to downsize the ICE by at least 50%; to improve the electric range from 10km to 30km by adding the PHEV (Plugin Hybrid Electric Vehicle) capabilities and optimizing the RES capacity; and case study for Compressed Natural Gas (CNG) heavy-duty engines.

EXPECTED IMPACT
The objectives set in ORCA will impact on various factors such as environmental, European economic as well as the competitiveness of the OEMs.

The environmental impact refers to significant (tailpipe) CO₂ reduction, one of the main targets from the European Commission in Horizon2020. This impact depends on the progression of the growth of the market, market share of the hybrid HD vehicles and the improvement in fuel reduction performance from using the hybrid HD vehicles.
ORCA

TECHNICAL APPROACH
ORCA will be conducted by an 11-member consortium from 7 different European Members States representing all requested competencies in the field of powertrain optimization for Heavy Duty vehicles. The consortium comprises OEM with IVECO, Fiat Chrysler Automobiles and Volvo Group, suppliers with Valeo, Bosch and JSR MICRO, leading RTD organizations and Universities with TNO, Fraunhofer, and VUB. The majority are also members of ERTRAC and EGVIA.

ORCA APPROACH TOWARDS SYSTEM OPTIMISATION

Achievements
Achieving these key innovations at affordable cost will significantly strengthen the European technical and technological leadership in the value chain of heavy-duty vehicles, enabling a leading position in this crucial field of hybridised vehicles and increasing the competitiveness of European heavy-duty road vehicle manufacturers and suppliers. The optimised real-world cost-competitive modular hybrid architecture will be ready for its first market introduction between 2021 and 2022.
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<td><strong>COORDINATOR</strong></td>
<td>Stefania Zandiri</td>
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<td>Centro Ricerche FIAT S.c.p.A.</td>
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<tr>
<td><strong>CONTACT</strong></td>
<td><a href="mailto:stefania.zandiri@crf.it">stefania.zandiri@crf.it</a></td>
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<tr>
<td><strong>PARTNERS</strong></td>
<td>EUCAR MEMBERS:</td>
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<td>Fiat Chrysler Automobiles, Ford</td>
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<td>Other: Borg Warner, BOSCH, Continental, EMITEC, Faurecia, POLIMI, RICARDO, Schaeffler, UNI Bath, UNI Berlin</td>
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[www.thomson-project.eu](http://www.thomson-project.eu)
Mild Hybrid cost effective solutions for a fast market penetration

**MOTIVATION AND OBJECTIVES**
The project aims to the development of cost effective solutions, based on 48 V architectures, answering the need to reduce the environment impact of the transportation sector through a clever combination of advanced engine technologies, electrification and wider use of alternative/renewable fuels.

**EXPECTED IMPACT**
The project addresses very precise and consistent objectives to support a quick transition towards high efficient, cleaner and affordable electrified powertrains focusing on the 48V architectures, intended as key element to increase fuel economy and reduce environmental impact and to support a quick penetration on the market of the hybrid powertrains.

**TECHNICAL APPROACH**
The project will provide an exhaustive evaluation of the hybrid concept through the development of two different 48V architectures, one integrating the e-machine on the front belt drive, the other between engine and transmission and on two different engine families: a mid-size 1.6 Diesel engine and a small downsized Spark Ignited CNG engine with Direct Injection system.
ACHIEVEMENTS
During the first 18 months of the project, the following achievements have been reached:

- Global vehicle models, to optimise energy utilisation and emission control, developed
- Definition of the 48V mHEV configurations
- mHEV CNG 1.0L engine built-up – calibration ongoing at test bench
- mHEV Diesel 1.6L engine built-up – calibration ongoing at test bench
**BUDGET**

| € 9.1 million |

**FUNDING**

| € 9.1 million |

**START**

| October 2017 |

**DURATION**

| 36 months |

**CALL**

| H2020-GV-2016-2017 |

**CONTRACT Nº**

| 769506 |

**COORDINATOR**

| Horst Pfluegl  
| AVL List GmbH |

**CONTACT**

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**PARTNERS**

| EUCAR members: Fiat Chrysler Automobiles, Ford of Europe, Renault Group.  
| Other: AVL-SFR, Bosch, SIE-NV, SIE-SAS, UNR, Valeo, CEA, Fraunhofer-LBF, FHJ, NIC, UL, UNIFI, US, VIF, VUB. |

**www.obelics.eu**
OBELICS

Optimization of scalable real-time models and functional testing for e-drive Concepts

MOTIVATION AND OBJECTIVES
OBELICS addresses the urgent need for new tools to enable multi-level modelling and testing of EV and their components in order to deliver more efficient vehicle designs faster while supporting modularity to enable mass production and hence improved affordability.

EXPECTED IMPACT
Using advanced heterogeneous model-based testing methods and tools; as well as scalable and easy to parameterize real-time models, OBELICS delivers
- Reduction in development and testing efforts for e-drivetrains by 40%
- Improving efficiency of the e-drivetrain by 20%
- Improving safety of electrified vehicles by a factor of 10

TECHNICAL APPROACH
With a comprehensive ‘Frontloading’ approach based on iterative model based design, development and testing - OBELICS enables engineers to readily understand design change impacts, validate and refine concepts at an early stage. Thus improving the performance, efficiency and safety, while reducing the time and efforts required for the EV development process.
ACHIEVEMENTS

• Development of novel methodologies for specifying and analyzing requirements with new models and testing methods
• Development of realistic use cases (four engineering domains) and metrics for guiding development of new tools for testing and modelling
• Advanced methodologies and strategies for assessing functional safety, reliability and safety
SUSTAINABLE PROPULSION

GAS ON

BUDGET
€23.4 million

FUNDING
€16.7 million

START
May 2015

DURATION
48 months

CALL
H2020 – GV.3 - 2014

CONTRACT N°
652816

COORDINATOR
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PARTNERS
EUCAR members: Fiat Chrysler Automobiles, Ford of Europe, Renault Group, Volkswagen Group.

Other: AVL, CEA, Continental, CTU, Delphi, Empa, ETH, FEV, IFPEN, Ricardo, Pierburg, Schaeffler, POLITO, Poznan Uv., UPVLC

www.gason.eu
GasOn

Gas-Only Internal Combustion Engines

**MOTIVATION AND OBJECTIVES**
In order to realize sustainable mobility in Europe, future vehicles for road transport have to be significantly more efficient by 2020. GasOn project aims to develop advanced CNG only, mono-fuel engines able to comply with post-2020 CO₂ emission targets, claiming the 20% CO₂ emission reduction compared to the current best in class CNG vehicle segment by segment, to fulfil the new homologation cycle and to guarantee a low fuel consumption even in real driving conditions.

**EXPECTED IMPACT**
New generation of CNG engines able to remove all gaps in comparison with conventional fuel engine/vehicle in terms of engine performance, fun to drive, driving range, trunk space and operating costs.

**TECHNICAL APPROACH**
GasOn is based on 3 parallel technology ways leading full development of demonstrator vehicles, all based on the integration of the gaseous direct injection system developed in the project matched with advanced variable valve actuation or advanced boosting system with variable compression ratio or lean burn/charge dilution combustion. The project is focusing also on innovative combustion approaches (like pre-chamber), advanced aftertreatments and fuel quality sensors.
GasOn

CNG DIRECT INJECTION ACTING ON AIR MOTION & COMBUSTION EFFICIENCY

ACHIEVEMENTS

- Demo vehicle equipped with CNG engine prototype with direct injection, fully flexible variable valve actuation and high compression ratio able to reduce more than 15% CO₂ emissions compared to conventional best in class bifuel models, complying with Euro6d limits and close to 600 km driving range
- CNG lean burn engine with pre-chamber achieving 44% brake thermal efficiency with very low NOx emissions
- CNG fuel quality sensor capable to detect the full spread of EU blends
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<td>Theodor Sams</td>
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<td>AVL List GmbH</td>
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<tr>
<td><strong>CONTACT</strong></td>
<td><a href="mailto:gernot.hasenbichler@avl.com">gernot.hasenbichler@avl.com</a></td>
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<td><strong>PARTNERS</strong></td>
<td>EUCAR members: Daimler, IVECO, MAN Truck and Bus (Volkswagen Group), Volvo Group. Other: AVL, BWR, Bosch, DINEX, FPT, IDIADA, POLIMI, RCD, SAG, TNO, TU Graz, UEF, UASE, UNR, ViF.</td>
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</table>
**MOTIVATION AND OBJECTIVES**
The overall objective of the HDGAS project is to develop, demonstrate and optimize advanced powertrain concepts for dual-fuel and for pure natural gas operation engines, perform integration thereof into heavy duty vehicles and confirm achievement of Euro VI emissions standards, in-use compliance under real-world driving conditions and CO₂ or greenhouse gas targets currently under definition.

**EXPECTED IMPACT**
The recently observed increase in oil price fuels the interest in gas powered vehicles. During 2017 several gas engine powered vehicles dedicated for long haul transportation have been launched and with the provided efficiency increase from the HDGAS project those products are able to provide an even higher CO₂ reduction. A prerequisite of a higher market penetration of gas powered long haul trucks is sufficient coverage with LNG however.

**TECHNICAL APPROACH**
HDGAS developed all key technologies (LNG fuel system including low and medium Pressure tank design, compact and insulation in tank, cryogenic pump, ATS systems), and three engines as well as new fuel systems. System integration into 3 Demonstration vehicles and evaluation and independent testing has also taken place within the frame of HDGAS.
ACHIEVEMENTS

FPT/IVECO’s concept shows a GHG reduction of 12% for the stoichiometric concept and appr. 16% on the lean burn concept (goal: 10%). The range requirement of 800km has been achieved. MAN’s dual fuel truck’ range requirement of 800km has been overachieved by large margin (>1400km). Volvo’s HPGI engine achieved the GHG target of -20 (-22%) The range requirement of 800km has been achieved with a large margin (1172 km) and the concept shows emission compliance.
REWARD

BUDGET
€12.5 million

FUNDING
€10 million

START
May 2015

DURATION
36 months

CALL
H2020-MG-3.1-2014

CONTRACT N°
636380

COORDINATOR
Herwig Ofner
AVL

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PARTNERS
EUCAR members: Fiat Chrysler Automobiles, IVECO, Renault Group, Volvo Cars.

Other: AVL, CNR, Johnson Matthey, Ricardo, Schaeffler, Le Moteur Moderne, Delphi, Uniresarch, IFP, VIF, Chalmers, CTU, UPVLC

www.project-reward.eu
REWARD

REal World Advanced Technologies foR Diesel Engines

**MOTIVATION AND OBJECTIVES**
REWARD reduced the pollutant emissions of diesel powered class B, C, D and E passenger cars below the Euro 6 emissions limits under Real Driving conditions (EU6 RDE) and, additionally, improved their fuel efficiency. REWARD developed and demonstrated advanced 4-stroke Diesel combustion concepts, exhaust gas after-treatment systems, control strategies and new approaches for friction & wear reduction. Furthermore, REWARD developed an innovative 2-stroke Diesel engine architecture.

**EXPECTED IMPACT**
REWARD successfully developed new combustion concepts for passenger car Diesel engines and new exhaust aftertreatment systems that release about half the emissions currently allowed by the EU and additionally achieve 5% fuel consumption improvement compared to reference MY2015 vehicles. The new approaches were confirmed by on-road tests (corresponding to the Real Driving Emissions legislation) and the current legal test procedure on chassis dynamometer.

**TECHNICAL APPROACH**
REWARD’s holistic approach addressed the 3 major energy conversion items for Diesel engines: Smooth cylinder charging & gas exchange; Efficient and complete combustion; Consistent exhaust aftertreatment. New control strategies focused on an improved model-based control of the cylinder charge and on new concepts for the compensation of emission drifts. Friction and wear reduction is accomplished by new coatings in combination with new lubricants.
ACHIEVEMENTS

- New Diesel combustion concepts for the demonstrator vehicles Renault Kadjar and Volvo XC60
- New catalyst formulations and their integration in complete aftertreatment systems
- Architecture of the Diesel 2-Stroke engine
- Cost assessment for new technologies
| **BUDGET** | €9.9 million |
| **FUNDING** | €6.5 million |
| **START** | September 2016 |
| **DURATION** | 36 months |
| **CALL** | H2020-GV-6-2015 |
| **CONTRACT N°** | 713783 |
| **COORDINATOR** | Dr. Alois DANNINGER  
AVL List GmbH |
| **CONTACT** | alois.danninger@avl.com |
| **PARTNERS** | EUCAR members:  
DAF Trucks, IVECO, Volvo Group.  
Other: AVL, FPT, Honeywell, SPOL, Bosch, Continental, FEV, Ricardo, Chalmers, CTU Prague, RWTH, POLIMI, POLITO, TU Eindhoven |
IMPERIUM

IMplementation of Powertrain control for Economic, low Real driving emissions and fuel ConsUMption

MOTIVATION AND OBJECTIVES
Fuel economy is a key aspect to reduce operating costs and improve efficiency of freight traffic, thus increasing truck competitiveness. The main objective of the IMPERIUM project is to achieve fuel consumption reduction of up to 20% (diesel and urea) whilst keeping the vehicle within the legal limits for pollutant emissions. The IMPERIUM consortium consists of major European actors and can provide a 100% European value chain for the development of future powertrain control strategies for trucks.

EXPECTED IMPACT
Targeted impact is to successfully market a new generation of optimally controlled Heavy Duty Vehicles in 2020 and beyond that are proved fuel efficient and compliant with Euro VI emissions limits under real driving conditions and attractive from a Total Cost of Ownership (TCO) perspective. For society, this leads to lower transport-related CO₂ emissions, improved (urban) air quality and lower noise levels. Results of IMPERIUM impacting >45% of European market share for HD trucks.
IMPERIUM

TECHNICAL APPROACH
The approach relies on the three following stages:
• Direct optimisation of the control of the main powertrain components (e.g., engine, transmission) to maximise (BE) their performances
• Global powertrain energy manager to coordinate the different energy sources and optimise (BE) their use depending on the current driving situation
• Provide a more comprehensive understanding of the mission (e.g., eHorizon, mission-based learning) to enable long-term optimization strategies

ACHIEVEMENTS
IMPERIUM’s objectives, main innovations and targeted key results are:
• Obj. 1: Development of a methodology and simulation environment for assessing the performance of HD trucks in real-driving conditions
• Obj. 2: Development of Dynamic eHorizon system for Heavy Duty trucks
• Obj. 3: Three advanced fuel efficient Heavy Duty Demonstrators
• Obj. 4: Analysis and validation of the project outcomes by means of in-vehicle measurements integrated into the proposed simulation environment
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<td><strong>COORDINATOR</strong></td>
<td>Simon Edwards</td>
</tr>
<tr>
<td></td>
<td>Ricardo</td>
</tr>
<tr>
<td><strong>CONTACT</strong></td>
<td><a href="mailto:secretary@uniresearch.com">secretary@uniresearch.com</a></td>
</tr>
<tr>
<td><strong>PARTNERS</strong></td>
<td>EUCAR members: Daimler, Jaguar Land Rover.</td>
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<td></td>
<td>Other: Ricardo, Bosch, FEV, Honeywell, Johnson Matthey, JRC, Uniresearch, IDIADA, Siemens, LOGE, ETH, UDE, RWTH, UFI Filters</td>
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MOTIVATION AND OBJECTIVES
The overall objective of PaREGEn is to demonstrate at up to TRL 7 a new generation of gasoline direct injection engined vehicles achieving a 15% reduction in CO₂ emissions via the optimal combination of advanced engine and robust aftertreatment technologies. Optical measurement will be made, simulation software verified and used to improve the design of the engines.

EXPECTED IMPACT
If successful and adopted across all light vehicle classes, these short-term gasoline engine developments are projected to reduce the European vehicle parc CO₂ emissions by about 2 Mtonnes in 2025 and up to 10 Mtonnes in 2030, together with around a 10% reduction in PN>10 nm. In addition, the new modelling & simulation tools will improve EU development competitiveness.

TECHNICAL APPROACH
The overall concept and technical approach comprises three major elements: Research for improved understanding; Innovation and demonstration of new technology combinations, where the developed know-how, software and control strategies are implemented in two novel optimised gasoline engined vehicles; Independent assessment of their impact to track the progress towards reaching the targets.
PaREGen

LASER DIAGNOSTIC VISUALISATION (BE) OF FUEL VAPOUR, IMPINGED LIQUID FUEL AND SOOT

ACHIEVEMENTS
A more fundamental understanding of the in-cylinder processes and their effects on emissions is being gained through optical measurements (see above) & simulation. New control models are being evaluated. For both demonstrators, the engines with their aftertreatment have been designed, built and are being tested: ready for installation in the vehicles and their assessment in 2019.
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| COORDINATOR | Stefania Zandiri  
Centro Ricerche FIAT S.c.p.A. |
| CONTACT  | stefania.zandiri@crf.it |
| PARTNERS | EUCAR MEMBERS: 
Fiat Chrysler Automobiles, VOLVO 
Other: AVL, CHALMERS, IFPEN, JOHNSON MATTHEY, POLIMI, SCHAFFLER, UNI GENOVA, UNI THESSALONIKI, VALEO |

www.upgrade-project.eu
UPGRADE

High efficient particulate free gasoline engines

MOTIVATION AND OBJECTIVES
The UPGRADE project aims to support the transition to high efficient, cleaner and affordable powertrain technology systems, based on Spark Ignited GDI (Gasoline Direct Injection) approach suitable for future Light Duty applications. The project also includes a deep analysis of the phenomenon of nanoparticles formation and the study and development of new Gasoline Particulate Filter (GPF) technologies.

EXPECTED IMPACT
• To lower the environmental and health impact of road traffic, by lowering emissions (nanoparticles down to 10 nm) especially in urban area and under Real Driving conditions
• The new engine platforms developed will allow a wider use of advanced biofuels and other alternative fuels like CNG and LPG

TECHNICAL APPROACH
To increase the engine efficiency under Real Driving conditions, the following steps will be carried out
• Address stoichiometric combustion approach on a «small» size engine and lean-burn combustion approach on a «medium-size» one
• Study and develop the best combination of technologies including advanced VVA/VVT capabilities, advanced boosting system, EGR and thermal management
ACHIEVEMENTS

During the first 18 months of the project, the following achievements have been reached:

- Calibrated the pressure drop and filtration efficiency models with engine test performed for many different GPF samples
- Development and integration of an efficient Electric Super Charger system
- Development and integration of a Low voltage BSG system with passive and active belt tensioner
**BUDGET**

|                  | €8.6 million |

**FUNDING**

|                  | €7.2 million |

**START**

|                  | October 2016 |

**DURATION**

|                  | 36 months |

**CALL**

|                  | H2020-GV-02-2016 |

**CONTRACT N°**

|                  | 723976 |

**COORDINATOR**

|                  | Herwig Ofner  
|                  | AVL List |

**CONTACT**

|                  | herwig.ofner@avl.com |

**PARTNERS**

- EUCAR members: Fiat Chrysler Automobiles, IVECO, Renault Group.
- Other: AVL, IFPEN, JM, Continental, Bosch, FPT, RIC, Siemens, ECN, VIF, CNR, UPV, UNR.

www.dieper-project.eu
**SUSTAINABLE PROPULSION**

**dieper**

Diesel engines efficiency improvement with particulates and emission reduction

**MOTIVATION AND OBJECTIVES**

Dieper is a logical continuation of European R&D programmes on diesel engines for passenger cars (such as the REWARD project) and light commercial vehicles. It contributes to the framework of sub 23 nm particles emissions with new technology for the reduction of sub 23 nm particles from diesel engines.

**EXPECTED IMPACT**

- Improved fuel economy compared to model year (MY) 2015 reference engines of the participating OEMs (≥5%)
- Pollutant emissions that go to ≤50% of EU VI directive, including particle emissions down to 10 nm in size
- The PN target is to go below 20% of the EU VI limit. The counting of particles will be carried out with improved techniques developed by DOWNTOTEN project

**TECHNICAL APPROACH**

Dieper develops advanced diesel engine technologies for passenger cars. These focus on fuel-efficient engine combustion with options such as VCR, advanced charging, EGR, thermal management and exhaust gas treatment concepts. Two demonstration vehicles (2,0L Renault Espace and 3,0L Iveco Daily) will contain the selected technologies.
ACHIEVEMENTS
Thermodynamic approach, Combustion system with VCR, sub 23nm PN source analysis and method to quantify sub 23 PN, NOx aftertreatment combined with improved filter technologies; specification of new engine and FIE for Renault Espace, Layout EAS, combustion system, engine and EAS calibration on testbed; concept definition for LCV – combustion system, friction, ATS, technology screening; PN characterisation; experimental evaluation FIE on CO₂, simulation models for CO₂ and pollutants; measurement reference vehicles
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| COORDINATOR  | Hilke Heinke  
Volkswagen Aktiengesellschaft |
| CONTACT      | hilke.heinke@volkswagen.de |
| PARTNERS     | EUCAR members: Fiat Chrysler Automobiles,  
Volkswagen Group, Volvo Group.  
Other: IFPEN, UU, UniBi, Imperial, UniFi, A4F,  
Neste, KIT, SYNCOM. |
Photofuel

Photofuel- Biocatalytic solar fuels for sustainable mobility in Europe

**MOTIVATION AND OBJECTIVES**
The motivation is to develop high quality, low impact transportation fuels by enabling phototrophic algae or cyanobacterial microorganisms to produce alkanes and alcohols, which are excreted to the culture broth for direct separation without cell harvesting. Objectives are:
- Advanced biocatalysts for the direct production of solar fuels.
- Upscaling of cultivation volume and raw fuel production.
Analysis of risks, economic efficiency and environmental impacts.

**EXPECTED IMPACT**
Long term impacts by advancement of solar fuel technology are:
- Highly sustainable production of drop-in fuels on arid or marginal land
- Economic and environmentally sustainable large-scale systems for conversion of solar radiation to fuels or chemical energy
Support rural communities and substitute fossil energy imports.

**TECHNICAL APPROACH**
The project addresses the complete value chain:
- Development of biocatalysts for production of butanol, undecane and bisabolene
- Upscaling to 5 m³ outdoor production (pilot scale)
- Fuel blending for engine and vehicle tests (passenger + heavy duty)
- Analysis of risks, economic efficiency and environmental impact of the complete production pathway
ACHIEVEMENTS
The project is on track and important milestones were achieved:
• The butanol biocatalyst surpassed the target of 34 mg/L/day
• Production of free fatty acids for alkane are on similar order
• Production upscaling has reached 120L
• Fuel blending matrix and design of LCA-assessment are agreed
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| **COORDINATOR** | Heiko Maas, Ford of Europe  
Per Hanarp, Volvo Group |
| **CONTACT** | EUCAR@eucar.be |
| **PARTNERS** | EUCAR, CONCAWE, Joint Research Center of the European Commission |

www.iet.jrc.ec.europa.eu/about-jec
MOTIVATION AND OBJECTIVES
EUCAR, CONCAWE and JRC (JEC) continue to perform joint evaluations of the WTW energy use and greenhouse gas (GHG) emissions for a wide range of existing and future fuel and powertrain options. The objectives of the study are:
Establish a consensual WTW total / fossil energy demand and GHG emission assessment of automotive energy carriers and powertrains relevant to Europe. Consider the viability of each fuel pathway. Attempt to have the approach and results accepted as a reference by all relevant stakeholders.

EXPECTED IMPACT
The program has successfully completed several phases:
2001–2003: Version 1, initial report
2012–2015: Version 4, projection towards 2020+ & full integration of EVs
2016–2018: Preparations for Version 5 on-going
**Photofuel**

**TECHNICAL APPROACH**
Well to Tank (WTT) evaluates the energy expended and the associated GHG emitted to deliver the final fuel to a vehicle. The Tank to Wheels (TTW) evaluation does the same for the fuel application in the vehicle. Hence the WTW integration enables an assessment of the combined fuel and vehicle pathways. The WTW study takes into account changes generated by fuel and/or powertrain substitution. This is particularly important for fuels where careful consideration of co-products is essential to a good understanding.

**WTW STUDY RESULTS FROM PREVIOUS VERSION, AND CURRENTLY BEING UPDATED**

![WTW Energy (2020+ BEV) and WTW GHG (2020+ BEV)](image)

**ACHIEVEMENTS**
Results of this work are used by the European Commission (EU Renewable Energy Directive default value methodology; EU Fuel Quality Directive calculation of Fossil Fuel Comparator) and provides input to new initiatives, like the Clean Power for Transport program. Furthermore, it is considered by Technology Platforms like the European Biofuels technology Platform as well as ERTRAC and recognized by EU member states.
AFFORDABILITY & COMPETITIVENESS

THE EUCAR STRATEGIC VISION

New sustainable approach for developing and producing affordable and competitive vehicles in Europe.
APPLICATION OF SUITABLE MATERIALS FOR FUTURE VEHICLES
Materials suitable for enhanced affordable and competitive design and manufacturing of functionally optimised and lightweight vehicles.

VIRTUAL ENGINEERING PRODUCT PROCESS INTEGRATED APPROACH
Innovative engineering solutions to guarantee and ensure the European automotive competitiveness for future vehicle generations.

SUSTAINABLE AND FLEXIBLE MANUFACTURING
Efficient and effective manufacturing systems capable of producing affordable and competitive vehicles in Europe.
### EUCAR Project Digital Book 2018

| **BUDGET** | €8.6 million |
| **FUNDING** | €8 million |
| **START** | October 2016 |
| **DURATION** | 36 months |
| **CALL** | H2020- NMBP-08-2016 |
| **CONTRACT N°** | 723893 |
| **COORDINATOR** | Dr. Sama Mbang  
Daimler |
| **CONTACT** | sama.mbang@daimler.com |
| **PARTNERS** | EUCAR members: Daimler, Fiat Chrysler Automobiles, Opel Automobiles, Toyota Motor Europe, Volkswagen Group, Volvo Cars.  
Other: TKS, NOVELIS, BATZ, BENTELER, SWEREA, Inspire, Fraunhofer, IKA, KIT, UNIFI, Bax & Company, Ricardo |

[www.lightweight-alliance.eu](http://www.lightweight-alliance.eu)
MOTIVATION AND OBJECTIVES
There is an urgent need for increasing energy efficiency in both conventional and electric vehicles. To date, lightweighting initiatives have resulted in several innovative solutions. However, the majority of efforts have failed to reach widespread adoption due to high costs. Six European carmakers, four suppliers and eight knowledge partners have joined forces to commonly deal with the high cost of innovations in vehicle lightweighting.

EXPECTED IMPACT
ALLIANCE aims to achieve a reduction of the automotive sector’s environmental impact by decreasing the energy consumption of road vehicles by 10%, decreasing life-cycle environmental impact (GWP) by 6%, and ensuring that the developed technologies reach widespread adoption by keeping the cost of lightweighting <3€/kg saved. Furthermore, ALLIANCE will strengthen the competitiveness and growth of European players in the lightweighting field.

TECHNICAL APPROACH
ALLIANCE brings together partners from the lightweighting value chain, aiming at developing innovative materials and their respective manufacturing technologies using a holistic framework that will ensure their market viability. The consortium aims to tap into the innovation potential of Europe by mobilising the entire ecosystem of innovators in the field through a pan-European innovation challenge. The developed technologies will be validated in 8 demonstrator modules.
The activities in the first 18 months have mainly focused on the development/adaptation of high performing materials, on the conceptual design of exemplary demonstrators as well as on the development of methodologies to assess the impact of lightweight solutions and to accelerate the conceptual design. More specifically, for the assessment of the new technologies, a cost and environmental assessment for the reference ICE and BEV models has been carried out, and a target weighing approach and multi-parameter optimisation methodology have been developed. In the materials domain, production and characterisation of Q&P steel, new aluminium grades (6xxx) and PA-based composites and their bonding has been performed, and simulation of new manufacturing technologies for the relevant materials has been performed. Finally, an open innovation challenge took place, attracting innovative materials and manufacturing solutions from all over the world. The four winners of the competition will be presenting their innovations on September 20th in Aachen.
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| **COORDINATOR** | Xavier Cort  
|  | IDIADA |
| **CONTACT** | xcort@idiada.com |
| **PARTNERS** | EUCAR members: Fiat Chrysler Automobiles, Toyota Motor Europe, Volvo Cars. |
|  | Other: IDIADA, AGC, Denso TS, Faurecia, Hutchinson, IEE, LIST, Coventry, Fraunhofer, IKA, Tecnalia, ViF, Uniresearch. |

www.domus-project.eu
DOMUS
Design OptiMisation for efficient electric vehicles based on a USer-centric approach

MOTIVATION AND OBJECTIVES
Part of transforming the anticipated market for EVs into reality lies in the ability of the automotive industry to address consumer concerns regarding EVs to fulfil their expectations of e-Mobility. Range anxiety is a main barrier to EV adoption by the larger public; the ambient conditions profoundly affect the actual driving range which can be achieved. DOMUS aims to deliver solutions to lower the energy demand for cabin conditioning while improving the user experience by developing, validating and applying a user-centric approach to EV design.

EXPECTED IMPACT
DOMUS will achieve an increase of 25% of the electric drive range of EVs compared to their 2016 reference models across a wide extent of ambient conditions. This will contribute to a wider adoption of EVs by the public and accelerated transition towards the production of low and zero emission vehicles, battery EV and (plug in) hybrid EVs.

TECHNICAL APPROACH
The overall concept and technical approach comprises five elements: Understanding of all factors influencing comfort perception; Development of radical new cabin and EV designs and methodology for virtual assessment of cabin designs; Development of new cabin components, systems and control strategies and the implementation and validation of the above-mentioned components.
DOMUS

DOMUS MODELLING

ACHIEVEMENTS

The priority factors for estimating comfort have been researched and described. These factors will be used to create the DOMUS Comfort Model. Newer models, such as Local Mean Vote (LMV), ISO 14505, and the Berkeley Comfort Model (BCM) cater for substantially different thermal environments for different parts of the body. The trend in the built environment is to move away from PMV and towards adaptive comfort models that consider recent temperature history.
An integrated approach for reliable, clean, safe and efficient freight transport and passenger mobility, through dedicated vehicle concepts and effective logistics.
CONNECTED COMMERCIAL VEHICLE
Commercial vehicles that are connected to the infrastructure, operators and drivers, supporting an efficient and resilient transport system and effective logistics.

SAFE COMMERCIAL VEHICLE
Commercial vehicles that protect all road users and avoid and mitigate accidents through advanced vehicle technology, cooperative systems and increasing levels of automation.

EFFICIENT COMMERCIAL VEHICLE
Commercial vehicles with optimum efficiency and performance, making use of advanced propulsion and energy systems and dedicated vehicle configurations.
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<td><strong>COORDINATOR</strong></td>
<td>Prof. Noshin Omar</td>
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<td></td>
<td>Vrije Universiteit Brussel (VUB)</td>
</tr>
<tr>
<td><strong>CONTACT</strong></td>
<td><a href="mailto:noshin.omar@vub.be">noshin.omar@vub.be</a></td>
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[www.assured-project.eu](http://www.assured-project.eu)
MOTIVATION AND OBJECTIVES
Project will develop innovative heavy-duty and medium-duty vehicle solutions with interoperable charging infrastructure concepts, enhancing performances, comfort and safety while reducing the TCO and contributing to a competitive and sustainable mobility.

Development of
- next generation modular high-power charging solutions (up to 600kW)
- interoperable and scalable high-power charging solutions
- innovative charging management strategies
- standardised conformance and interoperability test protocol
- efficient wireless charging solutions

Demonstration of
- efficient wireless charging solutions (up to 100kW)

ASSURED solutions (6 public buses, 2 trucks, and 1 VAN at TRL 7) in EU cities
- Evaluation and improvement of the cost, energy efficiency, impact of grid
- Support to the standardisation bodies (i.e. CEN-CENELEC, ISO, IEC)
EXPECTED IMPACT

ASSURED has the ambition to facilitate the following innovations to further promote full electric mobility through:

- Interoperable high-power charging systems with power levels up to 600 kW with high transfer efficiency
- Vehicle integration of cost-effective and industry-wide ASSURED fast charging solutions to enable the economic viability of urban heavy-duty and medium-duty vehicles also without government incentives
- Assessment of different fast charging options for opportunity charging considering operational costs and their impact on the power grid and battery ageing via ASSURED methods and tools for fleet level optimisation

ASSURED results will create benefits not only to the urban transport entities but will have a wider benefit for cities and their inhabitants. Indeed, the technical improvements are expected to result in a substantial reduction of emissions and noise without affecting the vehicles operation.

In addition, the close interaction with Standardisation Bodies in the frame of CEN-CENELEC, ISO, IEC will complete the picture towards the achievement of a full exploitation of the project outcomes and successful implementation.
TECHNICAL APPROACH

- ASSURED brings together 39 partners from 12 countries representing industry, research centres and local governments, ensuring that all stages of the value chain are covered.
- The project is building on 4 phases:
  - Operational specifications & requirements and city needs
  - Standardisation support & Development of Conformance/Interoperability Test Framework
  - Interoperability and conformance tests of charging solutions
  - 9 Use Cases on heavy, medium and light duty vehicles
  - User Acceptance & Demonstration in Cities
    Evaluation of Use Cases and Demonstration

INTEROPERABILITY ASSESSMENT OF HIGH-POWER CHARGING SOLUTIONS FOR DIFFERENT CHARGING CONCEPTS

ACHIEVEMENTS

- Strengthening the European technical and technological leadership in the value chain of electrified urban heavy, medium and light duty vehicles
- Further developing strong collaboration and interaction with Public Transport Organisations/Public Transport Authorities
### BUDGET
- €11.8 million

### FUNDING
- €9.5 million

### START
- 01 October 2017

### DURATION
- 42 months

### CALL
- H2020-GV-2017

### CONTRACT N°
- 769658

### COORDINATOR
- Mr. Ben Kraaijenhagen
  MAN Truck & Bus AG

### CONTACT
- ben.kraaijenhagen@man.eu

### PARTNERS
- EUCAR members:
  - DAF Trucks
  - FIAT Chrysler Automobiles
  - IVECO
  - MAN Truck & Bus ((VW Group)
  - Scania (VW Group)
  - Volvo Group.

- Other:
  - Uniresearch
  - SCB
  - VEG
  - Tirsan
  - CREO
  - Michelin
  - Wabco
  - Chalmers
  - DLR
  - Fraunhofer
  - IDIADA
  - HAN
  - NLR
  - TML
  - TNO
  - MHH
  - UIRR.

www.aeroflex-project.eu
MOTIVATION AND OBJECTIVES
The aim of AEROFLEX is to develop and demonstrate new technologies, concepts and architectures for complete vehicles meeting future logistics and co-modality needs to be met for the different segments and markets. The optimal matching of novel vehicle concepts and infrastructures require the definition of smart performance-based standards for future trucks, load carriers and road infrastructures.

EXPECTED IMPACT
AEROFLEX will develop the knowledge, concepts and technology to improve the efficiency of long-range freight vehicles by 18-33% while drawing up recommendations for implementing the results within European regulations and in the transport & logistic industry.

TECHNICAL APPROACH
• Characterise the European freight transport market (map, quantify and predict), the drivers, the constraints, the trends, and the mode and vehicle choice criteria
• Develop new concepts and technologies for trucks with reduced drag, which are safer, comfortable, configurable and cost effective and ensure satisfaction of customer needs under varying transport tasks and conditions
• Demonstration and impact assessment of potential truck aerodynamics and energy management improvements. 4) Drafting of coherent recommendations for revising standards and legislative frameworks in order to allow the new aerodynamic and flexible vehicle concepts on the road
AEROFLEX

AEROFLEX DEMONSTRATOR VEHICLE

ACHIEVEMENTS

• Smart Loading Units: 4 - 5% energy saving by separate platforms and 4 - 6% energy saving by using loading space more effectively
• Vehicle Technologies; 5 - 12% energy efficiency from the integration of advanced powertrains; 5 - 10% energy saving through improved vehicle aerodynamics and front end designs to ensure survivability in crashes
• Standardised interfaces leading to higher economies of scale aerodynamics; front end designs to ensure survivability in crashes and standardised interfaces leading to higher economies of scale
• Front end in crashes end designs to ensure survivability in crashes up to 50 km/h for occupants and vulnerable road users
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<td>Dr. Marika Hoedemaeker</td>
</tr>
<tr>
<td><strong>CONTACT</strong></td>
<td><a href="mailto:marika.hoedemaeker@tno.nl">marika.hoedemaeker@tno.nl</a></td>
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<tr>
<td><strong>PARTNERS</strong></td>
<td>EUCAR members: DAF Trucks, Daimler Trucks, IVECO, MAN Truck &amp; Bus (VW Group), Scania (VW Group), Volvo Group. Other: TNO, CLEPA, ERTICO, IDIADA, IFS, NXP, ZF, Wabco, KTH, VUB, Bosch, Continental, Brem,</td>
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[www.platooningensemble.eu](http://www.platooningensemble.eu)
MOTIVATION AND OBJECTIVES
The main goal of the ENSEMBLE project is to pave the way for the adoption of multi-brand truck platooning in Europe to improve fuel economy, traffic safety and throughput. This will be demonstrated by driving up to seven differently branded trucks in one (or more) platoon(s) under real world traffic conditions across national borders. Trucks can form platoons instantly on an ad hoc basis. Significant advances in platooning technology have been made in the last decade, but to achieve the next step towards deployment of truck platooning, an integral multi-brand approach is required.

EXPECTED IMPACT
Aiming for Europe-wide deployment of platooning, ‘multi-brand’ solutions are paramount. It is the ambition of ENSEMBLE to realise (BE) pre-standards (i.e., mature input for standardization) for interoperability between trucks, platoons and logistics solution providers, to speed up actual market pick-up of (sub)system development and implementation and to enable harmonisation of legal frameworks in the member states.
TECHNICAL APPROACH

- During the first year, the project partners will concentrate on setting the specifications and developing a reference design with acceptance criteria.
- This reference design will be taken up by the OEMs and suppliers for implementation on their own trucks during the second year, while the knowledge partners will perform impact assessments with several criteria.
- Year three of the project will focus on testing the multi-brand platoons on test tracks and international public roads. The technical results will be evaluated against the initial requirements. Also, the impact on fuel consumption, drivers and other road users will be established.

ENVISIONED TECHNOLOGY OF HIERARCHICAL PLATOONING WITH INTERACTING LAYERS

ACHIEVEMENTS

First project results are expected end of 2018.