

## Project overview + Main results & E-VOLVE cluster



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## **CEVOLVER** Overview





- o Call: H2020-LC-GV-2018-2019-2020
- Topic LC-GV-01-2018 Integrated, brandindependent architectures, components and systems for next generation electrified vehicles optimised for the infrastructure
- Grant Agreement ID: 824295
- Total cost: € 6,203,303.71
- EU contribution: € 4,999,700.26
- o 10 Partners from
- o 6 EU countries
- Thereof 2 SMEs



# CEVOLVER Objectives in short



Ensure a leap forward in user's confidence, functionalities and energy efficiency of future EVs	<ul> <li>Eco-routing</li> <li>Eco-driving</li> <li>Reliable range prediction</li> <li>Smart Fast Charging</li> <li>Assured Charging</li> </ul>
Ensure the affordability of future electric vehicles by a user centric development approach	<ul> <li>user centric, use-case and Big Data based approach</li> <li>optimal energy and thermal system</li> <li>right-sized components based</li> <li>advanced connected energy and thermal management strategies</li> </ul>
Validation of advanced components and systems, novel connected control strategies and functionalities	<ul> <li>Early assessment/validation of CEVOLVER innovations</li> <li>Testing on roller dyno, 5G test track and real-life</li> <li>Determination of the vehicle performance, energy efficiency and user experience and friendliness</li> <li>Validation of the simulation models</li> <li>Demonstration of the capability for long distance trips</li> </ul>
Assessment of the impact of the technical advancements of CEVOLVER and their applicability in different EV types and vehicle classes	<ul> <li>energy saving potential, user experience and market potential</li> <li>cost reduction of over 20% in mass production of specific components and subsystems</li> <li>ensuring the durability and lifetime by reliably preventing overload situations</li> </ul>



## CEVOLVER's user centric approach for optimising the development and operation of electric vehicles





## **Project Structure**







## WP1 - Setting the scene for a connected energy and thermal management concept









WP1 objectives

- To select and define the specification of brand independent or common electric/electronic interfaces
- To select and specify brandindependent standards for communication with the cloud and of the data to be communicated
- 3. To define use cases and driving profiles applied for user-centric development in subsequent work packages
- 4. To define requirements for controls of the BEV system



### WP2 - Frameworks, methodologies, models and tools ... Connected vehicle simulation platform incl. webservices and eco-features

#### WP2 Objectives

- 1. To define the virtual simulation platform and define the minimum and maximum boundaries of each component and subsystem as well as drivetrain system in order to virtually optimise the control variables;
- 2. To assemble a base vehicle model from other EU projects and add parametrisation to allow flexible powertrain design and sizing for of powertrain components for vehicle classes B, C, D (integrated design approaches) with optimal , energy-efficiency and thermal management strategies at both subsystems and drivetrain level;
- 3. To develop a multi-level and multi time-scales thermal management strategies to maximise the energy efficiency and thus the electric range through connectivity for the defined use cases.



VOLVER



# WP3 – System and component testing using an EV prototype component carrier

**Objectives:** 

- 1. To further develop a prototyping vehicle\*, flexible enough to iteratively integrate several subsystem alternatives.
- 2. To show results of objective 1 (Functions: Eco-driving, Energy efficient operation, and prediction of driving range) with the prototyping vehicle.
- 3. To show results of objective 2 (thermal systems) with the prototyping vehicle.
- 4. To improve simulation model accuracy of WP2 to improve the conclusions and decisions thereof.



\* Joint development project of Bosch and BENTELER



# WP4 - System development, vehicle upgrade design and build and demonstration of a FORD EV





#### Objectives

- 1. Definition of a set of technical specifications for the demonstrator vehicle system, with the purpose of taking away range anxiety as well as increasing the driving range for application-specific use cases
- 2. Development of the demonstrator vehicle system through a user-centric approach, selection and rightsizing of components, and integration of novel connected control strategies and functionalities
- 3. Upgrading and commissioning the EV demonstrator vehicle with proof of functionality of the entire vehicle system

#### Most important findings/results

- The application-specific use cases for the WP4 demonstrator are defined.
  - The most important use cases that are predicted for the battery electric transporter in WP4 are parcel delivery service related since the electric range is suitable for the daily mileage and the electric propulsion ensures the operation also in inner-city areas.
  - Occasional 700 km day trip (considered by the use case "Craftsman's oneday job 350 km away") seem possible with less than 60 min additional travel time, considering an average speed of 100 km/h and an average charging power of about 100 kW.



# WP5 - System and component testing and demonstration using Fiat A class electric vehicles







#### **Objectives**

- Advanced Thermal Management strategies Eco routing based.
- Eco driving impact evaluation

#### **NEW FIAT 500 BEV FOR BATTERY PRECONDITIONING AND FAST CHARGE**





#### **Objectives**

Fast Charge improvement Vs.
 Battery and Ambient Temperature

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## WP6 Validation and Verification



#### Objectives

- 1. Validation and verification of the demonstrators and assessment of the energy and thermal management optimisation framework and methodology.
- 2. Validation of the demonstrator vehicles of WP4 and 5 together with the methodologies and solutions developed in WP1 and 2 in this project against the targets set in Section 1.1.
- 3. Analysis of data retrieved within WP6 is analysed to show the benefit of the developed solutions with respect to economic and ecologic impacts with respect to the overall vehicle fleet.



# WP7 – Communication, dissemination and preparative exploitation activities



#### Objectives

The overall aim of WP7 is to increase the visibility and support the impact generation of the CEVOLVER project and its project results. ... The objectives are:

- 1. To maximise the dissemination of results and to express them in terms that are readily understandable to stakeholders in industry, suppliers and governments in order to accelerate the implementation of the research findings;
- 2. To promote the dissemination of the project findings through presentations at project workshops, technical conferences, scientific publications and the project website;
- 3. To facilitate technology transfer and accelerate dissemination of the on-going project activities;
- 4. To achieve an optimum knowledge management including appropriate handling of IPR; implementation and exploitation of the obtained results.

#### **Dissemination Results Summary**

- 5 peer-reviewed papers (2 more pending for publication past project closure)
- 16+ dissemination activities like newsletters (incl. joint newsletters with E-VOLVE cluster), conference presentations, workshop participations



## **CEVOLVER** Public Results

- Public Documents available
  - Executive Summary on every Deliverable
  - Public Deliverables:
    - Report on Connectivity Interface for simulation supported testing
    - Dissemination plan
    - Short description f the setup of the dissemination tools
    - Report on specifications of brandindependent E/E interfaces communication protocols, interactions of VCU and cloud
    - Report on brand-independent (or general) system level and controls requirements
    - Report on use cases and methodology for developing user centric connected EVs optimised for lifetime, value, efficiency and reach



- 5 Peer-reviewed papers
- 20+ dissemination activities like conference presentations, workshop participations, poster exhibitions, flyers, newsletters, E-VOLVE cluster board meetings, etc
- Public Demonstration
  - Happening today and here
  - Three demonstrator vehicles on site
  - Two vehicles to be seen on video
- o Overall
  - 35 deliverables, thereof
    - 27 approved
    - o 8 pending
    - o 8 public



CEVOLVER is Part of the EVOLVE Cluster for Joint Dissemination Activities





All projects respond to the <u>LC-GV-01-2018</u> topic, except for Multi-Moby (<u>LC-GV-08-2020</u>)



https://www.h2020-evolvecluster.eu/



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CEVOLVER – GA 824295 – FINAL EVENT

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