



POLITECNICO  
DI TORINO



Center for  
Automotive Research  
and Sustainable Mobility

# CARS@POLITO

**C**enter for **A**utomotive  
**R**esearch  
and **S**ustainable  
**m**obility

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# Outline

- **The Mission**
- **The Objectives**
- **The Organizational Model**
- **The Staff**
- **The Investment in new Facilities**
- **Synergies with related ongoing and future initiatives**
- **Location**



# The Mission

- short, medium, long term -



## Green Vehicles

1. New powertrain and chassis technologies for future hybrid/electrified vehicles
2. Decarbonization and renewable low-carbon fuels for new propulsion systems
3. Powertrain and vehicle system integration & control
4. Affordable zero/low emission vehicles
5. Post-lithium batteries



## Affordability & Competitiveness

1. Affordable lightweight: products and processes
2. Competitive automotive: lean and innovative manufacturing cycles



## Safer & Integrated Mobility

1. Passive/Preventive Safety of new vehicles
2. Enabling SAE high level automated vehicles
3. Safe & Secure connected vehicles - validation of automated driving
4. Automated transport systems



## Urban Mobility and Logistics

1. City Logistics: Modelling and Simulation
2. Pervasive ICT Technologies
3. Social Engagement and Behaviors



## Sharing Mobility

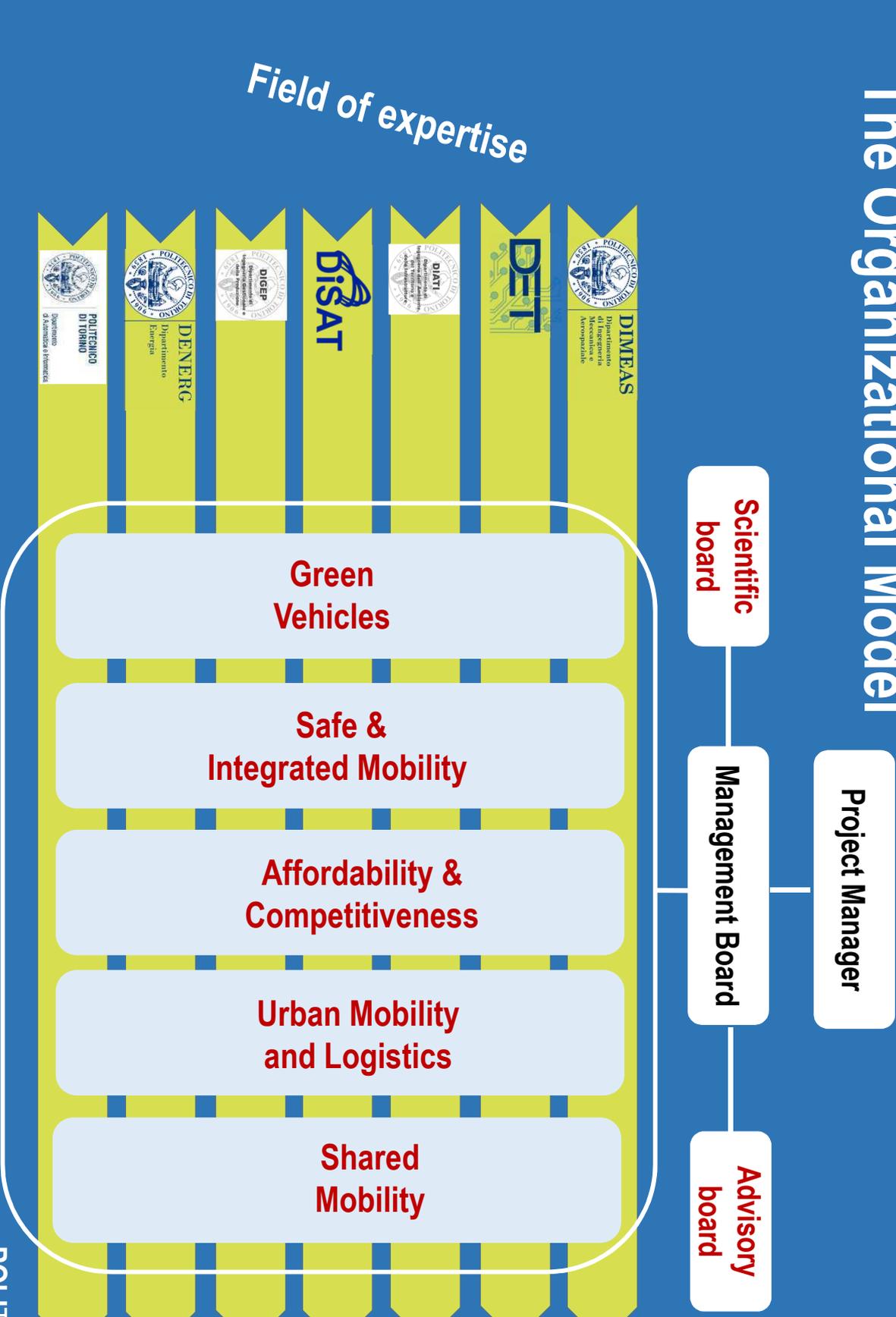
1. Monitoring and analysis
2. Integration in traffic monitoring system
3. EV Introduction in the urban system

# The Objectives

- Promote multidisciplinary approaches.
- Establish a reference Center for Automotive Engineering and Advanced Transportation Systems for Companies and Public Institutions of Piedmont District, but not only.
- Reinforce the already existing cooperation with public and private research entities.
- Place the Center in the international framework of Sustainable Mobility.
- Invest in challenging research lines at vehicle-environment level with interdisciplinary research teams.
- Invest in new test facilities and instrumentations for Vehicle System and Vehicle/Environment Level Validation.



# The Organizational Model



Field of expertise

## The Staff

<b>PoliTo People joining CARS (50 % of time)</b>	<b>Permanent Staff</b>	<b>Temporary Staff</b>	<b>Technical Staff</b>	<b>Total</b>
	<b>37</b>	<b>55</b>	<b>2</b>	<b>94</b>

<b>Investment in dedicated staff (next three years)</b>	<b>Assistant Professors time contract</b>	<b>PhD Students</b>	<b>Technical Staff</b>	<b>Total</b>
	<b>6 (2)</b>	<b>5 (3)</b>	<b>2</b>	<b>13 (5)</b>

# Investments in new Facilities

## Static Virtual Test Simulator for Advanced Driver Assistance System, HMI, Ergonomy

### Hardware

- 6 m diameter screen (210 deg.)
- 3 Projectors
- Modified Automotive cockpit
- Steering wheel motor

### Software

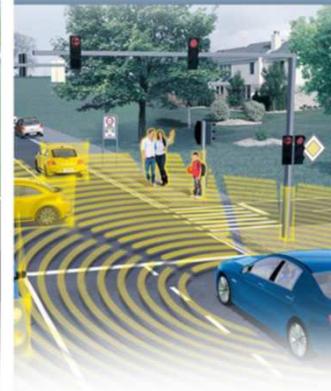
- Vehicle Dynamics - Real Time Simulation
- Traffic and sensor modelling



Vehicle Dynamics

ADAS

Powertrain





## Investments in new Facilities

### Instrumented Vehicles for Connected Cars and Advanced Driver Assistance Systems

Instrumentation of 1 + 1 vehicle for:

- Validation of sensor and actuators for assisted and autonomous driving.
- Implementation and validation of control strategies for autonomous vehicles.
- V2V and V2X field tests.

## Investments in new Facilities

Test Bench for conventional, Hybrid and Electric Vehicles dedicated to the experimental tests of complete vehicles

- Control Strategies for the energy management of conventional, Hybrid and fully Electric Vehicles
- HIL of autonomous and connected vehicles
- Energy consumption referred to homologation and other relevant driving cycles

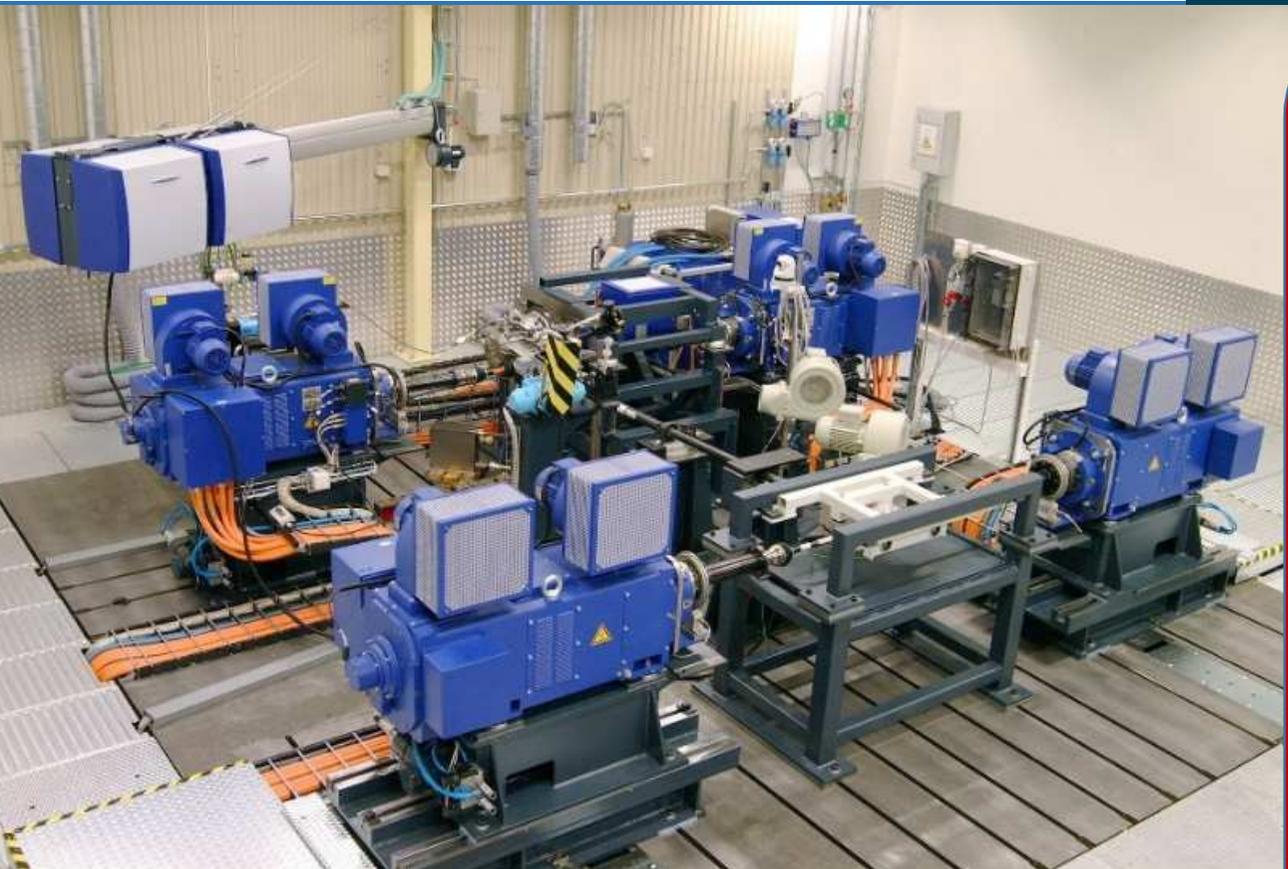
### MAIN DATA

- Power Unit up to 240+60 kW (2WD e 4WD)
- Test of Vehicles (ISO SUV) with mass up to 3500 kg
- Ability to perform homologation tests
- Max speed: 180 km/h
- Cell temperature: 20°C (Tmax 35°C)

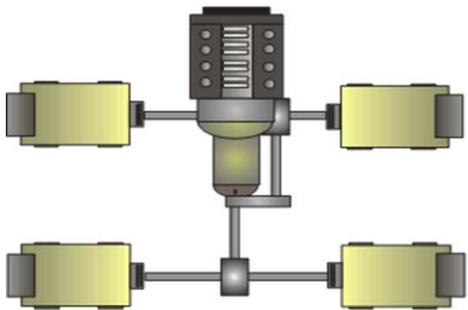
## Investments in new Facilities

Test Bench for conventional, Hybrid and Electric Vehicles dedicated to the experimental characterization of

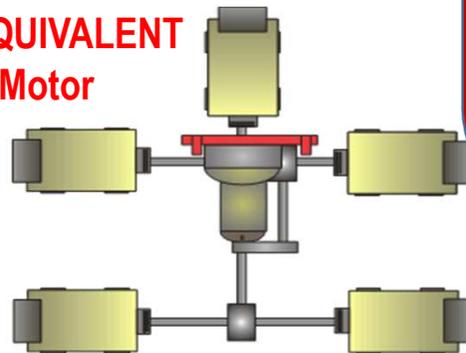
- Complete Hybrid Powertrains (P0-P4) with ICE installed
- Complete Hybrid Powertrains (P0-P4) with equivalent e-motor replacing the ICE
- Powertrain Components and Subsystems



ICE



EQUIVALENT  
E-Motor



# Synergies With Related Ongoing and Future Initiatives

- **MIUR – national CLUSTER on Transportation and related PRN**
- **Regional Projects – INFRAP**
- **Competence Center for Mobility**
- **KIC Urban Mobility Collocation Center – UMOVE consortium**
- **Automotive Industries investing in new Cooperation/Installation @ PoliTO**

# Education & Technology Transfer

- 2<sup>ND</sup> Level Specializing Marter's Programme in Automotive Suspensions: Technologies and Products for Mechanical Evolution and Smart Actuation (2017-2018)



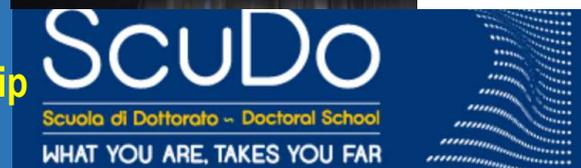
- 2<sup>ND</sup> Level Specializing Marter's Programme in Electrified and Connected Vehicle (2017-2018)



- Master di 2° Livello Sviluppo di criteri progettuali/costruttivi innovativi e soluzioni tecnologiche e di processo avanzate per la realizzazione di nuovi componenti e sistemi termici con incrementate caratteristiche per applicazioni veicolistiche (2017-2018)



- 5 PhD Students in Co-Tutorship



POLITECNICO DI TORINO



**Location**

**Short Term:  
Areas of the 7  
Involved Departments**

**Long Term:  
Mirafiori Campus –  
MTCC Competence  
Center Area**



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Thank You for Your Attention

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