ERTRAC CAD Roadmap 2017 & Strategic Research Agenda
2015: first joint roadmap on vehicle automation between OEMs, suppliers, research actors, infrastructure providers, cities, Member States

November 2016-March 2017: update work by the CAD Working Group

April 2017: draft of updated version distributed at the EU CAD Conference for public consultation

June 2017: Final new version distributed at European ITS Congress Strasbourg
Key Challenges on the Path to Higher Levels of Automated Driving
Development paths linked to "Future research needs"

<table>
<thead>
<tr>
<th>Automation Level</th>
<th>Established</th>
<th>2018</th>
<th>2020</th>
<th>2022</th>
<th>2024</th>
<th>2026</th>
<th>2028</th>
<th>2030</th>
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<tbody>
<tr>
<td>Level 5: Full Automation</td>
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<td>Full Automation</td>
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<td>Level 4: High Automation</td>
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<td>AutoPilot</td>
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<td>Level 3: Conditional Automation</td>
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<td>Chauffeur</td>
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<td>Level 2: Partial Automation</td>
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<td></td>
<td>Driving Assistance</td>
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<tr>
<td>Level 1: Driver Assistance</td>
<td>Advanced Driver Assistance Systems (ADAS)</td>
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<tr>
<td>Level 0: No Driving Automation, support beyond human capability to act</td>
<td>Warning or Support by active safety systems</td>
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</table>
ERTRAC SRA – Strategic Research Agenda

- Ensure mobility in urban areas
- Environmental sustainability: energy and resource efficiency, decarbonisation and air quality
- Ensure an efficient and resilient road transport system
- Connectivity and Automation – an enabler for improved mobility
- Provide perfect protection: safety and security
- Europe as world leader in innovation, production and services
- Towards Decarbonisation: CO2 Evaluation

Connected and Automated systems
Connectivity and Automation – an enabler for improved mobility

Vision 2050: “Digitalisation enables people to get the best service at highest level of comfort and safety”

- Fully multimodal mobility offerings including trip planning, pricing and payment
- Connectivity everywhere and at any time with stable connection and data rates
- Communication between vehicles and infrastructure to optimize traffic flow, traffic management and safety
- Mobility as a service regardless of ownership.
- Predicted demand from individual behaviours, enabling appropriate modal capacity and demand management
- Digital technology for vehicle access regulation, fee payments and prioritisation.
- Data privacy and international standards for data exchange and connectivity
- Highly automated vehicles for the inclusion of vulnerable users and people with reduced mobility (PRM)
- Accidents and delays are extremely rare and delays automatically resolved
- Harmonized legal frameworks for automated vehicles
Connectivity and Automation – an enabler for improved mobility

RESEARCH TOPICS 2020-2030:

Deployment of automated passenger vehicles in mixed traffic for improved safety and efficient road transport

Deployment of automated heavy commercial vehicles in mixed traffic for improved safety and efficient road transport
Connectivity and Automation – an enabler for improved mobility

RESEARCH TOPICS 2020-2030:

- Fully automated vehicles for urban use
- Societal benefits and user acceptance
- Fleet and traffic management of highly and fully automated vehicles under mixed traffic conditions
- Ensuring Safe, Secure and Resilient CAD
- Policies and regulation support
- Connectivity and Automation technologies for vehicles and infrastructure: sensors, software, systems-of-systems, high performance computing and Artificial Intelligence
RESEARCH TOPICS 2020-2030:
New services for people and goods enabled by Connectivity and Automation
### Development paths

#### Automated Passenger Car Development Paths

- User awareness, users and societal acceptance and ethics, driver training
- Policy and regulatory needs, European harmonisation
- Socio-economic assessment and sustainability
- Safety validation and roadworthiness testing
- New mobility services, shared economy and business models
- Big data, artificial intelligence and their applications
- Digital and physical infrastructure
- Human Factors
- In-vehicle technology enablers
- Connectivity
- Production and industrialisation

#### Automated Freight Vehicle Development Paths

#### Automated Urban Mobility Vehicle Development Paths

### Thematic Areas

#### Challenges, Drivers & Influencing factors

### Research topics for ART in the Work-program 2018-2020

- DT-ART-01-2018: Testing, validation and certification procedures for highly automated driving functions under various traffic scenarios based on pilot test data
- DT-ART-02-2018: Support for networking activities and impact assessment for road automation
- DT-ART-03-2019: Human centered design for the new driver role in highly automated vehicles
- DT-ART-04-2019: Developing and testing shared, connected and cooperative automated vehicle fleets in urban areas for the mobility of all
- DT-ART-05-2020: Efficient and safe connected and automated heavy-duty vehicles in real logistics operations
- DT-ART-06-2020: Large-scale, cross-border demonstration of highly automated driving functions for passenger cars

### Future research & innovation needs

1. Deployment of automated vehicles in mixed traffic for improved safety and efficient road transport
2. Fully automated vehicles for urban use
3. Societal benefits and user acceptance
4. Fleet and traffic management of highly and fully automated vehicles
5. Ensuring Safe, Secure and Resilient CAD
6. Policies and regulation support
7. Connectivity and Automation technologies...
8. New services for people and goods enabled by Connectivity and Automation

### ERTRAC 2050 Vision

Ensure mobility in urban areas

Environmental Sustainability: Energy efficiency, CO2 neutrality and air quality

Ensure an efficient and resilient Road Transport System

Digitalisation – an enabler for improved mobility

Safety, security and resilience

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**CAD Interactive Symposium**  
Thursday, April 19, 2018