Content of presentation:

• ERTRAC structure and functioning
• List of ERTRAC roadmaps
• Focus on powertrains
• Focus on automation
• Links with other European platforms
• Links with national platforms
• PPP European Green Vehicles Initiative
ERTRAC is the European Technology Platform (ETP) for Road Transport recognized and supported by the European Commission.

ERTRAC has more than 50 members, representing all the actors of the Road Transport System: transport industry, European associations, EU Member States, local authorities, European Commission services, etc.
ERTRAC Organisation

• Plenary
Gathering all the members, establishing the strategic orientations of the technology platform and endorsing the publications.

• Managing Board
Responsible for the practical management of the platform.

• Working Groups
Gathering experts from the ERTRAC members, responsible for the preparation of the ERTRAC documents.
ERTRAC Working Groups

Gathering experts from the ERTRAC members, responsible for the preparation of the ERTRAC documents. There are currently 5 WG:

- Urban Mobility
- Long Distance Freight
- Energy & Environment
- Safety & Security
- Global Competitiveness

+ Task Forces on dedicated topics: currently a TF on “Connectivity and Automated driving”
Horizon 2020 preparation by ERTRAC

Build recommendations for H2020 Work Programmes

- Following ERTRAC SRA, MAP and Roadmaps, keeping:
  - A Systems approach
  - The Guiding objectives
- Addressing the Horizon 2020 structure (pillars)
- PPP topics excluded (are managed by EGVIA)
ERTRAC Strategic Research Agenda
Taking a System Approach to address Societal Challenges
List of ERTRAC Research and Innovation Roadmaps:

- Automated Driving
- Energy Carriers for Powertrains
- Future light-duty Powertrain Technologies
- Electrification of Road Transport
- Hybridisation of Road Transport
- European Technology and Production Concept for Electric Vehicles.
- Infrastructure for Green Vehicles
- Transport Infrastructures Innovation
- Heavy Duty Trucks
- Sustainable Freight System for Europe
- Urban Freight
- Towards an Integrated Urban Mobility System
- European Bus System of the Future
- Road User Behaviour and Expectations
- Land Use and Transport Interactions
- Safe Road Transport
- Climate Change Resilient Transport
Current activities:

New roadmap just finalised:
• Automated Driving

Reviewing of key roadmaps
• Powertrains (Internal Combustion Engines)
• Electrification & Hybridisation
• Urban Mobility
Powertrains roadmap
Energy sourcing in 2030+

Diagram illustrating the flow of energy from primary energy sources (fossil and renewable) to energy carriers (fuels and electric power) and finally to powertrains (combustion engine, fuel cell, and battery).
The evolution of passenger road transport towards 2050
Different solutions for different mobility needs

- On Foot, Bicycle, E-Bike
- Battery Electric
- Plug-In or Range-Extender
- Combustion Engine

Travel distance (km)

Energy density requirement (kWh/litre)
Future Light Duty ICE Powertrain Technologies

Time for market introduction

- Totally new combustion processes and engine concepts
- Further development on components and systems, on the intelligent interplay of combinations of these technologies

Short term

Long term
Further development on components and systems

| Combustion Improvement | • Fully flexible injection systems, pressure, fuel quality, and rate shaping  
|                       | • Fully flexible valvetrains and Variable Compression Ratio (VCR)  
|                       | • EGR systems (internal, external, low and high pressure)  
|                       | • Downsizing, downspeeding, and high-pressure charging  
|                       | • Spark Ignition engine technology for future fuels (including downsizing)  
|                       | • Compression Ignition engine technology for future fuels |
Further development on components and systems

<table>
<thead>
<tr>
<th>Control systems</th>
<th>Multivariable model-based control systems</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model based development</td>
</tr>
<tr>
<td></td>
<td>Model based calibration</td>
</tr>
<tr>
<td></td>
<td>Further Sensor development</td>
</tr>
<tr>
<td></td>
<td>Predictive route based control</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emissions Control and After-treatment</th>
<th>Particulate Matter (PM) control with focus on in-Chamber PM Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Advanced after-treatment solutions for Spark Ignited engines including gas engines</td>
</tr>
<tr>
<td></td>
<td>Advanced After-Treatment Solutions for Compression Ignited engines</td>
</tr>
<tr>
<td></td>
<td>Non-precious metal aftertreatment systems</td>
</tr>
</tbody>
</table>
Further development on components and systems

<table>
<thead>
<tr>
<th>Component</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cool and Heat recovery</td>
<td>- Waste heat recovery</td>
</tr>
<tr>
<td></td>
<td>- Advanced cooling technology</td>
</tr>
<tr>
<td>Engine lightweight</td>
<td>- Integral part of powertrain lightweighting</td>
</tr>
<tr>
<td>Transmission</td>
<td>- Advanced Transmissions for Conventional and Hybrid Powertrains</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Heavy-duty Powertrain-Future Technologies

1.1 Energy carriers and conversions
1.2 Propulsion Energy utilization and energy recovery
1.3 Advanced concepts
   1.3.1 Scalable Powertrain Architectures
   1.3.2 Dedicated Hybrid Powertrain
   1.3.3 Electrical components
1.4 Cost effective vehicle combination architectures for different transport segments and assignments
1.5 Configurable modules
The challenge of decarbonisation of transport at acceptable costs cannot be solved without Hybrids:

Hybrid Electric Vehicles combine the advantage of two different propulsion systems:
- To drive with zero emission and to drive more efficient on long distances

Hybrids suit a lot of vehicle configurations:
- Small city cars, long distance family cars, delivery vans, city-buses

⇒ Hybrid Electric Vehicles combine the advantage of two different propulsion systems:
  - To drive with zero emission and to drive more efficient on long distances

⇒ Hybrids suit a lot of vehicle configurations:
  - Small city cars, long distance family cars, delivery vans, city-buses
Update of Electrification and Hybridisation roadmap will be done in 2016
Automated Driving roadmap
Automated driving: a European roadmap

- Creation of a Task Force in June 2014
- Call for experts within ERTRAC members:
  - Industry
  - European associations
  - Research providers
  - EU Member States
  - European Commission DG R&I/MOVE/CNECT/Growth
- 5 Task Force workshops have been organised to draft the roadmap (July 2014 – July 2015)
- Public consultation on draft document in March 2015
- Roadmap finalised in July 2015 and will be distributed at the ITS World Congress in Bordeaux in October
Automated Driving: a European Roadmap

Table of contents

2 Scope and Objectives
3 Common Definitions
4 State of the Art
5 EU and international situation
6 Key Challenges and Objectives
6.1 Environmental Detection and Perception
6.2 Demonstrating Reliability, Safety and Robustness of Technology
6.3 Legal and Regulatory Framework
6.4 Users’ and Societal Acceptance
6.5 Driver Attention and Involvement
6.6 Common Validation Procedures and Testing Requirements
6.7 Infrastructure Requirements
7 Roadmap
Roadmap Development

Conditional Automated Driving

Automated Commercial Vehicles

Automated Urban Road Transport
### Conditional Automated Driving

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrialisation</td>
<td>8 - 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regulation / standards</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilot / large scale demonstrator</td>
<td>5-6-7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technological research</td>
<td>2-3-4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Industrialisation**: 8 - 9
- **Regulation / standards**: 5-6-7
- **Pilot / large scale demonstrator**: 5-6-7
- **Technological research**: 2-3-4

#### Milestones

- **Milestone 1**: Large Scale EU FOT for conditional automated driving (Lvl 3)
- **Milestone 2**: Large Scale EU FOT for conditional automated driving (Lvl 3)
- **Milestone 3**: Large Scale EU FOT for conditional automated driving (Lvl 3)

#### Key Activities

- **Adapting Regulation for Pan-European testing**
- **Adapting Regulation for Pan-European implementation**
- **Test and Certification**
- **Environmental Modeling and communication (Digital infrastructure)**

#### ERTRAC Recommendation for WP 2016-2017 (in 32 and 33)

**SoA**: e.g. AdapIVe, projects in MG3.6: HMI issues; perception performance; guidelines for cooperative controls; key enabling technologies; evaluation methodologies; impact assessment; legal barriers;…

---

[Image: Conditional Automated Driving diagram]
Links with other European platforms
Overview of ERTRAC activities with other ETPs

- With EPoSS (ETP on Smart Systems) and SmartGrids ETP: roadmap Electrification of Road Transport and EGVI cPPP
- With FoF (Factories of the Future) and E2B (Energy Efficient Building): joint approach for Contractual PPPs
- With Biofuels ETP: contributed to Energy Carriers roadmap
- With ALICE: joint roadmap Urban Freight
- With ERRAC, WATERBORNE, ACARE, and ECTP: joint roadmap Transport Infrastructure Innovation
- With ERRAC: joint roadmap Urban Mobility
SETRIS: joint project of the Transport ETPs

- Bringing together all the transport ETPs
- Transport System approach
- Covering both passenger and freight
- For both long distance and urban mobility

+ support to the TRA Conference
6th European Transport Research Conference

MOVING FORWARD:
Innovative Solutions for Tomorrows Mobility

Poland
National Stadium

WARSAW
18-21 April 2016
Links with national platforms
ERTRAC approach to national representation:

• Full membership to the Plenary:
  “Representatives from the European Union Member States and Associated Countries, representing ministries or agencies competent for road transport research and innovation, and/or representatives of National Technology Platforms recognised by ERTRAC.”

• Can send representatives in Working Groups

• Annual coordination meeting hosted by one country
Active national platforms:

- Sweden
- Spain
- UK
- Austria
- Netherlands
- Turkey
- Slovenia
- Czech Republik
- Poland
- Hungary

+ Organisations in Germany and France
Spain:

- Spanish ERTRAC Forum: Gathering all road transport actors and public authorities on the model of ERTRAC.

- M2F, Automotive and Mobility Technology Platform: National platform focusing on automotive technologies, with working groups on key topics, making the link with the ERTRAC working groups.

http://www.move2future.es
Austria:

- A3PS Austrian Agency for Alternative Propulsion Systems

National platform with focus on powertrains research. Strong coordination with ERTRAC through common members and participation in annual conferences.

http://www.a3ps.at/
Germany and France:

- Strong national industry associations
- Specific associations and clusters on key topics (for electro-mobility, for automation, etc.)
- Links with ERTRAC are done via the industry members
European Green Vehicles Initiative
The European Green Vehicles Initiative has a focus on:
Energy Efficiency of Vehicles & Alternative Powertrains
ERTRAC end the EGVI in Horizon 2020

ETPs

All Stakeholders of the Road Transport System

All Stakeholders of the Smart Systems Domain

All Stakeholders of the Smart Grids Field

• Strategic Research Agendas
• Long-Term Roadmaps

PPP

European Green Vehicles Initiative

New association ‘EGVIA’

• Multi-Annual Implementation
• Annual Prioritization

www.ertrac.org
Scope of the EGVI PPP

- Covers all types of road transport vehicles:
  - passenger cars
  - trucks
  - buses
  - L-category vehicles
  - new vehicle concepts

- Defined goal and focus: energy efficiency of vehicles and alternative powertrains
Examples of topics contributing to the goal of the PPP:

- Electrification and hybridisation of powertrains
- Powertrain adaptation to renewable fuels
- Functionality improvement of the vehicle
- Reduction of the vehicle complexity and weight
- Management of the thermal and other energy flows of the vehicle

Any technological development supporting these objectives at the relevant product layers of the value chain - from modules to systems and vehicles
Example of technology content

- **Resources**
  - Alternative / lightweight materials
  - Alternative fuels and energies
  - Advanced materials, Equipment, Nano- / Microtechnologies

- **Integration**
  - Advancement and adaption of resources for green vehicles

- **Modules**
  - Processing, integrating advanced (lightweight) materials & technologies
  - Electrification & hybridization; Components for sensing & control;
  - Energy Storage, functional integration; design for manufacturing
  - Power electronics

- **Systems**
  - Drivetrain for alternative / renewable fuels;
  - Reliability and robustness
  - Advanced ICE and ICE in context of electrification & hybridization
  - PT systems design, optimization, modularization and integration

- **Vehicles**
  - PT integration, E/E architecture, thermal management, weight reduction
  - Simulation, prototyping, testing, recycling
  - Safety & security of data
  - Novel vehicle concepts; tailored trucks

- **Integration**
  - Interfaces and interaction to infrastructure outside vehicles,
    e.g. smart grid integration, IST for energy efficiency

- **Infrastructure**
  - Grid and road infrastructures
  - Data networks
  - Intermodal hubs
Association - European Green Vehicles Initiative Association (EGVIA) - gathering the private side members of the Public-Private Partnership

Main objectives:
- deliver research topics recommendations for EGVI calls
- disseminate information within the research community
- promote the PPP and its collaborative cooperation

EGVIA currently composed of 82 industry, research and associate members