Directorate General for Traffic (DGT)

Direct responsibility for:

- **Promote legislation** in Spain in terms of traffic, vehicles, drivers and mobility.
- **Traffic management** and **enforcement** (non urban roads).
- **National access point** for traffic and road safety information.
- Driving licensing.
- Coordination of **research** on road safety.
- **National registers** of drivers, vehicles, and accidents.
- National & regional strategic plans on Automated Driving (AD).
- Overview of current national large-scale AD activities, test environments, funded pilots etc.
- Challenges and lessons learned.
- Areas of cooperation.
1. National & regional strategic plans on Automated Driving (AD).
EUROPEAN CONTEXT

Graph showing the trend of EU fatalities from 2001 to 2020. The graph illustrates a reduction in fatalities over the years.

Source: CARE (EU road accidents database)
Ambitious targets

- 50% reduction in road deaths 2020
  - EU and WHO

Vision zero - SPAIN

- Fatalities
- Injuries
- Congestion
- Emissions
The main benefits are:

- Safety
- Efficiency and environmental objectives
- Comfort
- Social inclusion
- Accessibility
Vision on Autonomous & Connected Mobility
The **Spanish automotive industry** is a world reference.

The companies automakers and components form a tandem recognized prestige in terms of competitiveness and performance.

**Important innovation and research centers.**

Spain has **signed but not ratified** Vienna Convention.

Regulatory framework available for the testing and operation of vehicles on public roads (specific for autonomous driving). Autonomous vehicles are **already** being tested in Spain.

Testing requirements & conditions: flexible, **system certification** or other MS authorisation or certificate.
STRATEGY

- Working groups – legal framework
  - Future of **driving licenses** → Less Formation
  - Insurance and responsibility
  - **New Vehicle code** including fully autonomous driving.

- Promoting **real tests** of AD vehicles in Spain/Europe

- Its **not about doing the same things**
  - Connected **traffic cloud services**
  - Active cooperation with OEMs.
  - Support UNECE technical regulations → WP29 → **Software certification better than type approval.**
  - Digital and software solutions need a **quicker and smarter legal framework.**

- Current road safety system 1,2 M killed in road accidents.
**Vision**

- **Regulation:**
  - **Neutral:** avoid to block development
  - **Flexible:** adapted to the future
  - **Ambitious:** Societal needs and industrial advancements
  - **Long-term vision:** analyze present and future needs
- **Open:**
  - Easy to include any need without amendments
  - Participation of R&D centers, industry and stakeholders
2.- Overview of current national large-scale AD activities, test environments, funded pilots etc
67%* of the drivers use Mobility APPs while they are driving

* Foro de Movilidad.2016. Alphabet
V2X COMMUNICATION

- 3G/4G/5G.
- Growing potential of info exchanging.
- Data cost decreasing.
Mobile network Vs Road Side Units (potential locations)

Source: Opensignal.com
CONNECTIVITY FOR TRAFFIC MANAGEMENT: NEW MODEL

- High Availability
- Escalability
- Rapid Integration

Servicios Fabricante 1 → Servicios Fabricante n → Apps de Seguridad Vial

Comunicaciones: 3G, 4G, 5G

DGT Dirección General de Tráfico


Linco

CGT

ATGC

Datos de tráfico

MirrorLink

GARMIN

TomTom

ANONYMOUS
USE CASES

- **UC1**: Information by any road users: breakdown, accident, road work, etc...
- **UC2**: Planned roadworks
- **UC3**: Info provided by vehicles (lights, wipers, warnings, ESP..). - CAN BUS -
- **UC4**: Virtual VMS
- **UC5**: X,Y dynamic event (Abnormal sized vehicles, ambulance, fog etc)
- **UC6**: X,Y static event (points of interest).
- **UC7**: Recommended speed. Congestion
DGT & connected vehicle

- Improving opportunity.
- **Win-win models**
  - Promote connectivity services to enhance mobility and improve road safety
- Provide/share value info
- No competition
- Hub/Service Platform
USECASE: COMOBITY – USER PROTECTION

- Comobity (App) that allows:
  - Drivers:
    - To previously know the presence on roads
      - Cyclist and pedestrians.
      - Stopped vehicles
    - To adapt driving to that presence.
  - Pedestrians, cyclists and others:
    - More protection.
AGREEMENT WITH WAZE

• APP very extended and accepted
• Strategic partner
• Qualified information

(In integration process)
DGT Project in collaboration with Mobileye in order to improve the road safety in urban
Mobility Map allocated in the Spanish Single Access Point accesible through the [http://nap.dgt.es](http://nap.dgt.es)

- Sparse 3D
- Dense 1D
- Crowd sourced

- Localization: 10cm accuracy everywhere
- Roadbook: Precise drivable paths for autonomous driving & other map services

- Signals
- Landmarks
- Optimal trajectories
Vigo-Madrid (PSA-CITROEN)
COUNTRIES VISITED
BY VALEO CRUISE4U

United Kingdom
Germany
Netherlands
Czech Republic
Spain
France
WP231 - “San Sebastian” ARTS demonstration
Location: San Sebastian (Spain)
1/Jun/2016

✓ Process for the authorization

✓ Expectations:
- No accidents.
- Minimum disturbing.
- No important changes in the infrastructure.
- Reduce the use of private cars.
Barcelona Board Cooperative and Automated Driving is a Public Private Partnership (PPP) led by

- To create a ecosystem to develop urban self driving initiatives taking in account all the involved agents.
- To be one of top European cities in urban self driving
- To create the infrastructure to develop, to validate and test self driving experiences
- To support world wide companies by using Barcelona as an Urban Lab
- To attract investments and create new business opportunities
Create a **platform for the development, testing and validation of** vehicle connectivity solutions and automated driving.

Catalogue of **7 test routes** deeply analyzed:
How platoons can lead to environmental (reduced fuel consumption), safety (automated control) and congestion improvements (better traffic flow)

AUTOmated driving Progressed by Internet Of Things

AUTOPILOT brings IoT into the automotive world to transform connected vehicles into highly and fully automated vehicle. IoT open vehicle platform and an IoT architecture will be developed based on the existing and forthcoming standards as well as open source and vendor solutions.
3.- Challenges and lessons learned
AUTONOMOUS DRIVING

The **automated driving features are a reality** in nowadays cars:

- Advanced Driver Assistant Systems (ADAS)
- Automated Driving Functions/System (ADF/S)

Automated driving

Evolution not revolution

- Automated valet parking
- Remote parking assistant
- Avoiding maneuver assistant
- Automatic emergency brake (AEB)
- Assisted driving: Supports the driver
- Highway assistant
- Intelligent Cruise Control
- Traffic jam assistant
- Partially automated driving: Continuous supervision of the driver
- Highly and fully automated driving: Reduced driver supervision
- Automated pilot
- Highway Automated pilot
- Traffic jam pilot
PRESENT AND FUTURE MOBILITY

Disruptive change
New technologies
Hiper-connected society
New business models & services
Huge benefits:

- Safety
- Comfort
- Efficiency
The economic impact projected for autonomous driving for the years to come ranging up to €71bn in 2030.

The estimated global market for automated vehicles is 44 million vehicles by 2030.

The industrial sector and the legal framework needs to evolve and adapt in a fast pace to stay ahead in global competitiveness.
VEHÍCLE AS DATA SOURCE

- Vehicle as main actor in mobility.
- Data
  - Privacy
  - Big
NEW MODEL FOR TRAFFIC MANAGEMENT

- Floating car data
- New services
- New players/stakeholders
- 5G
- Different sources integration - PLATAFORM
AUTONOMOUS DRIVING

What role has to play a national traffic administration?

- Neutral.
- Promote a stable, open and flexible regulatory framework.
- Promote testing and operations of autonomous cars in real traffic.
- Attract investments for national Research institutes and industries.
- Inform of the benefits of Autonomous driving to rise the public acceptance. Demonstrate Reliability, Safety and Robustness of Technology.
- Principle: Too Much Regulation Could Hurt Innovation
4. - Areas of cooperation.
LEGAL ISSUES

AUTONOMOUS DRIVING

Regulation

Legal framework

- UNECE Conv.
- National Traffic Law
- Code for Vehicles
- Insurance and responsibility

Testing
LEGAL ISSUES

AUTONOMOUS DRIVING

Legal framework

UNECE Conventions
- Geneva/Vienna
- Amendments (long term).
- Interpretation (short term).
  (*Spain has not ratified*)

National Traffic Law
- No prohibition → Allow
- Interpretation
- Driver & control

Code for Vehicles
- Classification: levels
- Certification
- ODD/OEDR
- Fallback (override)
- Software Assessment: virtual testing

Liability
- Event Data Recorder
- Driver/System
INSTRUCTION 15/V-113: Authorization to conduct tests or research trials of automated vehicles on roads open to general Traffic.

- Applicant must provide a system certification, complying with the Annex I requirements.
- The authorization procedure is really swift and flexible.
- Mutual recognition with other Member States

Future: Type approval → Software certification
- **Some concerns** about what drivers will do while vehicle drives in automated mode, especially with respect to level 3 SAE.
  - Driver get progressively confident
  - Finally, the driver get focused on other tasks and the possibility of overriden might not be satisfactory enough.
    - Approach 1: Law include expressely what the driver can or can’t do → Enforcement.
    - **Approach 2:** With the participation of manufacturers who may require drivers to acknowledge that they understand the limitations.

- We consider that **liability on levels 4 and 5 should be assumed by the manufacturer.**

- Need adapt regulatory framework to include **rules of conduct** (use of mobile phone, drink-driving …)
RELATION WITH INDUSTRY

Listen the stakeholders.