Automotive Telecoms

Celtic-Plus Event

Barcelona 18th May 2017

International Conventions Centre

Alessandro Coda
Chief Technology Officer
**CLEPA Vision & Mission**

**Our vision**

is for the European automotive suppliers to be the leading providers of highly efficient and sustainable mobility worldwide.

**Our mission**

is to increase the competitiveness of the European automotive suppliers’ industry and to drive its smart growth while enhancing wealth and employment in Europe.
CLEPA Facts and Figures

- 122 Corporate Members
- 24 Association Members
- 1959 Active Partner with EU and UN
The European Automotive Suppliers represent:

- **3,000** Companies
- **5,000,000** People directly employed
- **€600,000,000,000** In yearly sales
Brussels Office & Thematic Groups

<table>
<thead>
<tr>
<th>Global Governmental Affairs</th>
<th>Technical Regulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trade &amp; Legal Affairs</td>
<td>Research &amp; Innovation</td>
</tr>
<tr>
<td>Aftermarket &amp; Warranty</td>
<td>Business Development</td>
</tr>
</tbody>
</table>
The Automotive Industry in Europe

12.2 million direct and indirect jobs

€44.7 billion in R&D spending, largest private investor

€100.4 billion positive net trade contribution

€401.5 billion in tax revenues (EU15)
CLEPA R&I WG Mission

Strengthen the position of Automotive Suppliers in the mobility research eco-system:

- Define common research priorities
- Communicate with other stakeholders
- Be part of the EU research agenda
Two big trends electrification and automated driving

**Electrification**
Stronger regulations on CO2 emissions, rising consumer demand, and government incentive programs for electric vehicles will boost electrical powertrain sales

**Automated Driving**
The technological advances and growth pockets for autonomous vehicles will drive increasing levels of autonomous vehicle features, leading to new market entrants, e.g., Google, and mergers and acquisitions

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**Market share of electric vehicles\(^1\) (incl. hybrids)**
/ Percent of units produced

<table>
<thead>
<tr>
<th>Year</th>
<th>Market Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>2</td>
</tr>
<tr>
<td>2030</td>
<td>65</td>
</tr>
</tbody>
</table>

**Lines of software code per vehicle\(^3\)**
Million units

<table>
<thead>
<tr>
<th>Year</th>
<th>Lines of Software Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>100</td>
</tr>
<tr>
<td>2030</td>
<td>300</td>
</tr>
</tbody>
</table>

Source: McKinsey

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# The impact of Key Trends on the Automotive Supply Chain

<table>
<thead>
<tr>
<th>Component groups</th>
<th>Key disruptive trends</th>
<th>Electrification</th>
<th>Connectivity</th>
<th>Autonomous driving</th>
<th>Advanced manufacturing</th>
<th>Advanced materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interior</td>
<td></td>
<td></td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
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<tr>
<td>Exterior</td>
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<td>7</td>
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<tr>
<td>Chassis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8</td>
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<tr>
<td>Powertrain</td>
<td>1</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E&amp;E</td>
<td></td>
<td></td>
<td>3</td>
<td>5</td>
<td></td>
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</tr>
</tbody>
</table>

**Examples**

1. Complete change of powertrain from mechanical clutch to gearless e-engines
2. Large screens for the interaction between user and car
3. New onboard architecture and cloud connectivity required
4. Complete change of interior design possible, e.g., turning seats
5. Computer will control all electric components of the car
6. 3-D printing of complex new design elements
7. From classical punching and welding to backing and gluing
8. Lightweight materials, e.g., carbon will change shape of the car as well as composition and setup of chassis

*Source: McKinsey*
# The impact of Key Trends on the Automotive Supply Chain

## Level of disruptiveness of major automotive trends on suppliers by component group

<table>
<thead>
<tr>
<th>Component groups</th>
<th>Key disruptive trends</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Electrification</td>
</tr>
<tr>
<td>Interior</td>
<td>Low</td>
</tr>
<tr>
<td>Exterior</td>
<td>Low</td>
</tr>
<tr>
<td>Chassis</td>
<td>Low</td>
</tr>
<tr>
<td>Powertrain</td>
<td>High</td>
</tr>
<tr>
<td>E&amp;E</td>
<td>Medium</td>
</tr>
</tbody>
</table>

### Examples

1. Complete change of powertrain from mechanical clutch to gearless e-engines
2. 3-D printing of complex new design elements
3. Lightweight materials, e.g., carbon will change shape of the car as well as composition and setup of chassis
4. From classical punching and welding to backing and gluing

Different communication technologies are enabling solutions for CAD

Source: McKinsey
# The impact of Key Trends on the Automotive Supply Chain

<table>
<thead>
<tr>
<th>Impact dimensions</th>
<th>Electrification</th>
<th>Connectivity</th>
<th>Autonomous driving</th>
<th>Advanced manufacturing</th>
<th>Advanced materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirement of new capabilities</td>
<td>The battle for talent</td>
<td></td>
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<tr>
<td>Resource reallocation</td>
<td>The portfolio optimization challenge</td>
<td></td>
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<tr>
<td>Change in roles</td>
<td>The battle for new profit pools</td>
<td></td>
<td></td>
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<tr>
<td>Competitive landscape</td>
<td>New players entering with lasting impact</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New business models</td>
<td>The shift in successful business building</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Shift of processes</td>
<td>Industry 4.0 entering the production process</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acquisitions</td>
<td>The race for the attractive targets</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: McKinsey
Declaration of Amsterdam 14 April 2016

Cooperation in the field of connected and automated driving

Connected, cooperative and automated driving developments should come together to harvest societal benefits.
High complexity

Connected and Automated Driving

- 3D Mapping
- Other Road Users
- Unexpected Events
- Sensors
- Bad Weather
- Acceptance (Safety)
- Peak Hours Demand
- Consumer Expectations
- Driver Intervention
- Cost/Price
- Commercial Reality
- Cyber Security
- AI
- Industry Standards
- Legacy Vehicles
- Connectivity: V2X, Networks
- Legal Issues & Liability
- Privacy
- Insurance

Source: CLEPA Automotive
High complexity

But it will likely be more complicated than this

Source: LMC Automotive

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Access to Data – Proposal

- provided by a third party
- is connected to multiple OEM servers
- contains a rule engine to send authorized data to specific service providers
- respects purpose of data
- service provider is not visible by the OEM

OBD only for diagnostic & maintenance

Ad hoc communication (controlled and safety functions)
European Automotive and Telecom Alliance

- Founded by six associations:
  - ACEA
  - CLEPA
  - etno
  - ecta
  - GSMA
  - GSA

- Operational roll-out through companies: 38 members
- Telco network operators: Deutsche Telekom, Eurofiber, KPN, Orange, Play, Post Luxembourg, Proximus, Vodafone, Telefonica, Telecom Italia, Telenor
- Telco suppliers: Nokia, Huawei, Ericsson
- Automotive OEMs: BMW, DAF, Daimler, Fiat Chrysler, Ford, Hyundai, Iveco, Jaguar Land Rover, Opel, PSA, Renault, Toyota, Volkswagen Group, Volvo Cars, and Volvo Group
- Automotive suppliers: Autoliv, Bosch, Continental, Denso, Delphi, Hella, Valeo
- Project management: ERTICO
European Automotive and Telecom Alliance

Connected Automated Driving

High way chauffeur L3 & L4

Automated Valet parking

High Density truck platooning
European Automotive and Telecom Alliance

**Car sensors**

**Connected data**
(road sensors and cooperative car data)

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The connected data as additional car sensor:
- New messages and attributes to messages (e.g., trust, confidence levels)
- Safety relevant applications need redundancy via the hybrid communication channels.
- Network slicing, priority for AD vital messages
- Application of safety rules on digital infrastructure (tbc)
- More accurate and safety relevant localization: GNSS correction

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**New challenges for automated driving**
European Automotive and Telecom Alliance

Structure

Evolution
- EATA as a legal entity: AISBL (non-profit organization)
- Differentiated membership and differentiated rights
- Create the role of “secretary of the board”
- Creation of a project leadership team
- Collaboration with 5GAA & C-Roads
European Automotive and Telecom Alliance

Concorda system overview

- V2V: 11p & LTE V
- LTE - 5G
- MEC V2V
- Connected road sensors
- RSU 11p
- RSU LTE V
- Low latency data aggregation / casting GNSS corrections, etc.

Services
- Day 1
- Probe data
- Match making
- Etc.
## European Automotive and Telecom Alliance

### Concorda test sites

<table>
<thead>
<tr>
<th>MS</th>
<th>Test site</th>
<th>enabling technologies for Use cases</th>
<th>OEMs</th>
<th>MNOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>DE</td>
<td>A9 30km Nürnberg</td>
<td>Highway chauffeur</td>
<td>BMW, Daimler, Ford, Hyundai, VW</td>
<td>T-Mobile, Vodafone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High density Truck platooning</td>
<td>Bosch with truck OEM</td>
<td></td>
</tr>
<tr>
<td>FR</td>
<td>Versailles Tiffest</td>
<td>Highway chauffeur</td>
<td>Renault, PSA</td>
<td>Orange</td>
</tr>
<tr>
<td></td>
<td>Lyon Transpols</td>
<td>Highway chauffeur</td>
<td>Renault, PSA</td>
<td></td>
</tr>
<tr>
<td>NL</td>
<td>Amsterdam</td>
<td>Highway chauffeur - collision avoidance</td>
<td>FCA (Ford, Toyota)</td>
<td>KPN</td>
</tr>
<tr>
<td></td>
<td>Noord Brabant</td>
<td></td>
<td></td>
<td>KPN</td>
</tr>
<tr>
<td></td>
<td>Rotterdam den Haag</td>
<td>High density Truck platooning</td>
<td>logistic companies with local prototyping companies</td>
<td>Eurofiber</td>
</tr>
<tr>
<td>ES</td>
<td>SESCOGA @ Vigo</td>
<td>Highway chauffeur</td>
<td>PSA</td>
<td>Telefonica</td>
</tr>
<tr>
<td>BE</td>
<td>E311 @ Antwerpen</td>
<td>Highway chauffeur</td>
<td>Toyota (Ford)</td>
<td>TBD</td>
</tr>
</tbody>
</table>

1st tier suppliers for OEMs and MNOs are on all test sites

**European Association of Automotive Suppliers**

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European Automotive and Telecom Alliance

Valet parking proposal

Content:
- Parking management/ control system
- HD map
- Communication with Infrastructure
- Sensor fusion
  - Using car sensors
  - Register leaving cars
  - P-slot sensors
  - Cameras
- Communication: NB IoT, Broadband (100% coverage)
- Localization, Slam (Simultaneous Localisation And Mapping)
- Security
- Inter parking connection

Current partners: Autoliv, Bosch, CEA, Continental, DT, Huawei, Orange, RISE, MDH

cletic-Plus
Smart Connected World

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Celtic-Plus - Scope and Research Areas 2016/2017

Vertical industries will trigger the development of new products and services.
## 7. TAXONOMY OF CELTIC-PLUS RESEARCH TOPICS

### B SERVICES AND APPLICATIONS
- B1 Voice Services
- B2 Data Services
- B3 Multimedia and content Services
- B4 Audio/Video Services (incl. image processing)
- B5 Mobile Services
- B6 Cloud Services
- B7 Security, Privacy related services
- B8 IoT related services
- B12 Smart enterprise / transport related services and applications
- B13 Smart traffic / car related services and applications
- B19 Location related services (incl. navigation)
- B20 Business related services and applications (incl. ePayment)

### E FUTURE USAGE AREAS AND MULTI-DISCIPLINARY APPROACH
- E1 Smart Cities (incl. smart grids, water management, etc.)
- E3 Digital Enterprise including Industry 4.0
- E4 Personal Mobility / Transport / Logistics / Food
- E6 Smart Car / Smart Traffic

### C FUTURE SERVICE ENABLERS
- C1 Future Service Platforms
- C2 Future interfaces
- C3 Multimedia enablers
- C4 Security/ safety, trust and identity
- C5 Big Data, Data Mining, Reality Mining
- C6 Business and societal issues
- C7 Future Displays / Enhanced reality