THE CHALLENGE OF FUTURE MOBILITY

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ABOUT CEiiA

CEiiA is a Centre of Engineering and Product Development that designs, implements and operates innovative products and systems alongside its partners in the automotive, mobility, aeronautics, sea and space industries.

CEiiA offers complete solutions, covering all product development phases from concept to the production of small series, and operates intelligent systems.

+250 Engineers

+10 Years in complex projects

Largest R&D investment in Portugal (nonprofit organisations - IPCTN 2016)
GLOBAL TRENDS

TRANSPORTATION NEEDS WILL KEEP GROWING
By 2050, passenger transport will grow between 30% and 50% in more developed countries and increase by a factor of 3 to 3.5 in economically less developed countries.

FULL CONNECTIVITY
We are all connected (internet of moving things)
7+ billion devices connected (2020: 50+)

CONSUMPTION MODELS
New generations are changing habits (?)
Economy of access and convenience / sharing economy

URBANIZATION
70% population in urban areas by 2050 / gentrification

Mega-Cities
2016: 31 megacities (>10 M)

ENERGY & ENVIRONMENT
1/3 of overall energy consumption and emissions
Cities with severe restrictions: London, Paris, Madrid, Beijing, …

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THE MOBILITY CHALLENGE
GLOBAL DRIVERS

Connectivity  Electrification  Autonomous driving  Integrated, flexible and on-demand
The industry evolves from an "industry pull" model to a "market push" / service oriented model, driven by operations in mobility environments.

Electrification, full connectivity (integration of vehicle-infrastructure-systems-services-users) and self driving functions induce the emergence of new technological players.
INDUSTRIAL RESTRUCTURING
DRIVEN BY TECHNOLOGY

Who’s leading on autonomous vehicles?

From Detroit to Silicon Valley

Driven to the Valley
Many automotive companies are opening Silicon Valley research labs and offices, as car technology, including self-driving systems, grows paramount to the industry’s future.
NEW SERVICES

New entrants

Traditional industry
ELECTRIFICATION

SIGNIFICANT EVOLUTION IN TECHNOLOGY
- 80% costs / kWh from 2008-15 (target: 100 USD/kWh)
+ 400% energy density from 2008-15

EMISSIONS TARGETS PUSH TOWARDS COST LEVELING
ICE’s growing complexity will see a cost line crossing with EVs by early 2020’s

STEADY MARKET GROWTH
1% of sales of plug-ins; yet, with an average annual growth of 42% which, if maintained, would take 80% of sales by 2030

NEW ENTRANTS
Tesla
ELECTRIC, CONNECT AND AUTONOMOUS

RESHAPING URBAN MOBILITY

Distance travelled based on electric autonomous vehicles through flexible and on-demand services

ap. 60%-95%+ in 2040

Unit mobility costs to be reduced by a factor of 4 to 10

Shared autonomous vehicles to account for majority of sales

1 shared vehicle = 7–10 private cars
SMART, INTEGRATED MOBILITY
FUTURE OF MOBILITY IN CITIES
Integrated and agnostic platform — mobi.me

Mobility and connectivity devices

Mobility services for different operators

mobility as a utility
CEiiA’s platform for smart mobility
intelligent integration of users, devices, shared and on-demand mobility services, infrastructure and public transportation under the perspective of user-centric “mobility as a service”
CEiiA | mobi.me® projects

MOBI.E (PT)
ECOMOB - APA (PT)
UberGreen (PT)
Municipality of Porto (PT)
Municipality of Cascais (PT)
eCooltra Motosharing Barcelona, Madrid (ES), Roma (IT), Lisboa (PT)
MOBI2GRID (PT, ES)
MOBI.Europe (PT, ES, FR, NL, IE)
Sharing Cities (PT, UK, IT, FR, PL, BG)
GreenWay (TR)
Smart mobility service for eCanter (JP)

Mob-I Foz do Iguaçu (BR)
Ecoelétrico Curitiba (BR)
Conect-ME Minas Gerais (BR)
CPFL Campinas São Paulo (BR)
Mob-I ONU Brasília (BR)
Ecomóvel (BR)

CEiiA
an interactive vehicle with autonomous functions for future urban services

- New interior paradigm: “third living space” and advanced HMI for autonomous driving
- Platform and structure ready for diverse sensor installation
- Integration with smart service platform for selfdriving based urban services
- Highspeed multiconfiguration electronics / gateway
- Distributed AI
DRAFT DEFINITION

Physical spaces that gather and replicate the real conditions of city ecosystems for the purpose of development of activities of research, demonstration and testing of technologies with different states of maturity in full security, privacy and confidentiality.
The concept of Free Technology Zones shall focus on the preparation of areas with differentiated character aiming at the testing and demonstration of autonomous driving solutions, under an integrated approach at vehicle operations, infrastructure, communication environments and backend systems.
CONNECTED MOBILITY
CHALLENGES

TECHNICAL
1. Distributed intelligence
   - Sensing
   - Machine learning / AI
2. Autonomy
   - High resolution navigation
   - Security / integrity
3. Resilient communications
   - High capacity, low latency: 5G
   - DSRC, etc.
4. Service complexity
   - Blockchain

SYSTEMIC
1. Vehicle-to-everything and service integration (MaaS)
2. V2X... X2X interoperability
3. Testing in real-life environment

CLUSTER RELATED
1. Industry
2. New services
3. New businesses / startups
4. R&D
CONNECTED MOBILITY
INTEGRATION CHALLENGES (EXS.)

Integration with users / pedestrians
- Maas
- Infotainment

Embedded intelligence
- Advanced sensing
- Augmented reality
- Machine learning / AI

Integration with energy systems
- Intelligent energy management
- Autonomous EV charging
- Wireless EV charging

V2I Vehicle-to-vehicle
- Event propagation
- New vehicle based services

V2I Vehicle-to-infrastructure
- Smart road infrastructure / road signs
- Traffic management
- Blockchain