

Preface

Innovation drives industry, keeps it competitive, generates business, and valuable employment. In the automotive industry, innovation is key to survival. And for the automobile world, innovation means ... electronics.

Electronics is reinventing the car. The good old mechanics, the powertrain is turning to hybrid, not to say pure electric. The usage of the car is now connected with any electronic mobile device and to the main data centers and sometimes ... without driver.

The share of electronics in the total value of passenger cars has been rising from 20 to almost 40 % in 10 years. This leads to the headline in the newspapers: restructuring, because traditional industry has gone down from 80 to 60 %. Restructuring is key in almost all traditional branches of car industry.

CESA was created in 2009 as car industry met the biggest crisis for decades. At this moment, electronics stepped strongly out of the shadow of the different domains. It became very clear that electronics is bringing fresh air with more and more appealing products and is today an essential driver for innovation and thus employment in this important sector of Europe's industry.

A fundamental revolution has already taken place. And we even see electronic engineers becoming presidents of car manufacturers today. This was unthinkable some years ago.

And further revolutions are on their way.

Keywords are

ADAS towards autonomous driving

Connected cars for safety and efficient mobility

Connected cars linked to Internet of things for keeping the customer on line

Advanced HMI to help all the different customers to use safely and easily these new ways of mobility

Electrification of the powertrains toward smart grids and smart cities

Cars are moving in a complex environment, while respecting increasingly stringent air quality and safety standards with being safe meaning the reduction

of the risk of accidents, being compatible with many different regional legal requirements and infrastructures, being comfortable and affordable.

More than ever, worldwide business relations and global market developments determine the health of the automotive industry. Europe is still a leader in many technical areas, but there are decisions on road safety or environment protection taken somewhere in the world that affect the global system and our markets. Asia is eager to catch up and the Silicon Valley is now targeting automotive applications as well.

The breakthrough of driver assistance systems is here. Automatic parking, emergency braking, or pedestrian protection systems are proliferating in all car segments and sales numbers are increasing rapidly. CESA did look at the new technologies that address increasing levels of driving automation and asked the question, what would be the consequence of a world of automation of driving in terms of infrastructure and usage of the cars of tomorrow. Several users might want to get their cars back at the parking at the same time. If not coordinated, this will create new kinds of traffic jams. Therefore, we do not only need onboard electronics, but also an intelligent and adapted infrastructure.

In this world of Internet of Things, the car is rapidly becoming one of the main connected elements in our daily life. This requires technical solutions that are not all yet known; many challenges and opportunities have arisen recently. Let us just think of the arrival of the iPhone in 2007. So many new services that nobody, but perhaps Steve Jobs, could imagine.

The society is overwhelmed, habits and values have changed almost too fast. Conscience is following slowly, but now more and more users are asking themselves the question, if they really wish to give access to their most intimate data. This requires answers that CESA did address in this edition.

Road transport is undergoing major technological changes with the communication technology car2X and progressive vehicle automation. These technological developments will lead to a paradigm shift in the way drivers should interact with their vehicle. The definition of future vehicle Human–Machine Interfaces (HMI) will intensify the need to involve further competences including cognitive ergonomists, psychologists, and interaction designers to be able to manage this new complexity and the interaction between human and robots.

The “driver” will need to understand what the car is doing during autonomous driving phase, be confident but also vigilant. As a side effect, entertainment proposed during autonomous driving will be completely different from the existing one in traditional cars. Moreover, there exists the critical phase, when the passenger has to take back his responsibility and take over the driving activity. This requests particular caution and careful design to allow a save takeover.

This clearly means that cockpit design will progressively change from a driving task-centered design to an autonomous driving-centered design. HMI will be a key enabler for complexity management.

Standardization will help to develop the market faster and make sure that the different levels of automation are understood and accepted rapidly. On one hand, the driver shall be discharged and on the other hand he needs to stay in the decision

and handle difficult situations. Consequently, the transition between automatic driving and normal driving, the takeover to normal driving requires particular care.

The increase in the number of functions forces to manage carefully the complexity and the combination of the variants which have to be tested. In the upcoming years, testing will remain an unabated core theme, since the final result is a product that goes into production. The business challenge lies in the right mix of intense testing of new developments with human control in the loop and virtual validation as much as possible to keep development complexity reasonable and product liability clear.

Nothing is written in advance in that matter; we all need to team up to better fulfill the end users' needs offering a real standardization ... while keeping up brand differentiation!

As in the previous editions, energy consumption was also a topic in Paris this year. New trends and new regulations lead to green cars with technological changes for internal combustion engines, hybridisation and electrification.

Finally, CESA did also look into new technologies in the fields of semiconductors, connection materials, cables, packaging, and plastics that continuously penetrate electronics domains.

Some are still in the state of advanced research, others are already used in industrial, aeronautic, or consumer applications and not always considered by the automotive industry yet. What are such new technologies? What can they bring? Can they easily be applied in automotive electronics applications, and what is needed to get the maximum benefit out of them?

This edition is a collection of some contributions to this CESA edition. The authors have agreed to share their experience and knowledge with the public in this form and we hope that it gives the reader a good overview of the issues that have been discussed.

It cannot be said enough, but without the outstanding level of motivation and the large number of constructive contributions of the committee members, CESA could never succeed.

Exchange and communication is essential to accompany this revolution in the long run. CESA 3.0 was only one event in a long row of many events, in which CESA is the most general. It is today a recognized and established date in the agenda of automotive industry managers and we invite you already to follow the next edition in 2016 end.

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