EXPECTATIONS AND TRENDS IN INDIVIDUAL MOBILITY

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Abstract

Emissions reduction constraints as well as petrol costs create new opportunities for radical innovations in solutions for mobility. In this paper, we focus on the future concepts of individual mobility.

Key words: innovations, individual mobility, e-mobility, electric vehicles, alternative fuels

Introduction

One of the biggest emitters of CO2, the transport sector, and in particular the passenger car segment, is required to make substantial improvements in its environmental efficiency.

Recent years have seen radical changes to the context of vehicle technologies. New development opportunities for electric vehicles: climate change concerns, the increase in oil prices and long term oil scarcity, major technological innovations in areas relevant to the automotive industry (eg. batteries), the pressure on innovation within the automotive sector, and the car manufacturers' response to the EU regulatory requirements for carbon emission reductions.

Policy makers must adopt a comprehensive strategy involving technologies as well as market incentives, infrastructure adjustments and changes in driving habits. Asian players and start-up companies are currently leading on electric vehicles and in addition, Asian suppliers control 90% of the Lithium-Ion battery market. USA and European OEMs are still in prototype and field difficult testing stages. Hybrid vehicles segments are the most attractive for growth, they are expected to witness strong growth supported by environmental legislations by various governments on the use of cleaner and fuel-efficient cars.

Solutions of individual mobility

According to new technologies development and based on research studies [1], [2], [3], [5] about automotive industry, we can say that future of individual mobility will be affect by four main directions (Fig.1).

1. Driver Asssintance (Autonomous Driving) - Autonomous cars have been proposed since the early 1900s and seriously researched since the 1960s. Highly developed computing and sensing performance since the 1980s has lead to automated highways and autonomous vehicles in research, and now a variety of driver assistance systems in production.
2. Alternative energy and electric mobility - Propelling vehicles with other forms than gasoline or diesel is not new, electric and even hybrid-electric have been researched for many decades. Recently, with concerns regarding oil depletion and global warming growing, alternative energies and electric vehicles are being reconsidered as automobiles.
3. Connectivity and communications - Vehicle-to-vehicle and to-infrastructure communication have been researched since 2000. Wireless ubiquitous internet is available since the mid 2000s through cell phone technology, bandwidth increasing. First mobility-specific applications is available since mid 2000s with manufacturer operated portals, business case challenging.
4. Mobile society (Mobility concepts) - Individual mobility is a basic human need, the automobile is today one of the most important means of transportation. Today's trends of mass-urbanization, environmental challenges, aging societies, changing values, economic burdens let societies reconsider the personal car as "the ultimate" solution.

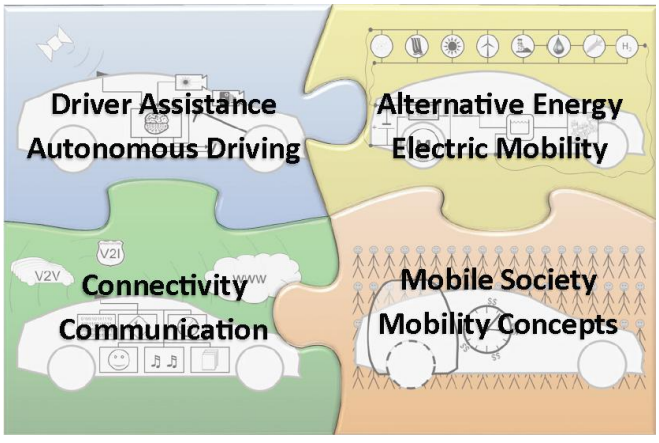

Fig. 1 Solution of Challenges in Individual Mobility [1]

E-mobility

One way of possible solutions listed above is the emergence of e-mobility. Plug-in-hybrids, semi-hybrids, full-electric vehicles, battery technologies

and mobility concepts that impact consumer usage are only a few of the many developments resulting from the emergence of the electric engine. During the course of this evolution the automotive industry will face new technologies, new market participants in a new ecosystem, an uncertain future and the challenge to adapt to new conditions. Looking back, we know that similar change of this significance and complexity has resulted in strong economic growth, but at the same time has led to the disappearance of formerly successful companies.

Key assumptions of demand for individual mobility in the future [2]:

- Basic need for personal mobility will continue to grow.
- Consistent global population growth for at least 30 years.
- Strong economic growth in countries with a large population.
- More automobiles, more traffic, more challenges.

E-mobility primarily involves the use of electric vehicles for different transportation needs and mobility concepts. In the broader sense the term is associated with the shift to a new network. This network consists of established players from the automotive industry and new players (such as e-mobility and IT providers, and battery charging/changing services) that are, in conjunction, shaping the industry with their different products and services (Figure 2).

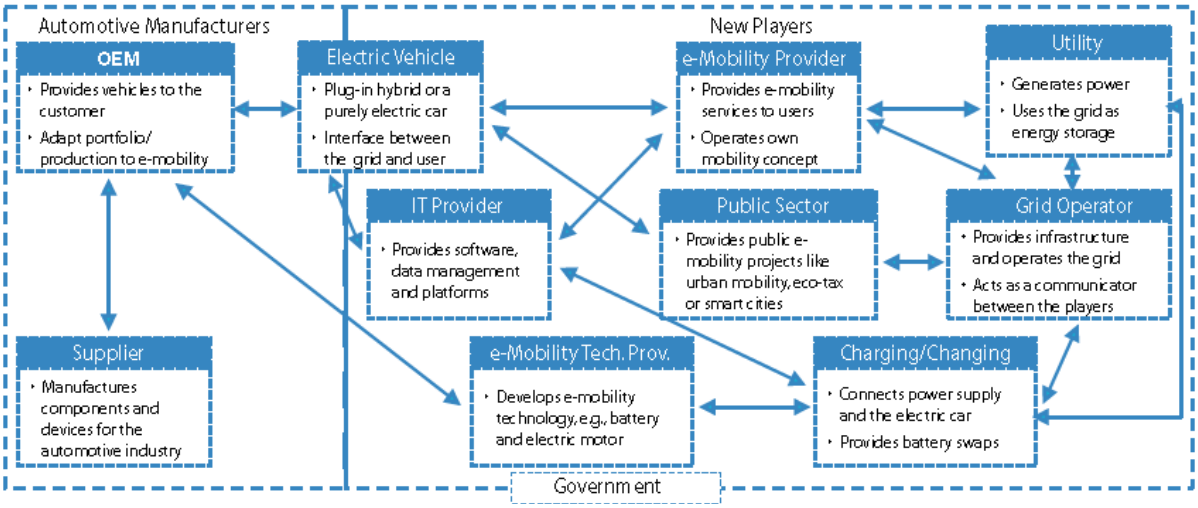

Fig. 2 New E-mobility Eco-system [2]

The Capgemini research [2] makes it clear that e-mobility represents a fundamental technological change for the automotive industry. More than 80% of survey respondents agreed that the future of their industry lies in e-mobility, with the change expected to occur over the coming five to 20 years. This wide time span appears realistic as many technological and market-related questions remain unanswered today. The automotive industry was identified as the most influential driver in the e-mobility network, with 88% of survey respondents indicating that the influence of automotive OEMs would be high or very high, and 76% expecting the influence of automotive Tier 1 suppliers to be high/very high (Figure 3). As a result, recommendations tailored to this industry will be essential to the successful development of e-mobility.

E-mobility will be the most important technological development in the automotive industry in recent years. Automotive companies must recognize that e-mobility will change the entire industry in its most basic aspects and that, sooner or later, they will need to give up their current positions, roles and products. As the technology gradually finds its way into mass production and reaches a state of consumer readiness, automotive companies need to decide which direction they want to pursue and move their company to the e-mobility model. Companies that fail to adapt to the new requirements will

lose their dominant market position and will play only a minor role in the e-mobility network.

These factors, considered as challenges for future development in automotive industry, may pose threats in terms of turbulent changes in business environment. For example, globalisation gives OEMs the chance to expand to new markets, but also increases the threat of new entrants or increased competition in traditional markets. Reputable companies published prognosis and promulgated its results of their scan of business risks for automotive sector in global terms.

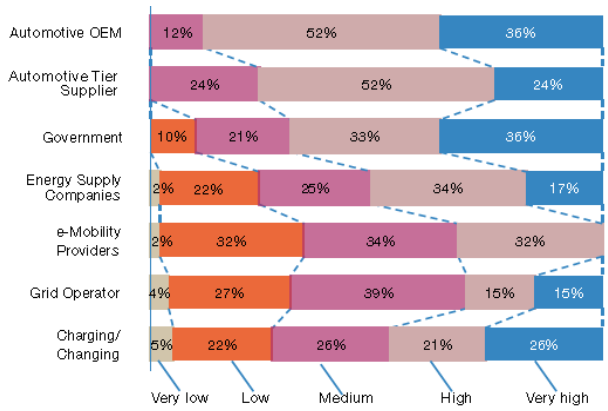

Fig. 3 The influence of different players in the e-mobility network [2]

Considering innovations in automotive technologies, there are two main ways of possible evolution [7] :

1. Vehicle motion and safety – it is relation between safety, comfort and agility. The relationship between vehicle drive management, which represent agility and comfort and active and passive safety.
2. Vehicle drive train – consider problems about alternative fuels and vehicle energy management (Figure 4).

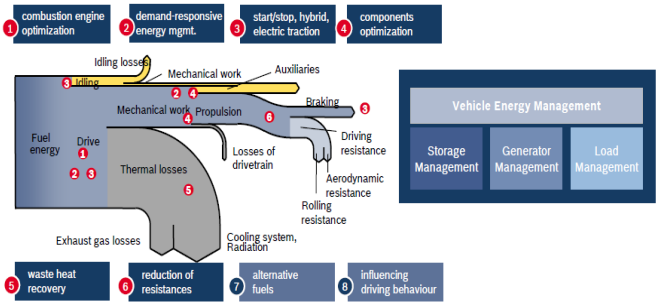

Fig. 4 Vehicle energy management [7]

The market share for new electrically chargeable automobiles will be in the range of 3 to 10% by 2020 to 2025, or between 450,000 and 1,500,000 units, depending on how quickly outstanding hallenges can be addressed [5].

Summary

Electric mobility includes not only cars but also vehicles of many kinds including bikes, scooters, powered-two-wheelers, delivery vans, and collective transport vehicles. However, the purpose of this article is oriented primarily to cars.

The electrification of individual mobility is a key element in making road transport more sustainable, but at this time is more important to improve the environmental performance of conventional vehicles.

According to analyses listed above we can sumarize follow results and expectations:

- Internal combustion engine will dominate at least for the next 20 years. Bio fuels can extend this dominant period significant
- The link between driver assistant systems, communication systems and traditional safety systems brings us close to the autonomous driving.
- New technologies (e.g.battery) need strong collaboration between suppliers and OEM to bundle volume and to reduce the costs.
- EV does not mean only electrical drive train development. It requests know how in new vehicle concepts: light weight, aerodynamic, air conditioning, inteligent energy management and active safety.

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