Will Vehicles Go the Mobile Way?
Merits and Challenges Arising by Car-apps

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Abstract: Currently people are used to share and to get information wherever they are. This new information requirements is for now not sufficiently satisfied when it comes to the mobility and especially car sector due to the currently developments of social media and smartphone applications. Here, due to questions of safety and security, in-car systems are still closed, despite the fact that C2X applications are developed, but not yet on the market. Here challenges for current key players arise because these information gaps could be closed by not authorised parties developing information applications. How and by which extend such "car-apps" might lead to new markets and consumer habits is discussed in this paper.

1 INTRODUCTION

Today information requirements and exchange demands of users are getting more and more complex and detailed. Living in the so called *information age* people, especially the younger ones, are used to the overall existing possibilities of getting and exchanging information. These information patterns are available of every detail in live. Having highest-performance smartphones, mobile information application make us give information about our mood in social networks, show the piano lessons of our children or play in augmented realities games in order to enclose regions of territory on the surface of the earth aiming for the master control (Gannes, 2012). There are also apps that let us match with friend in our capability in growing virtual grass (Grow, 2013). We are used to share, get and exchange information today in every situation.

The important aspect of mobility is also more and more involved in this habit of information exchange, for example by sharing our running routes and time records. For mobility based on public transport, today a lot of information services are also present, showing us the current timetables or change points on our trips.

Coming to an even more emotional aspect of mobility, the private car, it could be expected, that it has built a leading aspect in our networked life, because a car represents more than solely moving from point a to point b. It is still today a symbol of identification: people care for their car, the car manufacturers represent special values. But coming to this aspect of individual traffic, it has to be noticed that our information culture somehow lacks overwhelming information possibilities concerning this item!

In this position paper reasons why the car and the mobility it's making available for every one of us is not a main part of the growing information structure yet shall be discussed. First the closed system of the cars and their up-breaking developments will be shown. Furthermore current developments of networked cars using car-to-car-communication, but also their challenges are eveluated whether this technology might help to fill this gab of communication habits in future. Merits and challenges that have to be dealt with by OEMs and suppliers will be given.

The current and potential of the diagnosis bus will be described. Here intern current conditions of the engines such as trouble information, are already available, but not allowed to use without external authentication. Because the informed car owner today is aware that many information of their own car could be theoretical available, but despite he/she is the owner, they are not allowed to use this information due to security reasons. This state will soon lead to a conflict, which shows itself in currently not yet authorised but developed

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information applications. It shall be discussed further on if and how in future the OEM could find a way to answer the information needs by offering car-apps for the users and also ensure their information security and safety requirements. Apps have been already used in the automotive industry in recent years, but mainly for entertainment services (Harris, 2012). Here it shall be discussed how car-apps could be look like.

In the end three disputatious theses are given, that will show how the future (information) market of the cars of tomorrow could change the business structure of OEM and suppliers.

2 THE CAR: OPENING OF A CLOSED SYSTEM

Today I can have and share information about my cardio training easily using my smartphone. The current status of my bank account or energy consumption of my home flat can also be checked online whenever or whenever I need this very sensitive information. But on my way home the information structure ends as soon as I am opening the door of my car. No messages about my fuel consumption gives me a hint in which way I could adapt my route home to this need; a single flashing light maybe shows me there is a problem with the oil, but giving no further information or enabling me to ask my Facebook friends to trace back this problem.

One of the reasons why for this special item of everyday usage hardly uplinks to the networked life exist is: The car itself and its system are still closed modules. The current cars in their structure are much as they have been now for 50 years: An island of metal, but more and more equipped by electronic devices acquireing information from the outside to the inside towards the car and to its units. But it has not been developed to reverse this information flow up to now.

The existing information applications about the car, its position, speed and route which are available for outside systems are mainly made available using add-in systems, such as navigation devices.

But here the information structure is the same: either the information about the car has to be gathered individually, or by using information coming from the internal electronic systems of the car. No functional network linking the intern sensors to the outside world are present for now. When internal information is available today, the network to the users such as garages, suppliers, etc. is closed and the usage asks for authentication.

But the importance of communication systems in vehicles has grown in the recent years. Beyond pure entertainment applications also embedded applications for e.g. enhanced driving assistance are present, having the aim making the traffic of tomorrow safer and more self-organized. Vehicles of today are more and more changing to receiver and further on possibly to transmitting sensors of traffic information. In (Weyer, 2006) it is described that the number of modules in the car of the future, designed by Bosch, Daimler-Chrysler or Siemens, will increase leading to a growing variety of assistance systems realizing networks with other road participants, but also with traffic control centers or service providers.

The so called car-to-car or Car2X communication shall offer even more opportunities of communications. Vehicles are expected to build vehicle ad-hoc-networks (VANETS) decentralized communication networks for exchanging various information for co-operative services, such as Lane Change Assistants, emergency breaks or traffic light communication. This shall increase the currently limited range of the on-board sensors and their assistance systems leading to a networked and co-operative way of driving. These future aims are changing today the role of the individual vehicles. Because for making these services possible, a lot of vehicle-specific data is needed and the systems in the car are prepared for offering this information

2.1 New Challenges of Security

Opening of the currently closed vehicle systems will lead despite the new opportunities also to new challenges in safety and especially security

Today, the issue of in-car security is proposed as a relevant, but mostly isolated challenge for specific parts of the car. Because of the high complexity of modern automobile, the high risk for the whole automobile networks threated by security attacks is often shown by describing the consequence of single components. Such as (Wen, 2005) , where threats for the security of an in-vehicle sensor network such as the tire pressure monitoring system (TPMS) and the importance of security and privacy implications are described.

Deriving from the field of wireless communication, the C2X communication community, especially the C2C communication consortium's (C2CCC) working group Security has pointed out the secure exchange of data in VANETs as a main task of the cooperative traffic, as for example

described in (Kung, 2007). Nevertheless the activity of the C2CCC concentrates on conceptions and protocol standardizations for the wireless communication standard IEEE 802.11p. More embracing communication structures in order to achieve interoperability with embedded in-car devices or further communication are not in the main focus of science of industry yet.

3 APP-GOES-CAR - POSSIBLE FUTURE INFORMATION APPLICATIONS

Answering the user the demands it can be foreseen that in near future information applications offering various data about the intern conditions of vehicles, especially cars will be offered to the users. Here especially the use of the diagnosis bus plays a specific role.

In modern vehicles an increasing need to connect multiple control units such an electronic engine control and sensors exist. These complex systems and their communication structures via bus systems are making it more and more difficult for the service staff to detect errors. For this purpose, the vehicle has a diagnostic interface, which is the interface between the CAN diagnosis and the individual bus systems in the vehicle. It analyzes the data and presents them to the bus via a corresponding diagnostic connector on the diagnostic bus.

Even though the usage of this bus is only allowed to authorized units, such as the car maintenance staff in garages it can be also used in order to read intern vehicle information for outside services. This can be realized by making the information about the interfaces and controls in the car available to the driver by linking the bus information to a smartphone. Such has been done in (Frie et al., 2013) where as an example the given reasons of warning lamp flashing in the dash panel concerning the oil state have been widened by using an OBD devices with wireless LAN radio interface The additional information and further recommendations for actions have been shown on a smartphone via an specific App.

But despite this shown application, the current information structure concerning intern car data is for now authorised by the OEM due to safety and security reasons.

Here a new developing market for information services could arise for OEM and sub-contractors but is currently hindered by understandable not solved questions concerning warranty and safety reasons, not to mention juristically questions. But nevertheless activities in order to open the information source take place due to arising information demands.

It can be foreseen that in near future special apps will make the very intern data of cars available to the public, this will enhance the linking process of the car modules and will lead to challenging new questions concerning maintenance, safety and security.

The development of using apps in order to control cars and use inside-information has been already been taken place in the area of full electric cars, where an own market is currently developing concerning these niche products where e.g. A Class E-Cell and the Vito E-Cell can already control many functions over apps. (Electric car apps, 2013) It can easily be suggested that having such a development in the area of standard cars will lead to broad changes of the automotive marked. The introduction of Apps in the automotive sector and issues of data and system security have been shown that especially the concern of the car manufacurers are one of the key aspects to deal with in future (Burkert, 2012).

3.1 Car-app Suggestions

In the following some application ideas which could be offered by OEM or suppliers shall show the application area for the use of currently still intern car-information. The usage of the currently available automotive c2c-communication standard IEEE 802.11p will also be taken into account:

- EcoBattle – By using the data about current fuel consumption, route, traffic, weather and environmental conditions the “greenest” routes and driving strategies could be added to driver and car, making “ecological battles” with friends and other cars on the road possible.
- Car-Facebook – Your way of driving! Give your driving a face by delivering messages and evaluations about current driving strategies, fuel consumption of yourself and other driver on-track. Your current driving profile including the evaluations of other traffic participants can lead to a better estimation of everybody’s driving character.
- Let’s drive together! – Share motorways and vehicle platoons the smart way by adding route/destination planning to application of autonomous driving. Why not having a car(d) game on track while your vehicle is choosing the next parking space for a nice coffee break?

These apps show only a few possible ways of driving of the future. Having these in mind it is

possible, that the main benefit of the driving habits will change coming to a more flexible an ecological way of driving. Therefore not the car itself but it's flexibility on future apps will be business model.

Like the iPhones and Android systems has changed the market (Butler, 2011) of mobile phones and habits of device usage and information search in general (Kamvar, 2009) it is possible that the whole transportation market will change, setting new standards of desire and *cool-features* like apple has been realised purchasing the iPhone affecting several domains - financial, technical and cultural. The value of mobile phones and their manufacturers are today dependent of their technological potential using the applications.

To change a quote here, it could be possible, that if the car-app market will meet the user "expectations, it could create a new, unpredictable dynamic in the marketplace" of mobility (Macedonia, 2007).

3.2 Two theses to argue About

Two theses shall be given in order to show how the car of the future could change our everyday live:

- The usage of it's currently intern information will soon overcome the basic use and merit the car we know today, because car-apps will lead to a new image of cars. The value will not be set by the "hardware aspects" of cars anymore, such as PS, equipment or fuel consumption, but by the information services it will be able to offer to the users.
- The usage of the car of the future will not be limited to mobility any more. Being a backend system for many information services the aspect of moving will only be one of many more functions, benefitting and arising from the installed apps.

Following questions has to be answered in order to make such a new market for car-apps possible in future.

- Who will be responsible for the safety and security issues having such apps? Will it be the manufactures, the OEM or the app developers
- Who will be the main user and how can price changes be evaluated? Will it even be possible to have a budget car making high-end car-apps available?
- Who will be the key player?

4 CONCLUSIONS

In this position paper the question has been discussed how in future data from currently closed in-car systems can be made available for further use. Currently questions of warranty, safety and security are holding the networked usage back. Nevertheless first developments can be mentioned, answering the overall information demands of users but disregarding security issues.

If the questions of safety and security are answered a new market of car-apps will arise, being capable of developing an own market. Some examples of such car-apps are given and parallels to the change on the market of mobile phones due to iPhone and Android systems are given. At the end two theses about the future demands of car manufacturers and suppliers towards possible change of the usage of cars in general are given.

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