

EARPA Position Paper

'Urban Mobility - Where the citizen meets the automotive'

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About EARPA

Founded in 2002, EARPA is the association of automotive R&D organisations. It brings together the most prominent independent R&D providers in the automotive sector throughout Europe. At present its membership numbers 51, ranging from large and small commercial organisations to national institutes and universities.

Introduction

The first H2020 initiatives on Urban Mobility are now taking off. The Task Force Urban Mobility recently met key players (DG MOVE, DG RTD, DG CNECT, POLIS, EIP SCC etc.). These discussions show the dynamic developments on urban mobility and the need of the TF to realign with these developments. EARPA's TF Urban Mobility connects technology to the urban environment: understanding the details of the automotive technology under development while at the same time understanding and appreciating the complexity of urban mobility. Urban Mobility is not about technology. It is about the contribution to policy goals to make cities more livable and clean, whilst making travel efficient and create accessibility for its citizens, which allows for economic growth. To realize these goals, which sometimes seem to conflict, innovation is essential and new technological developments can offer integrated solutions.

Key research needs

Concerning the Urban Mobility – Where the citizen meets the automotive, EARPA stresses the importance of further research and development on the following elements:

1. To properly make the necessary decisions for keeping cities accessible whilst facilitating population growth but also reducing externalities, focusing on creating tooling allowing informed decisions for policy makers.
2. To create a seamless travel experience for citizens understanding travel behaviour is key, because this allows for effective use of innovative technologies (e.g. ICT, automation) and development of policy measures (e.g. pricing, car sharing, etc.)
3. Redesign and/or development of the existing transport system is necessary to implement innovative solutions (e.g. automated vehicles) whilst improving existing safety levels.

Expected impacts

The world for urban mobility is changing rapidly, not only will ICT most likely have a disruptive impact on the way mobility is experienced, mobility patterns and ownership models as well as vehicles will undergo changes that currently cannot fully be foreseen. EARPA is here for undeniable impacts of these developments, better understand of the related uncertainties and identify the potential that these new developments will bring. But EARPA not only scrutinizes these solutions but also develops them in cooperation with industry and public authorities.

Urban mobility key characteristics

The urban environment is a highly developed, highly utilised environment. Urban mobility therefore has complex characteristics, which require innovative solutions to solve the existing problems. Especially when the urban mobility characteristics are taken into account:

- Growth of Urban population is expected to be 84% in 2050 the growth of urban mobility cannot grow in similar speed due to already experienced externalities;

- Classical trips are changing – not only are trips becoming more multimodal, but also more criss-cross trips compared to classical home – work – home, this requires better understanding of travelling behaviour but also improving connections between modes;
- The speed of development regarding innovation is picking up, especially due to integration with ICT, however physical infrastructure is built and used with long-term perspective, to allow innovations to flourish adaptive and hybrid solutions are necessary to accommodate aforementioned growth in a sustainable way, and policy decisions have a long term effect;
- Complexity of urban mobility also is due to interaction between the different transport modes e.g. active modes (bicycling, cycling) or public transport, which is another factor into the complexity equation.

Research rationale

The following areas of interest EARPA works on, will contribute to a smarter, more sustainable environment in which citizens can more easily move around and in which mobility is facilitated when necessary:

- Clean engines and electrification for reduction of externalities, including policy measures for stimulation but also technological developments;
- Automation as an enabler (or innovation) that could facilitate population growth, however full-scale implementation poses a series of research questions;
- The impact of ICT on travelling in urban environment, including development of solutions for e.g. multimodality & travel information
- New transportation system for the urban environment

EARPA topics

Clean engines and electrification & Urban Mobility

Electrification and clean engines in road transport have the potential to support the zero-emission mobility in urban areas. The focus for TF Urban Mobility is on the identification of solutions for limited driving range for Electric Vehicles (EVs) as well as solving issues for alternatively fueled vehicles such as storage, production and durability. These solutions need to contribute to the deployment of aforementioned vehicles allowing for the 'right' vehicle for the right purpose with zero-emissions in mind. Three research topics are defined in more detail to allow for the deployment of these vehicles:

1. **Vehicles, components and costs:** one of the most important research needs would be extending the limited capacity and reducing the high costs of battery systems.
2. **Infrastructure integration:** in this context, research efforts should be directed to solve a lack of interoperability in existing infrastructure and services related to electromobility, such as infrastructure. Moreover, attention should be paid to develop new generations of charging infrastructure (e.g. automated charging for self-driving cars) and its integration to the grid.
3. **Innovative business models:** in order to remove short term barriers for adoption clean engines research on economic scenarios and new mobility business models is needed.

Within this multi-factor environment, EARPA UM TF members will provide research expertise related to organisational, behavioural, socio-economic and environmental effects of electrification and clean engines in urban mobility.

Automation & Urban Mobility

Vehicle automation is expected to have a large impact on mobility as a whole. Due to the complex nature of the urban environment role-out of automation within the transport system is expected to be complex and in need of a variety of research needs. The focus from EARPA is on deployment of

such systems in a safe and sustainable manner. At this moment automation is possible within closed environments (subways, closed tracks, etc.). Pilots are currently running in semi-open environments, which provide dedicated requirements from the automated vehicle perspective. Key areas of research that are foreseen within the taskforce Urban Mobility are:

- How to safely integrate automated vehicles within the urban environment, especially focusing on the interaction with active modes of transport (such as pedestrians & cyclists) as well as the related ICT infrastructure;
- Identification of durable deployment of different solutions for automated vehicles in the urban environment, especially looking into ownership, business models and integration with public transport;
- As part of the durable deployment it is essential to be able to properly assess the expected impacts of these developed solutions, which requires understanding of human behaviour as well as the socio-economic context for automated vehicles.

ICT & Urban Mobility

ICT is seen as one of the key enabling technology that will bring a number of services leading to the Urban Mobility of the future. Key areas of research on ICT for mobility cover different technologies, from positioning, testing, safety, etc. and other highly relevant topics such as Big Data, security, etc. that lay behind the current planning horizons. A transition period will be required to bring all the technologies to the application level and merge them with the aim of offering the required service level and hence impact.

From an Urban Mobility perspective, especially the complexity of the complete urban system requires a number of key topics to be focused upon:

- Seamless mobility: the user will need to move from one point to another. On the way, different transport modes can be employed. It is key for the user to switch from one mode to another in an easy and efficient manner. A number of technologies will be required for this, among them positioning and data communication.
- System deployment: it will be key to accelerate the deployment of the new systems and mobility strategies. For that standardized laboratory testing platforms and simulators will be required in order to better understand impacts of these systems. Within this testing understanding human behavior is essential to filter and select the appropriate ICT technologies that will have the best impact on urban mobility.
- Communication: together with the evolution of the communication technologies (4G and 5G), the ability to transfer a higher amount of data will be reached. This will help to have a number of new services for the user (infrastructure information, travel information, etc.) and for the infrastructure manager (remote high quality video surveillance, etc.). This brings together the need of a high amount data management (Big Data) and further improvements on data protection and privacy (security).

EARPA focusses on how these developments can be incorporated in automotive systems and the running development processes, and how these developments can support the citizen towards a smooth urban transportation system. New organizational structures are necessary to cover these developments and last but not least, the citizen and its behavior needs to be kept in mind to let both profitable and sustainable business models prevail.

New transport system & Urban Mobility

As explained above the existing transportation system within the urban environment is built with classical modes of transport in mind. To better facilitate the innovative solutions that are under development as well as make use of the development speed of ICT a redesign or development of the transport system is deemed necessary. This new transportation system especially should take into account the following new developments, which are key areas of interest for EARPA:

- 1) Sharification – where a vehicle is used by multiple users, thus optimising and making its use more efficient. Automation of vehicles is a key technological driver behind this development, to simplify the access to the vehicle but it requires more and more detail. In essence it shows the uncoupling of vehicle ownership and usage, which in turn allow for different business models to be exploited. For citizens this could result in more efficient and cheaper urban transport, but it has a number of requirements. These requirements and how to overcome the challenges that lay ahead are part of EARPA's Urban Mobility Taskforce research topics.
- 2) New (hybrid) modes – the classical division between car, public transport and active modes is changing. Not only because of the introduction of electrical bicycles (where some can reach up to 50 km/h) but also the differentiation between vehicles and their infrastructure to more fluently allow throughput in cities to be realized. These modes all have their respective requirements that if met, can facilitate sustainable future urban mobility.
- 3) Multimodality and seamless travel – the development of Mobility as a Service (MaaS) creates new opportunities, multiple modes will be used in different timeframes by a different set of users. This will increase the resilience of the transportation system due to increased flexibility, however it also becomes more prone to instability because of this flexibility creating uncertainty in prediction. Within this seamless travel it is key to understand the different social groups (e.g. digital natives) that use the transportation system to allow equal access for all groups while redesigning and developing.

For the three aspects it can be seen that not only vehicles will evolve, but also the soft aspects like business models and how to connect and attract users for the respective modes is key to understand. As can be seen here also human behavior is key to understand needs and requirements. Next to the behavior of citizens, the necessary infrastructure is another relevant topic to bridge the gap between stakeholders. EARPA Task Force Urban Mobility aims to bring stakeholders together in order to overcome the challenges identified.

Relation to other roadmaps

Within the ERTRAC working group on Urban Mobility a number of these topics have been shared and discussed. Furthermore discussion with key stakeholders will be continued.

Closing remarks

The field of Urban Mobility is on the verge of a system change, due to the availability of new transport modes but also the impact that ICT (in all its forms) has on the citizens urban travelling. This asks for more prudent and better understanding of the travellers behaviour, needed to better facilitate and arrange for a more efficient transport of citizens using the newly available technologies. Within these areas it is key to keep the societal context in mind, simply because we all want to live in a healthy and quiet environment. Technology could offer that to us, but we need to make the right decisions in order to make this happen. EARPA's taskforce for Urban Mobility focuses exactly on finding this balance keeping in mind both sides of the same coin.

For further information, please contact our taskforce leadership for Urban Mobility:

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