IMSOMOT:
Impact of mobile and social network applications on mobility and transport
Editorial

COLLA 2016 IARIA Conference

Thomas Schuster
Pforzheim University of Applied Sciences
Pforzheim, Germany
E-Mail: thomas.schuster@hs-pforzheim.de

Abstract— **Individual mobility is often both necessity as well as expression of independence and autonomy. Within the last decades individual mobility and logistics more and more relied on cars. While costs associated to cars and trucks decreased, traffic congestion and pollution increased. Nowadays especially metropolitan areas suffer from crowded streets and air pollution, while people experience loss of time and are exposed to health risks. These issues have grown and a lot of research has been conducted to tackle them. Within the last decade known-approaches, such as routing algorithms, have been transformed and adopted to be used online and on individual level. Furthermore, with rise of internet technologies a lot of new mobility services have been offered. This includes other modes of transport and introduces changes in people's behavior. While the service market is experiencing huge growth, it is still in question, if these changes and services can also help to reduce congestion and pollution of the overall traffic network.**

Keywords - Mobility; routing algorithms; traffic optimization; intermodal mobility; mobility services,

I. INTRODUCTION

Society and its mobility is significantly being challenged by traffic congestion and pollution. Especially, large and growing metropolitan areas suffer from these issues. Particularly in the context of health issues and climate change, it is increasingly being discussed how to solve these issues. Transportation is one contributor which significantly influences the overall state of air quality by its air pollutant emissions. Besides carbon dioxide, the emission of fine particles is a major issue in metropolitan areas. And from an economic perspective many hours are being wasted because of traffic congestion and result in a massive loss of productivity.

At European level, the European Union (EU) establishes several legislation acts to improve air quality. One strategy to reduce pollution is given by emission regulations for vehicles. Similar regulations are being made globally and force manufacturers to produce improved combustion engines and alternative powertrains (e.g. electric, hydrogen or hybrid). While alternative powertrains can reduce pollution, they are not capable to reduce congestion. Despite some successes, air pollution still remains the number one environmental cause of death in the EU. Approximately about 400.000 deaths each year are being caused by air pollution (such as elevated levels of fine particles and ozone) [1]–[3]. Therefore, the EU has established several advanced means within the so-called "Clean Air Policy Package" to reduce emissions of air pollutants until 2030. Especially directive 2008/50/EC of the European Parliament [4] is meant to reduce air pollution in metropolitan areas. It regulates that air quality plans must be introduced to correct conditions, if pollution levels are higher than the thresholds. In future penalties are being associated if pollution levels are not being controlled successfully. This includes that the EU enforces its member states and their cities to implement short-term action plans to reduce road traffic, construction works or other activities (e.g. industrial production).

Besides social interests, economic loss and threatening penalties create the basis for new strategies to tackle these issues. Hence, recent developments in public and private traffic management strategies seem to promise mitigation. Several different approaches allow to tackle the previously mentioned challenges:

- Infrastructure for alternative modes of transport
- Alternative powertrains
- Intelligent intermodal routing
- New Mobility services

All of these approaches are being discussed and are utilized, often in combination with each other. While within last decades a lot of research has been done to create accurate models for efficient traffic estimation, control and routing [5]. Nowadays advanced information systems (including smartphones as well as embedded devices in vehicles and road infrastructure) build an environment to influence traffic flow in an ad-hoc manner. These information systems are also advocated as connected driving, connected car or car2X communication. With increasingly intermodal mobility offers it is actually more than just car centered systems. From a traffic control perspective, there is need for comprehensive analysis of future developments in these systems, people's behavior and how these developments might be used to reduce pollution and congestion.

II. Opportunity: Mobility Services

Mobile business, social networks and sharing economy are driving an unexpected amount of new developments in the field of mobility services. Examples of such services are numerous, e.g. sharing services for bikes, e-bikes, scooters or cars (such as smoove, nextbike, YUGO, car2go, DriveNow or stadtmobil), on-demand mobility providers (such as Uber, flinc, Wundercar or mytaxi), urban delivery services (such as cargomatic, lieferando, Sidecar or Postmates), parking services (such as Barking, SpotHero, Parker, AirportParkingReservations or ParkingPanda) and intermodal mobility platforms (e.g. offered by google, Bing, here or Qixxit) promise a vast variety of modal and logistic options to the user. So far it seems questionable, to which extend these services can contribute to an overall sustainable, intermodal passenger transport and logistics network.

Looking at the services currently offered to support and enhance mobility it can be observed that several distinct service types are present. Amongst all services two top level categories of services can be identified, those offered for cargo transport (logistics) and those offered to people (individual mobility). An examination of currently offered services can further sub-divide these categories into the following six categories:

1. Services for transport planning
2. Services for transport routing
3. Services for transport sharing
4. Services for mobility planning
5. Services for mobility routing
6. Services for intermodal mobility
7. Services for mobility sharing

All of these services seek to optimize certain aspects of transport, of course they differ in optimization criteria. Costs are probably the most common criterion which is somehow included in all services offers. For logistics time might be the second most important criterion. For individual mobility another important aspect are individual preferences [6], those can, for instance, be mode of transport or comfort.

Successful implementation and application of the services depends on several aspects. In case of services offered to individuals, user behavior, especially user preferences and user acceptance (e.g. altered mobility based on socialization and technological change) is important. Typically, users tend to adopt services that reflect their preferences and meet their level of comfort. Many of these services, particularly those which deal with intermodal mobility and sharing depend on integration and interaction to other services (e.g. combined public transport and individual mobility services). Further properties which can influence user behavior is quality of data. For many services, also those which deal with logistics planning, real-time information and monitoring of other mobility services (e.g. pre-trip and on-trip planning and dynamic re-routing) precise and current data is key to success.

With these opportunities in mind evaluation and simulation of intermodal transport under influence of new mobility services (e.g. analysis of changes driven by information availability and intermodal booking systems) as well as network evaluation (e.g. usage and adoption rates, cost-benefits analysis, environmental and traffic impact) are major research topics in order to evaluate the impact of the aforementioned services types. Can they actually tackle the issues of metropolitan areas or do they only support optimized result on individual level (people, company)?

The purpose of this session is to examine: what has been accomplished so far, which obstacles still have to be tackled, how users adopt these services (including behavioral changes), and also to stimulate interest in further research of mobility services.

References

[1] ‘Air pollution — European Environment Agency’. [Online]. Available: http://www.eea.europa.eu/themes/air/intro. [Accessed: 02-Oct-2016].

[2] N. Künzli, R. Kaiser, S. Medina, M. Studnicka, O. Chanel, P. Filliger, M. Herry, F. Horak, V. Puybonnieux-Texier, and P. Quénel, ‘Public-health impact of outdoor and traffic-related air pollution: a European assessment’, *The Lancet*, vol. 356, no. 9232, pp. 795–801, 2000.

[3] K. Zhang and S. Batterman, ‘Air pollution and health risks due to vehicle traffic’, *Sci. Total Environ.*, vol. 450–451, pp. 307–316, Apr. 2013.

[4] ‘Cleaner air for Europe - Directive 2008/50/EC’, 2008. [Online]. Available: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=cellar:c9520199-e5aa-4a5b-a410-10d0474433e0. [Accessed: 29-Sep-2016].

[5] V. R. Vuchic, *Urban transit: operations, planning, and economics*. 2005.

[6] J. L. Adler and V. J. Blue, ‘Toward the design of intelligent traveler information systems’, *Transp. Res. Part C Emerg. Technol.*, vol. 6, no. 3, pp. 157–172, Jun. 1998.