Paper number ITS-2000

Stakeholder Thoughts on Future Urban ITS Applications

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Abstract

In this paper, we report the results of our efforts to better understand the current state of the field of urban ITS. ITS solutions for urban areas are interesting because on the one hand urban ITS has recently gained more and more attention from research, development, and deployment communities, and on the other hand because the ecosystem in urban areas is more challenging. A large number of diverse stakeholders need to be taken into consideration. In an attempt to gain insight into current developments, we have brought together thirteen relevant Austrian ITS stakeholders and experts for a workshop on the future of urban ITS. The summarized results of this workshop are reported in this paper. Furthermore, we have carried out interviews with five frequent drivers, with the goal of assessing the views of the end-users of ITS systems. The knowledge gained from these interviews is also reported in this paper.

Keywords:

Urban ITS, Stakeholders

1. Introduction

Intelligent Transportation Systems (ITS) with a focus on urban areas are receiving an increasing amount of attention from the research and development community. For example, the European Commission created an expert group addressing this issue in 2010 [1]. One important difference when considering urban areas in contrast to, e.g., motorways, is the larger number of involved stakeholders. In addition to drivers, vehicle manufacturers and road operators, stakeholders that are particularly relevant for densely populated areas need to be considered, such as public transport operators, municipalities, cellular network operators and parking lots. Furthermore, the number of active ITS service providers can be expected to increase with population density.

Technological developments such as the IEEE 802.11p [2] and ITS-G5 [3, 4] standards for vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication have been under research focus for some time (e.g., [5, 6]) and are mature enough to be rolled out to real-world applications. For example, the project "European Corridor – Austrian Testbed for Cooperative Systems" (ECo-AT) aims at specification and deployment of cooperative ITS systems for real-world applications [7]. However, in a field like ITS, technological advance alone is not sufficient to bring innovation into society, because the situation is more complex than starting to sell a new innovative product in stores, for example. Rather, deploying ITS applications (especially in urban environments) involves several entities from quite different fields, like communications infrastructure producers, road operators, municipalities, public transport operators, ITS service providers, regulatory authorities etc.

In order to get a clearer understanding of who the relevant stakeholders are and how they see the current status of urban ITS as well as their own role and the role of each other in the future of urban ITS, we have conducted a discussion workshop with relevant Austrian ITS stakeholders and one-on-one interviews with five frequent drivers representing the stakeholder of the end-users. This paper summarizes our findings.

The remainder of this paper is organized as follows. Section 2 summarizes the discussions around several questions from the stakeholder workshop. In Section 3, the information collected during the driver interviews is summarized. Finally, in Section 4 we draw some conclusions.

2. Views Emerging from the Stakeholder Discussion Workshop

In a half-day guided discussion workshop, thirteen participants engaged in answering a number of predefined questions. The diverse group of stakeholders included experts from the fields of communications technology manufacturing (V2V, V2I), ITS regulatory affairs, automobile clubs, traffic management systems, general ITS solutions, ITS focusing on railways, ITS consulting, and scientific ITS research, as well as heavy users of urban multimodal mobility services. In the following, answers emerging from the discussion for each of the seven addressed questions are summarized.

2.1. Why does the development and deployment of ITS services in urban areas lag behind, in comparison to motorways?

Several participants argued that this is not actually the case, as some services have been in use for quite some time in developed cities, which fall under a modern definition of urban ITS, but are not typically associated with this term. One example is traffic signal preemption for

emergency vehicles and public transport, a concept that is in widespread use since the 1970s [8, 9]. Nevertheless, a shift of focus of the ITS research and development community from motorways to urban areas can be observed. Deployment of ITS services for motorways did progress more rapidly, due to the smaller number of involved stakeholders and due to the lower complexity of the environment (technically, geographically but also from a regulatory point of view).

2.2. Which of the following application fields will contribute strongly to the propagation of urban ITS: multimodal travel, electromobility, traffic management, applications increasing driving comfort, extensions of existing business models?

Traffic management applications will play an important role for reaching political goals regarding traffic and transportation, according to the workshop participants. Some applications, especially safety-related ones, lack a clear business model and are therefore more relevant for public authorities and politics, who may also shape the regulatory conditions. By their nature, such entities have a larger interest in social economics than profit-oriented businesses. Other applications do have relevant business cases, and are therefore likely to be deployed and extended by businesses. For example, car sharing applications, which are also particularly relevant for urban areas. Driving comfort was seen as more relevant for vehicle manufacturers rather than ITS service providers.

2.3. Will personally owned vehicles decline in urban areas?

The workshop participants do indeed see such a trend, where the role of the automobile as a status symbol is weakened and a more pragmatic view as one means of transportation in the spectrum of multimodal mobility becomes increasingly widespread. Even automobile clubs actively pursue a shift towards becoming "mobility clubs". With a growing choice of multimodal mobility alternatives at competitive prices, especially young people in highly developed cities tend to refrain from investing in an own vehicle. However, even if such tendencies can be identified, this does not mean that personally owned vehicles are expected to disappear entirely in the near future.

2.4. Which stakeholders will participate most in vehicular urban ITS as a business and how?

In addition to (existing and new) businesses that specifically act as ITS service operators, some workshop participants identified cellular network operators as important players for urban ITS, via mobile payment solutions, by playing a role in localization and as Internet access providers for mobile devices. On the other hand, manufacturing and maintenance of dedicated ITS network technology (V2I via 802.11p/ITS-G5, etc.) will become increasingly

profitable with growing prevalence of such infrastructure. Vehicle manufacturers are foreseen to also play an important role, although they face particular challenges: there is a mismatch between the long product life cycles of vehicles on the one hand and rapid advances of software development on the other hand. Furthermore, they may potentially get access to large amounts of traffic-related data, but developing business models on top of these data deviates quite strongly from the core business of vehicle manufacturers (i.e., selling vehicles). It will be interesting to see which role large software and Internet corporations will play. However, for now the workshop participants consider the data quality achieved by their services to be insufficient for urban ITS applications.

2.5. What are important problems or barriers for urban ITS deployment?

According to the workshop participants, finding profitable business models in urban ITS is an important challenge, partly due to the prerequisite of large infrastructure investments. This may be alleviated if political decisions to make these investments are made with the goal of improving traffic safety, such that the resulting infrastructure may then also be used for additional, profit-oriented use cases. Furthermore, the large number of stakeholders involved in urban ITS is seen as a challenge. Many potentially interesting urban ITS use cases would require dialog and collaboration across multiple organizations, which is not taking place to a sufficient degree at the moment.

2.6. What is the role of open data for urban ITS applications?

The availability of open data is regarded to be very stimulating for the appearance of new services. However, it is an open question how data-collecting entities can be motivated to provide high-quality data via open interfaces. Most workshop participants agreed that there is a need for regulatory initiatives towards legal obligation to provide open data. On the other hand, there is a risk of restraining innovation by over-regulation.

2.7. How should data privacy be addressed in the field of urban ITS?

According to the workshop participants, many urban ITS use cases can be realized only if a certain amount of data from drivers, vehicles and traffic are available, and hence maximal data privacy is difficult to maintain. However, even though privacy is in principle an important concern for many people, they are in practice often more liberal in this regard when offered a concrete service with a clear benefit that utilizes their data. Of course user data need to be treated responsively and data privacy and also data security must be taken seriously.

2.8. General Topics Emerging from the Discussion

During the discussion of the above questions in the stakeholder workshop, a few topics were mentioned repeatedly and thus may be regarded as generally relevant aspects for urban ITS. It was mentioned for many of the questions that conclusive answers cannot be given for all urban areas in general, because of important differences between cities with regard to aspects like size and density, the degree of infrastructural development, the political and regulatory situation, factors of culture and society, and many more. For instance, more complex administrative structures in democratic societies might actually slow down the establishment of novel ITS applications. On the other hand, authoritarian systems bear a higher risk of corruption in administration, which may negatively affect the meaningful implementation of some urban ITS applications. As another example, the environmental awareness and also the sensitivity towards data privacy found in the general population can be expected to deviate strongly between different parts of the world.

Furthermore, many workshop participants shared the view that technical aspects of ITS like communications have already been researched quite well, and that the next challenge would be to actually implement such novel technologies in real-world applications. They also saw a considerable need for research in the areas of user-centric ITS, security, safety, and privacy, as well as in aggregation, processing and integration of ITS-related data.

Finally, it was repeatedly mentioned that the needs and expectations of the end-users in urban areas are changing in several respects. With a broadening spectrum of mobility options, the users will choose with higher flexibility between different offers and modes of transport. They will increasingly look at mobility as a service, and they will expect inter-connectedness and (sensible) data exchange between service providers of different sectors. Therefore, dialog and cooperation between different stakeholders need to be intensified.

3. Views Emerging from the Driver Interviews

In order to also cover the important stakeholder group of the drivers, i.e., the end-users of most urban ITS applications, we have interviewed five people who drive at least 8000 km per year in and around the city of Vienna (2 females and 3 males, aged between 23 and 54). In the following, several statements are reported for which there was high agreement between the five subjects. These are therefore considered to be more than simply individual opinions.

There was general agreement that the number of total passenger cars and especially the number of personally owned vehicles is expected to decrease significantly in urban areas in the future. Rising vehicle maintenance costs and improving alternative mobility services at

dropping prices will cause more and more people to use ITS-based multimodal transportation services (public transport, park-and-ride services, car sharing etc.), rather than driving their own vehicles.

All five persons reported to use Information and Communications Technology (ICT) devices in their daily lives (smartphones, tablets, personal computers). However, in the car this is limited to navigation systems (dedicated navigation devices or navigation functionality on smartphones). Several of them expressed concerns regarding distraction when using ICT devices while driving. We also asked them to give their opinion whether or not they consider a number of typical ICT use cases to be distracting from driving. Figure 1 shows the results, where it can be seen that only quite passive activities involving ICT technology are generally considered not to be distracting while driving. These intuitions of the interviewees are generally in line with empirical investigations in this field (e.g., [10, 11]).

Furthermore, all drivers were quite sceptical about partly and fully autonomous vehicles; they do not expect these technologies to become mainstream and would not want to use such systems in the near future. On a larger horizon of 25 years, however, some see the widespread use of autonomous vehicles as a key change they anticipate.

When asked about data privacy and security in the context of driving and ITS services, most of our interviewees stated that they did not consider these topics to be of high relevance now, but all agreed that they will be very important in the future.

4. Conclusions

In this paper, we have reported the results of our initiatives for better understanding the current state of urban ITS developments. A discussion workshop with relevant stakeholders from a variety of fields was held, and several frequent drivers were interviewed. The results of these two undertakings were summarized in the preceding two sections.

One important finding, which emerged from both the stakeholder workshop as well as from the driver interviews, is that a shift is taking place in urban areas from personally owned vehicles to mobility as a service spanning a spectrum of transport modalities. To facilitate this shift, the required technological infrastructure and corresponding ITS applications need to be developed, but for deployment also cooperation between different stakeholders, and initiatives to adapt the regulatory situation need to be intensified.

The challenge of bringing together the many stakeholders involved in development and deployment of ITS applications in cities needs to be addressed. It may however be impossible

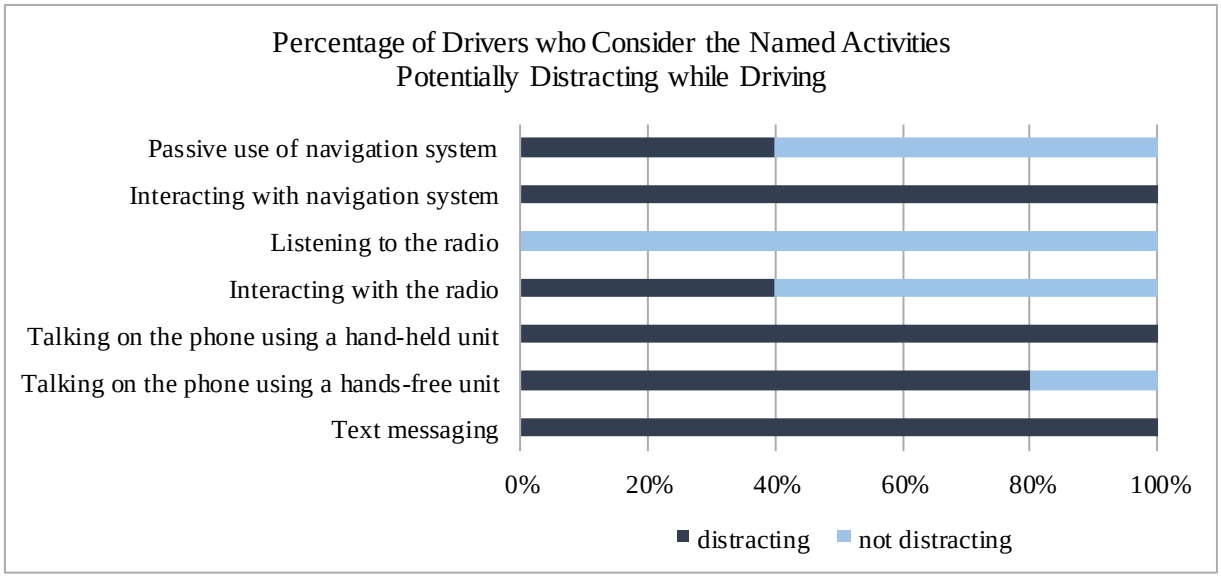

Figure 1 – Distracting ICT activities according to the interviewed drivers

to find a general solution to this challenge that can be applied everywhere; urban areas across the world exhibit vast differences in aspects that are highly relevant for rolling out ITS solutions.

Changing needs and expectations of the users need to be understood and considered, to develop new attractive services while maintaining driving safety as well as data privacy and security.

Acknowledgments

This work was performed in the FTW project Future ITS, a scientific cooperation co-funded by Kapsch TrafficCom AG, wengermayer business consulting e.u. and Vienna University of Technology. The Austrian Competence Center "FTW Forschungszentrum Telekommunikation Wien GmbH" is funded within the program COMET - Competence Centers for Excellent Technologies by BMVIT, BMWFJ, and the City of Vienna. The COMET program is managed by the FFG.

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